Volume 9, Number 4, (Cumulative No.31) Part 23 December 25, 2012 ISSN:1097-8135

Life Science Journal

Marsland Press

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Website:
http://www.sciencepub.net

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Life Science Journal 2012 Volume 9, Number 4, Part 23 ISSN:1097-8135

Volume 9, Number 4, Part 23 December 25, 2012 ISSN:1097-8135

Life Science Journal

ISSN 1097-8135

9 771097 813002

MARSLAND PRESS
Multidisciplinary Academic Journal Publisher

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http://www.lifesciencesite.com
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ISSN: 1097-8135

Life Science Journal

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Study of ERYTHROPOEITIN Effect ON IgM serum levels IN HCV positive patients on regular HD

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Abstract: Background: Both uremia and HD process cause immunosuppression in HD patients. There was significant increase of total serum IgG and IgM levels found in patients with chronic HCV compared with healthy controls. There is evidence pointing to direct effect of rHuEPO upon B cells. High doses of rHu EPO enhanced in vitro Ig production and proliferation of various plasma cell lines, as well as human plasma cells generated in vitro. Patients and methods: Study was conducted at hemodialysis Unit of Shubra Municipal hospital between August 2010 to February 2011. 30 HCV positive patients on regular hemodialysis were included in study, using bicarbonate dialysate and polysulfone membrane dialyser, for 4 hours 3 times weekly. Patients were divided into 2 groups: first group: 15 patients on EPO therapy. 4000 IU/week and second group not taking EPO ,for all patients full clinical examination was done, CBC, BUN, serum creatinine, ALT, AST, serum albumin and serum IgM by ELISA (quantitative assay), were done. Results: There was no significant difference between 2 groups as regards age, sex distribution, WBC count, ALT, AST, serum creatinine, BUN and IgM serum level. First group had borderline significant higher Hgb and Hct than second group ($p = 0.056$). Females didn't have higher serum IgM level than males ($p = 0.403$). All correlations of IgM serum level to other parameters of study were irrelevant. Conclusion: Uremia seems to protect ESRD patients on regular HD from complications of HCV and also EPO effect on Ig serum levels.

[Khaled Abo Seif, Mona Hosny and Ahmed Aboud. **Study of ERYTHROPOEITIN Effect ON IgM serum levels IN HCV positive patients on regular HD.** *Life Sci J* 2012;9(4):3386-3393]. (ISSN: 1097-8135).
http://www.lifesciencesite.com. 502

Keywords: Erythropoeitin – IgM- HCV- Hemodialysis

1. Introduction

Uremia is associated with a state of immune dysfunction characterized by immunodepression that leads to high prevalence of infections as well as by immune activation resulting in inflammation (kiechl *et al.* , 2002)

Improper immunological parameters of both humoral and cellular immunity in CKD patients seem to be deepened by hemodialysis (HD) process (Liwosca *et al.* , 2011b). Patients with renal disease have been at increased risk of acquiring HCV because of prolonged vascular access as well as the potential for exposure to infected patients and contaminated equipment (Fabrizi *et al.* , 2007).

Several studies have provided experimental evidence of disorders of both cellular and humoral immunity in chronic hepatitis C patients (Lotfy *et al.* , 2006).

HCV infection is strongly associated with mixed cryoglobulinemia (MC), a benign disorder characterized by the proliferation of B lymphocytes producing polyclonal IgG or monoclonal IgM with rheumatoid factor (RF) activity that characteristically may precipitate at low temperatures (Fazi *et al.,* 2010).

Besides B-cell activation (non-antigen-specific and antigen-specific), HCV seems to infect B lymphocytes directly (Bokle and Sepp , 2010).

Correction of anemia and maintenance of stable hemoglobin levels using erythropoesis stimulating agents (ESA) is an important aspect of ESRD management (Kalantar-Zadeh and Aronoff, 2009).

Epo therapy leads to improved humoral immune response, either directly or via T-cells help (Prutchi-Sagiv *et al.* , 2005). Epo treatment was associated with enhanced lymphocyte activity of both T-and B-cells (Lifshitz *et al.* , 2010).

Erythropoietin-receptor (EPO-R) presence on all populations of immune cells implies that EPO/rhEPO can influence lymphocytes, monocyte san granulocytes directly and somehow modulate their immunological responses(Liwoska *et al.* , 2011 a).

High doses of rHu EPO enhanced *in vitro* immunolglobulin production of various plasma cell lines, as well as human plasma cell generated *in vitro* (Prutchi-Sagiv *et al.* , 2005).

The uremic patient on regular hemodialysis (HD) is subjected to a wide range of immune modulators including the uremic sate per se, multiple transfusions and exposure to bio incompatible materials and endotoxins. Erythropoietin (EPO) therapy may raise concern about its potential

influence on this complex Scenario(William *et al.* , 1998).

Aim of the Work

Is to determine the effect of erythropoietin on IgM level in ESRD patients infected with HCV on regular hemodialysis as IgM is one of the markers of cryoglobulinemia.

2. Patients and Methods

This study was conducted at hemodialysis unit of Shubra Munieipal Hospital between august 2010 to February 2011. It was conducted on 30 ESRD hepatitis C positive patients on regular hemodialysis with bicarbonate dialysate and polysulfone membrane dialyser, three times per week. All patients had chronic hepatitis C infection for less than 10 years with liver enzymes less than two fold increase above normal (specially ALT) and last blood transfusion more than 30 days ago.

These patients were divided into 2 groups

First group: Includes 15 ESRD hepatitis C positive patients on regular HD and on erythropoietin therapy. Patients of this group were administered erythropoietin dose of 4000 IU/week.

Second group: Includes 15 ESRD hepatitis C positive patients on regular HD and not on erythropoietin therapy.

We excluded from the study patients with history of DM, autoimmune and allergic diseases.

Patients with hepatitis β virus confection, dialysis vascular access infection, history of paraproteinemia, systemic vasculitis, acute hepatitis liver cell failure or chronic infections other than HCV and chronic inflammatory diseases were excluded from the study.

All patients were subjected to full history and complete physical examination, complete blood count, blood urea nitrogen, serum creatinine, liver enzymes (AST and ALT), serum albumin, and serum IgM by ELISA (quantitative assay).

Methods

1- Creatinine

This assay is a kinetic method (Yatzidis , 1974).

Assay principle

Creatinine in alkaline solutions react with picrate to form a colored complex. The rate of complex formation is measured photometrically at 492 nm.

Calculations

A2-A2: A(specimen)-A (standard)

* Concentration of creatinine in serum or plasma

$$(\text{mg/dL}) = \frac{A\,Speacimen}{A\,s\tan dard} X 2$$

2- Urea

This procedure is enzymatic-spectro-photometric (Tabacco *et al.* , 1979).

Assay principle

Urea in the sample originates by means of the coupled reactions described below, a colored complex that can be measured by spectrophotometry:

$$\text{urea} + H_2O \xrightarrow{Urea} 2NH_4 + CO_2$$

$$\text{NH4+ salicylate} + \text{NaCLO} \xrightarrow{nitroprusside} \text{indophenol}$$

Calculations

The urea calculation in the sample is calculated using the following general formula:

$$\text{Urea in sample} = \frac{A\,Sample}{A\,s\tan dard} XC\,S\tan dard$$

X sample dilution factor

Where c= concentration

3- Albumin (BCG):

This assay is colori-metric method (Doumas et al. , 1971).

Assay principle

In a buffered solution bromo-cresol green forms with albumin, a green colour complex whose intensity is proportional to the amount of albumin present in the specimen calculations:

$$\text{Albumin Concnetration (g/dL)} = \frac{A\,Speacimen}{A\,s\tan dard} X 4$$

4- ALT (SGPT)

Liqui-UV test (Schumann and Klauke , 2003).

Assay principle

Kinetic method for the determination of ALT activity according to the recommendations of the expert panel of the IFCC (International federation of clinical chemistry) without pyridoxal-phosphate activation.

Reaction principle:

$$\text{2- Oxo-glutarate+L-alanine} \xrightarrow{GPT} \text{L-glutamate+pyruvate}$$

$$\text{Pyruvate + NADH+H+} \xrightarrow{LDH} \text{L-lactate+NAD}^+$$

5- AST (SGOT)

Liqui-UVtest(Schumann and Klauke, 2003).

Assay principle

Kinetic method for the determination of AST activity according to the recommendation of the expert panel of the IFCC (international federation of clinical chemistry) without pyridoxal-phosphate activation reaction principle: 2-Oxo-glutarate+L-aspartate $\xrightarrow{GOT}$ L-glutamate=oxaloacetate.

$$\text{Oxaloacetate + NADH+H+} \xrightarrow{MDH} \text{L-malate+NAD}^+$$

6- Serum IgM by Elisa (Diagnostic Automatic Inc. , 2009).

Intended use : to quantitate total human immunoglobulin M (IgM).

Statistical analysis

Statistical presentation and analysis of the present study was conducted, using the mean, standard error, student t-test, chi-square and linear correlation coefficient by SPSS V17. We also used Analysis of variance (ANOVA) test to compare different items in the same group in quantitative data.

P-value ≤ 0.05 is considered significant

* *P* value = 0.05 to < 0.1 is considered borderline significance

* *P* value ≤ 0.01 is considered highly significant

* *P* value > 0.1 is considered non-significant

3.Results

On comparing first and second group as regards age, there was no statistically significant difference between 1st group (50.533±8.766 years) and 2nd group (51.133± 6.632 years) using unpaired student t-test (*p*-value = 0.834).

We didn't find a statistically significant difference between 1st and 2nd group as regards sex distribution, (*p*-value = 0.140) using chi-square test, while females constituted 40% of 1st group and 66.67% of 2nd group and the total number of females included in the study constituted 53.33% of all participants in the study. Males constituted 60% of 1st group and 33.33% of 2nd group with a total of 46.67% of all participants in the study.

Table (1): Comparison of first group and second group as regards serum creatinine

	S. creatinine (mg/dL)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	6.100-12.500	10220±2.066	0.290	0.774
Second group	7.000-15.900	9.993±2.207		

* Unpaired student t-test

Table (2): Comparison of first group and second group as regards blood urea nitrogen

	Blood urea nitrogen (mg/dL)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	112.000-184.000	148.400±21.596	0.164	0.871
Second group	107.000-200.000	146.800±31.122		

* Unpaired student t-test

Table (3): Comparison of first group and second group as regards AST level in serum

	AST Iu/L		T-test*	
	Range	Mean±SD	t	*p*-value
First group	8.000-22.000	13.600±3.851	-2.282	0.030
Second group	10.000-21.000	16.467±2.973		

* Unpaired student t-test

Table (4): Comparison of first group and second group as regards ALT level in serum

	ALT Iu/L		T-test*	
	Range	Mean±SD	t	*p*-value
First group	5.000-15.000	8.533±2.800	-1.707	0.099
Second group	6.000-15.000	10.200±2.541		

* Unpaired student t-test

Table (5): Comparison of first group and second group as regards serum albumin

	S. albumin (g/L)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	3.100-4.200	3.573±0.371	-0.141	0.889
Second group	3.000-4.300	3.593±0.404		

* Unpaired student t-test

Table (6): Comparison of first group and second group as regards hemoglobin (Hgb) level

	Hgb (g/dL)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	7.800-14.500	10.113±2.144	1.992	0.056
Second group	5.700-12.400	8.600±2.015		

* Unpaired student t-test

Table (7): Comparison of first group and second group as regards hematocrit (Hct) level

	Hct (%)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	20.800-41.700	31.080±6.487	1.990	0.056
Second group	17.300-37.000	26.687±5.568		

* Unpaired student t-test

Table (8): Comparison of first group and second group as regards white blood cells

	WBC (x 10^9/L)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	3000.000-87.00	5373.333±1810.472	0.430	0.670
Second group	2100.000-8000.00	5073.333±2005.516		

* Unpaired student t-test

Table (9): Comparison of first group and second group as regards serum IgM level

	IgM (ug/mL)		T-test*	
	Range	Mean±SD	t	*p*-value
First group	40.300-213.700	119.467±61.781	0.238	0.814
Second group	43.000-214.500	114.647±48.536		

* Unpaired student t-test

Table (10): Comparison of IgM level in serum in males and females in both first and second groups together

	IgM (ug/mL)		T-test*	
	Range	Mean±SD	t	*p*-value
Female	40.300-213.700	125.025±52.345	0.850	0.403
Male	43.000-214.500	107.950±57.722		

* Unpaired student t-test

Table (11): Correlation of serum level of IgM and different parameters of the study in first group

First group	IgM	
	R*	*P*-value
Age	-0.119	0.674
S. creatinine	-0.374	0.170
BUN	-0.470	0.077
SGOT (AST)	-0.467	0.079
SGPT	-0.247	0.375
S. albumin	0.035	0.901
EPO dose	0.242	0.384
Hgb	0.005	0.987
Hct	0.122	0.665
WBC	-0.104	0.712

* Linear correlation coefficient (r)

Table (12): Correlation of serum level of IgM and different parameters of the study in second group

Second group	IgM	
	R*	*P*-value
Age	-0.147	0.600
S. creatinine	-0.064	0.821
BUN	0.300	0.277
SGOT (AST)	0.338	0.218
SGPT (ALT)	0.467	0.079
S. albumin	-0.085	0.762
Hgb	-0.305	0.270
Hct	-0.223	0.425
WBC	0.172	0.540

* Linear correlation coefficient (r)

Table (13): Correlation of serum level of IgM and different parameters of the study in both first and second group

1^{st} &2^{nd} group	IgM	
	R*	*P*-value
Age	-0.131	0.491
S. creatinine	-0.227	0.229
BUN	-0.057	0.766
SGOT (AST)	-0.167	0.377
SGPT (ALT)	0.034	0.858
S. albumin	-0.021	0.912
EPO dose	0.242	0.384
Hgb	-0.102	0.591
Hct	0.000	1.000
WBC	0.028	0.885

* Linear correlation coefficient (r)

4. Discussion

The depression of the immune response in the uremic patient is global and concerns both humoral and cellular sectors(Foley and Collins , 2007).

Disorders of both innate and adaptive immune systems and functional abnormalities of monocytes, neutrophils and dendritic cells, are directly linked with infection risk in this patient population (Lim *et al.,* 2007).

Death from sepsis is 50 times higher in hemodialysis patients than in the general population even after accounting for other comorbidities. One of the most difficult causes to treat is the development of an acquired immune dysfunction associated with chronic kidney disease (CKD) and dialysis therapy (Geara *et al.,* 2010).

Hepatitis C virus (HCV) is commonly associated with autoimmune disease as extra-hepatic manifestations (EHM).

The most important auto-immune diseases associated with HCV are mixed essential cryoglobulinemia (MEC) and Sjogren syndrome (SS) (Awad *et al.,* 2011). Increasing evidence suggests that HCV can interfere with innate immune activation at multiple levels (Jang and Chung, 2010).

HCV itself seems to be able to stimulate B cells through different pathways and mechanisms (Bokle and Sepp, 2010).

The persistent of stimulation of B cells by viral antigen could be responsible for leading to polyclonal and later to monoclonal expansion of B cells (Ito *et al.,* 2011).

The highest level of B-lymphocyte stimulator have been found in chronic HCV-infected subjects with clinical and laboratory features of autoimmunity (Bokle and Sepp, 2010).

EPO structure presents elements of cytokines composition and that is why, it is considered that this hormone, a part from its influence on red blood cells system, can regulate immunological responses (Liwoska *et al.,* 2011 b).

Studies over the last 12 years demonstrated that erythropoietin is probably able to modulate or amplify some signaling pathways important for human lymphocytes and monocyte functions. There are also many studies demonstrating the role of rHu EPO in improving immune responses in CRF patients and at the same time suggesting that rHu EPO may act as an immunomodulating cytokine in the human organism (Liwoska *et al.,* 2011 a).

In our study, there was no statistical significant difference as regards age (P = 0.834) and sex distribution (p = 0.140) between the first group with EPO therapy and the second group without EPO therapy. Serum immunoglobulin concentrations tend to increase with age (Gonzalez *et al.,* 2008).

On comparing first and second groups, there was no statistical significant difference as regards serum creatinine levels (p = 0.774) and blood urea nitrogen levels (p = 0.871), which means that HCV infection together with concomitant EPO therapy didn't influence these two parameters in ESRD patients on regular HD.

In our study, second group showed higher serum AST levels than first group on EPO therapy (p = 0.03). Also, second group showed a borderline significantly higher serum ALT levels than first group (p = 0.099). In our study, EPO seems to have an anti-inflammatory response influencing our markers of hepatic inflammation or may be it may have a liver supporting effect. Further studies are needed to elucidate this role using liver biopsy findings.

Compared to non-uremic HCV patients, ESRD patients with chronic hepatitis C have milder hepatic necroinflammation and fibrosis (Trevizoli *et al.,* 2008).

Patients with ESRD and HCV infection displayed normal ALT levels. Indeed ALT levels in these patients were significantly lower than those found in patients infected with HCV without renal damage but with similar grades and stages of liver alterations. It has been proposed that the increase in hepatocytes of HCV-infected patients with ESRD who are an chronic dialysis produces a hepatoprotective effect (Contreras *et al.,* 2007).

Causes of reduction in ALT activity in these patients are only partially known, such as a reduction in pyridoxal – 5' – phosphate, vitamin B_{12}, coenzymes of ALT, suppression of AST and ALT synthesis in hepatocytes and an inhibition of AST and ALT released from hepatocytes into the blood stream, as well as the possibility of liver protection by the hepatocyte growth factor, which is higher in patients with chronic renal failure (Lin *et al.,* 2008).

Among HD patients, serum ALT levels are elevated in 4-67% patients with positive anti-HCV antibodies, 12-31% of patients with positive HCV-RNA and one third of patients with biopsy proven hepatitis(Perira and Levey , 1997).

Shin *et al.* (2006) reported on two cases after accidental ten times overdose administration of recombinant human erythropoietin (rHu EPO) up to 318.000 units a day in acute myocardial infarction, that the only side effects they found were elevated liver enzymes and hemoglobin levels. These patients were followed up as out patients and elevated enzymes soon normalized.

In Berglund and Ekblom study (1991), that aimed to evaluate the effect of treatment with subcutaneous recombinant human erythropoietin (rHuEPO), 20-40 Iu/kg body weight, 3 times a week, Serum aspartate aminotransferase (AST) and serum alanine aminotransferase (ALT) were unchanged after rHu EPO treatment.

We didn't find a statistically significant difference in serum albumin between first and second group (p = 0.889), which means that EPO had no effect on serum albumin level.

Rhee and Erickson (2012) reported that protein energy malnutrition (PEM) diminishes immunoglobulin (IgA, IgM and IgG) concentrations and cytokine production.

This is not the case in our study as serum albumin is within normal range.

In our study, hemoglobin (Hgb) levels were borderline higher in first group than second group (p = 0.056). Also hematocrit (Hct) levels were borderline higher in first group than second group (p = 0.056) and this was expected due to administration of EPO in first group.

Khurana *et al.* (2008) hypothized that the chronic inflammation as a result of HCV infection or the increased production from the regenerating liver cells causes increased circulating EPO causing improved Hct in these patients. Also, he reported that hepatitis C patients tend to have higher baseline hemoglobin and decreased need for EPO therapy on dialysis.

Recently, some studies and case reports indicated attenuated anemia in HD patients with HCV infection, and they previously considered this to be related to increased erythropoietin production after hepatic stimulation by chronic infection with hepatitis virus (Alasran *et al.,* 2009).

In Lin *et al.,* study (2008), there were increased Hb levels in chronic HCV infected patients with ESRD.

In contrast, Abdalla *et al.,* (2000), reported a higher EPO requirement in HCV positive versus HCV negative patients that was a result of altered iron metabolism induced by chronic infection.

In our study, there was no statistically significant difference in white blood cells in blood (p = 0.670) between the two groups, which means that erythropoietin didn't increase white blood cells count above normal, but it only normalized it.

Different circumstances such as chronic renal failure, hemodialysis process, chronic hepatitis C virus infection and various dietary restrictions that we practice with those patients influenced immune system and immunoglobulin production. We didn't find a statistically significant difference in IgM level in serum between first group and second group, which means that EPO didn't influence much IgM level production by stimulated B-lymphocytes by either EPO or HCV infection.

Little is known about the effect of ESRD on B-cell sub-populations (Pahl *et al.,* 2010).

The increase in PMNL counts in CKD has been suggested to be a sign of pre-activation. The number of PMNL increasers in relation to the GFR decrease ($P < 0.0001$) PMNL decreases with increasing serum C-reactive protein and IL-6 and decreased albumin, all associated with declining GFR (Sela *et al.,* 2005).

In our study this was not the case, as we had lymphopenia but no undernourishment. Sardenberg *et al.* (2006) findings suggest that uremic toxicity plays an essential role in PMN apoptosis and that dialysis may correct or normalize apoptotic rates.

ESRD and especially HD, is associated with B-cell lymphopenia(Kato *et al.,* 2008).

HCV infection is associated with leucopenia in HD patients, is as common as in non-HD patients with liver cirrhosis (Ng *et al.,* 2008).

Chronic hepatitis C virus (HCV) infection is associated with B cell activation, although underlying mechanisms are unclear (Sugalski *et al.,* 2010).

This is evidenced by an elevation in serum immunoglobulin isotypes; IgG and its subclasses IgG, and IgG_2 and IgM. Mean serum IgM was increased in patients with HCV infection compared with healthy controls(Lotfy *et al.,* 2006).

However, it has been documented that Ig levels, serum IgG isotypes and both IgM and IgA production are normal in dialysis patients (Hauser *et al.,* 2008).

Starzyk *et al.* (1993) in their study on 10 patients with chronic renal failure treated with hemodialysis (HD) T and B cell populations were determined in peripheral blood, together with immunoglobulin concentration. There was no significant change in the concentration of IgA and IgM.

We didn't find in our study a significant difference in IgM level between males and females. This was not the case in Gonzalez *et al.* (2008)study who reported that IgM levels are higher in females than in males. Sex differences in immunoglobulins concentrations specifically high IgM levels in females, have been attributed to hormonal effects on B lymphocytes.

IgM didn't show in our study, any significant correlation to any of the measured parameters of the study including erythropoietin dose. To our knowledge, we are the first to study the effect of EPO on IgM level in HCV positive patients on regular hemodialysis.

In a previous study by Debska-Slizien *et al.* (2003), in order to find the influence of erythropoietin on immunological system of patients with chornic renal failure, it was found that treatment with EPO did not alter plasma immunoglobulin (IgG, IgM and IgA), as well as total count of lymphocytes. In a previous study, by Costa et al. (2008)[44], 50 HD patients, 25 responders and 25 non responders to rHuEPO, were compared to each other and to 25healthy controls. No statistically significant differences were found between the three groups of individuals concerning immunoglobulin serum levels (IgG, IgM and IgA).

In a previous study by Schaefer *et al.* (1992), who studied whether erythropoietin interferes with B cell function and the mechanisms of this effect,

IgM production, which appeared to be normal in uremia, remained unchanged.

A retrospective study was done to determine whether rHu EPO treatment modulates the humoral arm of the immune system in MM patients. There was a significant increase in the levels of normal Ig (IgG, IgA or IgM) in response to rHu EPO, during the 3-9 months from treatment initiation Gadassi et al.,(2007) and Prutchi-Sagiv et al. , (2006) Data indicate a direct stimulant effect of erythropoietin on B- lymphocytes in end-stage renal failure. Production of IgM was enhanced(Kimata *et al.,* 1991).

These findings also show that the pharmacologic response to rHuEPO is a function of the dose.

Moreover, these effects were seen in concentrations much higher than that used in our study.

Conclusion:

ESRD with all its restrictions seems to protect patients from increased level of serum IgM due to HCV infection and erythropoietin therapy and subsequent cryoglobulinemia. Further studies at molecular level of B-cell functions are still needed to elucidate the causes of this protection.

Acknowledgement:

We would to express my gratitude to clinical pathology team of Shubra Municipal Hospital for their effort in this work.

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11/12/2012

A Novel Approach for Spherical Spline Split Quaternion Interpolation on Lorentzian Sphere using Bezier Curve Algorithm

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Abstract: This paper presents the spline split quaternion interpolation on Lorentzian spheres. The split quaternions don't have group structure on the Lorentzian sphere, there for not defined squad (spline split quaternion interpolation in Minkowski space). In this paper, we propose a new method for smoothly interpolation on Lorentzian sphere using orthogonal projection and cubic Bezier curve.
[Ghadami R, Rahebi J, Yayli Y. **A Novel Approach for Spherical Spline Split Quaternion Interpolation on Lorentzian Sphere using Bezier Curve Algorithm**. *Life Sci J* 2012;9(4):3394-3397] (ISSN:1097-8135). http://www.lifesciencesite.com. 503

Keywords: Quaternion, Split Quaternion, Interpolation, Lorentz-Minkowsi Space, Timelike vector, slerp, spline, Bezier curve.

1. Introduction

Quaternions were discovered by Sir William Rowan Hamilton as an extension to the complex number in 1843. The most important property of quaternions is that every unit quaternion represents a rotation and this plays a special role in the study of rotations in three dimensional spaces. Also quaternions are an efficient way understanding many aspects of physics and kinematics. Many physical laws in classical, relativistic and quantum mechanics can be written nicely using them. Today they are used especially in the area of computer vision, computer graphics, animations, aerospace applications, flight simulators, navigation systems and to solve optimization problems involving the estimation of rigid body transformations. Shoemake (Shoemake 1985) suggested spherical linear interpolation (slerp) as a means for determining the intermediate orientations between two given ones. In computer graphics, slerp is shorth and for spherical linear interpolation, in the context of quaternion interpolation for the purpose of animating 3D rotation. It is a fundamental problem of computer animation and other computer simulations involving the dynamics of rigid bodies to be able to smoothly interpolate between a sequence of positions and orientations. Smooth interpolation of three-dimensional object orientation, starting from n key frame orientations, is used in computer animation to model moving solids, cameras, and lights (Noakes). Spherical spline curves have potential applications in computer graphics, in animation and in robotics and motion planning based on quaternions. In (Ghadami *et al.*), we showed spherical spline interpolation on hyperbolic spheres using split quaternions and metric Lorentz. For this reason set of split quaternion H′ is a non group structure on the Lorentzian sphere. The purpose of this paper offers a new method for smoothly quaternion interpolation on Lorentzian sphere using orthogonal projection and cubic Bezier curve. Since Bezier is one of the imperative polynomial and important tool for interpolation Bezier polynomial has several applications fields of engineering, science and technology such as highway or railway rout designing, networks, computer aided design system, animation, robotics, communications and many other discipline (Abbass and Jamal 2011). Also, in this paper we show propose method on the hyperbolic sphere and Euclidean sphere.

2. Preliminary

In this section, we give some useful definition and propositions about Minkowski space (O'Neill 1983, Kula and Yayli 2007).

Definition 1. The Lorentz-Minkowski space is the metric space $E_1^3 = \left(R^3, \langle , \rangle\right)$, where the metric $\langle , \rangle$ is given

$$\langle u, v \rangle = -u_1 v_1 + u_2 v_2 + u_3 v_3$$
$$u = (u_1, u_2, u_3), v = (v_1, v_2, v_3)$$

The metric $\langle , \rangle$ is called the Lorentzian metric.

A vector $\vec{v} \in E_1^3$ is called

1. spacelike if $\langle v, v \rangle > 0$ or $v = 0$
2. timelike if $\langle v, v \rangle < 0$
3. lightlike if $\langle v, v \rangle = 0$ and $v \neq 0$

We point out that the null vector $v = 0$ is considered

of spacelike type although it satisfies $\langle v,v\rangle = 0$. the norm of the vector $\vec{u} \in E_1^3$ is define by $\|\vec{u}\| = \sqrt{|\langle \vec{u},\vec{u}\rangle|}$. The Lorentzian vector product $\vec{u} \wedge \vec{v}$ of $\vec{u}$ and $\vec{v}$ is define as follows:

$$\vec{u} \wedge \vec{v} = \begin{bmatrix} -e_1 & e_2 & e_3 \\ \vec{u}_1 & \vec{u}_2 & \vec{u}_3 \\ \vec{v}_1 & \vec{v}_2 & \vec{v}_3 \end{bmatrix}$$

The hyperbolic and Lorentzian unit spheres are $H_0^2 = \{\vec{a} \in E_1^3 : \langle \vec{a},\vec{a}\rangle = -1\}$, $S_1^2 = \{\vec{a} \in E_1^3 : \langle \vec{a},\vec{a}\rangle = 1\}$

Theorem 1. Let $\vec{u}$ and $\vec{v}$ be vectors in the Minkowski 3-space. If $\vec{u}$ and $\vec{v}$ are timelike vectors, the $\vec{u} \wedge \vec{v}$ is a spacelike vector. $\langle \vec{u},\vec{v}\rangle = -\|\vec{u}\|\|\vec{v}\|\cosh\varphi$ and $\|\vec{u} \wedge \vec{v}\| = \|\vec{u}\|\|\vec{v}\|\sinh\varphi$ where φ is the hyperbolic angle between $\vec{u}$ and $\vec{v}$. The set of timelike vectors will be denote by τ and it is the following set: $\tau = \{(x,y,z) \in E_1^3 ; x^2 + y^2 - z^2 < 0\}$.

Proposition 1. Two timelike vectors $\vec{u}$ and $\vec{v}$ lie in the same timelike cone if and only if $\langle \vec{u},\vec{v}\rangle < 0$.

3. Split quaternion

Definition 2. The algebra H' of split quaternion is defined as the 4-dimensional vector space over R having a basis $\{1,i,j,k\}$ with the following properties (Kula and Yayli 2007)

$$i^2 = -1, j^2 = k^2 = 1$$

$$ij = -ji = k, kj = -jk = -i, ki = -ik = j.$$

form it is clear that H' is not commutative and 1 is the identity element of H' .It also H' is an associative algebra. For

$$q = a_0 \cdot 1 + a_1 \cdot i + a_2 \cdot j + a_3 \cdot k \in H'$$

$$(a_0, a_1, a_2, a_3 \in R)$$

we define the conjugate $\bar{q}$ of q as

$\bar{q} = a_0 \cdot 1 - a_1 \cdot i - a_2 \cdot j - a_3 \cdot k \in H'$. For every $q = a_0 \cdot 1 + a_1 \cdot i + a_2 \cdot j + a_3 \cdot k \in H'$ *we have* $q \cdot \bar{q} = (a_0^2 + a_1^2 - a_2^2 - a_3^2)$

we define the norm N_q and the inverse q^{-1} of the quaternion respectively the real number $N_q = a_0^2 + a_1^2 - a_2^2 - a_3^2$ and $q^{-1} = \frac{\bar{q}}{N_q}, N_q \neq 0$.

If $N_q = 1$ then q is called unit split quaternion. The algebra H_1' of split quaternion is called unit split quaternion. If $q = a_0 \cdot 1 + a_1 \cdot i + a_2 \cdot j + a_3 \cdot k$ and $p = b_0 \cdot 1 + b_1 \cdot i + b_2 \cdot j + b_3 \cdot k$ be two split quaternion and let $r = qp$, then r is given by

$$r = S_q S_p + g(V_q, V_p) + S_q V_p + S_p V_q + V_q \wedge V_p,$$

where

$$S_q = a_0,\ S_p = b_0,\ g(V_q, V_p) = -a_1 b_1 + a_2 b_2 + a_3 b_3,$$

$$V_q = a_1 \cdot i + a_2 \cdot j + a_3 \cdot k,\ V_p = b_1 \cdot i + b_2 \cdot j + b_3 \cdot k$$

$$V_q \wedge V_p = (a_3 b_2 - a_2 b_3) i + (a_3 b_1 - a_1 b_3) j + (a_1 b_2 - a_2 b_1) k.$$

If $S_q = 0$ then q is called pure split quaternion. Split quaternion product of two pure split quaternions $q = a_1 \cdot i + a_2 \cdot j + a_3 \cdot k$ and $p = b_1 \cdot i + b_2 \cdot j + b_3 \cdot k$ is

$$qp = \langle V_q, V_p\rangle + V_q \wedge V_p$$

$$= -a_1 b_1 + a_2 b_2 + a_3 b_3 + \begin{bmatrix} -i & j & k \\ a_1 & a_2 & a_3 \\ b_1 & b_2 & b_3 \end{bmatrix}$$

4. Linear Interpolation in Minkowski space

In this section, we compute the interpolation on hyperbolic sphere. We have done this interpolations using metric Lorentz and split quaternion.

Remark 1. The split quaternion, $p, q \in H_1'$, product $p^{-1}q$ can be greatly simplified by use of the fact that, for a unit split quaternion $u = [\cosh\varphi, w\sinh\varphi]$ and $u^t = [\cosh(t\varphi), \sinh(t\varphi)]$. From the definition you can see that $t = 0$ give rotation p , $t = 1$ the rotation q, and $t \in (0,1)$ gives all intermediate rotations (Ghadami *et al., 2012*),.

Proposition 5.

The curve $slerp(p,q,n): H_1' \times H_1' \times [0,1] \to H_1'$ is a great arc on the unit split quaternion hyperbolic sphere between p and q (Ghadami *et al., 2012*),.

Definition 3. The split quaternion used for a starting rotation given by p and ending with rotation q , for $p, q \in H_1', q = p(p^{-1}q)^n$. This can be written

$$slerp(p,q,n) = p(p^{-1}q)^n, n \in [0,1]$$

While from the $4-D$ geometry comes

$$slerp(p,q,n) = \frac{p\sinh((1-n)\varphi) + q\sinh(n\varphi)}{\sinh(\varphi)}$$

$$p, q \in H_1', \quad n \in [0,1]$$

Where $-\langle q_0, q_1\rangle = \cosh\varphi$. Slerp is spherical linear interpolation in Minkowski space (Ghadami *et al., 2012*).

5. Spline Interpolation of Split Quaternion on Hyperbolic Sphere

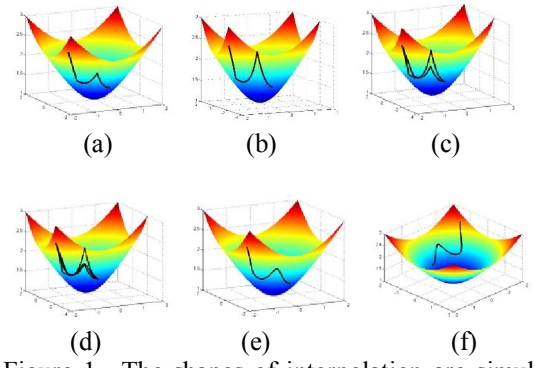
A Given a sequence on N unit split quaternion $\{q_n\}_{n=0}^{N-1}$, we want to build a spline which interpolated those split quaternion subject to the conditions that the spline pass through the control points and that the derivatives are continuous. The idea is to choose intermadiate split quaternions s_n and s_{n+1}. To allow control of the derivatives at the end points of the spline segements. The points s_n and s_{n+1} are called inner quadrangle points, and have to be chosen carefully so that continuity is guaranteed across segments. More precisely, let

$$squad(q_i, q_{i+1}, s_i, s_{i+1}, n) =$$
$$slerp(slerp(q_i, q_{i+1}, n), slerp(s_i, s_{i+1}, n), 2n(1-n))$$

Be the spline segments. ($squad$ is spherical spline split quaternion interpolation on hyperbolic sphere in Minkowski space) By definition

$$q_i \log(\left(q_{i-1}^{-1}, q_i\right) - 2\log\left(q_i^{-1} s_i\right) =$$
$$q_i \log(\left(q_i^{-1}, q_{i+1}\right) + 2\log\left(q_i^{-1} s_i\right)$$
$$s_i = q_i \exp\left(-\frac{\log\left(q_i, q_{i-1}^{-1}\right) + \log\left(q_i^{-1}, q_{i+1}\right)}{4}\right)$$

Thus $squad$ is continuously differentiable at the control points with s_i defined as above. All in all we have shown that $squad$ is continuous and continuously differentiable across all segments (Ghadami *et al.,*) (Figure 1).



(a) (b) (c)

(d) (e) (f)

Figure 1. The shapes of interpolation are simulated with MATLAB R2010a, (a) Split quaternion interpolation between the four key frames on hyperbolic sphere, (b) Inner quadrangle interpolation between the four key frames on hyperbolic sphere, (c) Combination of split quaternion and inner quadrangle on the hyperbolic sphere, (d) Smoothing split quaternion with using inner quadrangle, (e) interpolation curve for squad, (f) Inside scope interpolation curve for squad.

6. Interpolation on Lorentzian Sphere using Bezier Curve Algorithm

In this section shows to construct a smooth interpolation on Lorentzian sphere using cubic Bezier curve and orthogonal projection. Since set of split quaternion H' don't have group structure on the Lorentzian sphere. Therefore we can't use spherical spline split quaternion interpolation on hyperbolic sphere method that showed in (Ghadami *et al.*). In this paper, also we show propose method on the hyperbolic sphere and Euclidean sphere. Bezier curves of any degree can be defined. A degree n Bezier curve has n +1 control points whose blending functions are denoted $B_i^n(t)$, where (Abbass and Jamal 2011)

$$B_i^n(t) = \binom{n}{i}(1-t)^{n-i}t^i, \quad i = 0,1,2,\ldots,n.$$

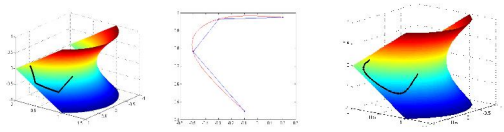
Recall that $\binom{n}{i}$ is called a binomial coefficient, sometimes spoken "n- choose -i", and is equal to $\frac{n!}{i!(n-i)!}$. $B_i^n(t)$ is also referred to as the ith Bernstein polynomial of degree n. The equation of a Bezier curve is thus:

$$R(t) = \sum_{i=0}^{n}\binom{n}{i}(1-t)^{n-i}t^i P_i.$$

$P_i = (x_i, y_i)$, $i = 0,1,2,\ldots,n$ is the control points of Bezier curve. In this paper, we use cubic Bezier curve. Cubic Bezier curve is defined as

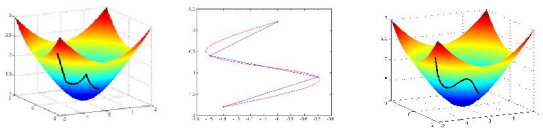
$$R(t) = (1-t)^3 P_0 + 3t(1-t)^2 P_1 + 3t^2(1-t)P_2 + t^3 P_3$$
$$0 \le t \le 1$$

The proposed method is explained as under steps: - Select split quaternion on Lorentzian sphere; - Draw Cubic split quaternion interpolation (as a set of three linear interpolations) on Lorentzian sphere; - The split quaternion interpolation curve one to one mapping to plane with orthogonal projection - Smooth the split quaternion interpolation using cubic Bezier algorithm in plane - smoothed curve is taken to Lorentzian sphere with transformation (Figure 1).



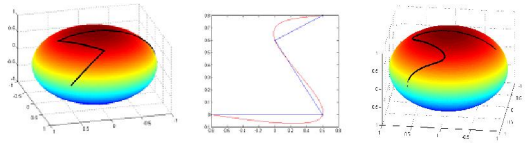
(a) (b) (c)

Figure 2. Interpolation on Lorentzian sphere, (a) split quaternion interpolation between the four key frames on Lorentzian sphere, (b) split quaternion interpolation curve mapping to plane with orthogonal projection and smooth the curve using cubic Bezier algorithm, (c) Smoothed curve is taken to Lorentzian sphere with transformation.



(a) (b) (c)

Figure 3. Interpolation on hyperbolic sphere. (a) split quaternion interpolation between the four key frames on hyperbolic sphere, (b) split quaternio interpolation curve mapping to plane with orthogonal projection and smooth the curve using cubic Bezier algorithm, (c) Smoothed curve is taken to hyperbolic sphere with transformation



(a) (b) (c)

Figure 4. Interpolation on Euclidean sphere. (a) Quaternion interpolation between the four key frames on Euclidean sphere, (b) quaternion interpolation curve mapping to plane with orthogonal projection and smooth the curve using cubic Bezier algorithm, (c) Smoothed curve is taken to Euclidean sphere with transformation

4. Discussions

The split quaternions have group structure on the hyperbolic sphere, using these properties, squad (spherical spline split quaternion interpolation in Minkowski space) interpolation is defined on the hyperbolic sphere. But the split quaternions don't have group structure on the Lorentzian sphere, there for not defined squad. This problem, for the Lorentzian sphere solved one to one orthogonal projection to plane and cubic Bezier algorithm. Also, the proposed method by squad interpolation can be used on the hyperbolic sphere and Euclidean sphere. Our results are favorable, but this method can be used with different projection.

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11/18/2012

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Impact of Quality of Work Life on Mental Health among Teaching Professionals in Indian Higher Learning Institutions: An Empirical Analysis

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Abstract: The rationale behind this study is to determine the level and relationship between Quality of Work Life (QWL) and Mental Health among teaching professionals in higher learning institutions of Tamilnadu, India. A survey instrument was used to measure the perception of teaching professionals concerning their level of QWL and its relationship to mental health. A total of 320 sets of questionnaire were distributed to teaching professionals in selected faculties and 164 useable questionnaires were used for statistical analysis. Based upon the study, the levels of QWL were found to be favorable and Mental Health among staff members was moderate. Practical implications, limitations of the study and suggestions for future research are offered.
[K.G. Senthilkumar, S. Chandrakumaramangalam, L. Manivannan. **Impact of Quality of Work Life on Mental Health among Teaching Professionals in Indian Higher Learning Institutions: An Empirical Analysis**. *Life Sci J* 2012;9(4):3398-3404]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 504

Key words: Quality of Work Life, Mental Health, Higher learning Institutions, and Teaching Professionals

1. Introduction

Today, the higher education systems, especially technical education in India has undergone a remarkable changes including the establishment of new private universities as well as the penetration of foreign universities. India's rendezvous with technical education began in1847, with the establishment of Civil Engineering College at Roorkee for training engineers. But today, India has 31,324 colleges with approved intake of 8.5 lakh in engineering and 1.5 lakh in the management sector respectively. Indian higher education perhaps has the biggest Private Public Partnerships in the world. Much of the infusion of private funds in higher education has been through private colleges affiliated to a public university. In this model, the university provides overall academic supervision, sets the curriculum and conducts the examination. The quality of higher educational institutions is ensured through accreditation. According to Houston D et al. (2006) all such changes demonstrate the complexity of academic work in an increasingly demanding environment. While these changes will create more opportunities leading to an increase in nation's supply of qualified workforce, the role played by teaching professionals is becoming more complex, challenging and demanding. In this situation, finding and positioning faculty is a difficult task. Because, the inability of staff members to balance the equally challenging demands of their work and personal life has contributed to the escalating stress and conflict in today's workforce (Edwards et.al., 2000). This in turn escorts to momentous increase in stress related to health problem, which is going to have a consequence financially on both the employer as well as the government (Frone, et.al., 1997, Johnson, et.al., 1997).

Quality of Work Life (QWL) has assumed increasing interest and importance in both industrialized as well as developing countries of the world. It has become critical in the last two decades because of the changed business environment and family structure (Akdere, 2006). According to Ganlinsky & Stein, (1990) the combination of fluctuating work environment with competing work and family commitments has negatively affect employees in many ways, such as lowered employee morale, reduced productivity and increased employee turnover. As QWL is a multidimensional concept there is no commonly accepted definition for it. Several researchers agree in general that quality of work life (QWL) is a construct that deals with the well being of employees.

Although most researches have been done on QWL, the majority of them have been focused on western settings. Only very few studies have been conducted in the Asian setting (Daud, 2008; Mat Zin, 2004; Saklani, 2004; Wyatt and Chay, 2000). Till today, the literature on QWL is widespread yet reasonably little work in this area relates to the field of higher education and still less on Indian higher learning institutions. The purpose of this study was to determine factors that can effectively represent the

conception of a quality of work life in higher learning institutions in India. More specifically, the objectives of the study were: 1) to identify the level of QWL among teaching professionals in the private engineering colleges in India and, 2) to investigate whether there is any relationship between the QWL and Mental Health among the teaching professionals. Based on the objectives above, the present study has formulated the following research questions: (1) what are the dimensions that represent the QWL among teaching professionals? and (2) is there any relationship between QWL and Mental Health among the teaching professionals?

2. Review of Literature

2.1 Quality of Work Life.

The term quality of work life (QWL) originated from the concept of socio-technical system design in the 1970s that emphasizing the human dimensions of work by focusing on the quality of the relationship between the worker and the working environment. In 1972, Louis Davis introduced the term 'Quality of Work Life" (QWL) in an attempt to establish that performance is linked to involvement and satisfaction of employees at workplaces. Numerous works on QWL thereafter provides variety of definitions and suggestions of what constitutes QWL. The comprehensive demarcation of the QWL concept is found in the important works of Walton (1974), Taylor (1978) and Levine et al. (1984). Walton (1974) has proposed eight major conceptual categories relating to QWL as adequate and fair compensation, safe and healthy working conditions, immediate opportunity to use and develop human capacities, opportunity for continued growth and security, social integration in the work organization, constitutionalism in the work organization, work and total life space and social relevance of work life. There appears plethora of definitions for quality of work life but no commonly accepted one. Lawler (1982) highlighted that the core dimension of the entire QWL in the organization is to improve employees' well-being and productivity. The most common interaction that relates to improvement of employees' well-being and productivity is the design of the job. He defined QWL in terms of job characteristics and work conditions. Robbins (1989) also conceptualized in the same manner. According to him, QWL is a process by which an organization responds to employee needs by developing mechanisms to allow them to share fully in making decisions that designs their lives at work.

Generally, QWL reflects the relationship that exists between the workers and their work environment. It refers to the favourableness or unfavourableness of a job environment for people. The basic concept underlying the QWL is "humanization of work". It means the provision of security, equity, individualism and democratic rights to workers. Havlovic (1991) revealed that among other dimensions of QWL, the key dimensions were job security, better reward system, higher pay, opportunity for growth, and participative groups. In the Health care industry Brooks and Anderson (2005) developed the construct of QWL with four dimensions such as, work life/home life dimension, work design dimension, work context dimension, and work world dimension. A study of QWL among academicians by Winter, Taylor and Sarros (2000) viewed QWL with five work environment domains such as, role stress, job characteristics to directly and indirectly shape academic staff's experiences, attitudes and bahaviour. In another study in Malaysia by Mohd.Hanefah et al. (2003) developed QWL measures for professionals with seven dimensions, viz. growth and development, participation, physical environment, supervision, pay and benefits, social relevance and workplace integration. The same dimensions were used by Daud N (2010) to study the QWL among academic staff in Malaysian higher learning institutions.

Saklani (2010) has used thirteen factors (dimensions) for the analysis of the QWL among non-managerial employees in India. These include adequate and fair compensation; fringe benefits and welfare measures; job security; physical working environment; work load and job stress; opportunity to use and develop human capacity; opportunity for career growth; human relations and social aspect of life; participation in decision-making; reward and penalty administration; equity, justice and grievance handling; work and total life space (balance in life) and image of organization in the society (social relevance of work life). He contended that non-managerial employees in India, although look for both financial and non-financial incentives, place greater emphasis on their economic goals. It is learned from the review of literature that several researches so far conducted on QWL have examined varied QWL dimensions across countries. This study was also conducted to develop dimensions of QWL among teaching professionals working in higher learning institutions of India. QWL in higher learning institutions has several significant dimensions. Most important of these dimensions in an educational setting are; teaching and learning process, learning opportunity, work load, compensation, leadership, professional relationship, employee support services, feedback on performance, communication and attitude towards change.

2.2. Mental Health.

Since the core competence of any organization is the real performance of their human resources, modern age companies must be built around human resources. Even, relatively low level of health problems will affect the organizational effectiveness and employees'

performance. Hence, to be competitive, organizations must focus on their employees' overall physical and mental health. Mental health can be defined as the ability to adjust to new situations and to handle personal problems without marked distress and still have enough energy to be a constructive member of society. Mental health is also defined as the feelings of someone toward oneself, world, life location and surrounding people, our responsibility to others, how to cope the income and time/place recognition (Levinson et al 1962). According to Karl Menninger, mental health is someone's adaptation to his/her around world in the best possible choice so that it causes his/her happiness as well as a useful and efficient perception.

In today's globalised business environment, the most part of employees' lives are spent at workplaces. Work can have a significant impact, either detrimental or enhancing, on an individual's mental and physical health (Warr, 1987). A comprehensive body of research suggests that an increasing percentage of the people suffers from work-related stress (e.g. Edwards and Burnard, 2003; Smith et al., 2000). Stress has become one of the most serious health issues of the 21st century. The occupational stress can be more prevalent in developing countries like India. This occupational stress can be best understood by the Karasek's occupational stress model (Karasek, 1979) with two dimensions: demand and discretion. Based on these dimensions, Karasek classified jobs into four types: high-strain jobs, low-strain jobs, active jobs and passive jobs. According to him, the high occupational stress supposed more common in the high-strain jobs (high work demand but without the benefit of high work control). Mental and emotional health problems of employees will lead to absenteeism and decreased productivity that in turn affect employers. Employers may be able to improve productivity in the workplace by promoting the mental health of their employees. It is obvious that the work environment plays pivotal role in the employee well-being, specifically, the mental health of employees.

The results of several studies concluded that the perception of roles, particularly role conflict and overload, is related to women's psychological health and overall wellbeing. According to McBride (1990), the competing demands of multiple roles will lead to role overload and subsequent strain. Concomitantly, Tiedje and Wortman (1990), in their study among married professional women, found that women who experienced high role conflict were more depressed and less satisfied. Likewise, Paden and Buehler (1995) found that both the role conflict and role overload were associated with physical and emotional affects among dual-income families. Similarly, Lease (1999) found that role overload was a powerful predictor of many types of strain in academic faculty. Currently, many people are losing their jobs as a result of the economic recession. The result of this is the work intensification i.e., less individuals have to do more work. In today's business scenario, the 'survivors' of organizational downsizing were more likely to experience poor mental health because of work intensification (Dragano, Verde and Siegrist 2005). Pearson (1998), in his study on investigating the relationship of both work and leisure to a comprehensive measure of psychological health, found that the combination of job satisfaction and leisure satisfaction was a stronger predictor of psychological health than job satisfaction alone.

Actually, the mental health research began with Jahoda (1958), who believed that positive mental health could be reviewed by six fundamental variables: self-acceptance, personal growth, autonomy, environmental mastery, personality integration, and an accurate perception of reality. In many ways, Jahoda's analysis has served as a yardstick for later researchers. Ryff (1989, 1995) drew from Jahoda's work and developed a general context-free model of well-being with her six basic dimensions: self-acceptance, personal growth, autonomy, environmental mastery, positive personal relationships, and a sense of meaning and purpose in life. Finally, Coan (1974, 1977) created a five-dimensional model of well-being: efficiency, relatedness, inner harmony, creativity, and self transcendence. Unlike Ryff, Warr (1994) developed context-specific model of well-being, as the relationship with job-related antecedents are stronger for job-related well-being, with four dimensions: affective well-being, aspiration, autonomy and competence.

According to the study conducted by William (2001) among undergraduate and graduate to measure psychological well-being resulted in three factor models. His study supported the hypothesis that psychological well-being can be conceptualized by a tripartite model that contains factors for subjective well-being, personal growth and a style of religiosity that is characterized by other-centeredness. Parviz Ahmadi et al. (2012), in their research in studying the relationship between job performance and employees' mental health in one of Iranian natural gas refinery concluded that there was a significant relationship between employees' job performance and mental health. Any increase in mental health aspects promotes job performance and low mental health level among employees can reduce job performance.

Researches indicated that employees should experience high levels of quality of work life as well as mental health in order to realize their full potential, and become an asset to the organization. The nature of the job could prevent the worker from attaining full

mental health. The workplace itself may contribute to distress and, ultimately to mental disorders (Thomas & Hersen, 2002). According to D'Souza, et al. (2006) both high work demands and job insecurity will lead to poor mental health. It is learned from these studies that the elements such as nature of job, work place environment, high work demands and job insecurity will have an impact on one's mental health. These elements represent the QWL of employees. Hence, it is understood that there is a strong positive relationship between QWL and employees' mental health.

3. Methodology

The study makes use of responses to a questionnaire survey conducted among teaching professionals in Anna University affiliated self financing engineering colleges in Coimbatore region of Tamilnadu, India. The research design for this study is a correlation study and a stratified random sampling method was utilized. A total of eight faculties were identified and a total of 40 questionnaires were randomly distributed to every faculty, which brings to a total of 320 questionnaires and in all, 164 responses were received and analyzed, which represented a 51.25% response rate.

3.1 Measures and Analysis of Data.

Items included in the "Quality of Work Life Survey" were selected after a review of the literature. The instrument was tested through pilot study on a small group of teaching professional. A 92 item questionnaire derived and adapted from an earlier QWL study by Curtin University (2006) and modified according to the Indian education sector were used to represent the twelve dimensions of the quality of work life such as teaching and learning process, learning opportunity, compensation, work load, feedback on performance, leadership, professional relationship, employee support services, physical environment, resources and equipment, communication and attitude towards change. Respondents were asked to indicate their agreement or disagreement about each QWL question with anchors ranging from strongly disagree (1) to strongly agree (5).

The measures for mental health used in this study were adapted from Warr's Mental Health Measures (1990). This instrument has been widely tested by researchers and making provision for 16 items consisting of three dimensions viz., work competence, work aspiration and negative work transfer. The same instrument with modifications which consists of 20 items with three dimensions viz., work competence, work aspiration, and work environment were adapted. Respondents were asked to indicate their agreement or disagreement on each mental health question with anchors ranging from strongly disagree (1) to strongly agree (5).

4. Results

Based on the demographic and other personal background information obtained and presented in the Table 1, majority of respondents were male (58.5%) and 41.5 percent were female. The majority of the respondents were belongs to the age category of 36 to 45 years (35.4%) followed by the 46 to 55 years age group (25.6%). More than three fourth of the respondents (84.1%) were belongs to 26 to 55years. The majority of the respondents (57.9%) were belongs to married category. The majority held Masters Degree (72.0%), and 28.0 percent with a PhD.

Majority of the respondents belongs to Assistant Professor, Assistant Professor (SG) and Associate Professor Category. They make up nearly three quarter (72.0%) of the respondents for the study. Majority of the respondents (70%) do not hold any administrative position. Majority of the respondents has teaching hours of between 12 – 21 hours (72.0%), while 28.0% has teaching hours of 8 to10 hours. This is usually seen in faculty members those hold administrative positions.

Table 1. Respondents Profile

Respondents profile	Total number of respondents		Percentage of Respondents	
Gender				
Male	96		58.5	
Female	68		41.5	
Age				
26- 35 years	42		25.6	
36- 45 years	58		35.4	
46-55 years	38		23.2	
Above 55 years	26		15.8	
Marital status				
Married	95		57.9	
Unmarried	69		42.1	
Qualification				
Masters Degree	118		72.0	
Masters Degree with Ph.D	46		28.0	
Designation		%	Administrative Position	%
Assistant Professor	33	20.1	Nil	0.0
Assistant Professor (SG)	36	22.0	Nil	0.0
Associate Professor	49	29.9	15	9.0
Professor	46	28.0	35	21.0
Teaching hours/week				
Assistant Professor	21		Average hours/ week 11-12	
Assistant Professor (SG)	18			
Associate Professor	12-16			
Professor	8-10			

A factor analysis technique was performed separately for items indicating QWL and Mental Health variables. The 92 items QWL measure were subjected to principal component factor analysis with

varimax rotation to determine if there were any underlying dimensions within the data on the attitude to the Quality of Work Life statements. From the output, twelve factor solutions emerged with Eigen values exceeding 1. Results of factor analyses indicated that the QWL measure was found to be consisted of twelve dimensions. The factor loadings in the twelve factors range from .59 to .89. From the analysis it is revealed that the mean of all QWL variables fall between 4.67 and 5.92. From the results it is concluded that the teaching and learning process, learning opportunity, work load, compensation, leadership, professional relationship, employee support services and feedback on performance contributed highly to the QWL of teaching professionals in higher learning institutions.

All the 20 items of Mental Health measure were examined using principal component factor analysis with varimax rotation to determine the dimensions. Results of factor analyses revealed that the Mental Health measure was fitted with the three dimensions. The factor loadings in the three factors range from .76 to .91.

Table 2. Impact of QWL on Mental Health (Regression Analysis)

QWL Factors	Regression coefficients		
	Work Competence	Work Aspiration	Work Environment
Teaching & Learning Process	0.1883*	0.1667*	0.1664*
Learning Opportunity	0.2417*	0.2334*	0.2634*
Compensation	0.1021	0.1408*	0.1786*
Workload	0.1887*	0.1818*	0.2034*
Feed Back	0.1216*	0.1489*	0.1029
Leadership	0.1902*	0.1017	0.1717*
professional relationship	0.1904*	0.1673*	0.1408*
Employee Support Services	0.0996	0.1022	0.1443*
Physical Environment	-0.0344	0.0164	-0.0341
Resources and Equipment	0.0717	-0.0213	0.0667
Communication	0.0884	0.0164	0.0739
Attitude toward change	0.0991	0.0242	0.0818
Constant	0.7349	0.8939	0.6145
R^2	0.8317	0.7426	0.8233
F	13.0919*	8.048*	13.0944*
*** Significant at Five Percent Level**			

4.1 Impact of QWL factors on Mental Health

To analyse the impact of QWL on Mental Health a multiple regression analysis was done. Table 2 exhibits the results of regression analyses of QWL factors on the four dimensions of Mental Health among the teaching professionals. The fitted regression model is given in Equation (1).

$$Y=a+b_1x_1+ b_2x_2+ b_3x_3+ b_4x_4+ b_5x_5+ b_6x_6+ b_7x_7+ b_8x_8+ b_9x_9+ b_{10}x_{10}+ b_{11}x_{11}+ b_{12}x_{12}+e \quad (1)$$

Here, the Y represents the score on Mental Health among teaching professionals and x_1 to x_{12} shows the perception on QWL variables among teaching professionals. The QWL factors such as, Teaching and Learning Process, Learning Opportunity, Compensation, Work Load, Feedback, Leadership, Professional Relationship and Employee Support Services were conceived to have a significant and positive relationship with Mental Health.

4.2 Impact of QWL on Work Competence

From the Table 2 it is learned that the QWL variables significantly and positively influencing work competence dimension of Mental Health among the teaching professionals. The variables such as Teaching and Learning Process (β=0.1883), Learning Opportunity (β=0.2417), Work Load (β=0.1887), Feedback (β=0.1216), Leadership (β=0.1902), and Professional Relationship (β=0.1904) were significantly influencing as their regression coefficients were significant at 5% level. A unit increase in the perception on the above QWL variables result in an increase in Mental Health among teaching professionals in higher learning institutions by 0.1883, 0.2417, 0.1887, 0.1216, 0.1902 and 0.1904 units respectively. The changes in the perception of QWL variables explain the changes in Mental Health of teaching professionals to the extent of 83.17% (R^2 = 0.8317, F= 13.0919)

4.3 Impact of QWL on Work Aspiration

From the Table 2 it is observed that the QWL variables significantly influencing work Aspiration dimension of Mental Health among the teaching professionals. The variables such as Teaching and Learning Process (β=0.1667), Learning Opportunity (β=0.2334), Compensation (β=0.1408), Work Load (β=0.1818), Feedback (β=0.1489), and Professional Relationship (β=0.1673) were significantly influencing as their regression coefficients were significant at 5% level. A unit increase in the perception on the above QWL variables result in an increase in Mental Health among teaching professionals in higher learning institutions by 0.1667, 0.2334, 0.1408, 0.1818, 0.1489 and 0.1673 units respectively. The changes in the perception of QWL variables explain the changes in Mental Health of teaching professionals to the extent of 74.26% since its R^2 is 0.7426 and F= 8.048.

4.4 Impact of QWL on Work Environment

From the Table 2 it is highlighted that the QWL variables significantly influencing work environment dimension of Mental Health among the teaching professionals. The seven QWL factors such as Teaching and Learning Process (β=0.1664), Learning Opportunity (β=0.2634), Compensation (β=0.1786),

Work Load (β=0.2034), Leadership (β=0.1717), Professional Relationship (β=0.1408), and Employee Support Services (β=0.1443) were significantly and positively influencing Mental Health as their regression coefficients were significant at 5% level. A unit increase in the perception on the above QWL variables result in an increase in Mental Health among teaching professionals in higher learning institutions by 0.1664, 0.2634, 0.1786, 0.2034, 0.1717, 0.1408 and 0.1443 units respectively. The changes in the perception of QWL variables explain the changes in Mental Health to the extent of 82.33% (R^2= 0.8233, F= 13.0944)

5. Conclusion

This study investigated the level of QWL and Mental Health and also the relationship between QWL and Mental Health among the teaching professionals in higher learning Institutions of Tamilnadu, India. The present study divulged that majority of teaching professionals have considered all the twelve dimensions of QWL as favourable. It is also revealed that the mental health of teaching professionals were moderate. The results of the regression analysis confirmed that teaching and learning process, learning opportunity, work load, feedback on performance, leadership, and professional relationship have been indicated by the respondents as significant predictors to work competence dimension of mental health. Teaching and learning process, learning opportunity, compensation, work load, feedback on performance, and professional relationship have a positive relationship with the work aspiration dimension of mental health.

Teaching and Learning Process, Learning Opportunity, Compensation, Work Load, Leadership, Professional Relationship, and Employee Support Services were significantly and positively influencing work environment dimension of Mental Health. It is concluded with these findings that there is a relationship between QWL and the three dimensions of Mental Health. This research study has highlighted the attitudes of teaching professional towards QWL, especially, how they view their work environment. Hence, it is paramount for any higher learning institution, to attract and retain highly qualified academic staff members, to provide QWL measures to their employees.

Although this study provides valuable information about the relationship between QWL and Mental Health, there exist some limitations. First, the sample derived for this study belongs to particular region of the state that raises the issue of generalizing the research findings. Second, similar study should be conducted on state level or national level as the present results of this study are not conclusive. This empirical study of the impact of QWL on Mental Health must be regarded as tentative.

Despite these limitations, the study has contributed to the present literature by providing empirical evidence on the twelve dimensions of QWL as compared to the seven dimensions of Mohd. Hanefah et al. (2003) and Daud N (2010). Another important contribution of this research study was that it empirically examined the relationships between QWL and the three dimensions of Mental Health among teaching professionals in higher learning institutions.

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10/12/2012

The Effect of Great Middle East plan on foreign politics of I.R. of Iran

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Abstract: Middle East has always been for various reasons one of the major regions of the world prone to crisis and for this reason has been attended of great powers in the history of the world. Thus, any change in the political conditions of the region has been able to influence the whole world. One of the issues that policymakers of the world have been attended in recent years is Great Middle East plan by the United States of America. The study also seeks to analyze the causes of formation performing and how to effectively the Middle East plan on the countries in the region and analyzed the effects on national security of the Islamic Republic of Iran. So the main question of this study is that Is the Middle East plan will affect the strategy of the Islamic Republic's foreign policy? In order to answer this question, the main hypothesis is that the Great Middle East Seems to be a great opportunities for Iran's foreign policy. In general, the Great Middle East plan is based on several major assumptions first; it seeks to destroy the source and origin of extremism and terrorism in the Near East, the Middle East and North Africa which Threat the West National Interest and international security. Second, the threat of the loss of freedom and democracy, low levels of knowledge, lack of scientific development, the unrighteous status of women and the dire situation of human rights. Thus eliminating these menaces and the priorities of Regional development policies should be focused on policy development by encouraging and guiding the country towards democracy liberal regimes and development of scientific and educational centers, economic liberalization and privatization. And altogether the policies will be big challenges for all countries in the region.

[Majid Masomi, Asghar Yazdi. **The Effect of Great Middle East plan on foreign politics of I.R. of Iran.** *Life Sci J* 2012;9(4):3405-3409]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 505

Key words: the Great Middle East, Foreign Policy, Middle East solidarity.

It stated:

Because of the importance of particular geopolitical the Middle East region has been historically the focus of great power. Today, this area due to the strategic location and its geopolitical and prevailing political status it considered as one of the factors affecting international equations. Superior geopolitical and placed between the great international powers, cheap raw materials, rich sources of energy, especially oil and gas, in all these cases, the area has become a major focus of power. Another important element that has added to the importance of the middle east region, existence different cultures, including Islamic civilization in the region that as a civilization, competing with the west, especially is considered the ruling liberal Christian civilization of Europe and America. On the other hand, people in this region due to a history of colonialism and Western domination, don't have very positive attitude and policies of the Western powers in the Middle East and consistently conflict with the positions of Western policies in the region. Altogether the regard, the Great Middle East plan as a comprehensive plan for modernization of the political, economic and cultural in the Middle East region have a great importance. Proposed this plan in the region, in general, will create a new atmosphere in relations with the countries of the developed world and specifically America. Regional and supra regional reactions towards the plan, opened the new season of positions and subsequently consultations in regional and international and Subject of the plan as a core issue in regional diplomatic moves, On the one hand, have made Western countries as sponsors this plan on the other hand. In total, can be gives the various opportunities and challenges facing the countries in the Middle East region. So the main question of this study is that the Middle East plan will affect the strategy of the Islamic Republic's foreign policy? In order to answer the above hypotheses have been proposed

Main hypotheses:

It seems the Great Middle East plan can be gives great opportunity disposal Iranian foreign policy that can be used to increase the level of solidarity between Iran and countries of the region.

Definition of concepts

1 - Middle East: a vast region in Southwest Asia which includes countries from North Africa to the Indian subcontinent and between the Red Sea and the Caucasus. (Ashuri, 1997: 60).

2 - The Great Middle East plan: this plan is driven policies of America in the Middle East region is responsible for reception America's policies in the region, The basic pillars of plan with the aim of creating a free and modern Middle East provided based on four basic principles that are Education,

economy, civil society and the increase of women's rights. America after the events of September eleventh and the invasion of Kuwait and Iraq and has raised , the Great Middle East plan with the aim of creating a platform in political, social, cultural and economic affairs according to their interests in the region. In general, are considered the following general objectives of the project. 1-to provide a free flow of energy in the region 2-advance the peace process in the Middle East 3-Israel's provide security and national interests. 4-Counter-Terrorism 5-fight against the converse country's interests and America's policies 6-Western developing culture under the banner of liberalism, civil liberties, increase women's rights and promoting democracy and human rights. (Moeen Alddin, 2007: 66)

3- Renovation: Renovation Include of the social change, In line with the development of new patterns of life in industrialized societies and visible and lasting change over time, so that the construction and impact Duties of social organization of a community that may change the course of history. (Ashurian, 1997: 67).

4 - Convergence: Karl Deutsch says that definition of convergence: Convergence include of a sense of community within the department and territory of a region and also access to a broad and powerful Activities and organizations. (Ashuri, 1997: 76).

5 - Democracy: Democracy is a Greek word and its Purpose is the Government of the People. Means the right of everyone to participate in decision-making in the public affairs of the community. Representative democracy is directly or indirectly it defined as participate in decision-making By the elected representatives of the people. (Ashuri, 2003: 52).

Impact of the Great Middle East Plan on Iran

Islamic Republic of Iran by the Terms and Conditions considered to be great powers in potential of economic, political and cultural and therefore has a special place in the Great Middle East Plan. Thus it can be said that new conditions and even the Great Middle East Plan could be create many opportunities for Iran. Iran's government has been introduced frequently by America as a adverse state and a part of the Axis of Evil. For example, fear of taking advantage by Iran from the situation in Iraq in 1991 lead to Semi putting projects of America in the region and the postponement of overthrow of Saddam Hussein was time of losing 10 years. Of course America at the time in Iraq was no substitute deputy for Saddam. Pro-Iranian forces took advantage of the opportunity and gradually could be influential in Iraq. But today a strong presence and investment by America for several years has away from Iran's influence in Iraq. And even religious Shias in Iraq have been in situations that are not fully associated with Iran .On the other hand Americans are trying to not allow form an alliance between Iran and Arabic countries. Enlarge the danger of Iran and exacerbating the existing problems between Iran and countries of the region and the use of elements such action is deemed appropriate for America. For this reason, in recent years, issues such as nuclear weapons, the name of the Persian Gulf, as the Shiite Crescent risk and overcome Shia, Persian Gulf islands, Discussions of human rights and ... Of this issues. Also are expected to expand the discussions the rise of anti-Israel and anti-American mood in the region, Iran's popularity is spreading and Follow the pattern of religious democracy in Iran and can be viewed in positive and great opportunities to counter of policies of America. (Khosravi 2005: 52).

On the other hand encounter discussion directly and increasing pressure on Iran and regime change in Iran can solve these problems for America But it seems these issues cannot be put on the agenda of America. They just try to achieve their goals with plan it and put a sword on top of the head of the regional countries. Control of Iran and regional countries of the region to increase their power and deprive them of serious movement in Afghanistan and Iraq. Engaging Iran in such discussions will be deprive from Opportunities and beside the Great Middle East plan can provide great opportunities for Iran to show that some of them are mentioned below:

The National Opportunities in the Great Middle East plan for Iran

Greater Middle East plan, despite create great political-security challenges for Iran can providing multiple opportunities for security, political and even economic for the policy makers of foreign policy of Islamic Republic of Iran that Means of disposal for the strategic management of threats through the optimal use of opportunities, the national safety Iran all sizes and sectors can have Quad Some of the characteristics of the local and national opportunities for Islamic Republic of Iran. Some other effects on the structure and evolution of region outcome of these two national and regional opportunities to promote power and national security of Iran.

Islamic Republic of Iran based on three aims and goal of the Great Middle East plan is political development (Dal, 1995: 58)

have the capacity Economic, cultural and scientific and has a lot of potential and actual capabilities That they can rely on their own will repel and resolve security challenges. In the context of political reform and democratic, with overcome discourse of democracy and democratic, is providing a

unique opportunity for the Islamic Republic so the main advantage and the element of their national power, that is religious democracy benefit for the national security. Islamic Republic of Iran finds an opportunity to use with experience and history of democracy and strengthen the use of this tool for deterrence of security threats because the development of democracy in the country is hindered Of America's military and civilian policies and measures against it, under the pretext of defending democracy and freedom. On the other hand Islamic Republic of Iran can be prevented in International field in security. Also, by convincing world public opinion and implementation of persuasive active diplomacy can be foreign policy of Iran's not to security. In this case, the pattern of relations of conflict and battle mode the pattern will become interactive and collaborative. (Hassani, 2009: 254)

In the economic sphere Iran has unique opportunities and capabilities that The Middle East plan and efficient use of it can actually help them. Firstly, the implementation economic terms, of the Islamic Republic's political and international And leads competitive national economy and reducing the role of government in order to accelerate economic development. Secondly, it will facilitate Iran's membership in WTO and the possibility of signing bilateral and multilateral trade agreements, allows for the country. Thirdly, according to the economic, industrial and technological and geoeconomical position capacity of Iran. In case plan and create a The Middle East plan Free Trade Area increased the access to new markets, and subsequently can be accelerated export development. Beyond this, the extent Iran's markets will increase foreign investment in its. The geographical position of our country It provides opportunities for Iran to become a regional energy hub. Because Iran in central plateau both north-south axis energy is Horizontal and Energy East- West. (Majidi, 1994: 53).

in the cultural field also Islamic Republic of Iran has many advantages and elements of national power. And this it provided a unique opportunity to create a positive and active to take advantage of them. Culture and civilization, history and religion in common and ethnic cohesion, equity is huge heritage. Beside political and economic development causes formation and strengthening of national identity and National unity. Especially when external threats and challenges, is more field of Strengthening and stabilization national identity and integrity. Moreover, the national unity also played an important role in creating political legitimacy of the government. Second, according to the proposed the plan Dialogue of Civilizations and Coalition for Peace in the Islamic Republic of Iran spread culture of peace in the region, increases Diplomatic status and authority in the region and the world. Third, the rule of democratic values in the Middle East, Community and public safety In terms of the rights of individuals and minorities and promotes their provided freedom by the government. (Vaezi, 2005: 26).

The regional Opportunities in the Great Middle East plan for Iran

the Great Middle East plan In addition to national opportunities, also to provide an appropriate regional context And provided reinforce the foundation and elements of national security. The first security regional chance due to spreading democracy in the Middle East countries, , becoming more Peaceful and secure external security Iran And consequently increase its military security. Because based on the results of theoretical and practical experience, National Security of Iran has been threatened by neighboring dictatorships and undemocratic regimes. Therefore, with establishment of a democratic regime in surrounding communities of Iran And public participation in decision-making, reduced tendency to aggression and violent. Also will change Interaction patterns of conflict and cooperation as competition.

The second positive security outcome of the Great Middle East plan for the national security of Iran becoming Non-security Islamic Republic as a threat against regional countries security Especially emirates in south of the Persian Gulf. Since with advent of political -security common threats due to this plan are provided grounds for none—security. Beyond this, Necessity and the need to deal with the common threat of regional provided the perfect platform for creation of structures and security arrangements regional by the presence of Iran. In other words, regional countries actions to repel the common evil, Requires the security cooperation and the establishment of a multilateral security arrangement.

The third opportunity that this plan creates for the Islamic Republic of Iran in regional, Preparation and possible model for native democracy, to other countries in the Middle East. As mentioned before, one of the main achievements of the Islamic Revolution Practical integration of Islam and Democracy By reading the liberal and democratic has been of Islam and Iranian and native culture. On the other hand, regional countries forced to adopt democratic governance practices will be under pressure Democracy imposed from outside. As a result, increases the interest of the Arab world Pattern of Religious Democracy in Iran to relieve the pressure regional. As many of the commentators, Development of democracy in the Middle East, as they know Islamists coming to power. Examples of Algeria and Turkey have confirmed this hypothesis.

Fourth, economic development and free trade in the region, accelerates and facilitates the process of economic integration and the creation of economic institutions in regional trade. Financial capabilities and geo-economic position of Iran, this allows to the country that to act as the core and focus of regional integration and improve their economic standing. In addition, regional economic development will train the Economic interdependence of countries that led to the Patterns of interaction toward peace-seeking and collaboration. Also, the spread of democratic common values in Middle East societies, Promote economic and political integration that will increase safety factor of Countries including Iran (Amini, 2004 :125).

According to the foregoing, it is determined that the Great Middle East Plan in character has perfectly Security and strategic goals. As was explained, the plan is a part of the National Security Strategy, National role and America's foreign policy goals in the region, the top of the face and proactively deal with asymmetric threats against the country. So battle with terrorism and its roots means of Islamic radicalism, Weapons of mass destruction and Governments that do not follow American norms and values, constitute the most important and most fundamental goals of the project. Therefore, America that defines the Islamic Republic of Iran as a country that is a clear example of asymmetric threats, As a result of these projects directly and indirectly Affect the Iran National security.

According to United States, First, the source and origin of the Islamic Republic of Iran's revolutionary Islamist or fundamentalist interpretation of Islamic extremism, Secondly, contrary to the Middle East peace process and defending the rights of the Palestinian people, support groups and movements America's opinion seems to be terrorists. Third, leaders and policy makers of America believe that Iran is seeking to acquire weapons of mass destruction. Fourthly, George Bush has put Islamic Republic of Iran one of the axis of evil that are Perfect examples of rogue governments.

Therefore, there is no doubt that one of the main goals of the Great Middle East Plan is the Islamic Republic of Iran. This plan in two overall and relative species will be able to influence the foreign policy of Iran. On the one hand, with the creation national and domestic challenges and vulnerabilities and compromised Political and security dimension that If the solution is not expected, would reduce Iran National safety But on the other hand will be able provide suitable opportunities for Iranian politicians that with the proper use and take advantage of this opportunities To utilize them to strengthen security And increase regional solidarity between Iran and Middle East countries.

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Conclusions

Iran As the largest country in the Persian Gulf and One of the most influential countries in the region, Requires that its geopolitical significance in the shifting global Through Creation extensive links to determine Relations with the Persian Gulf states And binding more efficient.

Meanwhile, the U.S. National Security Strategy Rather than focused on international power symmetric is designed for the struggle and opposition with threats and asymmetric players. Especially, the fight against terrorism and Prevent the spread of weapons of mass destruction. Achieving the purpose of strategy is achieved by adopting a proactive strategy in both military and civilian and through the following approaches:

- Support the ideals of human dignity.
- Strengthen alliances to defeat global terrorism and Action to prevent attacks against the U.S. and its friends.
- Cooperation with the regional and world countries to neutralize local conflicts.
- Prevent America's enemies from using weapons of mass destruction and Threats against the U.S. and its allies and friends.
- Beginning of a new era of global economic growth through free markets and trade.
- Expansion of Cycle of economic and political development through creates free Political space and Economic foundation of democracy and expansion of individual freedom.
- Expanded program of mass action By increasing the level of cooperation With other main centers of power.

Because our country, Iran is in a situation that it's National unity and integrity and power and pride, In such a way increasing being questioned by competing powers. Critical and pivotal location in the heart of region can be for occasion for our nation and can also be Catastrophic. If cannot intelligently Use into own advantage occurred opportunities and benefit from some states movements. Should be said in ultimately

concern and grievous which may Irreparable harm come in the body of our country. As a result of this project could have an impact on national security of Iran so for being ousted from the damages and indemnity should apply our knowledge and understanding of the realities, possibilities and limitations we act somehow that our national interest warrant. America for its consolidation and Complete the Control over the resources, control over the Players and control over the processes and world events, Require significant changes in circumstances, Actors and processes in the Middle East region. Middle East from the perspective of cultural issues and globalization, Ideological, economic and energy, geopolitics and especially from the perspective of national security has Special priority and fundamental importance for America. America to achieve its objectives in the foregoing discussion, following the Strategies, policies and Special plans in the Middle East That causes the Regional countries disparity Includes a wide range of government, monarchies, emirates governments, lifelong presidents and religious and native Democracy. On the other hand America's military performance in the region would causes the America's military presence in Afghanistan, especially in Iraq That this in the past few years left negative effects on the thought of the people of America and incorrect and violent performance of America Has outlined from that country Picture an occupation.

11/16/2012

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Distributed Fault Detection Method and Diagnosis of Fault Type in Clustered Wireless Sensor Networks

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Abstract: Due to resource restrictions in the sensor nodes of wireless sensor networks and because of their deployment in harsh environments, sensor nodes may be prone to failure. Thus, fault management is essential in these networks. Otherwise, faulty nodes will be used as intermediate nodes and cause disturbance in the routing process and expected operations. In most fault detection algorithms, each sensor compares its information with information from its neighbors. The status of sensors is determined using the results of this comparison. Many methods based on comparison do not work correctly if more than half of the neighbors are faulty and cannot detect common mode failures. In this paper, we have proposed a new fault detection method to solve the above-mentioned problems. In the proposed method four cases happen and each case has discussed and a query message used to decrease the incorrect decisions. Simulations results show that the detection accuracy and false alarm rate in the proposed method is acceptable in comparison with existing algorithms, even when the probability of faulty nodes is high.

[Shahram Babaie, Ahmad Khadem-zadeh, Kambiz Badie and Amir Shiri**. Distributed Fault Detection Method and Diagnosis of Fault Type in Clustered Wireless Sensor Networks**. *Life Sci J* 2012;9(4):3410-3422]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 506

Keywords: Wireless Sensor Networks; Detection Accuracy; False Alarm Rate; Fault Detection.

1. Introduction

Wireless sensor networks consist of a large number of low-power, small, and inexpensive sensor nodes that are usually scattered in dangerous and uncontrolled environments. Each of these scattered sensor nodes has the capabilities to monitor environment, sense phenomena, collect data, and route the aggregated data to the base station (often referred to as the *sink*) and to the end users for further operation (Akyildiz, 2002) (Yick, 2008). Data are routed back to the end user by a multi-hop infrastructure-less architecture through the sink. Wireless sensor networks are used in many applications, such as environmental monitoring, military and battlefield applications, agriculture, and health (Akyildiz, 2002) (Yick, 2008).

There have been several routing protocols proposed for wireless sensor networks that can be examined in the four groups, including data-centric protocols, hierarchical protocols, location-based protocols, and QoS-based protocols. In the general case, given that sensors are energy-constrained and most of the node energy is consumed by a transceiver unit, an efficient approach for transmission management can increase network lifetime. The most modern radio transceivers can adjust their transmitting power, so the sink can be reached either via a large number of smaller hops (called the *multi-hop approach*) or direct communication (called the *single-hop approach*). Comparing these approaches according to power consumption, it is obvious that multi-hop approaches are more efficient than single-hop approaches. Besides energy efficiency, single-hop techniques have some advantages, such as lower end-to-end delay, and lower packet loss (Fedor, 2007). The result of past researches shows that the conventional protocols of single-hop, minimum-transmission-energy, and multi-hop approaches may not be optimal for sensor networks. Thus for decreasing energy consumption, it is best to have a few nodes responsible for transmitting all data to the base station. Therefore, sensors nodes are grouped into disjoint and mostly non-overlapping clusters where each cluster has a leader node to communicate with the sink often referred to as the Cluster Head (CH). Clustering techniques increase scalability, facilitate fault and security management and balance energy consumption (Abbasi, 2007). Recently, a number of clustering algorithms such as LEACH (Heinzelman, 2002), EEHC (Bandyopadhyay, 2003), HEED (Younis, 2004), and DWEHC (Ding, 2005) have been introduced for wireless sensor networks. Clustering algorithms depend on node deployment and bootstrapping schemes, the pursued network architecture, the characteristics of the cluster head nodes, and the network operation model. A cluster head may be elected by the sensors in a cluster or pre-assigned by the network manager. A cluster head may also be just one of the sensors or a node that is richer in resources. However, LEACH outperforms

classical clustering algorithms by using adaptive clusters and rotating cluster heads, allowing the energy requirements of the system to be distributed among all the sensors. In addition, LEACH is able to perform local computation in each cluster to reduce the amount of data that must be transmitted to the sink. This achieves a large reduction in energy dissipation, as computation is much cheaper than communication.

The numbers of deployed sensors are many and their location is not predetermined. This specification offers the possibility to deploy sensors in dangerous and inaccessible environments, such as enemy territory. Since sensors are applied in uncontrolled environments, they are highly vulnerable to failure, which relates to wireless sensor network reliability alleviation. Therefore, failure detection, diagnosis, and discarding faulty sensors from the network are all necessary measures (Chenglin, 2011). Otherwise, such faulty sensors are used as intermediate nodes that lead to packet loss and incorrect routing in the network (Lee, 2010) (Choi, 2009). The most common causes of fault in wireless communications are noise in electronic amplifiers, electromagnetic interaction (EMI), lighting, and environmental factors such as temperature, dust, and equipment wearing. Hardware failure and battery completion are examples of permanent faults (Asim, 2008) (Babaei, 2001). In wireless sensor networks, every node has one of two states either faulty or fault-free (Jiang, 2009) (Chessa, 2002). Faults in wireless senor networks can occur in hardware or software and at various levels of the network. Hardware faults can be created due to undesirable performance of component circuits; software faults occur due to bugs in software of sensors (Krunic, 2007). According to researchers' investigations, major causes of wireless sensor network failure are follows:

- Node-level failure: Sensor nodes fail due to battery depletion, poor hardware or software performance of the node, or undesirable environmental conditions.
- Network-level failure: The instability of links among sensors in the network relates to the dynamic changes in network topology and causes network-level failure.
- Sink-level failure: Sink failure relates to heavy network failure. Error existence in sink-level software saves and processes data and relates to a huge amount of data loss and failure creation (Ssu, 2002).
- Failures caused by enemies: Because wireless sensor networks are implemented for critical applications, enemies' attacks may relate to the node-level failure and consequently network failure. Lack of infrastructure and the broadcasting nature of wireless communications open a possibility for enemies to intrude on the network and influence a node's performance in routing and data aggregation.

In general, failures are examined in two terms: timing and communication structure. With regard to the timing, faults are divided into three groups: transient faults, intermittent faults, and permanent faults. Transient faults occur just for a moment, and automatically disappear with passing time. Intermittent faults are similar to transient faults but will be repeated at certain time intervals. Permanent faults remain in the node and the node cannot be restored to its desired condition. With regard to the communication structure, faults are divided into two groups: environmental faults and nodes faults.

Permanent faults can occur in cluster head nodes and non-cluster head nodes. Creation faults in non-cluster head nodes are not as important as creation faults in cluster head nodes in wireless sensor networks, given that faulty non-cluster head nodes do not have high impact on the whole network operation or on other nodes' data. When a fault occurs in cluster heads, it causes the whole intra-cluster communications to be inactive and significantly decreases network accessibility. Thus fault management in cluster-heads must be controlled carefully (Asim, 2008) (Lai, 2007).

Faults in nodes of wireless sensor networks can be divided into two types: hard fault and soft fault. In hard faults, one of the main components of the node has a failure and this node cannot communicate with other nodes; however, in soft faults, the faulty node can communicate with other nodes but aggregated and transmitted data is incorrect (Mahapatro, 2011).

In general, sensor nodes may experience two types of faults that would lead to the degradation of performance such as function and data faults. In functional faults typically lead to disorder in operation of sensor nodes, packet loss, incorrect routing or it is maybe that provided data by sensors do not reach to the sink. In the data fault, nodes behave normally in all aspects except for their sensing results, leading to either significant biased or random errors. Several types of data faults exist in wireless sensor networks. Although constant biased errors can be eliminated after applying calibration methods, random and indefinite biased errors cannot be compensated by a simple calibration function (Guo, 2009) (Warriach, 2012).

Faults in sensor nodes, in terms of quantifying, are classified in three categories: minor faults, major faults and catastrophic faults. In minor

faults, only a limited number of the sensor nodes have crashed. These faults do not significantly reduce network operation. In major faults, some of nodes have crashed and lead to preventing some reports from reaching the sink. In catastrophic faults, a large number of sensor nodes have crashed and no reports reach the sink (Paoli, 2003). There is another fault type called Common Mode Failure (CMF) in wireless sensor networks. Common mode failure is the result of an event which, because of dependencies, causes a coincidence of the failure states of components in sensor nodes, leading to the network failing to perform its intended function. In this type of failure, a large number of sensor nodes have simultaneously crashed due to destructive environmental factors such as firelight, and dust (Gangloff, 1974). Most fault detection methods that are based on comparing data from a sensor node with its neighbor's data cannot detect this fault type because data of sensors are the same even when the sensors are faulty.

Fault management comprises three stages in wireless sensor networks: 1) fault detection and fault diagnosis; 2) localization and determining the exact location of faulty nodes; 3) removing faulty nodes across the network (Yu, 2007). Chen et al. (Chen, 2006) and Lee et al. (Lee, 2008) proposed fault detection algorithms for wireless sensor networks that use majority vote and are not able to detect CMF.

In this paper, we propose a new method to solve the problem of majority vote. Our method can also detect the faulty sensors with high Detection Accuracy (DA) and low False Alarm Rate (FAR), and exclude the faulty sensors from the network. In the proposed method, a certain status happens; each status is separately. We also use query messages to solve the problem of incorrect decision.

The rest of this paper is organized as follows. Related works are presented in section 2. In section 3 definitions and assumptions will introduce that are used in description of proposed method. Details of the proposed method and the diagnosis of fault type approach in the proposed method are discussed in section 4. Section 5 delineates the network model. Section 6 provides an evaluation on the simulation results. Finally, in section 7, we conclude the paper and discuss future research plan.

2. Related Works

In this section, we introduce some common algorithms and the proposed methods for fault detection. The fault detection techniques can be divided into two types: centralized fault detection techniques and distributed fault detection techniques (Hyun, 2012). In the centralized approaches, a sensor node, monitors and traces failed or misbehaved nodes in the network. This node can be the sink, a central controller, or a node as network manager (Huang, 2011), which has unlimited resources, high reliability, and high performance and is able to perform a wide range of fault management maintenance. In this method, the central node receives status messages from other nodes and uses these messages to detect the faulty nodes. These approaches are efficient for some applications, but are not applicable for large-scale networks. Centralized fault detection techniques generate too much useless network traffic around the manager node, which results in a waste of the limited network energy. Finally, in these techniques, choosing a manager node is too complicated to be used in energy-critical wireless sensor networks (Huang, 2011). In distributed fault detection techniques, the main goal is for all nodes to be associated in the fault detection process. Thus the more nodes cooperate in the fault detection process, and the less status information needs to be sent to the central node. So, energy consumption will be decreased (Hsin, 2005). These fault detection techniques are carried out in the following two ways: coordination with neighbor nodes (Chen, 2006) (Lee, 2008) (Ding, 2005) and use of clustering techniques (Asim, 2008) (Lai, 2007) (Shell, 2010).

Fault detection techniques in terms of detection ability, are classified in two groups (Yu, 2007): explicit fault detection techniques and implicit fault detection techniques. The explicit methods are able to detect the misbehavior or malfunction of nodes. For this purpose, the sensed data is compared by a sensor against a predetermined threshold or the average of its neighbors' data. According to the comparison results, faulty nodes will be recognized. In general, explicit fault detection techniques can recognize soft faults. The implicit fault detection methods only detect nodes that cannot communicate with other nodes. In general, these techniques can recognize hard faults.

Fault detection methods, in terms of network test time, are dived in two groups (Yu, 2007): offline fault detection methods and online fault detection methods. Offline fault detection methods are used by traditional wired networks. In these methods, when the network is working normally, the network manager does not perform any action for the fault detection. But as soon as the network should be in idle mode, the special and complex fault detection programs are used to detect available faults; if detection and correction are possible, recovery mechanism will correct faults in network automatically. Online fault detection methods called real-time fault detection methods use some procedures to detect existence faults or any external disturbing factors during network operation. These

methods are more suitable for wireless sensor networks.

Fault detection and fault tolerance algorithms for wireless sensor networks have been investigated in (Guo, 2009) (Lee, 2008). Guo et al. (Guo, 2009) have proposed a novel method called FIND to discovering data faults that uses metric of ranking difference. Since measured signal attenuate with increasing the distance, the sensor nodes in FIND method after that sense an event, ranked according to the their distance from the event. A node is identified as faulty node if there is a significant difference between the sensor data rank and the distance rank. In this paper was proved that average ranking difference is a provable indicator of possible data faults. In that paper Byzantine data faults with either biased or random error are considered and simulation results and test bed experiment results demonstrate that the FIND achieves low false alarm rate in various network settings. Using redundant mobile sensors to discard faulty nodes from the wireless sensor network was presented in (Mahapatro, 2012). This algorithm has two primary steps: in the first step, the location of the mobile redundant sensors is determined and then the next step uses cascade movements for faulty sensor replacements in the network. There is also a distributed approach for finding the best replacement route for energy consumption decrement in such networks. In (Luo, 2006), a distributed fault detection algorithm for wireless sensor networks is presented. In the mentioned algorithm for achieving a deterministic decision about sensor status, there are two steps of comparison among sensors. This method has few execution complications, and the probability of correct diagnosis is high. The cited algorithm needs to determine sensor geographical location and simply cover permanent faults; therefore, it ignores transient faults that can contribute to performance deviation. Gao et al. (Gao, 2007) have proposed a weighted majority vote based scheme for online distributed detection of faulty sensor, where spatial correlation are used to diagnosis the faulty sensors. In this method each sensor can diagnose itself through using the spatial and time information provided by its neighbor sensors. Lee et al. (Lee, 2008) have investigated transient faults in sensing and communication in wireless sensor networks.

Ding et al. (Ding, 2005) presented a local approach to fault detection. In this method, if information for each node had a significant difference with the mean data value of neighbor nodes, it would be diagnosed as a faulty node. This method will be useful when the probability of a node being faulty is low. If the number of faulty nodes is greater than the number of fault-free nodes, this algorithm will not be able to detect faulty nodes correctly. This approach needs to determine the geographical location of sensors using General Positioning System (GPS) or other methods. Due to high cost and high power consumption in GPS, this location finding system is unsuitable for wireless sensor networks.

Chen et al. (Chen, 2006) have proposed a new distributed fault detection algorithm for wireless sensor networks, wherein sensors do not need any awareness of their geographic location. In this algorithm, to reach the final decision on the status of sensors, comparison is performed twice between the information of sensors; as well, four steps have to be done and modified majority voting is used. In this method, two predetermined threshold values, marked up by $\theta 1$ and $\theta 2$, are used. Each sensor compares its own sensed data with information of neighbors in a time stamp t; if the difference between them is greater than $\theta 1$, the comparison will repeat in time stamp t+1; if the difference is greater than $\theta 2$, too, it means that information of this node is not similar to information of neighbor nodes. In the next step each sensor defines its own status as Likely Good (LG) if its own sensed data is similar to at least half of neighbors' data. Otherwise the sensor status will be defined as Likely Faulty (LF). In the next step each sensor can determine its own final status according to the assumption that the sensor status is GOOD (GD) if it determined its status as LG in the previous step and more than half of the neighbors are LG. Then sensors whose status is GD broadcast their status to their neighbors. The sensor that undetermined their status can determine their status using status of neighbors. The sensor whose status is defined LG and receives GD status from its neighbor whose own sensed data is similar to the data of the sender of this message, changes its status to GD. So the sensor whose status is defined LF and receives faulty status from its neighbor whose own sensed data is similar to the data of the sender of this message, changes its status to faulty. The algorithm complexity is low and the probability of detection accuracy is very high. This algorithm only detects permanent faults while transient faults are ignored, although these types of faults may occur in most of the nodes.

Lee et al. (Lee, 2008) proposed a distributed fault detection algorithm for wireless sensor networks that is simple and has high accuracy detection in identifying of faulty nodes. This approach uses time redundancy for increasing transient faults tolerance. In this method, two predetermined threshold values marked up by $\theta 1$ and q are used, in the algorithm, every node compares q times its own sensed data with data from its neighbor nodes in order to determine whether its data are similar to the data of neighbors or not. In the next step, the sensor status

will be defined as fault-free if its sensed data is similar to at least θ1 of the data of neighbor nodes. Each sensor whose status is determined will broadcast its status to undetermined sensors that define its status. Simulation results of this paper researchers show that the fault detection accuracy of this algorithm would decrease rapidly when the number of neighbor nodes is small, but fault detection accuracy is high when the number of neighbor nodes is high. The disadvantage of this algorithm is that it is not able to detect common mode failures.

Lai et al. (Lai, 2007) proposed a distributed fault tolerant mechanism for wireless sensor networks. It is called Cluster Member bAsed fault-TOlerant mechanism (CMATO). In CMATO, the non-cluster head nodes are responsible for detecting faulty cluster head nodes. In this mechanism, each node monitors the links between itself and its cluster head and eavesdrops on the data transmissions of the neighbors' cluster heads. If a certain percentage of nodes recognize that the cluster head has crashed, they will broadcast a cluster head-failed message to alert other nodes in the cluster. When the nodes receive this message, all nodes wake up and enter to recovery phase.

As mentioned above, most fault detection algorithms in wireless sensor networks compare their own sensed data with data of neighbor nodes. If their data is similar to at least half of the data sensed by neighbors, the cited sensor is fault-free. Fault detection methods based on comparison have several deficiencies. They are unable to detect faulty nodes in remote areas where sensors do not have any availability to data of neighbor nodes in their transceiver boards. The low functionality of algorithms in common mode failure detection is another problem of these techniques. Therefore, in this paper we propose a distributed method that can detect faulty nodes and reduce problems of majority vote in algorithms.

3. Definitions and assumptions

The In this section, we first give some definitions for the variables and assumptions that are used in the proposed method.

Definitions:

We list the notations used in our algorithm and analysis below.

- n: total number of sensors;
- p: probability of failure of a sensor S_i;
- k : number of received information packets from a sensor S_i;
- S: set of all the sensors as $S = \{S_1, S_2, \ldots\ldots S_n\}$;
- $\theta 1$ and $\theta 2$: two predefined threshold values;
- A : a two-row matrix;
- CH: set of all cluster heads as $CH = \{CH_1, CH_2, \ldots\ldots CH_v\}$;
- $N(CH_i)$: set of the non-cluster head nodes when CH_i is cluster head;
- T_i : tendency value of a sensor, $T_i \in \{P-F, I-F, T-F, GD\}$;
- *T-counter:* counts the correct packets;
- *F-counter:* counts the incorrect packets;
- W: number of neighbor sensors.

Assumptions:

According to the simulated model, the network has the following assumptions:

- All nodes have been uniformly distributed in a square area.
- Each node has a unique identifier.
- Each node has a fixed location and knows its geographic coordinate (x, y).
- The sensor nodes have the same transmission range.
- Transmission energy consumption is proportional to the distance of the nodes.
- All deployed sensor nodes are fault-free in the distribution phase.

4. Proposed method

Given that the sensor nodes are deployed in harsh environment and influence of destructive environmental factors on operation of these sensors, they are so vulnerable to failure, which relates to wireless sensor network reliability alleviation. Therefore, monitoring the operation of the sensor nodes is necessary. For this purpose behavior of each sensor must be controlled to detect of any failure, location of faulty sensors must be determined, and discard the faulty nodes in order to faulty sensors do not affect in normal operation of the network. These operations together called fault management. Most of the existing fault management techniques based on majority vote. As mentioned before the techniques based on majority voting cannot detect common mode failures and do not work correctly when the more than half of the sensors are faulty. Thus in this section we intend propose a novel method that solve the above-mentioned problem in clustered wireless sensor networks as far as possible.

In wireless sensor networks, fault tolerance phases are implemented at four levels of abstractions, such as hardware, system software, middleware and applications (Koushanfar, 2004). In this paper, we focus on hardware-level faults. We suppose that the sensor nodes are able to send, receive, and process the data even although they are faulty. In the proposed method, all nodes have been clustered by LEACH (Heinzelman, 2002) algorithm as shown in Figure 1. In the next step, cluster heads collect data

from their non-cluster head nodes; all nodes divide into two groups by comparing their majority vote with the threshold.

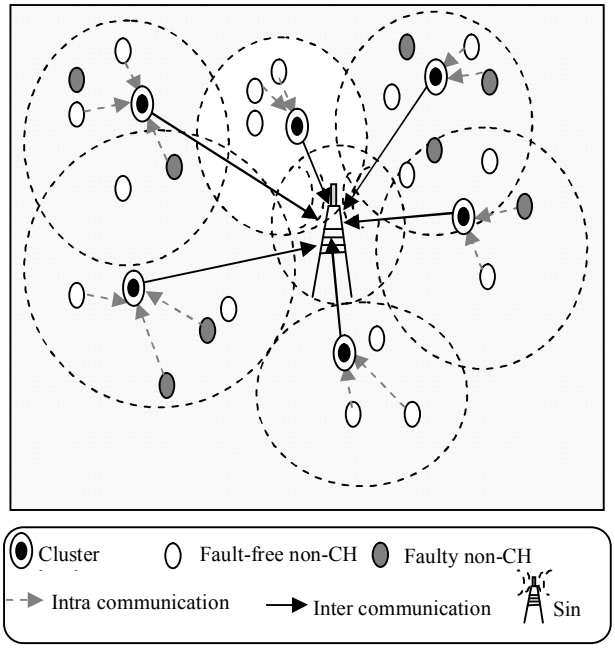

Figure 1. Clustered assumed network by LEACH algorithm

In all clusters, each group that has more nodes is identified as a fault-free group, while each group that has fewer nodes is identified as a faulty group. Cluster heads send the aggregated data from fault-free nodes to the sink. We describe this approach with a simple example. We are assuming that the presumptive network in Figure 1 is used for measuring environmental temperature. If the environmental temperature is β degrees, the acceptable error range will be in [-α, α]. In an environment and under normal conditions temperature differences cannot be more than α degree. The largest number of nodes whose measured temperature T are in the $\beta-\alpha \le T \le \beta+\alpha$ range recognized as fault-free group by cluster head, as β is calculated by equation 1.

$$\beta = \frac{\sum \text{Received temperature of sensor nodes}}{\text{Number of sensor nodes in cluster}} \quad (1)$$

The other nodes whose measured T for environmental temperature is not in the $\beta - \alpha \le T \le \beta + \alpha$ range are recognized as faulty nodes and the final decision is executed by majority vote. Because the proposed method is based on majority vote and the minority nodes are recognized as faulty nodes and their sensed data ignored and masked, our decision may not be true if the number of faulty nodes is greater than the number of fault-free nodes and we mistakenly adopt an incorrect conclusion. To solve the problem of incorrect decisions, we use query messages (Gehrke, 2004). The researcher's evaluation shows that a sensor will be diagnosed as fault-free in the first step if it has less than $W/5$ faulty neighbors. The probability of a sensor being diagnosed as fault-free in the first step of iteration is calculated by equation 2:

$$\sum_{i=0}^{i=\lfloor w/5 \rfloor} \binom{w}{i} p^i \quad (1-p)^{w-i} \quad (2)$$

Where i is the number of faulty neighbor nodes.

In the proposed approach the following cases may occur in each cluster. Figure 2 shows all cases of the proposed method.

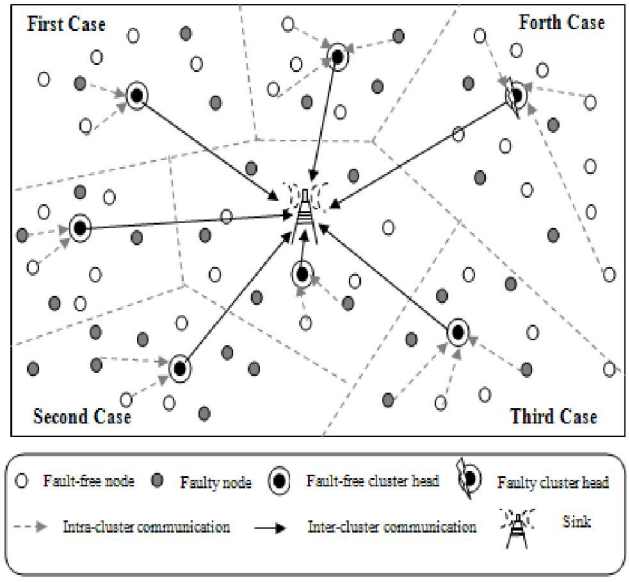

Figure 2. Example of network in four cases

I) First case: In this case, the cluster head is fault-free and the number of fault-free nodes is greater than the number of faulty nodes. Figure 2 shows this case. In this case, as with majority voting, the cluster head decides according to the information of fault-free nodes and removes the faulty nodes according to the algorithm that will be described in the next section. But there is a problem in that it does not determine fault-free nodes with certainty. Due to using majority voting to decide node status, it may be that nodes are not really fault-free. The proposed solution is to send two query messages to both groups of nodes in the cluster. The cluster head divides nodes into two groups in each cluster, and then randomly transmits these query messages to a non-cluster head node in each

group. Each non-cluster head, after receiving query, replies its answer. The cluster head realizes its own decision according to the nodes' replies. If the nodes are in a fault-free group and reply correctly, the cluster head realizes that the nodes must be fault-free and its decision was correct; otherwise, the nodes are faulty.

In this case, suppose that $T = |N(Si)|$; the probability of a fault-free node diagnosed as fault-free node is calculated by equation 3.

$$P_{g|Case\ 1} = (1-p)\sum_{j=0}^{\left\lceil \frac{T}{2} \right\rceil -1} \binom{T}{j} p^{j}(1-p)^{T-j} \quad (3)$$

II) Second case: Figure 2 shows the second case, where the cluster head is fault-free and in the cluster the number of faulty nodes is greater than the number of fault-free nodes. According to the proposed strategy and using majority voting, the cluster head will make its decision based on information from faulty nodes, so that the information it sends to the sink will be incorrect. In this case, the cluster head sends two query messages to both groups of nodes. The cluster head realizes its decision according to the nodes' replies. Then, faulty nodes records will be removed from the cluster head database. Cluster heads act according to the remaining nodes in each cluster. After renouncing faulty nodes if the numbers of nodes in clusters was lower than a certain number, the network will be re-clustered again.

In this case, the probability of a faulty node diagnosed as a fault-free node is calculated by equation 4.

$$P_{g|Case\ 2} = (1-p)\sum_{j=0}^{\left\lceil \frac{T}{2} \right\rceil -1} \binom{T}{j} (1-p)^{j} p^{T-j} \quad (4)$$

III) Third case: As shown in Figure 2, cluster head is a fault-free node and in the cluster the number of faulty nodes is equal to the number of fault-free nodes. The cluster head randomly selects one group of nodes and decided in accordance with information from selected nodes. Thus the possibility that selection has been carried out correctly is 50%. Again to ensure the correctness of decision, two query messages will send to both groups of nodes. We can recognize the fault-free nodes and reach a definitive decision according to the replies of these groups.

In this case, the probability of a fault-free node diagnosed as a fault-free node is calculated by equation 5.

$$P_{g|Case\ 3} = p\sum_{j=0}^{\left\lceil \frac{T}{2} \right\rceil -1} \binom{T}{j} p^{j}(1-p)^{T-j} \quad (5)$$

IV) Fourth case: In the last case, the cluster head is faulty and transmitted information to the sink will be incorrect. Although most of the nodes are fault-free and obtained information is sensed from the fault-free nodes, a faulty cluster head causes incorrect decision and mistaken aggregation. Our suggestion to solve this problem is using a query message that is repeatedly transmitted from the sink to control the status of cluster heads. If a cluster head replies with an incorrect answer, the sink will broadcast a "CH-failed" message to all nodes in the cluster. Then, non-cluster head nodes try to select a new cluster head and they become a member of the selected cluster head. The new cluster head sends its identifier to the sink and the record of the cluster head is updated by new received information. This procedure repeats until cluster head energy level is less than a determined threshold and new cluster head selection is done by member nodes.

In this case, the probability of a faulty node diagnosed as a fault-free node is calculated by equation 6.

$$P_{g|Case\ 4} = \sum_{j=0}^{\left\lceil \frac{T}{2} \right\rceil -1} \binom{T}{j} (1-p)^{j} p^{T-j} \quad (6)$$

Accordingly, each cluster is divided into two groups of fault-free and faulty nodes. Thus in all mentioned cases, two query messages have been sent. We suggest that instead of two query messages in each cluster we can randomly send only one query to one group and analyze its response. Sending a query instead of two queries lead to decrease the number of query messages and increase the network lifetime. Thus, we can recognize the faulty group or the fault-free one. If *m*, *n*, *E* are, respectively, the number of fault detection process, the number of clusters in network, and energy consumption for sending a query message, we will save *m*n*E* nJ energy in each round.

Those methods where the sink is responsible for fault detection and network management will be efficient for some applications especially for small network, but not suitable for large-scale networks. The other disadvantage of these methods is that network management performed as centralized and sending status messages from all nodes to a one

network management point tend to increase network traffic. On the other hand, status messages forwarded hop-by-hop and by neighboring nodes increase energy consumption in nodes that are closed to the sink. But our proposed method does not have any of mentioned disadvantages.

5. Diagnosis of fault type in the proposed method

The main point that must be attended in all mentioned cases is that the node may be fault-free and it may correctly sense and send data, but environmental interference will have an effect on wireless links and cause erroneous transition of packets. This problem may occur either in cluster head information (when it is in transition between the cluster head and the sink) and in non-cluster head information (when it is in transition between the non-cluster head and the cluster head). Also, destructive factors or external environmental factors may lead to transient, intermittent, or permanent faults in sensor nodes. For perform appropriate recovery mechanism must fault type diagnosed correctly. For this purpose, we can accomplish this goal by following the proposed procedure.

The considerable problem in diagnosing of the fault type is that destructive factors such as environmental disturbance may have repeated, long term effects on the network. Most of the existing diagnosis techniques recognize these fault type as transient fault that repeat in certain intervals. This fault type is so-called intermittent fault. We reset the proposed diagnosis technique after a period of time to solve the mentioned problem, such that our proposed method can distinguish between transient and intermittent faults.

In the proposed method, we assume that there is a record for each cluster head in the sink database and there is a record for each non-cluster head in the cluster head database to recovering mechanism. The format of these records is shown in Figure 3.

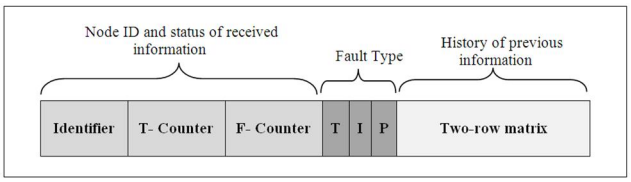

Figure 3. Format of records in the sink and in the cluster head database

Each record includes node ID and status of the received information partition, fault type partition, and history of previous information partition. The node ID and status of received information partition are made up of three fields that we introduce as follows:

- Identifier (ID): contains identifier of cluster head or identifier of non-cluster head.
- T-Counter: used for saving the number of correct received information. The default value is zero.
- F-Counter: used for saving the number of times for which received information is incorrect. The default value is zero.

The fault type partition is made up composed of three fields, as follows:

- T, I, P: These fields determine the fault type that has occurred. T, I, and P are defined as transient, intermittent, and permanent faults respectively. The default value for these fields is zero.
- When the value of field p in the record of each node is equal to '1', that node will be recognized as faulty and its record will be removed from the database. As a result, after this removal, the information of this node is not saved and does not have any effect on cluster head decision. After renouncing the faulty nodes if the number of nodes was lower than a certain number, the network will be re-clustered again.

The history of the previous information partition is a two-row (2-R) matrix. The received information from a node over a previous certain time are checked and number of their repetition are stored in this matrix. Diagnosis of the fault type is performed using the existing information in this matrix per the following:

In the first step, the received information from a sensor node is counted and classified. If the received information from a node is correct, the T-Counter value according to this node will be increased one unit. This procedure continues while the received information is correct. Once the received information is incorrect, T is inserted in the first position of the first row of the 2-R matrix and the T-Counter value is inserted in the first position of the second row of the 2-R matrix. The T-Counter value is also set to '0'. As long as the received information is incorrect, the F-Counter value increases one unit. Once the received information is correct, F is inserted in the second position of the first row of the 2-R matrix, and the F-Counter value is inserted in the second position of the second row of the 2-R matrix. The F-Counter value is also set to '0'. Figure 4 shows the pseudo-code that is used for classifying the received information. In the next step, this classified information is used for diagnosing the fault type.

In the second step, all numbers of the second row of the 2-R matrix are added together and the sum is set to variable *K*, whose initial value was zero. In other words, *K* shows the total times for which information is received.

Step 1:
Each CH_i classifies the received information from a $S_j \in N(CH_i)$ using the following procedure:

Each CH_i sets *T-Counter* = '0' & *F-Counter* = '0'
L1: While time < $\theta 1$
Read information
While received information is "*True*"
***T- Counter* = *T-Counter* + 1**
A[2][++j] = *T- Counter* & A[1][++j] = 'T' & *T-Counter* = '0'
While received information is "*False*"
***F-Counter* = *F-Counter* + 1**
A[2][++j] = *F-Counter* & A[1][++j] = 'F' & *F-Counter* = '0'
Go to L1

Figure 4. Pseudo-code for classifying the received information in the cluster heads

Step 2:
Each CH_i diagnoses the status of each node $S_j \in N(CH_i)$ using the following procedure:
If the last cell of the first row of A is *'F'* & the last number of the second row of

$$A > \frac{\sum_{i=1}^{w} A[2][i]}{2} + 1$$ **then**

***T_i=P-F* // this sensor is permanent faulty**
If in the first row of A, *'T'* and *'F'* are alternatively stored, and the difference between values of the second row is not greater than $\theta 2$ Then
***T_i=I-F* // this sensor is intermittent faulty**
If the first row of A is filled with *'T'* then
***T_i = GD* // this sensor is fault-free else**
***T_i=T-F* // this sensor is transient faulty**

Figure 5. Pseudo-code for diagnosing fault types

In the third step, the fault type is diagnosed as follows:

I) If the last cell of the first row of the 2-R matrix is F and the value of the last cell in the second row of the 2-R matrix is equal to or greater than *[K/2] +1*, the fault type is permanent and cannot be resolved. Field P, related to this node, is set to '1'. According to the recovery algorithm, the record of this node will be removed from the database of the sink or cluster head.

II) If the values of the second row of the 2-R matrix are alternately equal or have less difference between them, the fault type is intermittent and the field I, related to this node, is set to '1'.

III) If only one position of the first row of the 2-R matrix is filled and it is T, it means that all received information is correct and the sink or cluster head will recognize this sensor node as fault-free.

IV) Otherwise, the fault type will be transient and field T, related to this node will be set to '1'.

Figure 5 shows the pseudo-code used for identifying the fault type.

6. Network model

We simulate our proposed method in MATLAB software. In this simulation, 512 sensors are randomly deployed in a 100×100 square-meter area and we assumed that the sink is at the center of the area, with coordinates of (50, 50). The simulation is repeated in 1,000 cycles and energy consumption is calculated on the basis of table 1.We assume a simple model for radio hardware energy dissipation, where the transmitter dissipates energy to run the radio electronics and the power amplifier, and the receiver dissipates energy to run the radio electronics, as shown in Figure 6.

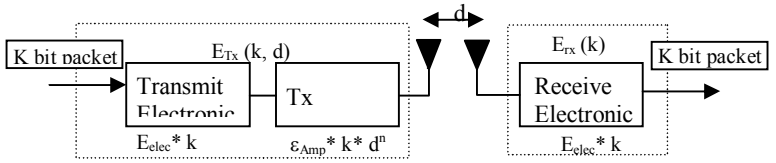

Figure 6. Radio energy dissipation model

For the experiments described here, both the free space (d^2 power loss) and the multi-path fading (d^4 power loss) channel models were used, depending on the distance between the transmitter and receiver (Heinzelman, 2002). Thus, the energy consumption for transmitting a packet of l bits over distance d is calculated by equation 7.

$$E_{Tx}(l,d) = E_{Tx-elec}(l) + E_{Tx-amp}(l,d) = \begin{cases} lE_{elec} + l\varepsilon_{fs} d^2 & d < d_0 \\ lE_{elec} + l\varepsilon_{amp} d^4 & d \geq d_0 \end{cases} \quad (7)$$

Power control can be used to invert this loss by appropriately setting the power amplifier. If the distance is less than a threshold d_o, calculated by equation 8, the free space (fs) model is used; otherwise, the multi-path (mp) model is used.

$$d_0 = \sqrt{\frac{\varepsilon fs}{\varepsilon mp}} \quad (8)$$

Energy consumption to receive a packet of l bits is calculated according to equation 9.

$$E_{Rx}(l) = E_{Rx-elec}(l) = lE_{elec} \quad (9)$$

Table 1. Radio characteristics used in simulations

Parameters	Values
Transmitter/Receiver Electronics	E_{elec}= 50 nJ/bit
Data Aggregation	E_{DA}=5 nJ/bit/signal
Transmit Amplifier (if dmax to BS < d0)	$\mathcal{E}_{fs}$=10 pJ/bit/m^2
Transmit Amplifier (if dmax to BS ≥ d0)	$\mathcal{E}_{mp}$=0.0013 pJ/bit/m^4
Data Packet Size	8192 bits
d_0	87 m
Initial energy of each sensor	3 Joules
Number of cycles	1,000 Cycle

We suppose the sensor nodes to be faulty with probabilities of 0.05, 0.10, 0.15, 0.20, and 0.25. Average numbers of neighbor nodes are assumed to be 7, and 10, respectively.

7. Simulation results and evaluation

We evaluate our proposed method's efficiency with Lee and Chen algorithms in terms of Detection Accuracy (DA) and False Alarm Rate (FAR) parameters. The DA is defined as the ratio of the number of detected faulty nodes to the total number of faulty nodes, while FAR is defined as the ratio of the number of fault-free nodes that are detected as faulty node to the total number of fault-free nodes. On the other hand, suppose that α denotes the number of faulty sensors that are diagnosed as faulty in the network; thus, the correction accuracy can be represented as $\frac{\alpha}{np}$. Similarly, suppose that β denotes the number of fault-free nodes that are diagnosed as faulty. Thus the false alarm rate is represented as $\frac{\beta}{n(1-P)}$. Figures 7 and 8 respectively show the simulation results by DA with the average number of neighbor nodes of 7 and, 10 for each node.

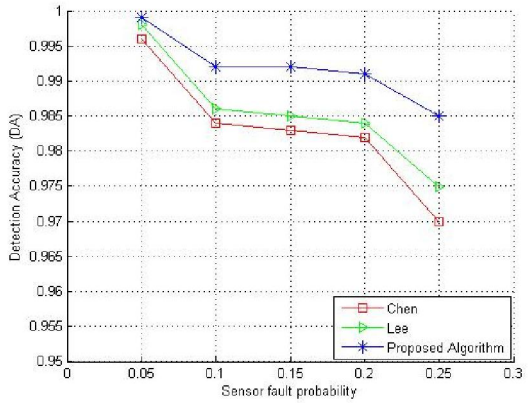

Figure 7. DA of in the proposed method for *W=7*

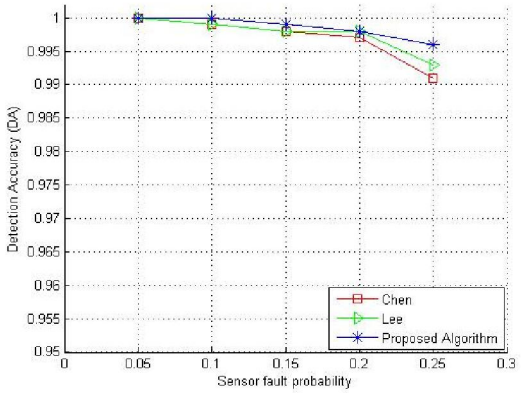

Figure 8. DA of the proposed method for *W=10*

If the probability of a node being faulty is 0.1 and each node has an average of 7 neighbor nodes, the Lee and Chen algorithms will respectively have DA equal to 0.986 and 0.984, but the DA in the proposed method will be 0.992. Thus, if the probability of a node being faulty is 0.25, the Lee and Chen algorithms will respectively have DA equal to 0.975 and 0.97, but the DA in the proposed method will be 0.985. Similarly, as shown in table 2, when each node has an average of 10 neighbor nodes if the probability of a node being faulty is 0.1, the Lee and Chen algorithms yield DA equal to 0.999, but the DA in the proposed method will be 1. If the probability of a node being faulty is 0.25, the Lee and Chen algorithms will respectively have DA equal to 0.993 and 0.991, but the DA in the proposed method will be 0.996. In general, when the probability of a node being faulty increases, the DA in the proposed method will increases more the Lee and Chen algorithms. Table 2 shows the numerical values of the comparison results.

Table 2. DA in the proposed method, compared to the Chen and Lee algorithms

P	Algorithms					
	Chen	Lee	Proposed algorithm	Chen	Lee	Proposed algorithm
0.05	0.996	0.998	0.999	1.0	1.0	1.0
0.1	0.984	0.986	0.992	0.999	0.999	1.0
0.15	0.983	0.985	0.992	0.998	0.998	0.999
0.2	0.982	0.984	0.991	0.997	0.998	0.998
0.25	0.97	0.975	0.985	0.991	0.993	0.996
	W=7			*W*=10		
	Average number of neighbor nodes					

Figures 9 and 10 show comparisons of the proposed method with the Chen and Lee algorithms in terms of FAR respectively, with average number of neighbor nodes of 7 and 10 for each node.

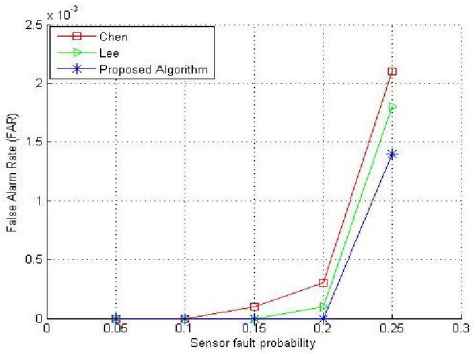

Figure 9. FAR of the proposed method for *W=7*

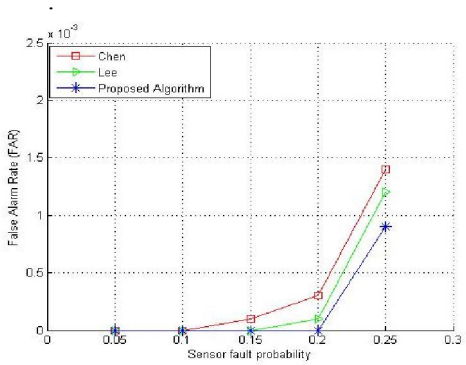

Figure 10. FAR of the proposed method for *W=10*

If the probability of a node being faulty is 0.15 and each node has an average of 7 neighbor nodes, the Lee and Chen algorithms will respectively have FAR equal to 0 and 0.0001, but the FAR in the proposed method will be 0. Thus, if the probability of a node being faulty is 0.25, the Lee and Chen algorithms will respectively have FAR equal to 0.0018 and 0.0021, but the FAR in the proposed method will be 0.0014. Similarly, as shown in table 3, when each node has an average of 10 neighbor nodes, if the probability of a node being faulty is 0.15, the Lee and Chen algorithms will respectively have FAR equal to 0 and 0.0001, but the FAR of the proposed method will be 0. If the probability of a node being faulty is 0.25, the Lee and Chen algorithms will respectively have FAR equal to 0.0012 and 0.0014, but the FAR in the proposed method will be 0.0009. In general, when the probability of a node being faulty increases, the FAR in the proposed method will decrease more than the Lee and Chen algorithms. Table 3 shows the numerical values of the simulation results.

In Figure 11, the average remaining energy in the proposed algorithm and in the Chen and Lee algorithms are compared. It is shown that in the initial rounds, the average energy of sensors in the proposed method decreases faster than the same in the Chen and Lee algorithms. This is because in the clustering process and cluster head selection in the proposed method many messages will transmit between sensor nodes, thus causing this reduction. Given that query messages will be sent in the proposed method to reach a definitive decision, energy consumption in the proposed method is greater than in the other mentioned methods. But after approximately 700 rounds we see that the average of remaining energy in the proposed method is higher than in the Chen and Lee algorithms. Therefore, at the end of 1,000 rounds, the remaining energy in the method algorithm will be greater than in the other algorithms discussed here.

Table 3. FAR in the proposed method, compared to the Chen and Lee algorithms

P	Algorithms					
	Chen	Lee	Proposed method	Chen	Lee	Proposed method
0.05	0.0	0.0	0.0	0.0	0.0	0.0
0.1	0.0	0.0	0.0	0.0	0.0	0.0
0.15	0.0001	0.0	0.0	0.0001	0.0	0.0
0.2	0.0003	0.0001	0.0	0.0003	0.0001	0.0
0.25	0.0021	0.0018	0.0014	0.0014	0.0012	0.0009
	W=7			*W*=10		
	Average number of neighbor nodes					

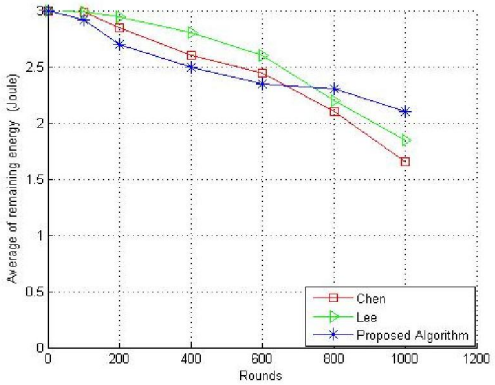

Figure 11. Energy consumption of the proposed method in comparison to the Chen and Lee algorithms

8. Conclusion and future works

Due to the failure of sensor nodes, fault tolerance in wireless sensor networks will decrease; thus, it is necessary to detect faulty nodes and exclude them from a network. In this paper, we have presented a new method to solve the problems of majority voting and also detect faulty sensor nodes with permanent faults with high DA and low FAR, as well as exclude them from the network by an appropriate approach. The proposed method can tolerate transient and intermittent faults in sensor reading and communication with negligible performance degradation. To investigate the

efficiency of the proposed approach, it was compared to the Chen and Lee algorithms. Simulation results showed that the proposed method demonstrate better performance across parameters such as DA and FAR, even with a large set of faulty sensor nodes. The researchers' evaluations also show that the proposed method decreases energy consumption and increases network life time and fault tolerance. In the future, we can use combination of this method with a learning automata technique for fault detection and for increasing network fault tolerance.

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11/16/2012

Efficiency of Pedigree Selection in Bread Wheat under Drought Stress Conditions. I. Morphological traits

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Abstract: Pedigree selection was practiced on two bread wheat populations, namely Debeira x Sahel 1 and Sids 6 x Sahel 1as a first and second population, respectively under drought stress conditions (at 12 % soil moisture content) in order to improve some morphological traits (plant height, spike length, no. of spikelets /spike and days to maturity). The obtained results revealed that all F_3 families in both populations were significantly affected by soil moisture content. Also, significant differences were found among families in F_4 and F_5 generations for both populations, except no. of spikelets / spike in F_4 generation for first population. The results showed that broad sense heritability (B.S.H) estimates were moderately in F_3 generation for both populations. Meanwhile, B.S.H estimates ranged from low to moderate /high for both F_4 and F_5 generations in two populations. Small differences were found between phenotypic and genotypic variability estimates (P.C.V.) and (G.C.V.) for all the three generations in both populations. Estimates of realized gains showed that a notable decrease was found after two cycles of pedigree selection in days to maturity by (-4.86, -9.52 and -6.18 %) and (-11.40, -11.40 and -7.89%) from the best parent, bulk sample and check variety in first and second population, respectively. Moreover, a notable increase was found after two cycles in plant height by (1.85, 8.23 and 6.60%) from the best parent, bulk sample and check variety in second population only. The families no. 29 and 30 gave superiority for spike length, spikelets no. /spike and days to maturity in population I. Concerning population II, families no. 22 and 25 gave superiority for plant height, spike length and days to maturity, while family no. 41 gave superiority for plant height, no. of spikelets / spike and days to maturity. Also, family no. 45 realized enhancement for spike length, no. of spikelets / spike and days to maturity. These families could be considered the best selected families produced from pedigree selection method for studied morphological traits.

[Abd-El-Haleem, S.H.M. Ehab M.R. Metwali and S.M.S. Mohamed. **Efficiency of Pedigree Selection in Bread Wheat under Drought Stress conditions. I. Morphological traits.** *Life Sci J* 2012;9(4):3423-3429]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 507

Keywords: Bread wheat, pedigree selection, morphological traits, genetic variance, drought stress conditions.

1. Introduction

Bread wheat (*Triticum aestivum* L.) is the most important cereal crop not only in Egypt but also all over the world, that play an important role in people's nutrition. The annual consumption of wheat grains in Egypt is about 14 million tons, while the annual local production in 2011 is about 8.5 million tons (Wheat Res. Dept., 2011). Therefore, increasing wheat production is an important goal to reduce the gap between production and consumption. This can be achieved by great continued efforts of wheat breeders and genetics. Effective improving planning depends not only on amount of variability among the diverse genotypes, but also on heritability for the traits under consideration. Breeders can reduce the required time for improving promising genotypes, if they have significant genotypic variability. Development of cultivars tolerant to drought is an objective in many breeding programs in dry and semi-dry regions. Drought usually is the most important a biotic stress that affects crop production. Agricultural drought as defined by (Van Bavel and Verlinden, 1956) is a condition that exists when there is insufficient water supply to meet crop water requirements. .However, the plant breeding for drought tolerance is difficult, long-term project and presents some problems such as complexity and quantitative inheritance of this trait, difficulty of founding some selection indices, and the lack of detailed physiological and genetic knowledge on drought stress (Borojevic, 1990). Breeding wheat cultivars with improved drought tolerance is challenged in adequate screening and tolerance quantification procedures. Successful breeding program will depend on the magnitude of genetic variation in the population (base population). Hence, selection for drought resistance and production of tolerant cultivars with high yield potential is the main

objective of breeding programs. The most efficient breeding methods and expected gain from selection depends not only upon the ratio between genetic variance and phenotypic one (heritability in narrow sense), but also on magnitude and the mode of gene effects i.e., additive, dominance and interactions between them for the studied traits (Alkaddoussi, 1996). Many researchers (Passioura, 1996; Richards, 1996 and Quarrie et al., 1999) believed that tolerance to drought stress must be done via genetic improvement of physiological traits. Heritability in broad sense should be recognized as the first step before starting any breeding program. Ismail et al. (2003) indicated that drought stress resulted in a significant reduction in yield components and vegetative attributes of durum wheat genotypes. Higher heritability was observed for plant height and its components. However, the heritability was in general found to lower under moisture stress conditions (Singh and Chaudhary, 2006). Meanwhile, high heritability (b.s.) for plant height was found under water stress (Abd El-Kareem and El-Saidy, 2011). The main objective of this study was to assess the response of two bread wheat populations to pedigree selection under water stress conditions.

2. Materials and Methods

The present study was carried out at The Experimental Farm, Fac. of Agric., Al-Azhar Univ., Assiut, Egypt during four successive winter growing seasons, 2004/05, 2005/06, 2006/07 and 2007/08 in order to estimate the response to pedigree selection under water stress conditions in early segregating generations of two bread wheat populations. The basic material used consisted of two F_2 populations of crosses established between three varieties, namely, Debeira, Sahel 1 and Sids 6. The first population was derived from the cross (Debeira x Sahel 1) and the second population was derived from the cross (Sids 6 x Sahel 1). The genetic parameters were estimated in F_3, F_4 and F_5 generations. The pedigree and origin of the three parents and the check variety are presented in Table (1). In the first season (Nov. 15th, 2004), 1000 plants from F_2 of each population were grown individual with non-replicated plants. Also, the parents and check variety (Sids 1) were sown in one row for each population; each row was 3 m. long and 0.30 m. wide having 30 plants. Grains were sown in clay loam soil at 10 cm. spacing with one grain per hill. The selection intensity was 10% for grain yield / plant. The 205 highest yielding plants from each population were selected.

Soil samples for moisture determination were taken down to 30 cm soil depth by soil auger. The samples were weighted and then oven dried. Percentage of soil moisture content was calculated on oven dry basis. The experiments were grown and given one surface –irrigation 30 days after planting irrigation (two irrigation were given through the whole season, the soil moisture content reached about 12 % which is considered moisture stress treatment) for all growing seasons. Some soil properties of The Experimental Farm are shown in Table (2). All the agronomic practices were applied as commonly used for growing wheat and carried out according to the recommendations set by the Ministry of Agriculture.

Table 1. The pedigree and origin of three parents and local check variety used of the two wheat populations.

Parental name		Origin	Pedigree
Population I	Debeira	HYBRID-DELHI-2160/5/TOBARI-66/CIANO-67//BLUEBIRD/3/NAINARI-60*2//TOM-THUMB/SONORA-	(India/Syria)
	Sahel 1	N.S.732 / PIm // veery " S " D 735-4 S d-1Sd-O S d	Egypt
Population II	Sids 6	Maya " S " /Mon " S " //CMH 74 A.592/3 Sakha 8* 2	Sids- Egypt
	Sahel 1	N.S.732 / PIm // veery " S " D 735-4 S d-1Sd-O S d	Egypt
(local check variety)	Sids 1	HD 2172 /Pavon " S " // 1158. 57 /Maya 74 "S"	Sids- Egypt

Table 2. Soil properties of the studied area.

Depth (cm)	Percentage (%)			Texture class	O.M (%)	$CaCO_3$ (%)	pH	EC (dS/m)	Soluble ions (meq/L)						
	Sand	Silt	Clay						$CO_3^{--}+HCO_3^-$	Cl^-	SO_4^{--}	Ca^{++}	Mg^{++}	Na^+	K^+
0-30	25.00	39.65	35.35	Clay loam	1.20	3.50	7.87	1.05	2.50	1.25	6.15	2.70	1.35	5.74	0.11
30-60	24.65	39.00	36.35	Clay loam	1.10	3.20	7.88	1.00	2.34	1.16	6.00	2.60	1.15	5.53	0.22

C.L. = clay loam

In the second season (Nov. 25th, 2005), the best 205 F_3 families were tolerant to water stress conditions for each population including the parents, F_3 bulked random sample (a mixture of equal number of grains from each plant to represent the generation mean) and the check variety (Sids 1) were sown in two separated experiments using a randomized complete block design of three replications under water stress conditions. Each family, bulk sample, parents and check variety for both populations were represented by one row, 3 meter long and 30 cm. apart and 10 cm. between plants in each replicate. The data were recorded and measured on random sample of 7 guarded plants for each family and the means of the 7 plants were subjected to the statistical and genetic analysis. Selection between and within families was practiced. Data were recorded on individual guarded plants on basis as plant height, spike length, no. of spikelets / spike and days to maturity. The best 66 F_4 plants from the best 66 families of each population were saved to give the F_4 families.

In the third season (Nov. 19th, 2006), the 66 F_4 families from each population with the parents, F_4 bulk sample and the check variety Sids1 were sown in two separated experiments in a randomized complete block design of three replications. The best 19 plants from the best 19 families of both populations were saved to give the F_5 families. Again data were taken as in the previous season.

In the fourth season (Nov. 30th, 2007), the 19 F_5 families from each population with the parents, F_5 bulk sample and the check variety Sids1 were sown in two separated experiments in a randomized complete block design of three replications. The data were recorded and measured as in the previous seasons.

Statistical analysis:

Analysis of mean squares with randomized complete block design to compute the significance for genotypes made according to Snedecor and Cochran (1980). The least significant difference (L.S.D) test at 0.05 % and 0.01% levels of probability, according to Steel and Torrie (1980) was used to compare among means. Estimates of phenotypic and genotypic variance ($\delta^2g + \delta^2ph$) and heritability estimates were calculated from the partitioning mean squares expectation (EMS) of variance components of the selected families according to Al-jiburi *et al.*, (1958), Table (3), as follows:

$$\delta^2g = m_2\text{-}m_1/r \text{ and } \delta^2ph = \delta^2g + \delta^2e$$

where : $\delta^2e = m_1$

Broad sense heritability (H^2 b) was calculated as the ratio of genotypic (δ^2g) to the phenotypic ($\delta^2g + \delta^2e$) variance according to Fehr (1987). The genotypic (G.C.V %) and phenotypic (P.C.V %) coefficients of variability were estimated using the formulae developed by Burton (1952).

Genotypic coefficient variability:

$$G.C.V.\% = (\delta g / x) \times 100.$$

Phenotypic coefficient variability:

$$P.C.V.\% = (\delta p_h / x) \times 100.$$

Where: δg and δp are the genotypic and phenotypic standard deviations of the family mean, and x is the family mean for a given trait.

Table 3. Analysis of variance and mean square expectations.

Source of variance	d.f	M.S	Expected mean square
Replications	r-1	m_3	$\delta^2e + g\delta^2r$
Genotypes	g-1	m_2	$\delta^2e + r\delta^2g$
Error	(r-1) (g-1)	m_1	δ^2e

Response to selection:

The realized response to selection was estimated as the difference between the mean of the selected families and the mean of the best parent, bulk population and check variety, Falconer (1989).

3. Results and Discussion

A successful breeding program is largely dependent on the magnitude of genetic variation in the base population as well as the efficiency of selection method used. So two cycles of pedigree selection were made to improve some morphological traits in two bread wheat segregating crosses.

I-Analysis of variance and mean performance of the base population (F_3 families):

Analysis of variance for F_3 and their parents for plant height, spike length, spikelets no. /spike and days to maturity of the two populations are presented in Table (4). Mean squares realized highly significant differences among families in F_3 (base population) families in both populations for all studied traits, indicating the presence of genetic variability among selected families.

The obtained results in Table (4), showed the mean, range, phenotypic (P.C.V.) and genotypic (G.C.V.) coefficients of variability and broad sense heritability (B.S.H.) for all studied traits. Plant height ranged from 69.17 to 105.0 cm. with an average of 86.96 cm. and 80.83 to 115.84 cm. with an average of 99.46 cm. in population I and II, respectively. The minimum spike length was 9.34 and 10.5 cm. to 13.67 and 15.0 cm. with an average of 11.65 and 12.37 cm. in first and second population, respectively. The least no. of spikelets /spike ranged from 16.5 and 17.0 spikelets /spike to 24.5 and 26.0

spikelets /spike with an average of 21.18 and 21.11 spikelets/spike in population I and II, respectively. The days no. to maturity ranged from 122.0 and 91.0 days to 137.0 and 101.0 days with an average of 127.29 and 92.19 days in population I and II, respectively.

Phenotypic and genotypic coefficients of variability and broad sense heritability of F_3 plants are presented in Table (4). The values of phenotypic coefficients of variability (P.C.V.) in the first population were 9.93, 9.56, 9.36 and 2.79 % for plant height, spike length, no. of spikelets /spike and days to maturity, respectively. The corresponding values were 8.92, 9.22, 11.32 and 3.36% in the second population. Also, the values of genotypic coefficients of variability (G.C.V.) in the first population were 7.73, 6.13, 6.51 and 1.71 % while the values in the second population were 6.49, 6.47, 8.71 and 2.08 % for the corresponding traits. These results showed sufficient phenotypic and genotypic coefficients of variability according to pedigree selection which increases the homozygosity of plants. Small differences were observed between (P.C.V.) and (G.C.V.) in the F_3 generation, indicating the importance of the genetic effects in the inheritance of all studied traits.

Heritability estimate is considered one of the most important parameters for selection response in early generations. The results clearly showed that the broad sense heritability for the previous studied traits ranged from low 37.49 and 38.16 (days to maturity) for first and second populations to moderate 60.48 and 59.19 for (plant height and no. of spikelets / spike) of first and second population, respectively. Similar results were in line with those obtained by Tammam (1989), Nasir ud- Din (1992), Abdel – Haleem (2003), El-Sayed (2006), Memon *et al.*, (2007), Abdel-Moneam & Sultan (2009) and El-Sayed (2012). They reported that decreasing in genetic variance magnitude and heritability under stress conditions.

Table 4. Analysis of variance, means, range, phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits of F3 selected families (base population) in two populations of bread wheat under drought stress conditions in 2005 / 2006 season.

S.O.V	D.F	Population I				D.F	Population II			
		Plant height	Spike length	No. of spikelets	Maturity		Plant height	Spike length	No. of spikelets	Maturity
Replications	2	115.89	5.11**	58.41**	2410.78**	2	1106.38**	22.41**	38.42**	85.01**
Genotypes	204	171.35**	2.26**	8.28**	22.06**	204	160.06**	2.59**	12.25**	17.17**
Error	408	40.95	0.72	1.98	7.74	408	36.71	0.67	2.33	6.34
Mean ± S.E (F3 selected families)		86.96±3.14	11.65±0.49	21.18±0.82	127.29±1.62		99.46±3.52	12.37±0.47	21.11±0.88	92.19±1.41
Best parent		97.5	12.0	17.17	124.5		106.67	11.33	20.67	96.0
Bulk sample		90.0	10.17	17.34	124.5		100.84	11.17	21.5	96.0
Check variety (Sids1)		89.17	11.17	19.67	124.5		95.0	12.5	20.67	93.5
Range		69.17-105.0	9.34 – 13.67	16.5 – 24.5	122 - 137		80.83 – 115.84	10.5 – 15.0	17.0 – 26.0	91.0 – 101.0
P.C.V %		9.93%	9.56%	9.36%	2.79%		8.92%	9.22%	11.32%	3.36%
G.C.V %		7.73%	6.13%	6.51%	1.71%		6.49%	6.47%	8.71%	2.08%
B.S.H %		60.48%	41.13%	48.35%	37.49%		52.84%	49.23%	59.19%	38.16%

II -Analysis of variance and performance of pedigree selection cycles (F_4 and F_5 families):

Results in Table (5) presented the analysis of variance of plant height, spike length, spikelets no. / spike and days to maturity for the two populations. The results realized significant differences among families in both F_4 and F_5 generations for all studied traits, except spikelets no. /spike in F_4 generation in first population. These results refer to the sufficient of genetic variability among selected families in these traits.

Table (5) showed the mean, range, phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits. The obtained results of plant height ranged from 80.78 to 108.89 cm. with an average of 95.67 cm. and from 73.43 to 99.80 cm. with an average of 83.24 cm. for first population in the F_4 and F_5 generations, respectively. For second population, plant height ranged from 81.11 to 131.69 cm. with an average of 112.75 and from 80.73 to 110.6 cm. with an average of 97.08 cm. in the F_4 and F_5 generations, respectively. The least spike length varied between 9.14 and 12.28 cm. with an average of 10.74 cm. and from 7.35 to 11.83 cm. with an average of 9.79 cm. for population I in the F_4 and F_5 generations, respectively. Meanwhile, for population II, spike length ranged from 10.97 to 17.05 cm. with an average of 14.15 cm. and ranged

from 11.78 to 17.03 cm. with an average of 13.85 cm. in both F_4 and F_5 generations, respectively. For first population, the minimum no. of spikelets /spike was 16.68 while the maximum one was 22.89 spikelets with an average of 19.86 spikelets. The corresponding values of minimum and maximum were 18.25 was 23.25 with an average of 20.43 spikelets in the F_4 and F_5 generations, respectively. For population II, no. of spikelets /spike ranged from 17.93 to 27.0 with an average of 22.63 and ranged from 21.96 to 26.27 with an average of 24.39 in both F_4 and F_5 generations, respectively. The no. of days to maturity ranged from 129.0 to 144.0 with an average of 137.09 and from 130.33 to 146.0 with an average of 135.73 in population I in the F_4 and F_5 generations, respectively. For second population the no. of days to maturity ranged from 128.67 to 163.0 with an average of 145.14 and from 121.33 to 145.0 with an average of 132.02 in both F_4 and F_5 generations, respectively.

Estimates of phenotypic (P.C.V.) and genotypic (G.C.V.) coefficients of variation and broad sense heritability (B.S.H.) of all studied traits are presented in Table (5). Phenotypic coefficient variability (P.C.V.) values of plant height, spike length, no. of spikelets / spike and days to maturity were (9.32 and 11.62 %), (11.02 and 19.22 %), (10.37 and 10.55%) and (3.12 and 3.92 %) in population I for both F_4 and F_5 generations, respectively. In addition, for population II, P.C.V. values for the same traits were (12.76 and 13.40 %), (13.43 and 13.25 %), (14.91 and 6.4 %) and (4.78 and 5.16 %) for both F_4 and F_5 generations, respectively. Also, genetic coefficients variability (G.C.V.) values of the same traits were (4.58 and 7.52 %), (3.95 and 15.12%), (3.02 and 6.73%) and (2.17 and 2.69%) in first population for both F_4 and F_5 generations, respectively. Meanwhile, for the second population, the G.C.V. values for the same traits were (11.27 and 12.07%), (6.28 and 11.0%), (7.37 and 2.75%) and (4.41 and 4.12%) for both F_4 and F_5 generations, respectively.

Broad sense heritability (B.S.H.) values of plant height, spike length, spikelets no. /spike and days to maturity (Table 5) were (24.14 and 41.93%), (12.86 and 61.86%), (8.49 and 40.65%) and (48.66 and 47.13%) in population I for both F_4 and F_5 generations, respectively. In this regard, for population II they were (78.02 and 81.16%), (21.88 and 68.48%), (24.41 and 18.15%) and (85.24 and 63.98%) of the same traits for the F_4 and F_5 generations, respectively. These results indicated that drought stress conditions resulted in lower broad sense heritability. Similar results were in agreement with those obtained by Stuber *et al.*, (1962), Johanson *et al.*, (1966) and Asay and Johanson (1990).

Table 5. Mean squares, means, range, phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits of both F4 generation and F5 generation in two populations of bread wheat under drought stress conditions in both 2006/2007 and 2007/2008 seasons.

Generations	S.O.V	D.F	Population I				D.F	Population II			
			Plant height	Spike length	No. of spikelets / Spike	Maturity		Plant height	Spike length	No. of spikelets / Spike	Maturity
F4	Replications	2	60.04	8.73**	10.46	1716.10**	2	182.63*	8.81*	2.76	91.37**
	Families	65	152.48**	1.77*	4.84	34.75**	65	500.14**	5.25**	16.42**	141.37**
	Error	130	63.87	1.17	3.75	9.68	130	50.67	2.75	8.83	7.08
F5	Replications	2	241.89**	33.86**	17.95**	39.28	2	25.04	4.73*	1.23	119.49**
	Families	18	301.22**	3.37**	6.93*	62.31**	18	373.29**	10.63**	5.40**	213.63**
	Error	36	52.87	1.42	3.13	14.65	36	32.88	1.12	2.07	17.21
F4	Mean ± S.E (F4 selected families)		95.67±4.48	10.74±0.64	19.86±1.14	137.09±1.80		112.75±3.89	14.15±0.97	22.63±1.69	145.14±1.54
	Best parent		115.92	11.24	19.79	133.67		113.0	13.16	21.77	155.0
	Bulk sample		102.67	11.48	19.03	137.67		119.56	13.64	20.78	156.33
	Check variety (Sids1)		104.92	12.08	21.56	136.67		108.0	13.61	20.49	155.0
	Range		80.78-108.89	9.14-12.28	16.7-22.89	129.0 - 144.0		81.1 - 131.7	10.97-17.05	17.93-27.0	128.67-163.0
	P.C.V %		9.32%	11.02%	10.37%	3.12%		12.76%	13.43%	14.91%	4.78%
	G.C.V %		4.58%	3.95%	3.02%	2.17%		11.27%	6.28%	7.37%	4.41%
	B.S.H %		24.14%	12.86%	8.49%	48.66%		78.02%	21.88%	24.41%	85.24%
F5	Mean ± S.E (F5 selected families)		83.24±4.25	9.79±0.67	20.43±0.96	135.73±2.23		97.08±3.26	13.85±0.59	24.39±0.82	132.02±2.36
	Best parent		115.41	10.92	21.49	142.67		95.34	11.30	23.10	149.0
	Bulk sample		88.27	10.91	20.89	150.0		89.70	15.03	25.10	149.0
	Check variety (Sids1)		85.0	8.73	19.59	144.67		91.07	9.97	21.99	143.33
	Range		73.43-99.80	7.35-11.83	18.3 - 23.3	130.3-146.0		80.73-110.6	11.78-17.03	21.96-26.27	121.33-145.0
	P.C.V %		11.62%	19.22%	10.55%	3.92%		13.40%	13.25%	6.46%	5.16%
	G.C.V %		7.52%	15.12%	6.73%	2.69%		12.07%	11.0%	2.75%	4.12%
	B.S.H %		41.93%	61.86%	40.65%	47.13%		81.16%	68.84%	18.15%	63.98%

III- Mean value and realized gains to pedigree selection:

Means of the selected families after two cycles of pedigree selection for all studied traits for both populations under drought stress condition are presented in Table (6). In the first population after two cycles, the pedigree selection for spike length, no. of spikelets /spike and days to maturity resulted two superior families (no. 29 and 30) which exceeded the best parent ,bulk sample and check variety. Concerning family no. 29 exceeded by (5.59, 5.68 and 32.07%), (8.19, 11.30 and 18.86 %) and (-3.74, -8.45 and -5.07 %), for the previous studied traits, respectively. Moreover, family no. 30 exceeded by (8.33, 8.43 and 35.51 %), (7.49, 10.58 and 17.92 %) and (-0.7, -5.55 and -2.07 %) for the same traits, respectively. Regarding after two cycles in the second population, the results in Table (6) revealed four families i.e. 22, 25, 41 and 45 were attained the superiority for the studied traits. Concerning families no. 22 and 25 were exceeded by (1.92, 8.33 and 6.70%) and (10.37, 17.31 and 15.55%), (43.98, 8.25 and 63.19%) and (38.50, 4.13 and 56.97%) and (-11.41, -7.90 and -11.41 %) and (-7.83, -4.19 and -7.83%) for plant height, spike length and days to maturity, respectively. While, family no.41 achieved superiority by (13.59, 20.74 and 18.92 %), (10.91, 2.07 and 16.51 %) and (-15.21, -11.86 and -15.21 %) for plant height, spike length and days to maturity, respectively. While, the last family no. 45 exceeded by (33.63, 0.47 and 51.45 %), (9.52, 0.80 and 15.05 %) and (-6.26, -2.55 and -6.26 %) for spike length, spikelets no. / spike and days to maturity, respectively. Previous results summarized that applying of pedigree selection to improve morphological traits after two cycles were effective to isolate promising genotypes in both bread wheat populations under drought stress conditions.

The realized response to selection according Falconer (1989), measured as the deviation percentage of the overall cycle mean from the best parent, bulk sample and the check variety are shown in Table (7). In first population, the results indicated that selection after two cycles of pedigree selection led to a desirable decrease in days to maturity by (-4.86, -9.52 and -6.18%) from the best parent, bulk sample and check variety, respectively. Meanwhile, in the second population, realized response to selection was obtained for plant height by (1.83, 8.23 and 6.60%) from the best parent, bulk sample and check variety, respectively. Moreover, realized response to pedigree selection was found for days to maturity by (-11.40, -11.40 and -7.89%) from the best parent, bulk sample and check variety, respectively. The current study, realized response to selection was found for days to maturity in both populations and plant height in the second population only, suggesting that the pedigree selection practice is high scope for improvement of these traits under drought stress conditions, indicating the role of additive gene action for inheritance of these traits. Similar results were in line with those obtained by Ali (2011) and El-Sayed (2012).

Table 6. Means of the fifteen F5 families (selected under drought stress conditions), best parent, bulk sample and check variety after the second cycle of the pedigree selection in both populations.

No.of selected family	Population I				No. of selected family	Population II			
	Traits					Traits			
	Plant height	Spike length	No. of spikelets / Spike	Days to maturity		Plant height	Spike length	No. of spikelets / Spike	Days to maturity
Best parent	115.41	10.92	21.49	142.67	Best parent	95.34	11.30	23.10	149.0
Bulk Sample	88.27	10.91	20.89	150.0	Bulk Sample	89.70	15.03	25.10	143.33
Check variety (Sids 1)	85.0	8.73	19.59	144.67	Check variety (Sids 1)	91.07	9.97	21.99	149.0
8	76.33	7.35	18.25	130.33	10	80.73	11.78	24.03	121.33
14	76.11	9.45	18.72	135.33	12	88.9	14.03	26.27	130.33
16	78.45	9.43	20.03	138.0	15	84.1	12.38	24.93	133.0
17	77.45	8.81	18.56	141.67	19	82.67	17.03	25.07	133.0
18	78.17	9.56	18.88	143.0	21	108.57	14.1	23.9	130.33
20	80.80	9.60	19.95	137.33	22	97.17	16.27	25.03	132.0
21	86.46	10.39	19.41	141.0	25	105.23	15.65	24.60	137.33
23	90.67	10.86	22.19	140.33	26	109.63	13.53	23.6	133.67
24	73.43	9.87	20.34	137.0	34	88.71	13.53	23.47	136.0
29	99.80	11.53	23.25	137.33	36	90.52	12.01	24.0	126.67
30	90.46	11.83	23.1	141.67	41	108.3	12.23	25.62	126.33
39	94.17	9.91	21.04	144.0	45	81.5	15.1	25.30	139.67
40	82.44	9.76	22.39	145.33	49	109.7	12.07	21.96	128.67
41	83.27	9.15	19.22	146.0	51	110.53	13.40	24.8	127.0
47	80.56	9.39	21.09	144.33	57	110.6	14.56	25.30	145.0
Average	83.24	9.79	20.43	135.73	Average	97.08	13.85	24.39	132.02
$LSD_{0.05}$	12.04	1.84	2.93	6.34	$LSD_{0.05}$	9.49	1.75	2.38	6.87
$_{0.01}$	16.14	2.47	3.93	8.50	$_{0.01}$	12.73	2.35	3.19	9.21

Table 7. Realized gains in the two cycles of pedigree selection for both populations in percentages from the best parent, bulk sample and the check variety for all studied traits under drought stress conditions.

Item		Population I				=Population II			
		Plant height	Spike length	No. of spikelets / Spike	Days to maturity	Plant height	Spike length	No. of spikelets / Spike	Days to maturity
C1	Best parent	-17.47	-4.45	0.35	2.49	-0.22	7.52	3.95	-6.36
	Bulk sample	-6.82	-6.45	4.36	-0.49	-5.70	3.74	8.90	-7.16
	Check variety (Sids1)	-8.82	-11.09	-7.88	0.24	4.40	3.97	10.44	-6.36
C2	Best parent	-27.87	-10.35	-4.93	-4.86	1.83	22.57	5.58	-11.40
	Bulk sample	-5.70	-10.27	-2.20	-9.52	8.23	-7.85	-2.83	-11.40
	Check variety (Sids1)	-2.07	12.14	4.29	-6.18	6.60	38.92	10.91	-7.89

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Efficiency of Pedigree Selection in Bread Wheat under Drought Stress Conditions II – Yield and its component traits

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Abstract: Pedigree selection was practiced on two bread wheat populations, namely i.e. (Debeira x Sahel 1) as considered population I and (Sids 6 x Sahel 1) as considered population II. Experiments were conducted under drought stress conditions (at 12 % soil moisture content) in order to improve some yield and its component traits (no. of spikes / plant, biological yield, grain yield / plant and 1000-grain weight). Variance analysis revealed that all F_3 families in both populations were highly significantly affected by soil moisture content. Also, significant or highly significant differences were found among families in both F_4 and F_5 generations for two populations, except no. of spikes/plant in F_4 generation in both populations, also biological yield/plant and grain yield/plant in F_5 generation in population I, and also no. of spikes/plant in F_5 generation in population II. Results showed that broad sense heritability estimates were low to moderately in F_3 generation for both populations. Also, estimates of B.S.H ranged from low to moderate /high for both F_4 and F_5 generations in two populations. Moderately differences were found between phenotypic and genotypic variability estimates (p.c.v.) and (g.c.v.) for all the three generations in both populations. Realized response to selection was found after two cycles of pedigree selection for 1000-grain weight in first population and grain yield/plant in the second population. In the first population after two cycles of the pedigree selection resulted one superiority family no. 16 which exceeded the best parent ,bulk sample and check variety by (18.12, 0.46 and 16.22 %) , (9.10, 3.26 and 28.19 %), (10.47, 29.97 and 2.70 %) and (11.88, 7.91 and 15.40 %), for no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight, respectively. In this regard, in the second population, the results revealed three families i.e. 21, 26 and 41 were attained the superiority for the studied traits. Concerning family no. 21 was exceeded by (30.51, 23.25 and 14.89%), (62.13 , 24.19 and 51.45 %), (14.43, 51.51 and 70.48 %) and (2.12, 15.31 and 23.29%) for no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight, respectively. Regarding, families no. 26 and 41 were exceeded by (37.34, 5.20 and 28.29 %) and (48.98, 14.40 and 39.16%), (38.72, 83.68 and 106.67 %) and (11.60, 47.76 and 66.26 %) and (12.46, 26.98 and 35.77 %) and (0.25, 13.20 and 21.03%) for biological yield, grain yield / plant and 1000-grain weight, respectively.

[Abd-El-Haleem, S.H.M.; S.M.S. Mohamed and Ehab M.R. Metwali. **Efficiency of Pedigree Selection in Bread Wheat under Drought Stress ConditionsII – Yield and its component traits**. *Life Sci J* 2012;9(4):3430-3437]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 508

Keywords: Bread wheat, pedigree selection, yield and its component traits, genetic variance, drought stress conditions.

1. Introduction

Wheat (*Triticum aestivum* L.) is the most important cereal crop in many parts of the world, it is a stable diet for more than one third of the world population, so it is commonly known as king of cereals. In Egypt, the annual consumption of wheat grains in Egypt is about 14 million tons, while the annual local production is about 8.5 million tons in 2011(Wheat Res. Dept., 2011). Drought is one of the prime a biotic stresses in the world. Water deficiency is generally considered as one of the limiting factors for crop productivity, which affects physiological as well as biochemical processes in plants (Osborne *et al.,* 2002). High yield and drought tolerance are the main objectives of most wheat breeding programs. Thus, successful of breeding program for improving wheat under a biotic stress conditions depends on the magnitude of genetic variation in the population (base population). Moreover, reliable estimates of genetic and environmental variations will be helpful to estimate heritability ratio and consequently predicted genetic advance from selection. These estimates are useful to initiate such breeding program in order to improve wheat productivity. Developing crop cultivars with high grain yield has been the principle aim of wheat breeding programs worldwide (Bhutta, 2006). Considering that yield is polygenic and its heritability is low to achieve high yield,

selection is done using yield components (Khayatnejad *et al.,* 2010). On the other hand, Richards (1996) stated that heritability of this trait has been low because of genotype × environment interaction; hence, selection based on yield would not be profitable for its improvement. Sadiq *et al.*, (1994) found high grain yield proved to be the best indicator of drought tolerance. Saxen and Bahatia (1970) pointed that high heritability is not always associated with high genetic advance, but in order to make effective selection, high heritability should be associated with high genetic gain. Selection for yield is one of the most important and difficult challenge of plant breeding. The efficiency of a breeding program for drought tolerance depends largely on the selection criteria and selection method used to achieve genetic improvement through selection In addition to the complexity of drought itself (Passioura, 2007). Growth of wheat grain is reduced depending upon degree of water stress and on the rate of stress development, thereby limiting final wheat yield (Plaut *et al*., 2004). Breeding for drought tolerance by selecting solely for grain yield is difficult, because the heritability of yield under drought conditions is low, due to small genotypic variance or to large genotype-environment interaction variances (Blum, 1988). Broad sense heritability should be determined as the first step before starting any breeding program. Heritability measures are the portion of the total genetic variance that are due to heritability factors. Genetic variance and heritability estimates were higher in the irrigated environment than in the drought-stressed environment (Nasir ud- Din 1992). The ideal genotype for moisture stress conditions must combine a reasonably high yield potential with specific plant characters which could buffer yield against sever moisture stress (Blum, 1983). The difficulty in breeding for moisture stress is the use of yield as principal selection index because the variability as well as heritability is reduced under drought stress conditions (Roy and Murthy, 1969; Turner, 1986). This causes slow progress in selection under drought stress conditions as compared to environment with optimal rainfall. Phenotypic and genotypic variance, heritability and genetic advance have been used to assess the magnitude of variance in wheat breeding material (Jhonson *et al*., 1956; Zaheer *et al*., 1987; Khan, 1990) The heritability was in general found to lower under moisture stress conditions Singh and Chaudhary (2006). Rab *et al.* (1984) reported that water deficit at tillering stage caused reduction in grain yield. Kobata *et al.*, (1992) summarized that grain yield and 1000-grain weight was reduced under drought stress. Grain yield increased with the increase in soil moisture content (Dawood *et al.,* 1988). Hassan *et al.,*(1998) reported significant variation in grain yield of wheat genotypes grown under different management practices. Crop yield losses due to drought stress are considerable (Ashraf, 2010). Ismail *et al.*, (2003) indicated that drought stress resulted in a significant reduction in yield components and vegetative attributes of durum wheat genotypes. Using yield components and selection criterion should be superior to improve yield under drought condition. Relative yield performance of genotypes in drought stressed and more favorable environments seems to be a common starting point in identification of traits related to drought tolerance and selection of genotypes for use in breeding for dry environment (Clarke *et al.,* 1984). The main objective of this study was to assess response of two bread wheat populations to pedigree selection under moisture stress conditions.

2.Materials And Methods

The present study was carried out at the Experimental Farm of the Faculty of Agriculture, Al-Azhar University, Assiut, Egypt. During four successive winter growing seasons, 2004 / 2005, 2005 / 2006, 2006 / 2007 and 2007 / 2008. The objective of this study was to estimate the response to pedigree selection under water stress conditions in early segregating generations of two bread wheat populations. The basic material used in this study consisted of two F_2 populations of crosses established between three varieties, namely, Debeira, Sahel 1 and Sids6. The first population was derived from the cross (Debeira x Sahel 1) and the second population was derived from the cross (Sids 6 x Sahel 1). The genetic parameters were estimated in F_3, F_4 and F_5 generations. The pedigree and origin of the three parents and the check variety are presented in Table (1). In the first season, (Nov.15 th ,2004), 1000 plants from F_2 of each of the two populations were grown individual with non-replicated plants. Also, the parents and check variety (Sids 1) were sown in one row for each population, the single row was three meter long, 30 cm. wide and contained 30 plants. Grains were sown at 10 cm. , spacing with one grain per hill. Grains were sown in clay loam soil at 10 cm. spacing with one grain per hill.

Soil samples for moisture determination were taken down to 30 cm soil depth by soil auger. The samples were weighted and then oven dried. Percentage of soil moisture content was calculated on oven dry basis. The experiments were grown and given one surface –irrigation 30 days after planting irrigation (two irrigation were given through the whole season, the soil moisture content reached about

12 % which is considered moisture stress treatment) for all growing seasons . Some soil properties of The Experimental Farm are shown in Table (2). All the agronomic practices were applied as commonly used for growing wheat and carried out according to the recommendations set by the Ministry of Agriculture.

Table 1: The pedigree and origin of the three parents and the local check variety used of the two wheat populations

Parental name	Pedigree	Origin
Population I		
Debeira	HYBRID-DELHI-2160/5/TOBARI-66/CIANO-67//BLUEBIRD/3/NAINARI-60*2//TOM-THUMB/SONORA-	(India/Syria)
Sahel 1	N.S.732 / PIm // veery " S " D 735-4 S d-1Sd-O S d	Egypt
Population II		
Sids 6	Maya " S " /Mon " S " //CMH 74 A.592/3 Sakha 8* 2	Sids- Egypt
Sahel 1	N.S.732 / PIm // veery " S " D 735-4 S d-1Sd-O S d	Egypt
Sids 1(local check variety)	HD 2172 /Pavon " S " // 1158. 57 /Maya 74 "S"	Sids- Egypt

Table 2. Soil properties of the studied area.

Depth (cm)	Percentage (%)			Texture class	O.M (%)	$CaCO_3$ (%)	pH	EC (dS/m)	Soluble ions (meq/L)						
	Sand	Silt	Clay						$CO_3^{=}$+H	Cl^-	$SO_4^{=}$	Ca^{++}	Mg^{++}	Na^+	K^+
0-30	25.00	39.65	35.35	C.L	1.20	3.50	7.87	1.05	2.50	1.25	6.15	2.70	1.35	5.74	0.11

In the second season (Nov.25 th ,2005), The best 100 and 99 F_3 families for highest grain yield / plant were selected to water stress conditions from population I and population II, respectively **.** Parents, F_3 bulked random sample of each population (a mixture of equal number of grains from each plant to represent the generation mean) and the check variety (Sids 1) were sown in two separated experiments using a randomized complete block design of three replications. Each family, bulk sample, parents and check variety for both populations were represented by one row, 3 meter long and 30 cm. apart and 10 cm. between plants in each replicate. The data were recorded and measured on random sample of 7 guarded plants for each family and the means of the 7 plants were subjected to the statistical and genetic analysis. Selection between and within families was practiced. Data were recorded on individual guarded plants on basis as no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight. The best 66 and 68 F_4 families for grain yield / plant were selected and saved to give the F_4 families from population I and II, respectively **.**

In the third season (Nov.19 th ,2006), the best 66 and 68 F_4 families for grain yield / plant were selected from population I and population II, respectively with the parents, F_4 bulk sample of each population and the check variety Sids1 were sown in two separated experiments in a randomized complete block design of three replications. The best 19 plants from the best 19 families of both populations were saved to give the F_5 families. Again data were taken in the previous season.

In the fourth season (Nov.30 th ,2007), the 19 F_5 families from each population with the parents , F_5 bulk sample and the check variety Sids1 were sown in two separated experiments in a randomized complete block design of three replications. The data were recorded and measured as in the previous seasons.

Statistical analysis:

Analysis of mean squares with randomized complete block design to compute the significance for genotypes made according to Snedecor and Cochran (1980). The least significant difference (L.S.D) test at 0.05 % and 0.01% levels of probability, according to Steel and Torrie (1980) was used to compare among means.

Estimates of phenotypic and genotypic variance ($\delta^2 g + \delta^2 ph$) and heritability estimates were calculated from the partitioning mean squares expectation (EMS) of variance components of the selected families according to Al-jiburi *et al.* (1958), Table (3), as follows:

$\delta^2 g = m_2 - m_1/r$ and $\delta^2 ph = \delta^2 g + \delta^2 e$ where :

$\delta^2 e = m_1$

Broad sense heritability (H^2 b) was calculated as the ratio of genotypic ($\delta^2 g$) to the phenotypic ($\delta^2 g + \delta^2 e$) variance according to Fehr (1987).

The genotypic (G.C.V %) and phenotypic (P.C.V %) coefficients of variability were estimated using the formulae developed by Burton (1952).

Genotypic coefficient variability:

G. C .V. % = $(\delta g / x) \times 100$.

Phenotypic coefficient variability:

P. C .V. % = $(\delta p_h / x) \times 100$.

Where: δg and δp are the genotypic and phenotypic standard deviations of the family mean, and x is the family mean for a given traits.

Response to selection:

The realized response to selection was estimated as the difference between the mean of the selected families and the mean of the best parent, bulk population and check variety, Falconer (1989).

Table 3: The analysis of variance and mean square expectations

Source of variance	d.f	M.S	Expected mean square
Replications	r-1	m_3	$\delta^2e + g\delta^2r$
Genotypes	g-1	m_2	$\delta^2e + r\delta^2g$
Error	(r-1)(g-1)	m_1	δ^2e

3. Results And Discussion

I-Analysis of variance and mean performance of the base population (F_3 families) :

Analysis of variance for F_3 and their parents for no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight of the two populations are presented in Table (4). Mean squares were highly significant differences among families in F_3 (base population) families in both populations for all studied traits, indicating the presence of genetic variability among selected families under drought stress conditions. Similar results were obtained by Subhani and Chowdhry (2000), Asif *et al.*, (2003) and Sadeghzadeh and Alizadeh (2005), Ali (2011) and El-Sayed, (2012).

The obtained results in Table (4), showed the mean, range, phenotypic (P.C.V.) and genotypic (G.C.V.) coefficients of variability and broad sense heritability (B.S.H.) for all studied traits. No. of spikes/plant ranged from 4.0 to 7.17 spikes with an average of 5.52 spikes and 4.34 to 8.67 spikes with an average of 6.24 spikes in population I and population II, respectively. The minimum biological yield/plant was 11.08 and 12.03 gm. to 23.97 and 38.64 gm. with an average of 16.06 and 23.54 gm. in first and second population, respectively. The least no. of grain yield/plant ranged from 2.70 and 2.24 gm. to 11.40 and 13.04 gm. with an average of 6.45 and 6.12 gm. in population I and populations II, respectively. The 1000-grain weight ranged from 22.50 and 21.50 gm. to 32.0 and 50.88 gm. with an average of 27.96 and 40.98 gm. in population I and population II, respectively.

Phenotypic and genotypic coefficients of variability and broad sense heritability of F_3 plants (base population) for all studied traits are presented in Table (4). The values of phenotypic coefficients of variability (p.c.v.) were (16.80 and 20.08 %), (21.78 and 25.85%),(29.25 and 39.96%) and (9.41 and 13.32%) for no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight in first and second population, respectively. Also, the values of genotypic coefficients of variability (g.c.v.) were (9.24 and 11.22%), (13.68 and 15.99%), (20.33 and 29.0%) and (5.49 and 9.01%) in the same both traits and conditions in population I and population II, respectively. These results showed sufficient of phenotypic and genotypic coefficients of variability according to pedigree selection which increases of homogeneity of plants. Moderately differences were observed between (p.c.v.) and (g.c.v.) in the F_3 generation, indicating the importance of the genetic effects in the inheritance of all studied traits.

Heritability estimate consider one of the most important parameters to selection response in early generations. From Table (4) results showed clearly that the broad sense heritability for the studied traits ranged from low 30.23 and 31.21 (no. of spikes/plant) for both populations to moderate 48.31 and 52.68 (grain yield/plant) for first and second population, respectively. Similar results were in line with those obtained by Dawood *et al.*, (1988), Tammam (1989), Nasir ud- Din (1992), Abdel – Haleem (2003), El-Sayed (2006), Memon *et al.,* (2007), Abdel-Moneam and Sultan (2009) and El-Sayed, (2012), they reported that decreasing in genetic variance magnitude and heritability under stress conditions.

II -Analysis of variance and performance of pedigree selection cycles (F_4 and F_5 families):

The analysis of variance for no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight of the two populations are presented in Table (5). Results revealed significant or highly significant among families in both F_4 and F_5 generations for all studied traits, except no. of spikes/plant in F_4 generation in both populations, and also biological yield/plant and grain yield/plant in F_5 generation in population I, also no. of spikes/plant in F_5 generation in population II.

Table 4: Analysis of variance, means, range, phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits of F3 selected families (base population) in two populations of bread wheat under drought stress conditions in 2005 / 2006 seas

S.O.V	D.F	Population I				D.F	Population II			
		No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight		No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight
Replications	2	16.42**	1190.66**	122.45**	69.36**	2	9.71**	88.76*	0.48	9373.40**
Genotypes	99	1.36**	21.55**	7.13**	11.39**	98	2.53**	64.04**	11.86**	54.87**
Error	198	0.61	7.98	2.81	4.63	196	1.05	22.39	2.81	15.54
Mean ± S.E (F3 selected families)		5.52±0.45	16.06±1.57	6.45±0.78	27.96±1.23		6.24±0.60	23.54±2.76	6.12±0.97	40.98±2.32
Best parent		5.83	13.15	9.77	30.0		6.17	21.51	6.02	41.75
Bulk sample		4.67	12.37	5.53	28.5		5.5	19.26	4.61	43.18
Check variety (Sids1)		5.34	14.48	5.45	29.75		6.5	19.85	6.2	40.92
Range		4.0-7.17	11.08-23.97	2.7-11.4	22.5-32.0		4.34-8.67	12.03-38.64	2.24-13.04	21.5-50.88
P.C.V %		16.80 %	21.78 %	29.25 %2	9.41%		20.08%	25.85%	39.96%	13.32%
G.C.V %		9.24 %	13.68%	%20.33	5.49%		11.22%	15.99%	29.0%	9.01%
B.S.H %		30.23%	39.49%	48.31%	34.10%		31.21%	38.27%	52.68%	45.77%

Results presented in Table (5) showed that mean, range, phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits. From obtained results, no. of spikes/plant ranged from 4.19 to 5.80 spikes with an average 4.99 spikes/plant and from 4.74 to 6.52 spikes with an average 5.68 spikes/plant for first population in the F_4 and F_5 generations , respectively. For second population, no. of spikes/plant ranged from 4.09 to 6.33 spikes with an average 5.30 spikes/plant and from 5.59 to 8.64 spikes with an average 7.09 spikes/plant in the F_4 and F_5 generations, respectively. The least biological yield/plant was 23.29 to 45.45 gm. with an average 35.27 gm. and from 17.89 to 27.82 gm. with an average 21.43 gm. for population I in the F_4 and F_5 generations, respectively. Meanwhile, for population II, biological yield/plant ranged from 23.22 to 48.55 gm. with an average 36.07 gm. and ranged from 20.94 to 42.77 gm. with an average of 34.77 gm. in both F_4 and F_5 generations, respectively. For first population, the minimum of grain yield/plant was 9.44 and the maximum was 18.47 gm. with an average 14.17 gm. while, the minimum was 6.86 and the maximum was 9.31 gm. with an average 7.73 gm. in the F_4 and F_5 generations, respectively. For population II , grain yield/plant ranged from 4.96 to 16.89 gm. with an average 9.93 gm. and ranged from 7.30 to 15.19 gm. with an average 10.25 gm. in both F_4 and F_5 generations, respectively . The weight of 1000-grain ranged from 37.41 to 54.83 gm. with an average of 45.21 gm. and from 35.06 to 44.60 gm. with an average 39.97 in population I in the F_4 and F_5 generations, respectively. For second population the 1000-grain weight ranged from 37.0 to 61.38 gm. with an average of 46.29 gm. and from 28.72 to 46.6 gm. with an average of 37.18 gm. in both F_4 and F_5 generations, respectively.

Estimates of phenotypic (p.c.v.) and genotypic (g.c.v.) coefficients of variation and broad sense heritability (B.S.H.) of all studied traits are presented in Table (5). The values of phenotypic coefficient variability (p.c.v.) of no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight were (11.16 and 11.68 %),(22.62 and 17.54 %), (31.34 and 16.21%) and (10.64 and 8.60 %) in population I for both F_4 and F_5 generations, respectively. In addition, for population II, the values of phenotypic coefficients of variability (p.c.v.) for the same traits were (14.74 and 17.62 %), (19.45 and 21.70 %), (36.04 and 31.60 %) and (12.96 and 15.09 %) for both F_4 and F_5 generations, respectively. Also, the values of genetic coefficients of variability (g.c.v.) of the same traits were (3.47 and 5.28 %) , (6.97 and 7.96 %), (8.32 and 1.83 %) and (8.75 and 6.36 %) in first population for both F_4 and F_5 generations, respectively. In this regard , for the second population, the values of genotypic coefficients of variability for the same traits were (8.85 and 9.36 %), (10.39 and 14.34 %), (20.56 and 18.97 %) and (10.95 and 12.65 %) for both F_4 and F_5 generations, respectively.

The values of broad sense heritability (B.S.H.) of no. of spikes / plant, biological yield , grain yield / plant and 1000-grain weight Table (5), were (9.68 and 20.46%), (9.51 and 20.59 %), (7.05 and 1.27 %) and (67.59 and 54.70 %) in population I for both F_4 and F_5 generations ,respectively. Meanwhile, for population II it was (36.07 and 28.21 %), (28.55 and 43.66 %), (32.55 and 36.03 %) and (71.36 and 70.28 %) of the same traits for the F_4 and F_5 generations, respectively. These results indicated that drought stress conditions resulted in lower broad sense heritability. Similar results were in agreement with those obtained by Stuber *et al.,* (1962), Johanson *et al.,* (1966) and Asay and Johanson (1990).

Table 5: Mean squares, means, range phenotypic and genotypic coefficients of variability and broad sense heritability for all studied traits of both F4 and F5 generations in two populations of bread wheat under drought stress conditions in both 2006/2007 and 2007/2008 seasons.

Generations	S.O.V	D.F	Population I				D.F	Population II			
			No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight		No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight
F4	Replications	2	0.29	1136.83**	111.11**	10.75	2	5.56	862.77**	63.73**	62.41**
	Families	65	0.34	102.98*	23.61*	52.62**	67	6.15	91.01**	23.71**	89.68**
	Error	130	0.27	66.33	19.96	7.28	134	5.19	35.59	8.74	10.0
F5	Replications	2	0.80	91.35**	6.91	4.97	2	10.10**	332.49**	3.69	6.28
	Families	18	0.63*	18.36	1.73	24.4**	18	2.10	113.13**	16.86**	64.71**
	Error	36	0.33	11.97	2.31	5.01	36	1.15	33.23	5.81	9.25
F4	Mean ± S.E (F4 selected families)		4.99± 0.3	35.27±4.38	14.17±2.65	45.21±1.58		5.30±0.36	36.07±3.42	9.93±1.70	46.29±1.85
	Best parent		4.95	33.92	10.17	46.08		4.94	24.17	6.13	38.5
	Bulk sample		5.16	30.77	7.94	50.38		4.46	27.51	4.68	51.67
	Check variety (Sids1)		5.01	38.20	11.61	44.0		4.94	29.33	4.84	42.84
	Range		4.19 – 5.80	23.29-45.45	9.44-18.47	37.41-54.83		4.09-6.33	23.22-48.55	4.96-16.89	37.0-61.38
	P.C.V %		11.16%	22.62%	31.34%	10.64%		14.74%	19.45%	36.04%	12.96%
	G.C.V %		3.47%	6.97%	8.32%	8.75%		8.85%	10.39%	20.56%	10.95%
	B.S.H %		9.68%	9.51%	7.05%	67.59%		36.07%	28.55%	32.55%	71.36%
F5	Mean ± S.E (F5selected families)		5.68±0.35	21.43±1.93	7.73±0.72	39.97±1.33		7.09±0.61	34.77±3.27	10.25±1.50	37.18±1.77
	Best parent		5.52	23.51	7.93	38.04		6.62	26.38	10.95	40.13
	Bulk sample		6.49	24.84	6.74	39.44		7.01	34.44	8.27	35.54
	Check variety (Sids1)		5.61	20.01	8.53	36.88		7.52	28.24	7.35	33.24
	Range		4.74-6.52	17.89-27.82	6.86-9.31	35.06-44.6		5.59-8.64	20.94-42.77	7.3-15.19	28.72-46.6
	P.C.V %		11.68%	17.54%	16.21%	8.60%		17.62%	21.70%	31.60%	15.09%
	G.C.V %		5.28%	7.96%	1.83%	6.36%		9.36%	14.34%	18.97%	12.65%
	B.S.H %		20.46%	20.59%	1.27%	54.70%		28.21%	43.66%	36.03%	70.28%

III- Realized gains to pedigree selection:

The realized response to selection according Falconer, 1989, measured as the deviation percentage of the overall cycle mean from the best parent ,bulk sample and the check variety are shown in Table (6). In first population, the results indicated that selection after two cycles of pedigree selection led to a desirable increase in 1000-grain weight by (5.07, 1.34 and 8.38 %) from the best parent, bulk sample and check variety ,respectively. Meanwhile, in the second population, realized response to selection was obtained for grain yield/plant by (31.80, 0.96 and 23.12 %) from the best parent ,bulk sample and check variety, respectively. In this present study, realized response to selection was found for 1000-grain weight in first population and grain yield/plant in the second population, suggesting that the pedigree selection practice is high scope for improvement of these traits under drought stress conditions, indicating the role of additive gene action for inheritance of these traits.

Means of the selected families after two cycles of pedigree selection of no. of spikes / plant, biological yield, grain yield / plant and 1000-grain weight for both populations are presented in Table (7). In the first population after two cycles, the pedigree selection resulted one superior family no. 16 which exceeded the best parent ,bulk sample and check variety by (18.12, 0.46 and 16.22 %) , (9.10, 3.26 and 28.19 %), (10.47, 29.97 and 2.70 %) and (11.88, 7.91 and 15.40 %), for the previous studied traits, respectively. Regarding, in the second population, the results Table (7) revealed three families no. 21, 26 and 41 were attained the superiority for the studied traits. Concerning family no. 21 was exceeded by (30.51, 23.25 and 14.89%), (62.13, 24.19 and 51.45 %), (14.43, 51.51 and 70.48 %) and (2.12, 15.31 and 23.29%) for no. of spikes / plant, biological yield, grain yield / plant and 1000-grain weight, respectively. Meanwhile, families no. 26 and 41 were exceeded by (37.34, 5.20 and 28.29 %) and (48.98, 14.40 and 39.16%), (38.72, 83.68 and 106.67 %) and (11.60, 47.76 and 66.26 %) and (12.46, 26.98 and 35.77 %) and (0.25, 13.20 and 21.03%) for biological yield, grain yield / plant and 1000-grain weight, respectively. These results concluded that applying of pedigree selection to improve **yield** and its component traits after two cycles were effective to isolate high yielding genotypes in both populations under drought stress condition. Similar results were in line with obtained by Ali (2011) and El-Sayed, (201)2.

Table 6: Realized gains in the two cycles of pedigree selection for both populations in percentages from the best parent, bulk sample and the check variety for all studied traits under drought stress conditions.

Item		Population I				Population II			
		No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight	No. of spikes/plant	Grain yield/plant	Biological yield	1000-grain weight
C1	Best parent	0.81	3.98	39.33	-1.89	7.29	49.23	61.99	20.23
	Bulk sample	-3.29	14.62	78.46	-10.26	18.83	31.12	112.18	-10.41
	Check variety (Sids1)	-0.40	-7.67	22.05	2.75	7.29	22.98	105.17	8.05
C2	Best parent	2.90	-8.85	-2.52	5.07	7.10	31.80	-6.39	-7.35
	Bulk sample	-12.48	-13.73	14.69	1.34	1.14	0.96	23.94	4.61
	Check variety (Sids1)	1.25	7.10	-9.38	8.38	-5.72	23.12	39.46	11.85

Table 7: Means of the fifteen F5 families (selected under drought stress conditions), best parent, bulk sample and check variety after the second cycle of the pedigree selection in both populations.

No.of selected family	Population I Traits				No.of selected family	Population II Traits			
	No. of spikes/plant	Biological yield	Grain yield/plant	1000 - grain weight		No. of spikes/plant	Biological yield	Grain yield/plant	1000-grain weight
Best parent	5.52	23.51	7.93	38.04	Best parent	6.62	26.38	10.95	40.13
Bulk Sample	6.49	24.84	6.74	39.44	Bulk Sample	7.01	34.44	8.27	35.54
Check variety (Sids 1)	5.61	20.01	8.53	36.88	Check variety (Sids 1)	7.52	28.24	7.35	33.24
8	5.25	17.89	7.30	41.48	10	7.11	20.94	7.93	46.60
14	5.72	19.29	6.86	40.34	12	6.96	31.06	10.23	36.28
16	6.52	25.65	8.76	42.56	15	7.32	30.29	12.52	34.70
17	5.95	21.43	8.08	39.84	19	6.00	40.48	7.56	36.53
18	5.68	20.40	8.60	43.96	21	8.64	42.77	12.53	40.98
20	5.42	20.19	7.69	35.06	22	6.74	39.15	8.47	28.72
21	5.88	20.27	7.97	39.91	25	5.82	41.64	7.30	35.32
23	5.32	21.46	9.31	43.29	26	7.45	36.23	15.19	45.13
24	5.87	21.21	7.07	38.81	34	7.60	36.18	8.20	33.38
29	6.50	27.82	7.12	39.37	36	7.15	25.99	7.63	32.01
30	5.86	24.28	7.43	35.61	41	7.21	39.30	12.22	40.23
39	5.61	21.18	6.89	39.87	45	5.59	34.81	12.21	36.47
40	4.74	19.9	8.16	37.41	49	8.42	32.12	12.45	36.40
41	5.41	20.2	7.51	37.43	51	8.06	34.29	10.25	32.35
47	5.54	20.28	7.17	44.60	57	6.35	35.56	9.12	42.65
Average	5.68	21.43	7.73	39.97	Average	7.09	34.77	10.25	37.18
$LSD_{0.05}$	0.95	5.73	2.52	3.71	$LSD_{0.05}$	1.78	9.55	3.99	5.04
$_{0.01}$	1.28	7.68	3.38	4.97	$_{0.01}$	2.39	12.80	5.35	6.75

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Barriers to Green Supply Chain Management in the Petrochemical Sector

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Abstract: Green supply chain management has emerged as an important organizational performance to reduce environmental risks. This study is used the Analytic Network Process (ANP) method to find influential Barriers in implementation of GSCM. The results of this paper indicate that the Lack of understanding among supply chain stakeholders is the most important Barrier in implementation of Green Supply Chain Management .Also less important Barrier in implementation of Green Supply Chain Management is Competition and Uncertainty. The managerial implications and conclusions are discussed.

[Javad Mehrabi, Davood Gharakhani, Sajjad Jalalifar, Hossein Rahmati. **Barriers to Green Supply Chain Management in the Petrochemical Sector.** *Life Sci J* 2012;9(4):3438-3442]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 509

Keywords: Green Supply Chain Management, Petrochemical Sector, Sustainable Development, Analytic Network Process

1. Introduction

In recent years, green supply chain management (GSCM) initiatives have gained considerable prominence. However, how much value it brings to organizations is still being investigated. As a result of global economic development and high levels of industrialization, the environmental protection problems faced by each country grow on a daily basis and are greatly endangering the natural environment. Environmental management has thus become a topic of mutual concern of businesses, government and consumers. GSCM can be considered as an environmental innovation from the DoI view. Since its introduction by Rogers (1962), DoI has been widely applied to describe the patterns of innovation adoption, explain the mechanism, and assist in predicting whether and how an innovation will be successful. Important characteristics of an innovation include: relative advantage, compatibility, complexity, trialability, and observability. As an emergent environmental management philosophy which incorporates supply chain members, GSCM can be considered as a relatively advanced organizational technological innovation for manufacturers to improve their environmental performance (Narasimhan and Carter, 1998). GSCM can be also used in parallel, and overlaps, with other current environmental innovations such as cleaner production and environmental management systems, further indicating its compatibility. Today's business environment is characterized by increasing uncertainties. GSCM has emerged as an important new approach for enterprises to achieve profit and market share objectives by reducing environmental risk and impact. In supply chains with multiple vendors, manufacturers, distributors and retailers, whether regionally or globally dispersed, performance measurement is challenging because it is difficult to attribute performance results to one particular entity within the chain. Theoretical research suggests that supply chain integration provides a significant competitive advantage. However, apart from contributing to a better understanding of SCM, it falls short of proposing any specific implementation path to SCM.

Green Purchasing is defined as an environmentally conscious purchasing initiative that tries to ensure that purchased products or materials meet environmental objectives set by the purchasing firm, such as reducing the sources of wastage, promoting recycling, reuse, resource reduction, and substitution of materials. Useand secondary use (repairability, remanufacturability and recyclability). Redesigned products will only be effective if they are able to provide at least the services of the products they replace. Life-cycle analysis is an important sub-concept to Green Design. Life-cycle analysis was introduced to measure environmental and resource related products to the production process. Reverse logistics activities differ from those of traditional

logistics .Reverse logistics networks have some generic characteristics related to the coordination requirement of two markets, supply uncertainty,returns disposition decisions, postponement and speculation Dowlatshahi and Carter and Ellram define reverse logistics as a process where a manufacturer accepts previously shipped products from the point for consumption for possible recycling and re-manufacturing. Recent studies of GSCM can be separated into two ways: framework for GSCM, and performance measurement. Some frameworks propose how to improve the collaborative relationships between manufacturers and suppliers, to explore the gaps between the framework and the present state, to aid managerial decision making, or to develop general procedure towards achieving and maintaining the green supply chain (Beamon, 1999). The idea of GSCM is to eliminate or minimize waste (energy, emissions, chemical / hazardous, solid wastes) along supply chain (Hervani et al. 2005). In green product design, analysis is made to assess the environmental impact during the useable life cycle and afterwards, and attempts are made to minimize adverse effects. Modular design and easy disassembly options help in repair and remanufacturing of the end-of-use returns, and recycling of end-of-life returns. Logistics is the function responsible for moving materials through supply chains, where a supply chain is the series of activities and organisations through which materials move on their journey from initial suppliers to final customers. Logistics management is essentially an integrative process that seeks to optimise the flows of materials and supplies through the organisation and its operations to the customer. Logistics has always been central to, and essential for, economic activity. Decisions about transportation involve mode selection, shipment size, and routing and scheduling. GSCM is one of the best strategies for meeting the challenge to reduce carbon emission and enhance sustainability because of its potential to improve the environmental performance of any organizations.

2. Literature review

2.1. Supply chain management

Supply chain management (SCM) can be defined as the "systematic and strategic coordination of the traditional business functions within a particular company and across businesses within the supply chain, with the aim of improving the long-term performance of the individual companies and the supply chain as a whole" (Mentzer et al., 2001). Supply chain management often refers either to a process-oriented management approach to sourcing, producing and delivering goods and services to end consumers or, in a broader meaning, to the co-ordination of the various actors belonging to the same supply chain (Harland, 1996) . SCM is such a broad notion that it can be approached from many different perspectives: purchasing and supply, logistics and transportation, industrial organisation, marketing, strategic management, and many others (Croom et al., 2000) the breadth of the concept is also the main reason why it still lacks a unitary and widely accepted definition. In SCM, each supply chain member performs a specific added value function in relation to the product/service as it progresses towards the final consumer" (Ritchie and Brindley 2002). Although SCM adds value to the process, it is important to note that a basic premise of SCM is that value must increase faster than the costs associated with creating that value; i.e., efficiently managing the supply chain (Lockamy and Smith 1997). The core purpose of SCM has been, since it was established more than two decades ago (Stevens, 1989), to break down functional silos and cooperate within the same logistics system, with the common goal being to serve the end customers with a smooth, flexible and cost efficient flow of goods (Mentzer et al., 2001). As a key factor for SCM, the matter of coordination also becomes the main challenge from top management's point of view (Lancioni, 2000). The nature of SCM needs a force standing above the functional silos and focusing on the complete "horizontal organisation" (Mangan and Christopher, 2005).

2.2. Green Supply chain management

Green supply chain management has considered the supply chain of various links of environmental problem and paid attention to environmental protection and to promote coordinated development of economy and environment. Judging from the composition of green supply chain, participate in the green supply chain of basic are mainly suppliers, manufacturers, distributors and retailers enterprise and end users. GSCM, advocating efficiency and synergy between partners, facilitates environmental performance, minimal waste and cost savings (Rao and Holt, 2005), and is attracting the increasing interest of researchers and practitioners of operations and supply chain management. GSCM has emerged ''as an important new archetype for enterprises to achieve profit and market share objectives by lowering their environmental risks and impacts while raising their ecological efficiency'' (Zhu et al., 2005). Green marketing has been defined by different scholars in different ways. There seem to be three main views on its definitions. The first view is linking green marketing to identifying and satisfying green customers, and promoting environmentally-friendly products. For example, Banyte et al. define it as "determining the need to know the new, so called green, consumer and to adapt marketing decisions to the focus on ascertaining the expectations and satisfying the needs of such a consumer" (Banyte,

Brazioniene, & Gadeikiene, 2010). Sustainable supply chain management is defined as "the strategic, transparent integration and achievement of an organization's environmental, social and economic goals in the systematic co-ordination of key inter-organizational business processes for improving the long-term economic performance of the individual company and its chains" (Carter & Rogers, 2008). SSCM is sometimes referred to as closed-loop supply chainmanagement or green supply chain management. Closed-loop supply chains are those supply chains where care is taken of items once they are no longer desired or can no longer be used. A closed-loop supply chain consists of a forward chain and a reverse chain (Yuan & Gao, 2010). First, the green supply chain strategy composed by five basic collocation factors including green operation strategy, green outsourcing strategy, green channel strategy, green client service strategy and green asset network should be established. Second, the green supply strategic culture should be established, and the green supply chain management should be integrated into enterprise culture. Finally, the green supply chain strategy which can be organically integrated with green product strategy and green market strategy should be developed. Therefore, the green supply chain strategy which can accord with the competitive strategy, client demand strategy, strength status of textile and apparel enterprise and fit in with the environment should be developed. Managing supply chain sgainednotoriety in practice as evidenced by the management and engineering literatureintheearly 20th century (Svensson, 2001; Askarany et al., 2010). Some of the initial best practices of modern supply chains, such as lean and just- in-time (JIT) manufacturing can betraced to Henry Ford's efforts to vertically integrate the automotive supply chain and organiza- tional practices. The concept of JITand SCM at that time focused on enhancing operational efficiency and minimizing waste (Bornholt, Faurote, 1928). The purpose of the minimization of waste was not for environmental, but economic reasons. Waste means greater economic loss (Lai and Cheng, 2009).

2.3. Barriers to the GSCM implementation

Approaches towards Green Supply Chain Management (GSCM) practice have been identified by various researches; they are briefly outlined below. Shang et al. (2010) conducted a study based on six dimension of green supply chain management i.e. eco design, green manufacturing and packaging, environmental participation, green marketing, stock and suppliers. The results inferred that the firms which were focusing on green marketing had been successful competitors against the rivals. Quinghu Zhu et al (2008) conceptualize Green Supply Chain Management practices implementation as encompassing different dimensions of practices including Green Procurement, Internal Environmental Management, Eco Design, Customer Cooperation, and Investment Recovery. Ramudhin A., et al. (2010) proposed a strategic planning model and insisted that internal and external control mechanism are of great importance to decision makers while designing sustainable supply chain network. GSCM scope ranges from implementing and monitoring of the general environment management programmes to more creating or controlling practices implemented through various R(Reduce,Re-use, Rework, Reclaim, Recycle, Remanufacture, Reverse logistics, etc.) towards attaining a GSCM waste minimization is being considered as an important strategic. The waste, which is non-value adding activity, carried out in any operation. Waste is the most commonly perceived enemy to environmental protection in manufacturing and production operations. That is, manufacturing and production processes are viewed as the culprits in harming the environment, in the forms of waste generation, ecosystem disruption, and depletion of natural resources (Jamal Fortes, 2009). Table 1 illustrates the Effective Barriers in implementation of GSCM.

Table 1. Barriers to the GSCM implementation

Barriers
-Lack of sustainable GSCM practices in organizations vision and mission
-Lack of corporate leadership and support
-Lack of knowledge and Experience
-Lack of understanding among supply chain stakeholders
-Poor organizational culture
-Lack of green initiatives
-Shortage of resources
-Lack of technology infrastructure
-Competition and Uncertainty
-Financial implications
-Lack of demand and public awareness
-Perceived lack of government support

Source : Balasubramanian (2012)

2.4. Analytic network process (ANP)

Analytic network process (ANP) is an MCDM method that takes simultaneously, several criteria, both qualitative and quantitative, into consideration, allowing dependence and feedback and making numerical tradeoffs to arrive at a synthetic conclusion indicating the best solution out of a set of possible alternatives. ANP was officially introduced by Saaty (1996) as a generalization of the analytic hierarchy process (Saaty, 1980). The analytic network process is the generalization of the analytical hierarchy process (AHP) as it incorporates feedback and interdependent relationships among decision criteria and alternatives (Jharkharia and Shankar,

2007). Technically, the model consists of clusters and elements. The dominance or relative importance of influence is the central concept. The ANP provides a general framework to deal with decisions without making assumptions about the independence of higher-level elements from lower-level elements and about the independence of the elements within a level as in hierarchal decision making methods. In fact, the ANP uses a network without the need to specify levels.

The generalized supermatrix of ahierarchy with three levels–which is used in this paper–is as follows:

$$w = \begin{array}{c} \\ c1 \\ c1 \\ c1 \end{array} \begin{array}{c} \begin{array}{ccc} c1 & c2 & c3 \end{array} \\ \begin{bmatrix} w11 & w12 & w13 \\ w21 & w22 & w23 \\ w31 & w32 & w33 \end{bmatrix} \end{array}$$

W is apartitioned matrix because itsentries are composed of the vectors obtained from the pairwise comparisons. Since W is a column stochastic matrix, its limiting priorities depend on the reducibility and cyclicity of that matrix.If the matrix is irreducible and primitive, the limiting value is obtainedbyraising W to powers suchasin Eq.(1) in order to obtain the global priority vectors (Saaty andVargas,1998).

$$\lim_{k\to\infty} w^k$$

Finally, after the supermatrix is assured of being column stochastic, it is raised to a sufficiently large power until convergence occurs (Saaty, 1996). In other words, the supermatrix is the nraised to limiting powers to become W^{2k+1}, where k is an arbitrarily large number to capture all the interactions and to obtain asteady-state outcome.

3. Research methodology

Questionnaire was adopted to collect data from a series of managers in Petrochemical industry. In this study the ANP method is used to evaluation of Effective Barriers in implementation of GSCM. This research designed one questionnaire for ANP. . The objects were professional experts of the Petrochemical industry in Iran (15 experts). The Effective Barriers in implementation of GSCM in this study are as follows: -Lack of sustainable GSCM practices in organizations vision and mission -Lack of corporate leadership and support -Lack of knowledge and Experience -Lack of understanding among supply chain stakeholders -Poor organizational culture -Lack of green initiatives -Shortage of resources -Lack of technology infrastructure -Competition and Uncertainty -Financial implications -Lack of demand and public awareness -Perceived lack of government support.

4. Analysis and results

According to the connections developed in the model, all pairwise comparisons were completed. ANP uses a verbal scale developed by Saaty (1980), which enables the experts to incorporate subjectivity and experience. ANP and its software SuperDecisions also enable the decision-maker to evaluate his/her judgments with the inconsistency ratio denoted by I_R. The judgment matrixes are said to be consistent if $I_R \leq$ 0.1 (Saaty, 1980, 1996). If there is inconsistency in a matrix, the decision-maker needs to check his/her judgments to make them better to satisfy $I_R \leq$ 0.1. The resulting final priorities for the proposed ANP model can be read from limit supermatrix (LSM) in Table 2. Final prioritization of Barriers to implementation of Green Supply Chain Management is shown in table 2. Result show that, the Lack of understanding among supply chain stakeholders is the most important Barrier in implementation of Green Supply Chain Management .Also less important Barrier in implementation of Green Supply Chain Management is Competition and Uncertainty. Lack of understanding among supply chain stakeholders is the most important Barrier with weight of 0.1065, followed by Lack of green initiatives with weight of 0.1049, Lack of corporate leadership and support with weight of 0.0981and Poor organizational culture with weight of 0.0947 etc.

Table 2. final prioritization of Barriers

Barriers	prioritization Based on limited weighted supermatrix	prioritization of Un-weighted	Priority
-Lack of sustainable GSCM practices in organizations vision and mission	0.044	0.0744	9
-Lack of corporate leadership and support	0.058	0.0981	3
-Lack of knowledge and Experience	0.054	0.0914	5
-Lack of understanding among supply chain stakeholders	0.063	0.1065	1
-Poor organizational culture	0.056	0.0947	4
-Lack of green initiatives	0.062	0.1049	2
-Shortage of resources	0.051	0.0863	6
-Lack of technology infrastructure	0.049	0.0829	7
-Competition and Uncertainty	0.031	0.0524	12
-Financial implications	0.035	0.0592	11
-Lack of demand and public awareness	0.042	0.0711	10
-Perceived lack of government support	0.046	0.0778	8

5. Conclusions

The implementation of green supply chain management can maximize the resource utilization, reduce the resource consumption and enhance its international image with the improvement of its operation performance so as to promote the compatibility between enterprises and society and environment, thus achieving sustainable development. This study is used the Analytic Network Process (ANP) method to find influential Barriers in implementation of GSCM. The results of this paper indicate that the Lack of understanding among supply chain stakeholders is the most important Barrier in implementation of Green Supply Chain Management .Also less important Barrier in implementation of Green Supply Chain Management is Competition and Uncertainty. The managerial implications and conclusions are discussed. The result of this study can hopefully help the company evaluate and analyze the suitable supplier which focuses on this research. There are useful implications of our study for both developed and developing countries on the diffusion of GSCM and other corporate environmental practices. We found that international policies can influence developing country adoption of environmental management practices. This study contains several limitations that future studies need to have further examine. First, this study applies the ANP to influential Barriers in implementation of GSCM through individual rather than a full-fledged industrial survey. Second, GSCM is still a fairly new concept which has not been widely implemented in the industry; hence, the expert system only bases on few industrial and professional experts. Future research can also use different methods to identify more criteria to justify the GSCM performance.

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Calculation of generation system reliability index: Expected Energy Not Served

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Abstract: Generation system reliability is an important factor in the long term planning for future system capacity expansion to make sure that the total installed capacity is sufficient to support demand. The planning process utilizes reliability indices as criteria to decide on new investments in new generation capacities. Generation system reliability is evaluated by using different indexes. In this paper, Expected Energy Not Served (EENS) is simulated to evaluate the system reliability. Effects of the system parameters such as forced outage rate (FOR) are tested on the EENS index.

[Mojtaba Shirvani, Ahmad Memaripour, Mostafa Abdollahi, Asadollah Salimi. **Calculation of generation system reliability index: Expected Energy Not Served.** *Life Sci J* 2012;9(4):3443-3448]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 510

Keywords: Generation System Reliability, Expected Energy Not Served, Capacity Outage Probability Table, Analytically Method.

1. Introduction

Electricity has been the driving force for economies of the world and provides day-to-day necessity for the population in the world. The generation, transmission and retailing of electricity have existed hundreds of years in providing the much needed electricity. Due to the nature of electricity systems, the variable demand at every moment needs to be met by consistent electricity supply in making sure the continuous availability of the resources. Not meeting the demand in any case will lead to a huge loss of income to the generators as well as to the consumers. The reliability of the generation, transmission and distribution of electricity in this sense is crucial for the continuous supply of electricity to meet the demand.

A modern power system is complex, highly integrated and very large. Fortunately, the system can be divided into appropriate subsystems or functional areas that can be analyzed separately [1]. These functional areas are generation, transmission and distribution. The function of the generation system is to make sure enough capacity is available to meet the load/demand at any time. Transmission and distribution systems need to be reliable in making sure the electricity generator can be delivered to the consumers. System planners have been assigned the role of planning for forecasting the load into the future and plant capacity addition to meet the load and provide a level of reliability in case some of the plants are out on maintenance or breakdown. Probabilistic method is often used to determine the system reliability and the system reliability can be summed up into a single value, the reliability indices. Reliability studies are conducted for two purposes. Long-term evaluations are performed to assist in system planning and short-term evaluations to assist in day to day operating decisions. In short, these reliability indices (for long-term evaluations) are used by system planners and the authorities to decide on and advice for new investments in building new generation capacities [1].

Generation system reliability is an important aspect in the planning for future system capacity expansion. It provides a measurement of reliability or adequacy to make sure that the total generation system capacity is sufficient to provide adequate electricity when needed [1].

In this paper an important reliability index EENS is evaluated for generation system. The proposed index is simulated by using analytically method. Effects of changing system parameters such as FOR are tested on the EENS.

2. Generation system reliability

Reliability has been and always is one of the major factors in the planning, design, operation, and maintenance of electric power system. Generation system reliability focuses on the reliability of generators in the whole electric power system where electric power is produced from the conversion process of primary energy (fuel) to electricity before transmission. The generation system is an important part of the electricity supply chain and it is crucial that enough electricity is generated at every moment to meet the demand. Generating units will occasionally fail to operate and the system operator has to make sure that enough reserve is available to be operated when this situation happens [2-31].

Reliability of the generation system is divided into adequacy and security [32]. System adequacy relates to the existence of sufficient

generators within the system to satisfy the consumer load demand or system operational constraints. System adequacy is associated with static conditions of the system and do not include system disturbances. System security on the other hand relates to the ability of the system to respond to disturbances arising within the system. Therefore system security is associated with the response of the system to whatever perturbation it is subjected to. In this study, the reliability evaluations will be focused on the generation system adequacy and will not take into account system security.

The basic modeling approach for the generating system adequacy assessment consists of three parts as shown in Figure 1. The generation and load models are convolved to form an appropriate risk model where the element of interest is the risk of generation capacity less than the load. In short, adequacy evaluation of generation systems consists of four general steps as Figure 1:

(i) Create a generation capacity model; (ii) create a load model; (iii) combined the generation capacity model with load model to obtain a risk model and (iv) calculating indexes.

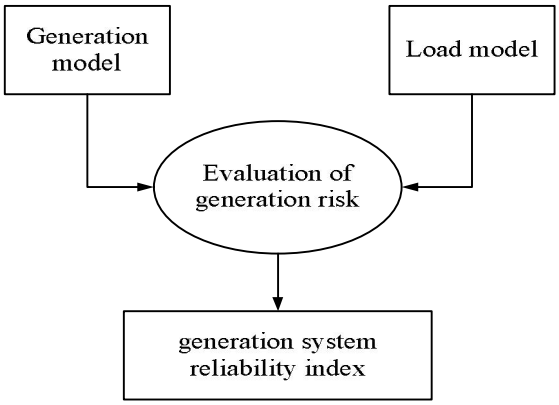

Figure 1. Generation reliability evaluation process

Analytical methods or Monte Carlo simulation [33] can be used to calculate the reliability indices. Analytical techniques represent the system by analytical models and evaluate the indices from these models using mathematical solutions. Monte Carlo simulations, on the other hand estimate the indices by simulating the actual process and random behavior of the system, treating the problem as a series of experiments. The reliability indices obtained indicate the ability of the generating facilities to meet the system demand.

In the analytical method, the generating system model used for generation capacity adequacy assessment is a Capacity Outage Probability Table (COPT) which can be created using the recursive technique. As for the load model, the daily peak load or hourly load for a period of one year is normally used to form the Load Probability Table (LPT).

3. Load model

The load in a power system in any time period is a stochastic process, which is difficult to describe with a simple mathematical formula. Different models are created, starting from rimary load data and according to the need to calculate reliability. Primary load data will provide a minimum amount of data that is needed to establish an hourly chronological load profile. Most primary load data consist of the percentage of maximum monthly load or weekly load in a year, the load in 24 hours in a typical day in each season and the maximum load in each day in a week. With the percentages of these data available and the annual peak load known, the hourly chronological load profile can be established.

4. Forced Outage Rate

There are many concepts in reliability evaluation such as: failure rate, repair time, unavailability, forced outage rate (FOR) and etc. Unit unavailability is also known conventionally as "forced outage rate" (FOR), although the value is not a rate. The FOR is defined as below.

$$FOR = \frac{\text{Forced outage hours}}{\text{In service hours} + \text{Forced outage hours}} \quad (1)$$

The FOR is calculated for a long period of time (e.g. 365 days), is the same index as the unavailability.

5. Generation system reliability indices

The quantification of reliability is an important aspect of generation system reliability assessment. The measurement used to quantify reliability of a generation system is given various reliability indices. These reliability indices are used to assess the reliability performance of a generation system against some predetermined minimum requirements or reliability standards, compare alternative designs, identify weak spots and determine ways for correction in the generation system and to be integrated with costs and performance considerations for decision making. These indices are better understood as estimates of system-wide generation adequacy and not as absolute measures of system reliability [18].

Basically, system reliability evaluations can be divided into deterministic and probabilistic. The most common deterministic indices are the Reserve Margin and the largest set in the system. An important shortcoming of these methods is that they

do not account for the stochastic nature of system behavior.

Probabilistic methods can provide more meaningful information to be used in design and resource in planning and allocation. There are two approaches that use probabilistic evaluation. The analytical methods and Monte Carlo simulation as can be seen from Figure 2. The analytical methods represent the system by mathematical models and use direct analytical solutions to evaluate reliability indices from the model. As for the Monte Carlo simulation, reliability indices are estimated by simulating the actual random behavior of the system. So of the commonly used probabilistic reliability indices are Loss of Load Probability (LOLP), Loss of Load Expectation (LOLE), Loss of Energy Probability (LOEP), Loss of Energy Expectation (LOEE), Expected Energy Not Served (EENS), and Loss of Load Frequency (LOLF) and Loss of Load Duration (LOLD). Most of these indices are basically expected values of a random variable. Expectation indices provide valid adequacy indicators which reflect various factors such as system component availability and capacity, load characteristics and uncertainty, system configurations and operational conditions, etc [1]. Typical reliability indices used in power system evaluations and their categorizing is shown in Figure 2.

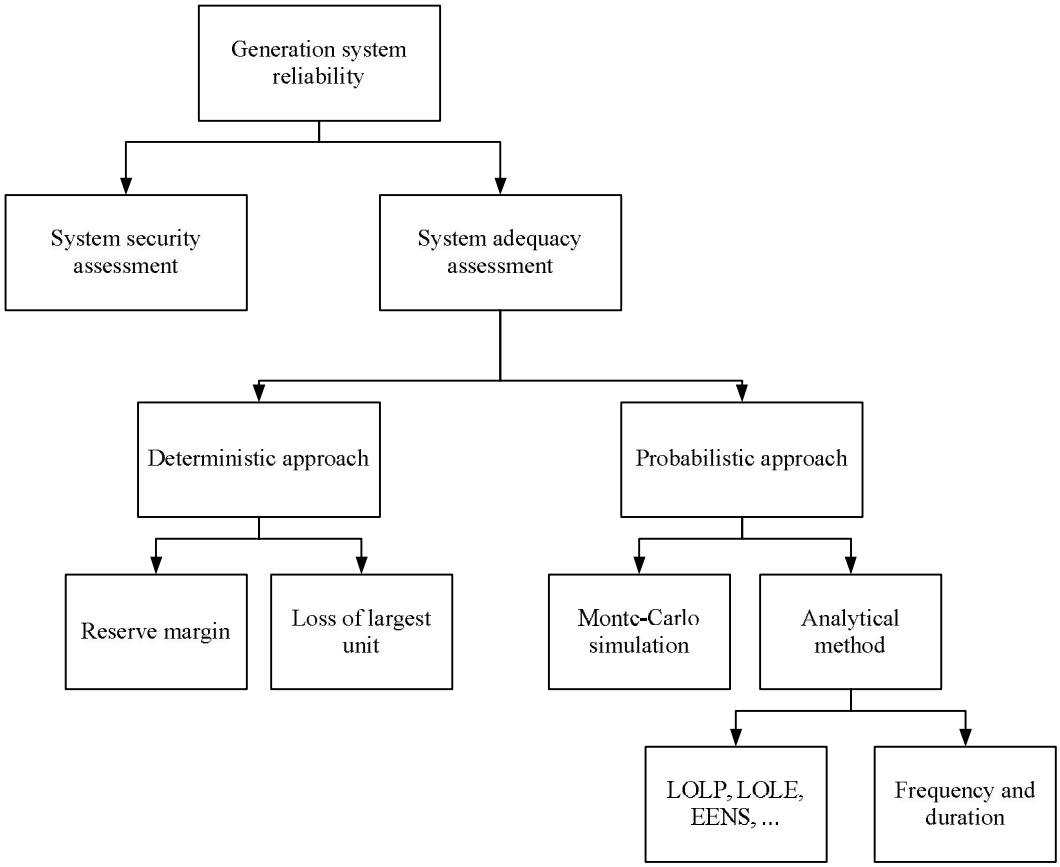

Figure 2. Generation system reliability assessment indices category

6. Expected Energy Not Served

Since the power systems are in fact energy system, where energy sale is the real revenue for the electric company, so, another essential and most needed reliability index known called the EENS can be deduced as follows:

$$EENS = C_{Oi} \times P_{Oi} \times T_{Oi} \quad (MW/Year) \qquad (2)$$

where, C_{Oi}: capacity outage i (MW); P_{Oi}: probability of capacity outage i and T_{Oi}: time of capacity outage i (h/year).

7. Case study

In this section a numerical case study is carried out for reliability evaluation. Table 1 shows the proposed generation test system. This system contains four generation companies with six units.

The system data and capacity of units are considered as typical. The load model is also considered as Figure 3.

Table 1. Generation system details

Generation Company	Number of units	Capacity of each unit (MW)	FOR
1	2	25	0.03
2	2	40	0.02
3	1	50	0.01
4	1	100	0.01

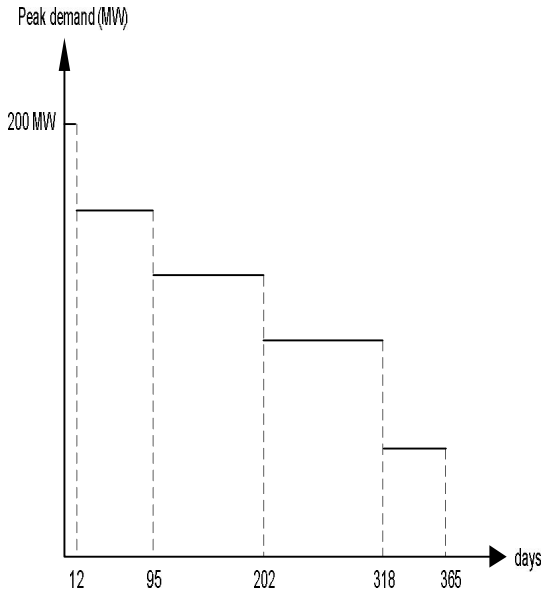

Figure 3. Daily peak demand of year

8. Simulation results

In this section EENS index is calculated for the proposed test system. The procedure presented in section 6 is used to computing EENS. In first the Capacity Outage Probability Table (COPT) is derived. Table 2 shows the COPT and the probability of different outages is listed.

EENS index is calculated as mentioned above. In this regard, the EENS is obtained as below.

EENS = 27134 (MW/Year) (3)

In order to show the sensitivity of EENS index to the system parameters, an evaluation is carried out and the results are listed in Table 3. It is seen that changing FORs and load has a direct effect of the reliability of generation system.

Table 2. COPT for the test system

Capacity Outage (MW)	Probability
0	0.88565791683600000
25	0.05478296392800000
40	0.03614930272800000
50	0.00894603956400000
50	0.00084715923600000
65	0.00223603934400000
75	0.00055336327200000
80	0.00036887043600000
90	0.00036514447200000
90	3.45779280000000e-05
100	0.00894603956400000
100	8.55716400000000e-06
105	2.28167280000000e-05
115	2.25862560000000e-05
125	0.00055336327200000
130	3.72596400000000e-06
130	3.52836000000000e-07
140	0.00036514447200000
140	3.49272000000000e-07
150	9.03640360000000e-05
150	8.55716400000000e-06
155	2.30472000000000e-07
165	2.25862560000000e-05
175	5.58952800000000e-06
180	3.72596400000000e-06
180	3.56400000000000e-09
190	3.68832800000000e-06
190	3.49272000000000e-07
200	8.64360000000000e-08
205	2.30472000000000e-07
215	2.28144000000000e-07
230	3.76360000000000e-08
230	3.56400000000000e-09
240	3.52800000000000e-09
255	2.32800000000000e-09
280	3.60000000000000e-11
	Sum of probabilities=1

Table 3. Effect of changing parameters on the EENS index

Parameter changing	EENS (MWh/year)
FOR unit 25 MW=0.01	2.2931e+004
FOR unit 25 MW=0.05	3.1322e+004
FOR unit 40 MW=0.05	3.4970e+004
FOR unit 50 MW=0.05	3.4186e+004
FOR unit 100 MW=0.1	2.6464e+005
Increasing load by 10% in all levels	4.8635e+004
decreasing load by 10% in all levels	5.6740e+003

Conclusions

In this paper a commonly used reliability index of generation system EENS was successfully calculated and evaluated. Different conditions and changing were considered. COPT was carried out and then the reliability calculated. Simulation results showed that changing components FOR and load level can directly affect of the system total reliability.

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11/17/2012

Construction and Characterization of a cDNA Expression Library from the Endangered *Jinnan* Cattle

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Abstract: Jinnan cattle is one of the most important species in China, It is also listed as one of the 78 nationally protected domestic animals by the Chinese government in the year of 2000. The construction of cDNA expression library of Jinnan cattle is of great significance for its protection of genetic resources, and it is very important for the research of gene function. In this study, the total RNA was extracted from the ear tissue of Jinnan cattle, then the ear tissue cDNA expression library of Jinnan cattle was constructed using SMART^{TM} technique. The result showed that the titer of amplified cDNA library is 1.17×10^{10}pfu·mL^{-1}, the rate of recombinant is above 93.47%, and the average size of the fragments is 0.7 kb. This study has an important significance for the preservation of Jinnan cattle gene resources.

[Hu PF, Li XC, Wang ZY, Guan WJ, Ma YH. **Construction and Characterization of a cDNA Expression Library from the Endangered *Jinnan* Cattle**. *Life Sci J* 2012;9(4):3449-3451] (ISSN:1097-8135). http://www.lifesciencesite.com. 511

Keywords: Jinnan cattle; cDNA expression library; endangered animals

1. Introduction

Jinnan cattle is one of the most important species in China, it was listed as one of the 78 nationally protected domestic animals by the Chinese government in the year of 2000. Constructing Jinnan cattle cDNA library for the protection of genetic resources, as well as the study of gene function has an important genetic significance (Shurong Zhao, 2008).

cDNA library refers to a biological developmental stages of a transcription of all mRNA, by reverse transcription of cDNA fragments, a vector could be formed by connecting a collection of clones (Qingsheng Wang, 2009). The establishment and characterization of Chinese Jinnan cattle cDNA library, our aim is not only to preserve this nationally protected breed resource, but also provide molecular markers linkage map of the building used by probes, more importantly, it could be used to separate full-length genes and then to carry out gene function research (Ruffini, 2007).

2. Material and Methods

Samples were taken from the South of Shanxi Yuncheng city, Shanxi Province, Linyi County Cattle conservation farm, ear marginal tissues were obtained by ear clamp, then they were immersed in ice-box with RNA Locker and transported to the laboratory, stored in -80 ℃ refrigerator.

Ear marginal tissue samples were cut into small pieces (100mg), placed into liquid nitrogen quickly. Repeatedly frozen, stored at -80 ℃ or directly extracted RNA, 100mg frozen tissue was put into a mortar filled with liquid nitrogen, crushed with pestle research organization, then the powder was moved into a centrifuge tube containing 1 ml Trizol reagent, put it aside at room temperature after mixing 5 min, adding 0.2 ml chloroform, and vortex mixing the oscillator oscillation 15 s at room temperature, put it aside for 2-3 min, 4 ℃ 12000 r/min for 15min, take the upper aqueous phase to another centrifuge tube, add 400 μl isopropanol, mixing at room temperature then put it aside after 10 min, 4 ℃ 12000 r/min for 10min, washed with 1 ml 75% ethanol, precipitated twice, 37℃ 5-10 min to dry ethanol, finally, the total RNA was dissolved in 50-100 μl DEPC-treated water.

Synthesis of cDNA first strand was according to clontech's SMART^{TM} cDNA library construction Kit, adding the following samples in a sterile 0.5 ml centrifuge tube: 3 μl total RNA sample, 1 μl SMART III Oligonucleotide, 1 μl CDS III 3 `PCR Primer, deionized water, make up 5 μl. 72 ℃ 2 min, ice-cooled 2 min, To take another test tube by adding the following reagents: 2.0 μl 5 × First-Strand buffer, 1.0 μl DTT (20mM), 1.0 μl dNTP mix (10mM), 1.0 μl MMLV reverse transcriptase (200U/μl), the total volume was 10.0 μl. 42 ℃ incubated for 1 hr, on ice to terminate reaction.

Take 2 μl first strand cDNA product for the LD-PCR amplification of cDNA, adding the following samples in a sterile a PCR tube: 2 μl first strand cDNA, 80 μl deionized water, 10 μl 10 × advantage 2 PCR Buffer, 2 μl 50 × dNTP Mix, 2 μl 5 `PCR Primer, 2 μl CDS III / 3 `PCR Primer, 2 μl 50 × advantage 2 Polymerase Mix, the total volume was

100μl. PCR reaction was according to the following amplification program: 95 ℃ 25 sec, 95 ℃ 25 sec, 68 ℃ 6 min, 21 cycles.

After proteinase k digestion, chroma SPIN-400 column separation, connection, λ phage packaging, Picked from the plate work VCS257 monoclonal inoculated 15 ml LB/MgSO4/maltose liquid medium in vitro. 37 ℃, 140 r/min overnight train, until the OD600 to 2.0, 5,000 r/min centrifuge 5min, abandoned on the clear liquid, precipitation with 7.5 ml 10 mM MgSO4 suspension, ready enough to 100 mm LB/MgSO4 flat, preheating, prepare 5 ml test tube, add 500μl of the overnight bacteria and sufficient to form 6-7 × 10^4 phage clones dilution packaging samples, 37 ℃ water bath-15min. Each tube plus 4-5 ml melt LB/MgSO4 soft top agarose, rapid mixing shop to LB/MgSO4 flat, cooling plate at the proper temperature 10 minutes, so that the top agarose hardening. Inverted plate at 37 ℃ for 6-18 hours, until plaque contact with each other. Each plate plus 12 ml 1 × lambda dilution buffer, 4 ℃ overnight. Flat in the horizontal shaking the bed in order to train 50r/min proper temperature 1 hr, the λ phage lysis buffer into the sterile beaker to obtain an integrated amplified library lysate.

Monoclonal plate was inoculated into 20 ml LB/MgSO4/maltose (plus appropriate antibiotics) liquid medium in vitro.37 ℃, 140 rpm overnight train, until the OD600 to 2.0. 5,000 rpm for 5min. Supernatant was precipitated with 7.5 ml 10 mM MgSO4 suspension. the library with 1 × lambda dilution buffer diluted 1:10000 and SM buffer. 37 ℃ water bath, 15min, each tube by adding 3 ml molten (45 ℃) of the LB/MgSO4 top agarose, rapid reversal of mixing, immediately to the shop has 37 ℃ preheating the LB/MgSO4 plate and quickly absorbed shop will be flatcool 10 minutes in the proper temperature, so that the top agar hardened, inverted plate at 37 ℃ for at least 6-7 hours culture. Calculate the titer (pfu / ml) pfu / ml = (number of phage plaques × dilution factor × 10^3) / μl (diluted phage decking).

3. Results

Take appropriate Jinnan Cattle ear marginal tissue extract total RNA, denatured by formaldehyde agarose gel electrophoresis can clearly see that 28 S and 18 S 2 bright bands, and the 28 S and 18 S ratio of 2 brightness: 1, UV spectrophotometer measured the concentration of 0.83ug/μL, A260/A280 ratio was 1.93, indicating, the total RNA extracted from non-degradable and there are no other substances, pollution has reached the experimental requirements (Figure 1a).

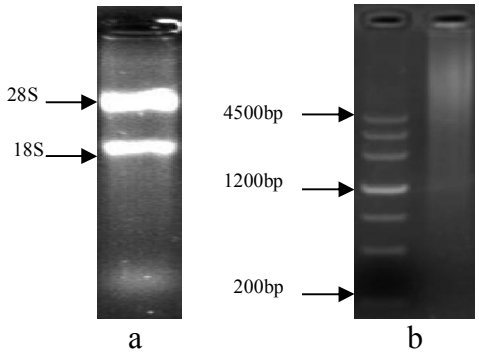

Figure 1. a, Jinna Cattle ear marginal total RNA formaldehyde denaturing agarose gel electrophoresis
b, LD-PCR amplification products by agarose gel electrophoresis

The use of SMART technology, the first strand reverse transcription by LD-PCR reaction, synthetic double-stranded cDNA. By 1.1% agarose gel electrophoresis, band was dispersed, mainly in the 300bp-4kb (Figure 1b), in line with the requirement of experiment.

The double-stranded cDNA Sfi Ⅰ digestion by Chroma SPIN-400 column fractionation large cDNA fragments, electrophoresis results showed that the first 6,7,8 and 9-eluting material is greater than the length cDNA of 300bp (Figure 2a).

Test results showed that the titer of unamplified cDNA library was 1.93×10^6 pfu/mL, the titer of amplified library reached 1.17× 10^{10} pfu/mL. 96 randomly picked phage clones for monoclonal PCR, by 1.0% agarose gel electrophoresis results showed that six empty (including the fragment length of less than 300bp), the positive of 90, re-rate was 93.47%, the average length of the inserted fragment was about 0.7kb (Figure 2b).

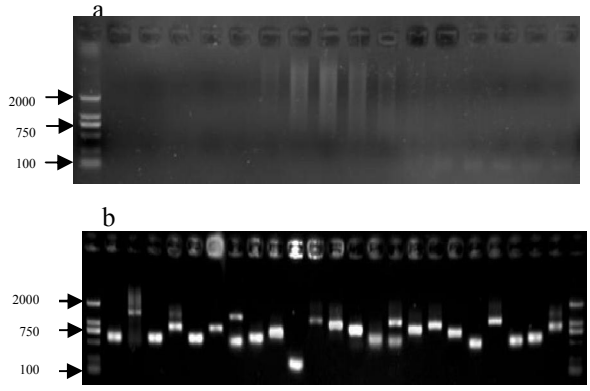

Figure 2. a, Synthesis of Jinnan cattle ear marginal double-stranded DNA before column separation
b, cDNA insert size by PCR detection

4. Discussions

By RNA formaldehyde denaturing agarose gel electrophoresis, it was in order to test the band does or not appear as a standard. As the total RNA was 90% of rRNA, so that the electrophoresis pattern of rRNA, including the 28S, 18S and 5S rRNA. mRNA was dispersed during the period. 1.0% formaldehyde denaturing agarose gel electrophoresis of total RNA quality, 28S and 18S bands were clear, the brightness was about 2:1, UV-spectrophotometer A260/A280 ratio was 1.93, the concentration was 0.83 ug/μL, it was showed that the total RNA was high quality, RNA with no degradation of integrity is better. In addition, there is no additional sample ran out of holes in the DNA, which shows that total RNA samples were without DNA contamination. Total RNA were obtained on the proposed LD-PCR, the results are needed fragments, and make the connection, transformation, etc., thus obtaining the total that the proposed RNA quality is relatively high, it could be used for further library construction (James, 1991).

Evaluation of the quality of cDNA library from the library and re-rate the capacity of two ways (Maria, 2005). Construction of cDNA library aims to find more meaningful cDNA cloning method using PCR amplified from the library promptly gene, the library must be as much as possible, including all mRNA molecules reverse fragment, so that each gene has the opportunity to be cloned. Both in terms of capacity or the library insert sizes respects in accordance with quality requirements, library has a certain integrity of representation and sequence, can be used for further research. As a result of Clontech's SMART^{TM} technology, on the Joint primer and reverse transcriptase are optimized, they can effectively remove the non-poly A tail of RNA and genomic DNA, the reverse transcription for the mRNA 5 'end of time , Super Script II reverse transcriptase as a "template jump" function will be a specific SMART IV oligonucleotide connector to the mRNA 5 'end, reverse transcription enzyme jump shift and continue to the end of the connector, as such jumps often occur in eukaryotes cap structure, only contains the full mRNA and SMART II oligonucleotide template joints in the LD-PCR reaction to amplify them, thus simplifying the RNA purification process to ensure high quality full-length cDNA of access, increased length cDNA library contained in the ratio.

According to the Clontech gene library of the company on good quality standard: The original library of recombinant number of 5×10^5-5×10^8, more than 90% re-insert cDNA fragment is not less than 0.3kb, we constructed cDNA library did not expand by library titer 1.93×10^6 pfu/mL, the titer of amplified library was 1.17×10^{10} pfu/mL, recombination rate was 93.47 percent, reaching library construction requirements.

Acknowledgements:

This research was funded by the Ministry of Agriculture of China for Transgenic Research Program (2011ZX08009-003-006, 2011ZX08012-002-06), the project National Infrastructure of Animal Germplasm Resources (2012 year) and China Agriculture Research System-40-01.

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11/18/2012

The effect of music Therapy on Separtion Anxiety

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Abstract: Nowadays music becomes more interesting because some of its feature such as helping children to be able to express emotion ,regulate emotion and communicate. It was a randomized controlled trail, parallel designed. Eligible participants were student between 10 to 12 years age in Iran. Paraverbal music therapy has been used as an intervention for the present study. The objective of our study was to determine the relationship between music therapy and emotional intelligence dimensions under paraverbal music therapy intervention with respect to emotional intelligence for young people. In addition, it was compared the effect of music therapy on improvement of male's and female's total emotional intelligence score in young people. Participants were divided in to two groups, experimental group who entered to intervention and control group who just asked to study an easy book about musical instrument .Participants, parents, therapists and those assessing the outcomes were blinded to group assignment. Between participants, a total of 100 people (boy=50, girl=50) with the lowest scores in Baron emotional intelligence measurement for young people short version, employee in the present study. It shows that paraverbal music therapy improves emotional intelligence in children. However; there was no significant difference between mean value on emotional intelligence level for male and female after music therapy. Music therapy can be used to increase emotional intelligence in children whose emotional intelligence suffered by some problem or can be improved through training and remedial programs as well as through therapeutic interventions. During the different period, people with antisocial personality disorder is defined as many titles by researchers and experts, but the symptoms of this disorder remains as featured the same. Origins of antisocial personality disorder and social deviance is in childhood, means when the symptoms may be seem in actions such as, away from school, constantly lying, robberies and fights. This practice often continues into adulthood. Antisocial personality disorder is first recognized disorder. This disorder is characterized by continuously antisocial and criminal acts, but is not criminality equivalent and is inability to adapt to social norms. Actions such as: behaviors such as aggression to people and their property, failure to pay the debts and financial obligations, criminality and committing acts unlike ethics and law. Antisocial personality disorder including anti-social features, such as no sense of shame or regret, failure to learn from past experiences, weakness and failure in the emotion and excitement, stay away from others, anxiety and stress and asthma. Antisocial personality disorder is 2 to 3 percent, and in male is four times more than women. Antisocial personality disorder is a long-lasting and durable. Four potential sources considered for this disorder, which include: 1- family and social context; 2 learning disorders; 3 – genetics; 4 – bad performance physiology of the central nervous system. Divorce is considered among the most important and most social damage. The word of divorce means release and separation of marriage and the marriage bond, and is terminating the marriage and is a phenomenon that caused ability to disrupt marital ties. Personal relationships with others, includes: individuals, groups and institutions are ingredients implementation of life. Only the living can have many components, but usually only a few of them, which are associated with marriage, family and career, are vital for life. The reports indicate that early adulthood (young), is the most of the energy in their favor, conflict and stress. Physical separation is different from the actual subtraction (That is due to the cessation of cohabitation), and must be done by court order also couples living separated without divorce without duties in common life. Adolescence and young thinks to marriage as a target, with diverse experience, growing relationship with the social environment, development dimensions of intellectual, understanding many aspects and reality of life, considering the material and spiritual, depending on their character and with influence of family life. Today the kind of marriages among youth can have an influence on the prevalence of divorce and lack of understanding between couples.

[Seyidemozhghan salehi, Zahra shamlourad, Vida Abdollahi shamami**. The effect of music Therapy on Separtion Anxiety.** *Life Sci J* 2012;9(4):3452-3459] (ISSN:1097-8135). http://www.lifesciencesite.com. 512

Keywords: Music Therapy, Emotional Intelligence, Young Children, Adolescence, divorce, marriages, social, family, Anxiety, depression, social, deviance, separation

1. Introduction

The concept of emotional intelligence has, in the past decade, become increasingly popularized and has been promoted as capable of solving most personal and social problems. Goleman's two popular books, published in 1995 and 1998 respectively, 'Emotional

Intelligence' and 'Working with Emotional Intelligence' brought the concept to the popular media and espoused emotional intelligence as an insightful, revolutionary new perspective on society's ills and work success. Complementary to this 'revolutionary' perspective on intelligence, but far less populist, was Gardner's (1983) theory of Multiple Intelligences, as published in his book, 'Frames of Mind.' Gardner (1983) argued that our notion of human intelligence remains limited and proposed eight different forms of intelligence, including inter- and intrapersonal intelligence. Both these authors helped to spark and add to the general interest in emotional intelligence as a viable, independent concept.

In 2004, Mayer, Caruso and Salovey defined emotional intelligence as: the capacity to reason about emotions and of emotions to enhance thinking includes the abilities to accurately perceive emotions to access and generate emotions so as to assist thought, to understand emotions and emotional knowledge, and to reflectively relegate emotions so as to promote emotional and intellectual growth. These authors, consequently, created a four-pronged, hierarchical model consisting of four related abilities.

Of these four abilities, perceiving and using emotion (Experiential Emotional Intelligence) are considered the more fundamental, while understanding and managing emotions (Strategic Emotional Reasoning) are the more sophisticated and advanced of these emotional skills. Despite variation in the interpretation and conceptualization of emotional intelligence, for the most part, definitions of emotional intelligence include at least one of the following elements: the ability to recognize and understand emotions, the ability to understand how others feel and to relate to them, the ability to manage emotions and the ability to generate positive emotions that are self-motivating (Bar-On, 2006). Emotional intelligence concerned with understanding oneself and others, related to people, and adapting to and coping with the immediate surroundings which increases one's ability to be more successful in dealing with environmental demand (Bar-On & Parker, 2000. Emotional intelligence is such an important factor that the emotional capabilities of which is vitally importance in making effective relations.

Emotional intelligence can be applied to expressing the quality of relating, understanding people's emotions, sympathizing with others and being able to exploit a favorable mood**.**

Life is an important concept in Levinson's theory, and it is the basic pattern or design of life at any given moment. Personal relationships with others, includes: individuals, groups and institutions are ingredients implementation of life. Only the living can have many components, but usually only a few of them, which are associated with marriage, family and career, are vital for life. However there are large individual differences in the main value of the component side of life. Biographical reports of many people confirm that describes the stages of life from the perspective of Levinson. These reports also indicate that early adulthood (young), is the most of the energy in their favor, conflict and stress. These years, high satisfaction of love, sexuality, family life, career and research accomplishments are important goals of life. But these issues have a lot of pressures on the people. Important decisions about marriage and business are important issues before many people have the life experience necessary to choose wisely.

Women in live longer have more same-sex intimate relationships than men. Women say they prefer just to talk with friends. Whereas men say they prefer do anything, when they are with their friends. These are due to quality of friendship and individual differences, which gender identity and marriage activity involved on them. Those who being informed of the behavioral characteristics of each other after married due to men and women with mental health problems, or lack of understanding of each other, will cause problems later in the life; and after the wedding they discuss the many issues. Previously had described individually about their decision or their families; they tackle everyday issues and the relationships were informed about each other.

Because of all these issues can be important degree and divorce. Especially those who are outside the age range for marriage norms are often faced with stress,that this move makes it harder. Marriage are the ones before, maybe your family, or a family looking for their elusive, most of these people never have, yet secure identity and independence have not grown enough for marriage is essential. Despite advances in women's rights, traditional marriage in Western countries are still to be found in this type of marriage,a clear division between the roles of husband and wife there. Male head of family is his main responsibility for family finances; women devote themselves to the care of his wife and children and have a duty to provide comfort to the family.

However the, traditional marriage have changed in recent decades, women's values are eflected. In this case, a couple of times to connect and power is divided, both partners are trying to spend their time and energy to working with children and their relationships are balanced; the couple's divorce and separation may show less, however, understanding each other lives and professional relationships, both parties must be observed. (Karbasi, 2005). History The history of marriage is divorce. The cause of the man's natural desire marriage bond closes in loving family to come together for rest and relaxation, just as

each other may be some reason that you continue Specific requirements in human have emerged in courtyard of the evolution of human life history, but their emerged is associated with the community. Each community gives particular to individual according institutions and special factors. Psychologists used to long history of human such as learning laboratory, and unlike other psychologists such as Freud that does not know character builder of community, but his belief it is of community that makes the characters. In other words, different character is caused by different communities. All humans are in need of satisfying your hunger, thirst-quenching, rest and sleep, etc. But in the different community these needs are met in different aspects. For example, in a capitalist society, need for sameness may be satisfied in this way that Community members pay to accumulate wealth and property and thereby making their leading, or join a great company his points lead due to its dependence to the company. Human surrounded by the affairs of opposing. Life and death is one of the opposite issues.

Sometimes these are two categories and not reasonable to think that things in life that is considered as antisocial behavior. Anxieties of those who are anti-social behavior have been studied. Psychopathic individual are less anxious than normal. By default, only a little and this may be true; although those social biases of people with less than other people seem to be worried and anxious. But all the physical symptoms of anxiety such as muscle, usually in heart rate and shortness of breath and ... Core personality in social deviations avoiding people, new experiences, and previous experience; This disorder is often a combination the a silly fear with a penchant for acceptance and love the people with this disorder, growing appetite for new social relationships or activities. But may be due to the fear of not being accepted and approved, the reluctance of certain social relationships are drawn to show the deviation (Mansor, 2002).

During the different period, people with antisocial personality disorder is defined as many titles by researchers and experts, but the symptoms of this disorder remains as featured the same. Origins of antisocial personality disorder and social deviance is in childhood, means when the symptoms may be seem in actions such as, away from school, constantly lying, obberies and fights. This practice often continues into adulthood. Actions such as: behaviors such as aggression to people and their property, failure to pay the debts and financial obligations, criminality and committing acts unlike ethics and law. The main characteristics of people with antisocial personality disorder are no shame or remorse, failure to learn from past experiences, etc.

Thus the vicious cycle seen in the behavior of these people and this belief may be induced. People with social deviance or antisocial disorders of emotion and excitement of failure and are lack of moral conscience that can control their behavior.

2. Material and Methods

It was a randomized controlled trail, a control group for comparison and randomization procedures for group allocation with convenience (10 to 12 years of age) double –blind , parallel group and study conducted in Iran. Eligible participants were all young children between 10 to 12 years of age with the lowest score of emotional intelligence according to Baron Quotient inventory (In order to show the best effects of intervention on children) and whose parents were completely satisfied for participation of their children in the present study. The study took place at two halls of two the schools in SHIRAZ (name of the city in IRAN). From March 10th to march 30th 2009 .Those hugs and quiet halls, had suitable environment for our study and they were nearby student classes so it mad participation in the study more easy for them. A total of 100 children were chosen to the experimental and control group (boy=50 and girl=50). Researcher has chosen sample size according to table for determining sample size from a given population (Krejcie & Morgan, 1970).

Then, they randomly divided in to the control and experimental group. Next, pre-test for experimental and control group done. Experimental group has given intervention while control participants just asked to study an easy book about different kind of musical instruments for children. Finally, post-test separately for each group (experimental and control group) conducted.

The measurement which has been used is Baron Emotional Quotient Inventory: Youth Version short form (BarOn EQ-I: yv(s)) which is an easily administered self-report instrument to assess emotional intelligence in young people aged 7 to 18 years. Youth Version short form (Bar-On & Parker, 2000) is a 30 item self-report instrument designed to measure emotional intelligence in young people age seven to eighteen years. It consists of the following six scales: intrapersonal, interpersonal, adaptability, stress management, positive impression and total EQ.

According to Pfeiffer (2001), the inventory is geared for fourth grade reading level and takes about 25 minutes to complete. The instrument uses a 4-point Likert style format (very seldom true, seldom true, often true, and very true) and summons self-appraisals about having fun, ease at telling others how you feel or talking about deep feelings, the importance of friends, and knowledge about how other people are feeling. The age of interest in this study is the 10 -12 year old groups. By examining the individual scale

scores one can pinpoint specific strengths and weakness of a responder's EQ .Furthermore, an overall level of EQ (total EQ scale) is retrieved using this measure. It is necessary to maintain that due to conducting this study in Iran, translation of BarOn EQ-i: yv and following that calculation of reliability for the test were necessary .Researcher has translated the questionnaire to Persian (Iranian language). According to the psychometrics judgment there was no trans cultural differences between translated questionnaire and original one. Therefore, after calculation of validity and reliability for test, it has been used to measure emotional intelligence in children in, SHIRAZ, Iran. With respect to the face validity and content validity which have been calculated by BarOn & Parker (2000), and Correlation calculated between judgments of experted persons (which have been done by researcher) the validity of the test was determined to use in Iran and it was 0.732 (agreement coefficient). And in the present study to assess the reliability of instrument cronbach's alpha has been calculated. After translation of the instrument to Persian language cronbach's alpha reveals a value (α) of 0.95.

Paraverbal music therapy has been used as intervention method which is a method of psychotherapy developed by Evelyn Heimlich (1965, 1972, 1980, 1983, and1985) which has been used for the present study. As implied by its prefix, "paraverbal" music therapy utilizes both nonverbal and verbal channels of communication, and employs various expressive media (viz, speed, language, music, mime, movement, psychodrama, painting, and drawing) in unorthodox and nontraditional ways. Its main purpose is to gratify the expressive communication and therapeutic needs of the client as they are manifested from moment to moment.

Paraverbal music therapy has been used primarily with children who have emotional communication problems that are not responsive to verbal method of therapy .This includes children with various diagnoses including psychosis, emotional disturbance, mental retardation, learning disability, medical illness, etc. This method is also used with the mother –child dyads and with developmentally disable individuals of various ages. The basic goal is to fulfill the clients' basic emotional needs to develop a sense of self, to foster self expression and communication, to provide relief from painful emotions and to eliminate symptoms. The paraverbal music therapy session contains four main procedures and stages: observation, maneuver, shift, and

3. Physical separation

This separation is different from the actual subtraction (That is due to the cessation of cohabitation), and must be done by court order. And that means that, couples living separated without divorce without duties in common life. But if the death of a spouse, the other party is entitled to the legal rights, upon the death of spouse is determined.

However, if the parties their asked of the court, physically subtraction is demanding, they could be downed inheritance rights after the death. This issue has many branches, which are influence in the French Civil Code (Haqqani, 1986).

4. Incentives for marriage

After adolescence and young, with diverse experience, growing relationship with the social environment, development dimensions of intellectual, understanding many aspects and reality of life,anyone considering the material and spiritual and with depending on their character and with influence of family life thinks to marriage as a target. And in this time that he thinks in the case of married and a partner who could be friendly to him. He will check your employment opportunities, economic and social situation and to search for select a suitable wife. He measures individuals of the opposite sex, directions, intellectual, behavioral, economic, familial, social and educational. And tries their friendly relations with a person are additional. This type of culture, community and family ties, and thus determines the shape is different. The relations of the two makes k d to assess the need for having a common life and marriage do that the agreement will lead to marriage.

Otherwise withdraw of the marriage relationship and the friendship continues, or due to the differences between cut and re-assessed to be anyone else (Askari, 2001). Same-sex relationships in adolescence are anxious to come out and fix alone.

As mentioned, establishing a relationship with the opposite sex, it depends on the culture. In some cultures disapprove of premarital sex is acceptable in other cultures, and therefore the relationship between boys and girls before marriage is controlled by cultural norms. Unfortunately, in the absence of sex before marriage is not friendly or prohibited, girls and boys having sex on the imitation of other cultures can be and the difficulties and problems that can affect them in the future, wrote to its adverse effects.

In these cases the Gender and mental needs of parents of the children in this area is important and as a preventive measure they can suck on their children, especially girls from sex to protect fateful consequences. A person who wants to marry their careful aim and motivation thinks marriage and to examine their motives would marry, any marriage that marriage is only for having a Common life without purpose and knowledge required to accept, fate is often vague and unpleasant. Meeting sprang to discuss and reflect on each other's behavior and enables young people to continue that the absence of understanding

of the relationship before it comes to emotional factors, to prevent. In many communities there is a tradition in the family through marriage matchmaking is done, matchmaking occurs usually by the family of the boy, the time has come for the Son family feels that marriage or the family's request to marry his son to take action, the search for a suitable girl starts Usually women with family and friends to talk with a girl will consider and the woman's family shuttles initial negotiations do, and if that was their preferred girl and her family also announced its agreement, both father and family were in progress. Flows out of the their sons and daughters about their properties, if the original agreement and family, parents and son, something few people in my family to attend a formal suit, if the two families of boys and girls expressed their satisfaction, the candidate's work to be done and the wedding and thus will be married. And may be the son of the family, previous acquaintance with a girl or a boy and a girl who may have been friends, and soon reached the conclusion that they are married; the boy wants to woo the girl of the their family to go. When the marriage is performed by woo two families together from different directions are considered necessary and to assess the pros and cons. In fact, these are the families of the bride and groom would like to get married and with have good experience to know or reasons for boys and girls do not accept links. Score this kind of marriage is that the two families, in first of many necessary aspects of cultural, social, economic and family are doing, and, if appropriate and necessary agreement to marry their son or daughter to be happy and any support that is needed, of the bride and groom do not hesitate. Disadvantage of this type of marriage is that in some cases, unfortunately, there are not male and female views.Unless the male and female candidates have ample opportunity to review each, and agreed by both male and female, and their views should be considered.

Otherwise it may be a conflict between the married couple will appear. In addition, because families play a vital role in this type of marriage; therefore, allow imposing their views in many issues girls and boys are involved, and this will cause a married couple.

Whereas the involvement of the families of sons and daughters and try to apply for their children under proper guidance and do manufacturer, them to maintain their lives and friendship and mutual advice.

And if you need any assistance do not hesitate to give them stability and shared prosperity in the lives of their children will ensure (Askari, 2001).

5. Antisocial personality disorder

Antisocial personality disorder including antisocial features, such as no sense of shame or regret, failure to learn from past experiences, weakness and failure in the emotion and excitement, stay away from others, anxiety and stress and asthma. Antisocial personality disorder is first recognized disorder. This disorder is characterized by continuously antisocial and criminal acts, but is not criminality equivalent, and is inability to adapt to social norms. That includes many facets of youth development is ill. Because of the wide impact on public safety and economic health of the community, more than any other anti-social personality disorders research has been done about the problem. The amount of disorder in men is 3% and in women is 1%. The prevalence of this disorder among residents of urban poor areas all over the region can be seen moving. Extended families with more boys than girls are rising up. Onset of the disorder is before the age of 15. Prevalence among prisoners may reach up to 75 percent. It is five times more prevalent disorders in first degree relatives. As previously mentioned, those anxiety disorders, body shape, and other non Psychotic disorders are affected. Although friends and family may be upset, but basically they are uffering from their ailments; In contrast, people with anti-social disorder, there is no suffering. The symptoms of this disorder are characterized by a predator attitude towards others, and chronic emotional indifference to their rights as lying, stealing, fraud, and abuse may be manifested (Milani-Far, 2001).

6. Historical background the prevalence of the disorder volition

Antisocial personality disorder is 2 to 3 percent, and in male is four times more than women.

But only people with antisocial personality disorder do not commit theft and fraud, but also those so-called “normal” attempts to theft, forgery, and embezzlement.

The fact is that for years it was not thought that antisocial personality will be in sychology terms. Thus, all those who had been lost to crime and wrongdoing, were convicted and only difference was the level and severity of their crimes. But in the nineteenth century, under the influence of psychological development, in particular the idea spread that certain types of criminal behavior may occur when a person has no control over them. This condition can be controlled from the social, psychological, or due to be biological. Thus, if the mass of the people against their will and desire that has been caused by circumstances they had no control over. In this century, it was believed that the anti-social people "morally insane" and the volition people with the disorder were considered. However, today the term "antisocial personality disorder" alternative moral crazy, but still these people as those who volition have failure and disorder, are considered.

Robert (1986)states that people with antisocial personality disorder are a mental structure, much like the children are ten years old. This means that both cannot take responsibility, have difficulty in understanding others, and their minds are highly subjective (remain in the concrete logic). One of the eatures of antisocial personality disorder is a disorder volition, and will is not subject to all or nothing. That is not to say that no will or the volition man, but, like other sychological actions, which volition form a continuum, normal, low or too high, but even fewer people with antisocial personality disorder will it is normal to have a bit of interest. Like anxiety and inference volition is not be visible. It reflects the attitude that the person wishes, can be inferred. As long as a person does not express the particular behavior, we cannot judge who is suffering from a personality disorder or not. So DSMIII-R measures of cognitive - behavioral offers for diagnosing antisocial personality disorder (Mansor, 2002).

7. Anti-social personality characteristics

Crime has a special meaning for ordinary criminals. We can find out what they actually have done and why? For example, want to become rich immediately to obtain position. Although many of these behaviors are not approved; but they have understood incentive. But those anti-social crimes often are seem aimless, random, and impulse. Cannot understand themselves and others and cannot understand why and for what reason these people have committed a particular act. It seems that they are not prompted for a reasonable goal, but the impulse to have committed deviant behavior. There was no shame or remorse for past bad deeds, etc. from any and all sizes that are obscene, common characteristics of antisocial people. They have no moral conscience and therefore do not pay any attention to the rights of others. Therefore, their relationships with others and the whole surface to exploit them; they do not have the ability to love and constant dependence of compassion, kindness, and love remain effective. Shameless lying, and cruelty towards those who trust them, they abuse and oppression. One of the major differences that a normal person convicted of a person with antisocial personality distinguishes the depth of emotion that is experienced. It seems that common criminals that other individuals have the same excitement, experience, emotional experience of anti-social, but very superficial. Anti-social behavior in ways that seem to be able to continue to love, anger, sadness, joy and not despair; In fact, they experience emotional disabilities.

8. Causes of anti-social behavior

Antisocial personality disorder is a long lasting and durable. This disorder is called, conduct disorder if appears in childhood or early adolescence and may continue into adulthood. Four potential sources considered for this disorder, which include: 1-family and social context; 2 learning disorders; 3 –genetics; 4 - bad performance physiology of the central nervous system. It seems that people are anti-social, moral standards of society are not innate. Therefore, it is natural psychological development resources -moral, social and family background, especially as anti-social causes are examined. There is evidence that childhood experiences of people with anti-social behavior in the relationship. A number of studies indicate that the loss of a parent due to death, divorce, separation, or a long stay in the hospital has a associated with the emergence of anti-social behavior in the future. Further studies have shown that the more severe anti-social behavior, the likelihood that an individual had experienced parental separation and deprivation is greater. Many authors have noted that the exclusion of their own parents and the rise of antisocial behavior per se is not the emotional space to accelerate the divorce, and subsequent events, is effective in anti-social personality. For example, high contention and strife, conflict and chaos, the instability of the parents, and the major factors causing the neglect of the parents are an emotional injury. Similar findings, but the large groups of people who are awake during the years 1924 to 1929 were studied in a child guidance clinic (Robbins, 1966). The clinic eports about the precise psychological and sociological problems and family situations of children, who were referred to the clinic, were prepared. When the children grew up, the children in the control group who had never been referred to the clinic were interviewed and detailed comparison. The survey revealed that about 22% of the group who were referred to the clinic, as were antisocial personality diagnosis, while only 2 percent of the control group had such a diagnosis. Many clinicians inability of anti-social individuals have highlighted the lessons of experience.

Thus, they suffer from a weakness and failure in learning, it may be a little careful about them. One of the cases in the areas of learning weakness of antisocial disorders avoidance learning has been studied (Milani-Far, 2001).

9. Anxiety in anti-social

Antisocial individuals are evaluated in terms of anxiety; the presumption seems to be that psychopath people are less anxious than normal; however, these assumptions may be true only in the limit of slightly. Skaling (1978), in their review found that although the anti-social people seem to worry less than others, but usually all the signs of Physical, and lean muscle their anxiety such high heartbeat dyspne and muscle stress experience. If we share the concern of anxiety to cognitive and physiological components of the body's

response to fear, it seems that anti-social people who lack the cognitive anxiety (Siasi, 2000).

One being that the natural environment and social and cultural set is T cannot be separated from where it lives, or the culture of a group that is a member, or the role that the building department is responsible consideration and understanding. Basically, anyone who is a social person means a device (system) from human interactions.

10. Divorce

Although the subject of this research is divorced, but is required before divorce, the issue of marriage discussed which context of divorce is based on it. Marriage is the basis of human survival and reproduction condition in different ethnic groups, in schools, communities and different generations, with different traditions and customs. Select the dickey, survival, reproduction and birth of a new generation are involves maintaining and improving the human race, training the next generation, community affairs and activities of individual in the production and distribution of economic, flow of social interaction and cultural processes, working in politics and art, etc. are indebted to children and future generations, which will happen of marriage. Marriage in general has the following objectives and functions: Creating a center of calm and familiarity and affection for couple and children; replacement and creating a new generation and raising and mighty healthy children; and a means to achieve purity in moral relationships (Sotoodeh, 2006). The couple's union is not always going well and always ethical and behavioral and emotional adjustment, and communication between couples cannot bear the thought and everyday life circumstances and personal and social haracteristics of individuals and couples is not to embrace each other to deal with problems between couples in love and always balance each other and keep is not continuity and stability in the marriage. Forever and environmental factors such as parental addiction, bankruptcy, personal characteristics such as aggression and nervousness in prison and irritability, and verbal or financial weakness or obscene behavior, such as gambling and drinking alcohol buddy alcohol unwilling couples play together desire or select another dickey or deception and bad speculation and suspicion, such as items that threatens the foundation of families. If couples are unable to overcome and cope with this phenomenon inevitably become a ruinous divorce happens.

Divorce is considered among the most important and most social damage. The word of divorce means release and separation of marriage and the marriage bond, and is terminating the marriage and is a phenomenon that caused ability to disrupt marital ties. Voltaire says of marriage and divorces in this world are born a few days earlier, perhaps marriage is born, because after a few days or a few months of marriage and marital relations, divorce phenomenon may be caused. Divorce and marriage are two of the old man is both necessary and essential for gaining (Haqqani, 1986).

Hope and trust, taking the role of parents and young children, they need emotional and financial support and therapy and cognitive and social crisis and change, it will be by divorce, and a sense of helplessness and humiliation and inferiority.

Children and young people will feel inferiority, in discharging their homework and answering questions from severe anxiety, and that is the ability to go down and break out of isolation and to collect and select.

Her self-esteem, feelings of helplessness and reduces your inner talents, there will bury themselves in crisis. Regardless of behavior disorders such as anxiety and depression, inferiority and humiliation which is portion of the area of divorce and family breakdown among children and adolescents and the social dimension of behavior disorder is more dangerous (Nikkhoh, 2000).

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11/17/2012

Improve image contrast using the histogram of the matrix obtained in a uniform method of histogram and without noise histogram overlay

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Abstract: In this paper, we approach used in the original paper, which improved the image contrast of the histogram is based on informal we represent. The source of the original histogram using the histogram below with reference to the brightness level and a limited range of the mean and variance improves. As a final total weighted images obtained histogram is consistent with the Uniform Building. By the range of the minimum and maximum values of each individual operator draws the histogram equalization is limited. We use in this method, the matrix obtained from the histogram method. The histogram of the image without using the histogram of uniform methods and Using the histogram method improves the overall image is described and finally we will compare these two methods. [Kangarani Farahani J, Ahmadi R, Asgari Z, Bayat H. **Improve image contrast using the histogram of the matrix obtained in a uniform method of histogram and without noise histogram overlay.** *Life Sci J* 2012;9(4):3460-3463]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 513

Keywords: Improve contrast; Histogram of uniform; the uniform of the histogram; Noise Uniform; image processing.

1. Introduction

Improve the contrast, brightness provides a clear picture of the amount. In other words, as the distances stretch characteristics between the bright and dark improves. The two techniques can improve the overall community image did. General methods [2] through the normal cumulative distribution function are extremely helpful. This method will make the narrow Noisy many pixels as noise overlap occurs. To solve this problem, we use a uniform method of local histogram [3,4] we use. Thus local histogram method is that the original image is divided into several sub-blocks of non-overlapping sub-blocks and the uniformity of the histogram does. Image results obtained with one of the blocks is. In this way the problem of discontinuity in the block nears the block boundaries that happen -. Local methods within each sub-block only local information without a complete picture of the balance of uses.

2. Method of uniform size with cumulative distribution function

Uniform method of histogram overall scale factor normalized cumulative distribution rate and the image brightness values on the original scale factor used to intensity will be distributed.

An image data is shown below:

$$X = \{X(i,j)|X(i,j) \in \{X_0, X_1, \dots, X_{L-1}\}\} \quad (1)$$

Here the components of L if X (i, j) is shown.

Normalized intensity of the screen X_k, k the level of intensity. For uniform histogram of the intensity function of the form shown in Equation 1, we use.

$$P_X(X_K) = \frac{n_k}{n} \quad (2)$$

$$0 \le X_K \le 1 \; and \; \sum_{k=0}^{l-1} P_X(X_K) = 1 \quad (3)$$

In this equation, n the total number of pixels in the image and me n_k, k is the number of pixels. To obtain a uniform histogram function, the cumulative distribution function of the probability distribution function is calculated using equation (2) has the form beyond. [2]

$$S_K = T(X_K) = \sum_{j=0}^{k} P_X(X_K) = \sum_{j=0}^{k} \frac{n_j}{n} \quad (4)$$

The level of cumulative distribution function of T (Xl-1) = 1 and k = 0, 1... 1-1 K is the intensity of the image. Then the histogram of an image consistent with a uniform distribution, we may be a function of the distribution of the output image is equal to all distributions. The resulting image of the form (1) with the original image histogram and histogram has improved.

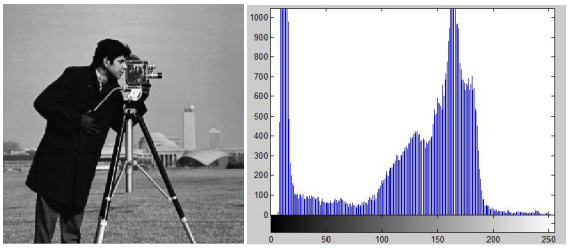
3. From the histogram of uniform

The original article [1] by using Gaussian approximation and calculate the mean and variance of the equation 3 and 4 in which the definition is applied to remove unnecessary areas be $\sigma_n^2 = \sum_{x=n_s}^{n_g} (x-\mu_n)^2 \times f(x)$

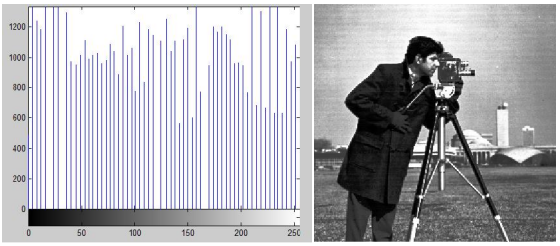
$$(x) = \frac{1}{\sigma\sqrt{2\pi}} \exp\left(-\frac{(x-\mu_n)^2}{2\sigma_n^2}\right)$$

σ_n^2 in equation 3 and the variance of the Gaussian distribution of selected regional centers by the center

is created. When the two equations are used, the Gaussian approximation can be obtained similar to Figure 2.



A, B



C, D

Figure (1): A - original image. B - Tsvyrasly histogram. C - The uniform histogram. D. - the image histogram is uniform.

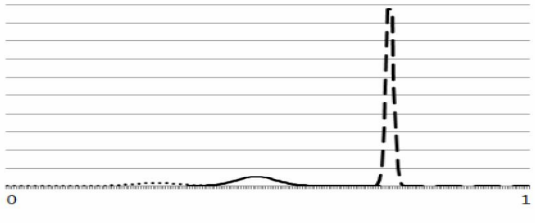
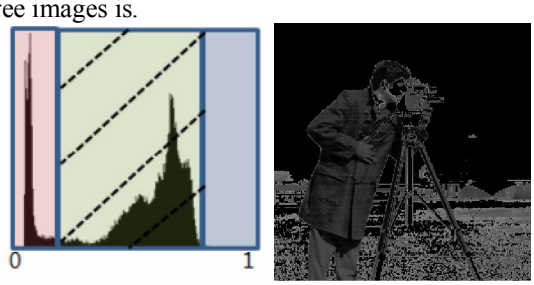


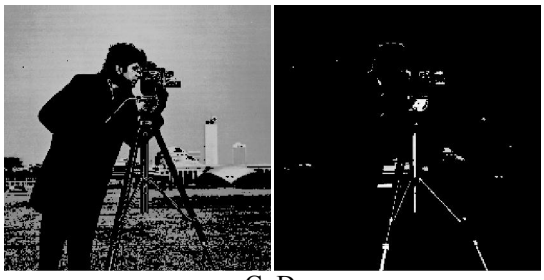
Figure (2): the Gaussian approximation

Figure (3) below show the uniform

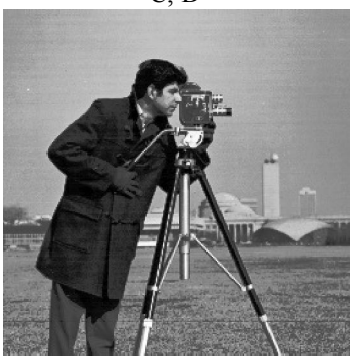
Uniform illumination of the area under the histogram and cumulative distribution function by the district to act this form is divided into three sub-histogram and a histogram showing the uniform sub and the resulting image is obtained by one of these three images is.



A, B



C, D



E

Figure (3): A - Histogram divided. B - 46 ~ 0 C- the histogram of the uniform - the uniform histogram region of 165 ~ 47 D - a uniform region of 255 ~ 196 E - the final image.

4. characteristics of binary histogram method of maintaining uniform brightness

The histogram method is based on the average brightness of the input is divided into two parts. X_B is the first independently and then equations (5) and (6) are formed.

$$x_B = \int_0^1 r P_r(r) dr \qquad (5)$$

$$f(x) \begin{cases} \frac{1}{x_B} \int_0^{x_B} P_r(r) dr, & 0 \le z \le x_B \\ \frac{1}{1 - x_B} \int_{x_B}^1 P_r(r) dr, & x_B \le z \le 1 \end{cases} \qquad (6)$$

This method can be symmetrically distributed around a mean average brightness of the input histogram itself be preserved, but the video does not have this feature. Average brightness of the input image is dependent. Improved image at this stage in the form of (2) is shown. [5]

This method is very similar approach to the uniformization technique called two-component histogram of the image [6], with the difference that here we separate the input image is gray X_D as the middle class and the equation (6) is calculated.

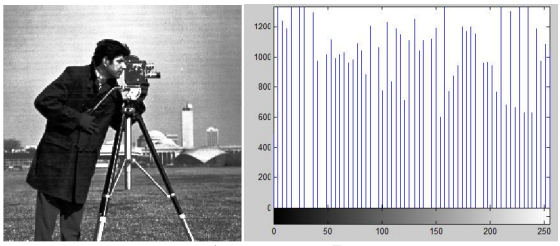
$$\int_0^{x_D} P_r(r) dr = 0.5$$

This method is applied to the image on the image in the form (3) is shown.

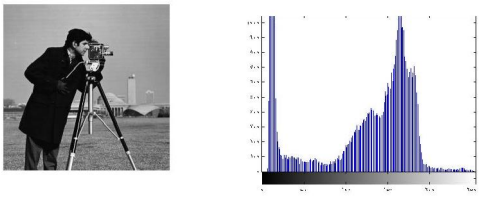
Figure (4): the image of the average threshold

Figure (5): the image of a moderate threshold.

Result of improved image after combining the two methods is better. Histogram of the image using the mean or average and median as the threshold in the form (6) with the histogram has improved.



A, B



C, D

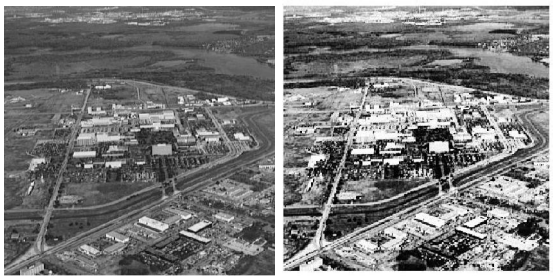
Figure (6): A and C - the final image using the second method. B and D - the histogram of the image

5. Compare

According to the source article of the figure3 (e), and the results obtained from the combination of the two methods improve the contrast of the average mid see Figure 6, Figure 6 is the result looks much better.

6. Conclusions

This paper presents a new method to enhance the contrast of the density histogram of the uniform acts. In the paper the problem of the origin of most general way some of the images that are high-density histogram distribution are narrow, the regional distribution of low density and wide distribution. To solve this problem, the histogram of the input image histogram and density sub histogram is uniform. The algorithm assumes a uniform impact of a number of small high density area of the histogram is narrow, split. Another area of the histograms normally operates smoothly. The method described in this article was not the source of problems in the article picture and the result is better. The impact of this approach on a satellite photo you can see in Figure 7.



A, B

Figure (6): a and b - Satellite Image Using the second method

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11/18/2012

Phenolic Compounds and Antioxidant Activity of White, Red, Black Grape Skin and White Grape Seeds

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Abstract: Grape skin and seeds are sources for phenolic compounds that contribute to the sensory characteristics and beneficial bioactive of many processed foods. Hence, the study was aimed to evaluate and characterize the phenolic composition and evaluate the antioxidant activities of three grape varieties skin (white, red and black) and white grape seeds. The results indicated that among the grape skin of the three varieties, black grape skin (BGS) contained the highest amount of total phenolic compounds (2070.02mg GAE/100g dry weight). While white grape skin (WGS) found to have the lowest phenolic contents (296.27mg GAE/100g). On the other hand, white grape seeds (WG Seeds) contained the highest content of phenolic compounds compared to the skin samples (2536.5mgGAE/100g dry weight).The phenolic composition of the grape skin and grape seeds samples were determined by HPLC. The main phenolic compound in the three grape skins was Di-OH-cinamic acid. In the contrast, the main phenolic compounds in the grape seeds were Catechin and Brocyanidin B1. Besides, all the extracts showed remarkable DPPH radical scavenging activities with EC50 values ranged from 0.26-26.91µg extract/µg DPPH. The results showed that scavenging capacity of black grape skin and grape seeds extracts increased with increasing concentration of the skin extract in the range 0 – 21.08 µg extract/µg DPPH and grape seeds extract up to 1.92 µg extract/µg DPPH. Effect of addition different concentrations of grape skin and seeds extracts on oxidative stability of sunflower oil at 100 °C by Rancimat was studied. The results indicated that at low concentration 200ppm all extracts improved the oxidative stability of sunflower oil comparing to the control. The addition of 2% WGS, RGS, BGS and WG Seeds to rats diet showed significant decrease $P<0.05$ of TC, LDL-C and TG. On the other hand, 4% (RGS, WG Seeds), 8% BGS and 2% WG Seeds showed the same effects as BHT. Feeding rats on diet containing 200ppm BHT and 4% (WGS, RGS, and BGS) showed that no significant change of HDL-C compared to the control group. Serum Glucose was increase by increasing the levels of grape skin and seeds, in the diet. Feeding rats on diet containing 8% (WGS, RGS, and BGS) and WG Seeds at different levels caused a significant increase in catalase enzyme activity compared to synthetic antioxidant. Meanwhile, Feeding rats on diets containing 4% and 8% grape skin and seeds decreased liver function more than 2% compared to the control group and synthetic antioxidant. In Conclusion grape skin and seeds had higher antioxidant activity a specifically at low concentrations. Moreover, higher concentrations lead to higher decrease of liver function more than low concentration. The high phenolic content and the considerable antioxidant activity of the grape skin and seeds could be potentially considered as sources for natural antioxidants

[Samah, M. Ishmael; Sahar, S. A. Soltan; Khaled, A. Selim and Hoda, M. H. Ahmed. **Phenolic Compounds and Antioxidant Activity of White, Red, Black Grape Skin and White Grape Seeds.** *Life Sci J* 2012;9(4):3464-3474]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 514

Key words: Natural Antioxidants; Phenolic Components; Antioxidant Activity; Antioxidant Enzymes; Lipid Profile.

1. Introduction:

Lipid peroxidation during processing and storage of food is a serious problem that the development of undesirable off-flavor, potentially toxic reaction products and lowers the nutritional value of food and loss of shelf- life (*Millard et al., 1996* and *Baydar et al*., 2007). The major strategies for preventing lipid oxidation are the use of antioxidant (*Tang et al., 2001*). Antioxidants are organic compounds that, when added to food products, especially to lipids and lipid – containing foods, can increase shelf life by reducing the process of lipid peroxidation (*Anon, 2003*).

Antioxidant can interfere with the oxidation process by reacting with free radicals in one or more of the following ways: 1)- as reducing agents, 2)-As free radical scavengers, 3)- As complexes of prooxidant metals and 4)- as singlet oxygen quenchers (*Pratt and Hudson, 1990*). Some antioxidant compounds are synthetic antioxidants and others are natural dietary constituents (*Larson, 1988*). Synthetic antioxidants such as Butylated hydroxyanisole (BHA), Butylated hydroxytoluene (BHT), Propyl gallate (PG) and tertiary butyl-hydroquinone (TPHQ) especially BHA and BHT are widely used in lipids and food that contain lipid. Results showed their possible undesirable effects and carcinogenic effect on human health. Also, abnormal affects on enzymes systems *(Jayaprakasha et al., 2003, Bayder et al., 2007,*

Monica et al., 2007 and Sayago- Ayerdi et al., 2009). Therefore interest in natural antioxidants, that can replace synthetic ones, that causes many Side effects, is increasing (*Puupponen- Pimia et al., 2005*). Plants provide a rich source of natural antioxidants. These include tocopherol, vitamin C, carotenoids and phenolic compounds (*Harboner, 1994*).

Grape (*Vitis vinifera L.*) is the world's largest fruit crop *(Maier et al., 2009*). About 80% of the total crops are used in wine-making, yielding by-products which include grapes skins and seeds (*Valiente et al., 1995*). Also during juice making from grape, high quantities of by- products (grape pulp, seeds and skin) remain, which are used only as a feed for animals due to their fiber content (*Palma et al., 2001*).

By-products of grape juice are rich phenolic compounds including flavonoides and non-flavonoids. It is a good and cheap source of high quality polyphenolic compounds which can be used in different therapeutic procedures with the purpose of free radical neutralization in biological system (*Heim et al., 2002*, *Yilmaz and Toledo, 2004*, *Balasundran et al., 2006*, *Lafka et al., 2007* and *Makris et al., 2007)*.Some of researchers reported the grape barriers are-sources for polyphenolic compounds which used as functional food additives and procyanidin rich extracted from grape seeds and skin have antioxidant properties (*Liuis et al., 2011 and Felic et al., 2012*)

This study aimed to investigate the phenolic composition and evaluate the antioxidant activity of white, red, black grape skin and white grape seeds.

2. Materials and Methods.

Materials

White grape (*Vitis vinifera L.*) By-product (skin and seeds) were obtained from Ganklees factory "Wady El-Natroon"-Alexandria Governorate, Egypt, season 2010. Red and black grape were obtained from local market – Egypt then prepared to get their by-product. Linoleic acid, Ammonium thiocyanate, Iron (II) chloride purum anhydrous and Butylated hydroxytoluene (BHT) were obtained from Sigma-Aldrich Chemical GmbH, Riedstr.2, D. 89555 Steinem, and Germany. Folin – Ciocalteu reagent, Gallic acid monohydrate and 2, 2-diphenyl-1-picrylhydrazyl (DPPH) were purchased from Sigma Chemical Company. (USA). All solvents used (ethanol and methanol) were obtained from El - Goumhouria CO. 23, El Sawah St. Cairo-Egypt. Kits of blood analysis were purchased from Biodiagnostic Company. 29 Tahreer St., Dokki, Giza, Egypt.

Methods

1- Chemical evaluation

Preparation of grape by product sample

Grape skin and seeds were air dried at 40 °C for 1hr and ground into fine powder using laboratory electric mill (Braun, model 2001 DL, Germany) then stored in the polyethylene bags in the freezer at -20°C until use (*Mohamed and Girgis, 2005*).

Moisture Content, Ash, Protein, Lipid and Crude Fibers: were determined according to *A.O.A.C (2000*). Total Sugars were determined by difference.

Identification of fatty acids by chromatographs (GLC):

The method described by *Farag et al., (1986)* was applied for determination of fatty acids by GLC. The methyl esters of fatty acids obtained from oil of samples and standard materials were analyzed with a Pye Unicom Series 304 gas chromatograph equipped with dual flam ionization detector and dual channel recorder. The separation of fatty acid methyl esters was conducted using a coiled glass column (1.5 m x 4 mm) packed with Diatomite (100 - 120 mesh) and coated with 10 % polyethylene glycol adipate (PEGA). The column oven temperature was programmed at 8ºC/min from 70ºC to 190ºC, then isothermally at 190ºC for 25 min with nitrogen at 30 ml/min.

Total phenolic contents

Total phenolics were determined spectrophotmetrically using the modified Folin–Ciocalteau colorimetric method (*Asami et al., 2003*). Briefly 5ml of distilled water, 0.5- 1.0 ml of each sample of extracts, 1.0 ml of folin ciocalteu reagent was added to a 25ml volumetric flask. The contents were mixed and allowed to stand at room temperature for 5-8 min. Then 10 ml of 7% NaCO3 solution was added to the flask. After two hours, absorbance was measured at 750 nm using spectronic 2000, spectrophotometer, Busch and lamb (USA).The results are expressed as Gallic acid equivalent on fresh weight basis, mg /100g.

Total anthocyanins

Total anthocyanins content of grape by-products samples (White Grape Skin (WGS), Read Grape Skin (RGS), Black Grape Skin (BGS) and White Grape Seed (WG Seeds)) was measured using the pH differential absorbance method described by *Worlstad and Giusti, (2001*). Total anthocyanins were expressed as cyaniding-3-glucoside for all of samples on dray weight basis, mg/100g. Absorbance was measured at 537 nm using spectronic 2000, spectrophotometer, Busch and lamb (USA).

Identification of individual phenolic compounds by HPLC

Phenolic compounds were identified by HPLC according to the method of *Goupy et al. (1999).* 5g of sample were mixed with methanol and centrifuged at 10000 rpm for 10 min and the supernatant was filtered through a 0.2µm Millipore membrane filter then 1-3 ml was collected in a vial for injection into HPLC Hewllet Packared (series 1050) equipped with autosamplling injector, solvent degasser, ultraviolet (UV) detector set at

280 nm and quarter HP pump (series 1050). The column temperature was maintained at 35°C. Gradient separation was carried out with methanol and acetonitrile as a mobile phase at flow rate of 1 ml/min. phenolic acid standard from sigma Co. were dissolved in a mobile phase and injected into HPLC. Retention time and peak area were used to calculation of phenolic compounds concentration by the data analysis of Hewllet Packared software, Germany.

Determination of antioxidant activity of the extracts:

Preparation of grape by-products extracts

Samples were air-dried and homogenized. Dry sample (5g) was placed in flask with 50 ml of extraction solution (80-20 methanol/ H_2O) according to *Vinson et al., (2001*). The mixture was placed in the dark at 4°C for 24 hrs. The supernatant was collected and replaced with an equal quantity of extraction solution, then placed in the dark at 4°C for a further 48 hrs. The two supernatants were mixed and extraction solution was added until a total volume of 100 ml was obtained. The solvent was removed and the extract was stored at -20 °C for further analysis.

***Determination of antioxidant activity using (DPPH) radical scavenging method*:**

Antioxidant activity of grape by-products samples (WGS, RGS, BGS and WG Seeds) was determined using the stable radical (DPPH) according to (*Brand – Williams et al., 1995*). The absorbance was read at 515 nm by Perkin Elmer spectrophotometer.

$$\% \text{ inhibition} = \frac{(\text{Absorbance control} - \text{Absorbance sample})}{\text{Absorbance control}} \times 100$$

$$\text{Antiradical efficiencies} = \frac{1}{EC50}$$

EC50 = extraction concentration providing 50% inhibition of the DPPH.

Determination of antioxidant activity in linoleic acid system

Antioxidant activity of grape by-products samples extracts (WGS, RGS, BGS and WG Seeds) was carried out by using the linoleic acid system (*Osawa and Namiki, 1981*) 200, 400, 800 ppm samples and BHA (200 ppm) were added to a solution mixture of linoleic acid (0.13ml), 99% ethanol (10ml) and 0.2M phosphate buffer (pH 7.0. 10ml). The total volume was adjusted to 25ml with distilled water. The solution was incubated at 40 ºC and the degree of oxidation was measured according to the thiocyanate method.

Oxidative stability of sunflower oil by different concentrations of grape by-products extracts:

Oxidative stability of sunflower oil at 100 °C by different concentrations of grape by-products extracts was measured using 679 Rancimat (Metrohm Ltd., CH.9100 Herisau, and Switzerland) Agric Res., Center, Giza at 100±2 °C. The sunflower oil free of additives was used as the substrate for oxidation studies (control Sample). Freeze dried extracts of WGS, RGS, BGS, WGSeeds at concentrations of (200, 400 and 800 ppm) and BHA were added the oil with the concentration 200 ppm. Ion products the volatile decomposition Products (mainly organic acid) are trapped a measuring detected with distilled water (60 ml) and continuously detected with a conductivity cell (conductivity range 25-200 us/cm) according to the method described by (*Gutteridge and Halliwell, 2000*).

2- Biological Evaluation

Experimental design

Seventy Male albino rats weighing 90- 120 grams were used for the study. They were purchased from Institute of Ophthalmology, Giza, Egypt. The animal housed individually in stainless steel under control condition at constant temperature (22 °C) and lighting (12 light- dark cycles). Rats were divided into 14 groups, five rats in each group and were fed the following diet for four weeks.

Group1: rats were fed the basal diet (control group) standard diet was prepared according to *Reeves et al., (1993)*.

Group2: rats were fed the basal diet containing 200ppm BHT

Groups 3, 4 and 5: rats were fed the basal diet containing 2%, 4% and 8% WGS powder

Groups 6, 7 and 8: rats were fed the basal diet containing 2%, 4% and 8% RGS powder

Groups 9, 10 and 11: rats were fed the basal diet containing 2%, 4% and 8% BGS powder

Groups 12, 13 and 14: rats were fed the basal diet containing 2%, 4% and 8% WG Seed

Each rat was weighted at the beginning and end of experimental. At the end of the experimental period (four weeks), rats were sacrificed after overnight fasting. Blood of each rat was collected and centrifuged at 300 rpm for 20 minutes to obtain the serum, which was kept at -20 °C until analysis.

Determination of lipid profile

Serum glucose, serum total cholesterol, serum triglycerides, HDL cholesterol and LDL cholesterol were determined as described by *Trinder, (1969*) *Richomand, (1973*); *Burstein et al., (1970); Wieland and Seidal, (1983) and Jacobs and Vandermark, (1960)*.

Determination of liver enzymes

ALT and AST were determined by the method of *Reitman and Franakal, 1957.*

Determination of antioxidant enzymes

Catalase and Glutathione reductase were determined by the method of *Aebi, 1984*; Goldberg and *Spooner, 1983*.

Statistical analysis

Data were evaluated statistically using analysis of variance. Duncan's multiple range tests at 5% level of significance was used to compare between means. The analysis was carried out using the PROC ANOVA procedure of Statistical Analysis System (*SAS, 1996*).

3. Results and Discussions

Chemical composition of grape by-product (WGS, RGS, BGS and WG Seed) was determined. The obtained results are shown in Table (1).

It was noticed that the highest percentage of moisture (18.97%) and protein (10.146%) were observed of WGS. Meanwhile the highest percentage of Ash (8.36%) and total sugar (54.103%) obtained from BGS. Moreover WGSeed contained the highest percentage of Fat (10.38%) and total fiber (37.25%). These results are in line with those of *Schieber et al., (2002) and Zein et al., (2005*).

Gas liquid chromatography technique (GLC) was employed to study the fatty acid composition of WGSeeds. The results are shown in Table (2). These result agreements with *Beveridge et al., (2005*) reported that linoleic acid of seven different varieties of grape seed oil were ranged (66.8-73.6%). Oleic and palmitic acid were present as a major component (20.44% and 13.93%) after linoleic acid. These results are in line with that obtained by *Crews et al.,* (*2006). Lutterodt et al., (2011*) reported that the Egyptian grape seeds contained higher amount of oleic acid. Arachidic acid, Eurucic acid and palmitoleic acid were present as a minor components percentage of (0.17, 0.21 and 0.25%) respectively.

Total phenolic and total anthocyanins contents in WGS, RGS, BGS and WG Seeds were determined and the results are shown in Table (3) . The results indicated that the highest concentration of total phenolic compounds was obtained for WG Seeds (2536.5 mg/100g) followed by BGS and RGS (2070.02 and 511.23 mg/100g). While WGS had the lowest total phenolic compounds (296.27 mg/100g).

Negro et al., (2003) mentioned that the quantity of total phenolic substances and flavonoids contained in grape seed extract was higher than that obtained from marc and peel. In addition, *Anstasiadi, et al., (2010)* reported that grape seeds had a total phenolic contents ranged between 825.8 and 3313.5 mg/100g GAE while, the total phenolic contents for the same grape skins ranged between 64.5 and 351.97 mg/100 GAE.

Total anthocyanins of WGS, RGS, BGS and WG seed are shown in Table (1). The highest levels of total anthocyanin was obtained of BGS (300.37 mg/100g) followed by RGS (47.3 mg/100g), WG seed (13.64 mg/100g). Meanwhile WGS had the lowest total anthocyanins (4.09 mg/100g). Concentration of anthocyanin and phenolic compound was different among grape by-products. These results are resemblances with that established by *Pastrana- Bonilla et al., (2003),* for five bronze and five purple cultivars of muscadine grape skins and seeds in Georgia who mentioned that the concentration and total contents of anthocyanins and phenols varied among different varieties.

There are wide variations between the total phenolics contents of the different fruits or vegetables or even for the same fruits or vegetables reported by different authors. These differences may be due to the complexity of these groups of compounds, and the methods of extraction and analysis (*Bravo, 1998; Kalt et al., 2001 and Maier et al., 2009).*

Besides, phenolics contents of plant depend on a number of intrinsic (genus, species, cultivars) and extrinsic (agronomic, environmental, handling and storage) factors (*Toma´s-Barbera´n and Espin, 2001*). *Bozan et al., (2008*) studied the polyphenolic contents in the seeds of 11 red grape varieties cultivated in Turkey and found that the total phenolic content ranged from 79.2 to 154.6 mg GAE/ g seeds. While *Adamez et al., (2012)* found that the total phenolic content ranged between 6.04±0.6 GA g/L^{-1} for the seeds obtained from juice and 2.41±34 gL^{-1} GA for the seeds obtained from wine

Polyphenolic composition of extracts by HPLC

HPLC coupled with a UV-Vis detector was employed to separate and quantify phenolic compound from white, red, black grape skin and white grape seeds. The amounts of the different identified phenolic components are presented in Table (4). The major phenolic components in white grape skin were Di-OH cinammic acid, salicylic acid, Di-OH benzoic acid and synergic acid (4.91, 2.93, 2.90 and 2.45 ppm).

In red grape skin, the abundant compounds were pyrogalol, Di-OH cinammic acid, vanillic acid, synergic acid and catechol (11.41, 8.20, 3.6, 2.90 and 2.30 ppm, respectively) while, salicylic acid, Di-OH benzoic acid are not detected in the red grape skin. Concerning to the black grape skin, Trans 4OH-3CH-3O-Cinnammic acid, Di-OH Cinnammic acid, salicylic acid, P. OH benzoic acid and vanillic acid were the most abundant phenolic components (6.8, 6.7, 3.9, 3.6 and 2.7 ppm, respectively). In addition Table (4) shows that other phenolic compound such as Gallic acid, *P*-coumaric acid, procyanidin B1, B2 and B3 and catechin are also found with minor constituents in the three grape skins studied. The comparison among the polyphenolic profile of the three grape skin varieties studied revealed that the poly phenolic content varied with cultivar.

However, the red and black grape skin exhibit higher polyphenolic content as compared to the white grape skin. These finding are consistent with the previous work (*Berrin et al., 2008*) which noted that total monomeric and oligomeric flavanol

contents varied with variety and with the results obtained by *Anastasiadi, et al. (2010)* on polyphenolic composition involving skin of Greek grape cultivars. The difference in phenolic content and composition in the skin of grapes could be partly attributed to the genotype and environmental conditions (*Montealegre et al., 2006*), whereas wide ranges of grape skins contained lower amounts of procyanidin monomer with no significant differences among the genotypes (*Poudel et al., 2008*).

Data in Table (4) also revealed that they exhibit a very different qualitative and quantitative polyphenolic profile. Seeds are particularly rich in monomeric favan-2- ols (+) catechin and the dimeric procyanidin B1, B2 and B3. They also display a high level of Di-OH cinammic acid, salicylic acid. The quantity of the abundant phenolic components in the seeds were 521.80, 357.01, 269.70, 231.87, 185.40 and 174.10 ppm for (+) catechin, procyanidin B1, Di-OH cinammic acid, procyanidin B3, salicylic acid and procyanidin B2 respectively. These results are in accordance with the previous studies on polyphenolic composition involving seeds of Greek cultivars (*Guendez , et al., (2005a and 2005b*) which, noted that the most abundant polyphenolic compound in grape seeds extracts was catechin (189mg/100g) accounting for 49.8% of the TPC, followed by epicatechin (98.6mg/100g) and epecatechin gal late (35.5mg/100g seeds) the present results also in agreement with that obtained by *Anastasiadi, et al.,(2010)* and *Adamez et al., (2012*). In addition, flavonoids have been found to be the abundant phenolic compounds in grape seeds mainly catechin, epicatechin and epecatechin gallate and dimeric procyanidin B1 and B2 (*Naczk, et al., 2005*, *Maier et al., 2009 and Yi et al., 2009*).

On the other hand, our results are different from that reported by *Tounsi et al., (2009*) who reported that the most abundant polyphenolic compound in three different grape seeds varieties was quercetin accounting for 27.2, 48.8, and 28.4% of the total phenolic content of Muscat, Syrah and Carignan grape varieties, respectively. They also found that dimeric proanthocyandins B1 and B2 were minor constituents in all grape varieties studied.

Large difference in the phenolic compositions in different parts of the grape fruit have been also reported by *Pastrana- Bonilla et al. (2003*). Finally, the composition of phenolic in grape varies with variety, species and season conditions as well as environmental and management factors such as soil conditions, climate and crop load (*Tounsi et al., 2009*).

Scavenging effect of extracts on DPPH radical

The free radical scavenging activity of different grape by-product extracts was evaluated with the change of absorbance produced by reduction of DPPH. The results are summarized in Table (5). The high antioxidant capacity of all extracts has been observed and related to the presence of a mixture of polyphenolic compounds with good antioxidant activity. Seeds extract showed higher scavenging activity than all other extracts with EC50 0.259µg extract/µg DPPH followed by black grape skin extract (EC50 3.98µg extract/µg DPPH) and red grape skin extract (EC50 20.87µg extract/µg DPPH) while the white grape skin extract showed the lowest scavenging activity with EC50 28.91µg extract/µg DPPH. The potent and scavenging activity of the seeds extract is mainly attributed to its high contents of procyanidin B1 and B3 which have been assumed to be the most important radical scavengers in grape seeds extracts (*Guendez et al., 2005(b) and Maier et al., 2009*). However, the seeds extract was also characterized by high catechin content.

Our results indicated that the scavenging capacity of white and red grape skin extracts were dependent upon concentrations of the phenolic compound. On the other hand scavenging capacity of black grape skin grape seeds extracts increased with increasing concentration of black grape skin extract in the range 0 – 21.08 µg extract/µg DPPH grape seed extract up to 1.92 µg extract/µg DPPH after which scavenging effect on the DPPH radical was found to decrease. Thus, both black grape skin and grape seeds have very good antioxidant potential at lower concentrations and start showing prooxidant behavior at higher concentrations. Our results are consistent with that obtained by some investigators and disagree with others.

Some authors showed that a fine linear correlation exists between antioxidant capacity and total phenol contents in wine and wine by products (*Alonso et al., 2002; Ghiselli, et al.*, 1998 and Louli, *et al.,* 2004*).* The studies by *Jayaprakasha et al., (2003) and Adamez et al., 2012*) indicated that radical scavenging activity of the grape seeds extracts was dependent upon the contents of phenolic compound. While, a number of studies indicated that many of the dietary phenolic compounds have concentration-dependent antioxidant or prooxidant activities (*Yoshino and Murakami, 1998; Yen et al., 2002 and Maurya and Devasagayam*, *2010).* The beneficial effects of dietary antioxidants mainly focus on their defensive function against excessive oxidative damage induced (*Middleton et al., 2000*). .

Antioxidant activity of extracts from different grape skins and white grape seeds at different concentrations (200, 400 and 800ppm) were investigated in lenoleic acid system and the results are summarized in Table (6). It could be noticed that the antioxidant activity of grape skin and seeds extracts was high when used at low concentration 200ppm while the antioxidants were decreased with increasing the extract concentration up to 800ppm.

These results are in agreement with our previous result for DPPH.

Effect of extracts on oxidative stability of sunflower oil

Different concentrations of polyphenolic compounds extracted from white, red and black grape skin and white grape seeds were added to sunflower oil at concentrations of 200 and 400 ppm. In addition 200 ppm BHT was used as synthetic antioxidant. Oxidative stability of all samples was measured by rancimat method at 100 °C.

Table (7) and Figure (1) showed the results as induction period. The results indicated that BHT was superior to all natural extracts in agreement with (*Peschel et al., 2007*). When adding polyphenolic extractions, the results showed that BGS, (200ppm) had the highest stability with 12.9h followed by the WGS and RGS (12.8h, 12.8h) respectively with the same concentration and the same timeline while the WG seeds showed the lowest stability.

Effect of different grape by-product on body weight and lipid profile

Effects of different grape by-product on body weight are shown in Table (8). Data in Table (8), illustrated that there are no significant different $P<0.05$ in initial body weight and final body weight compared to the control group. There are no significant change was observed in body weight gain of all treatment compared to the control group except for red group skin at 4% and 8% BGS.

Data in Table (9) demonstrated that feeding rats on diet containing 200ppm BHT (synthetic antioxidant) showed significantly increase $P<0.05$ of total cholesterol (TC), LDL-c and Triglycerides (TG) compared to the control group. The rate of increase was 61.11%, 88.32% and 15.50% respectively compared to the control group.

Meanwhile, the addition of 2% WGS, RGS, BGS and WG Seeds of rats diet showed significant decrease P<0.05 of TC, LDL-c and TG compared to the control group. On the other hand, 4% (RGS, WGSeeds), 8% BGS and 2% WGSeeds showed the same effects as BHT. These results in accordance with the results obtained by (*Perez- Jimenez et al., 2008* and *Jiao et al., 2010*). reported that the supplementation with 0.5% or 1% grape seed proanthocyanidin and 7.5g/d grape antioxidant dietary fiber decrease total cholesterol and triglycerides. *Tebib et al., (1997)* found that 2% addition of seed extract to diet containing 1% cholesterol reduced plasma total cholesterol and LDL-C.

Feeding rats on diet containing 200ppm BHT and 4% (WGS, RGS, and BGS) showed that no significant change of HDL-c compared to the control group. The best results in serum HDL-c recorded for the group fed on diet treated daily with WG Seed in all levels followed by the group fed on diet treated daily with grape skin 8%, the group fed on diet treated daily with grape skin 4%. Our results are in line with (*Martin-Carron et al., 1999*) who indicated that HDL-cholesterol concentration was significantly higher in rats fed on dietary fiber and polyphenol -rich grape product than in the unsupplemented group.

Data in the same Table revealed that, serum Glucose increased gradually by increasing the levels of grape skin and seed, in the diet. On the other hand, the mean values of serum Glucose increased significantly in groups which treated with grape skin and seed, comparing with non treated groups. Increase of serum glucose may be due to grape pomace containing high level of sugars. These results are in agreement with Sayago – Ayerdi *et al.,* (2009) who mentioned that the grape pomace containing high level of sugar soluble (20.7±0.30g/kg).

Effect of grape by products on antioxidant and liver enzymes

Effect grape by-product on antioxidant enzymes are shown in Table (10). The results in Table (10) illustrated that treating rats with 200ppm BHT, WGS, RGS, BGS at 2% and 4% showed that no significant change ($P \leq 0.05$) in catalase enzyme activity, as compared to the control group. While, feeding rats on diet containing 8% (WGS, RGS, BGS) and WG Seed at different levels caused a significant increase in catalase enzyme activity. These results are disagreement with (*Alía et al., 2003*) who reported that antioxidant dietary fiber from grapes had no effect on the activity of catalase enzyme and there is an agreement with (*Xu et al., 2009*) who reported that grape seed extract increased the activity of catalase (CAT).

The data in this Table revealed that, glutathione enzyme activity in BGS 2% and WG Seed 2% groups increased significantly $P \leq 0.05$ (0.06±0.007a and 0.06±0.008a) respectively as compared to the groups fed on the same diets with other different levels of grape skin and seed. These results are in line (*Yousef and Romeo, 2004*) showed that polymeric grape seed tannin in the diet increase total glutathione level in blood. These results not agreement with (*Yousef et al., 2009*) who reported that grape seed proanthocyanidin extract decrease Glutathione enzyme activity.

Effect of feeding rats on diets containing different levels from grape skin and seed (2%, 4% and 8%) on the activities of some liver enzymes AST and ALT in serum of rats was illustrated in Table (10)

The results indicated that feeding rats on diet containing 4,8% grape skin and seed, decreased liver function (ALT) by about 63.63% than that of the control group. Meanwhile, 2% grape skin and seeds showed a significant increase of liver enzymes. These results are agreement with (*Yousef et al., 2009*) who reported that grape seed

proanthocyanidin extract caused significant increase in AST and ALT. These results approved by *Kotamballi et al., (2002)* indicate that the grape pomace MeOH extract is capable of protecting the activities of hepatic enzymes, which play important roles in combating the reactive oxygen species.

Table (1): Major chemical constituents (g/100g dry matter) of grapes skin and grape white seeds

Constituents (%)	Grape skin			White grape Seeds
	White	Red	Black	
Moisture	18.97	7.28	18.21	8.38
Fat	3.93	6.43	1.89	10.38
Protein	10.146	6.999	7.872	9.076
Total Fibers	10.56	7.335	9.565	37.25
Ash	6.35	2.94	8.36	2.38
Total Sugar	50.044	69.016	54.103	32.534

Table (2): Fatty acid profile of grape seeds oil by GLC

Fatty acids		Percentage %
Saturated fatty acids:		13.93
Palmitic acid	C16:0	8.59
Stearic acid	C18:0	5.16
Arachidic acid	C20:0	0.17
Unsaturated fatty acids:		86.07
Palmitoleic acid	C16:1	0.25
Olic acid	C18:1	20.44
Linoleic acid	C18:2	64.72
Linolenic acid	C18:3	0.43
Eurucic acid	C20:1	0.23

Table (3): Total phenolic compounds, total anthocynins, efficient concentration and antiradical efficiencies of different grape skin and white grape seeds

Samples	Total phenolic compounds mg/100g	Total anthocyanin mg/100g	Efficient concentration (EC50)	Antiradical efficiencies (AE)
WGS	296.27	4.09	28.91	0.043
RGS	511.23	47.3	20.85	0.048
BGS	2070.02	300.37	3.98	0.25
WG Seeds	2536.5	13.64	0.26	4.00

Table (4): Polyphenolic composition of extracts from white, red, black grape skins and white grape seeds by HPLC

Phenolic compounds(ppm)		Test results			
		White grape skin	Red grape skin	Black grape skin	White grape Seeds
1	Gallic	1.04	0.20	0.70	11.07
2	Catechol	0.96	2.30	2.40	20.20
3	Pyrogalol	2.07	11.41	---	---
4	Di-OH Benzoic	2.90	---	1.1	35.07
5	P.OH Benzoic	0.107	0.47	3.60	1.10
6	Catechin	0.84	1.7	1.9	521.80
7	Vanillic	1.25	3.60	2.70	63.40
8	Procyanidin B1	1.61	1.07	1.72	357.01
9	P-Coumaric	0.26	0.69	0.90	23.30
10	Chrisin	0.83	0.12	0.40	---
11	Chlorogenic	---	2.17	1.004	66.30
12	Synergic	2.45	2.90	1.90	64.20
13	Trans-4OH-3CH-3O-Cinnammic	0.75	1.40	6.80	---
14	Salicylic	2.93	---	3.90	185.40
15	Di-OH Cinnammic	4.91	8.20	6.70	269.70
16	Hespertin	0.21	0.50	1.20	28.80
17	Procyanidin B3	1.05	1.55	1.19	231.87
18	Procyanidin B2	1.14	1.44	1.69	174.10

Table (5): The effects of phenolic compound of different grapes skin and white grape Seeds on remaining percentage of DPPH and inhibition ratio of DPPH µg/µg.

White Grape skin		Red Grape skin		Black Grape skin		White Grape Seed	
Conc. µg/µg	Inhibition Ratio%	Conc. µg/µg	Inhibition Ratio%	Conc. µg/µg	Inhibition Ratio%	Conc. µg/µg	Inhibition Ratio%
12.86	30.0	9.06	22.96	1.07	31.07	0.26	51.18
16.08	31.4	11.33	28.90	1.68	33.02	0.34	73.46
18.37	37.4	12.92	34.28	2.08	41.87	0.51	75.83
21.04	38.2	15.10	42.18	2.7	46.44	1.00	86.89
21.44	40.9	16.31	43.67	3.98	50.24	1.92	97.20
25.73	44.5	20.87	50.07	7.32	74.40	3.52	86.73
42.88	63.2	26.23	55.76	21.08	84.20	4.23	84.73
64.33	72.8	45.33	66.03	43.92	68.99	21.2	68.29

Table (6): Antioxidant activity of different grape skin and white grape seed in linoleic acid system

Samples	Absorbance at 515nm Storage time (days)							
	Zero	1	3	5	8	11	14	16
Control	0.244	0.269	0.288	0.294	0.305	0.337	0.348	0.358
BHT(200ppm)	0.244	0.257	0.264	0.271	0.276	0.281	0.288	0.298
WGS 2%	0.244	0.258	0.262	0.296	0.278	0.268	0.293	0.306
WGS 4%	0.244	0.258	0.278	0.285	0.297	0.305	0.316	0.323
WGS 8%	0.244	0.272	0.294	0.312	0.322	0.339	0.342	0.359
RGS 2%	0.244	0.245	0.266	0.273	0.279	0.284	0.291	0.305
RGS 4%	0.244	0.267	0.290	0.292	0.306	0.338	0.349	0.361
RGS 8%	0.244	0.271	0.299	0.328	0.345	0.352	0.359	0.374
BGS 2%	0.244	0.252	0.260	0.271	0.278	0.282	0.29	0.302
BGS 4%	0.244	0.259	0.272	0.279	0.295	0.354	0.352	0.365
BGS 8%	0.244	0.268	0.297	0.302	0.348	0.355	0.361	0.379
WG Seed 2%	0.244	0.256	0.267	0.275	0.28	0.289	0.298	0.314
WG Seed 4%	0.244	0.262	0.309	0.313	0.338	0.398	0.427	0.447
WG Seed 8%	0.244	0.278	0.332	0.352	0.378	0.502	0.531	0.563

Table (7): The effect of addition different grape by-products samples on Oxidative stability of sunflower oil at 100 °C by Rancimat

Samples	Oxidative stability At 100°C
Control	11.9
BHT	14.6
WGS 200ppm	12.8
RGS 200ppm	12.8
BGS 200 ppm	12.9
WG Seed200ppm	12.2
WGS 400ppm	12.4
RGS 400ppm	11.8
BGS 400 ppm	11.6
WG Seeds 400ppm	11.4

Table (8): Effect of different types grape skin and white grape seed of grape on body weights

groups	Initial body Weight (gm) Mean ±SD	final body weight (gm) Mean ±SD	Body weight gain (gm) Mean ±SD
1-Control	107.00 ± 10.95^{a}	157.60 ± 13.16^{ab}	50.60 ± 7.12^{bc}
2-BHT	107.00 ± 10.95^{a}	149.80 ± 8.13^{ab}	42.80 ± 5.87^{c}
3-WGS 2%	107.00 ± 10.95^{a}	150.00 ± 7.07^{ab}	43.00 ± 7.34^{c}
4-WGS 4%	107.00 ± 10.95^{a}	165.60 ± 7.82^{ab}	58.60 ± 6.07^{b}
5-WGS 8%	107.00 ± 10.95^{a}	164.60 ± 14.06^{ab}	57.60 ± 7.52^{b}
6-RGS 2%	107.00 ± 10.95^{a}	156.20 ± 19.1^{ab}	49.20 ± 11.77^{bc}
7- RGS 4%	107.00 ± 10.95^{a}	145.20 ± 7.91^{b}	38.20 ± 6.80^{d}
8-RGS 8%	107.00 ± 10.95^{a}	157.40 ± 10.62^{ab}	50.40 ± 8.65^{bc}
9-BGS 2%	104.00 ± 10.83^{ab}	157.00 ± 15.47^{ab}	53.00 ± 5.37^{bc}
10-BGS 4%	104.00 ± 10.83^{ab}	161.00 ± 10.04^{ab}	57.00 ± 8.59^{b}
11-BGS 8%	104.00 ± 10.83^{ab}	166.40 ± 9.28^{a}	62.40 ± 4.06^{a}
12-WG Seed 2%	104.00 ± 8.94^{ab}	163.00 ± 14.81^{ab}	59.00 ± 5.64^{b}
13- WG Seed 4%	104.00 ± 10.83^{ab}	160.40 ± 14.08^{ab}	56.40 ± 6.50^{b}
14- WG Seed 8%	108.00 ± 16.43^{a}	153.60 ± 14.39^{ab}	45.60 ± 6.26^{c}

Table (9): Effect of different types grape skin and white grape seed on lipid profile and Glucose

groups	Total cholesterol mg/dl means ± SDM	HDL- C mg/dl means ± SDM	LDL-c mg/dl means ± SDM	VLDL-C mg/dl means ± SDM	Triglycerides mg/dl means ± SDM	Glucose mg/dl means ± SDM
1- Control	79.90±17.80 ^{c}	44.41±0.89 ^{d}	58.60±19.90 ^{f}	23.12±1.68 ^{ab}	115.62±8.43 ^{b}	20.26±8.92 ^{e}
2- BHT	128.73±13.53 ^{a}	45.08±2.17 ^{d}	110.36±10.24 ^{a}	26.70±5.26 ^{a}	133.54±26.33 ^{a}	27.53±14.41 ^{d}
3- WGS 2%	58.33±24.00 ^{d}	37.03±6.67 ^{e}	71.60±1.06 ^{d}	22.86±3.04 ^{b}	114.31±15.20 ^{b}	27.53±7.50 ^{d}
4- WGS 4%	93.40±10.17 ^{bc}	41.69±5.79 ^{de}	75.23±12.22 ^{d}	23.51±4.16 ^{b}	117.59±20.84 ^{b}	40.00±6.24 ^{b}
5- WGS 8%	109.00±18.14 ^{b}	48.63±8.41 ^{bc}	87.60±15.89 ^{c}	26.23±1.05 ^{a}	136.17±5.29 ^{a}	42.00±7.00 ^{b}
6- RGS 2%	109.43±20.04 ^{b}	42.17±7.66 ^{c}	85.30±17.35 ^{cd}	23.03±6.03 ^{ab}	115.18±17.41 ^{b}	39.33±3.21 ^{b}
7- RGS 4%	126.06±20.05 ^{a}	44.71±0.57 ^{d}	71.38±20.33 ^{ab}	22.03±1.59 ^{b}	110.16±7.95 ^{c}	41.16±9.64 ^{b}
8- RGS 8%	94.33±10.26 ^{bc}	48.10±5.91 ^{bc}	103.58±13.72 ^{d}	25.35±2.41 ^{a}	126.77±12.0 ^{ab}	42.33±4.37 ^{b}
9- BGS 2%	94.66±22.53 ^{bc}	24.52±0.98 ^{f}	53.09±23.72 ^{b}	22.95±0.59 ^{b}	114.75±2.95 ^{b}	42.66±16.79 ^{b}
10- BGS 4%	93.13±6.37 ^{bc}	41.45±4.63 ^{de}	93.25±6.27 ^{j}	25.57±0.60 ^{a}	127.86±3.00 ^{ab}	52.46±12.62 ^{ab}
11- BGS 8%	121.36±1.35 ^{a}	62.39±2.84 ^{de}	105.45±3.13 ^{ab}	25.48±1.82 ^{a}	127.43±9.12 ^{ab}	59.28±8.53 ^{a}
12- W.G Seed 2%	128.50±8.94 ^{a}	63.28±6.20 ^{abc}	91.22±5.75 ^{bc}	26.01±1.64 ^{a}	129.18±9.04 ^{ab}	25.33±5.82 ^{d}
13- WG Seed 4%	118.13±9.52 ^{ab}	77.53±3.62 ^{a}	63.81±11.78 ^{e}	23.21±0.46 ^{ab}	116.06±2.30 ^{b}	33.33±3.49 ^{c}
14- WG Seed 8%	93.43±5.30 ^{bc}	70.13±1.13 ^{a}	46.12±4.19 ^{h}	22.81±1.16 ^{b}	114.09±5.82 ^{b}	34.33±3.39 ^{c}

Table (10): Effect of different types grape skin and white grape seed on Antioxidant enzymes activity and liver function

groups	Enzyme Activity		Liver function	
	Catalase mM/L Mean ± SD	Glutathione mM/L Mean ± SD	AST µg/dl Mean ± SD	ALT µg/dl Mean ± SD
1- Control	87.4±2.16 ^{b}	0.04±0.001 ^{c}	38.76±1.26 ^{c}	69.28±2.0 ^{c}
2- BHT	85.23±5.81 ^{b}	0.03±0.004 ^{d}	41.31±3.54 ^{bc}	77.71±3.85 ^{b}
3-WGS 2%	85.32±4.77 ^{b}	0.04±0.003 ^{c}	41.03±2.73 ^{bc}	81.06±5.10 ^{ab}
4- WGS 4%	86.46±3.65 ^{b}	0.04±0.001 ^{d}	34.40±1.96 ^{d}	68.56±7.90 ^{b}
5- WGS 8%	101.90±5.53 ^{a}	0.04±0.001 ^{c}	32.67±3.27 ^{d}	59.77±3.15 ^{d}
6- RGS 2%	85.24±2.64 ^{b}	0.05±0.001 ^{bc}	43.16±2.78 ^{ab}	82.66±3.21 ^{ab}
7-RGS 4%	89.56±0.83 ^{b}	0.04±0.002 ^{c}	34.04±2.26 ^{d}	46.38±3.41 ^{e}
8- RGS 8%	99.97±2.14 ^{a}	0.04±0.0005 ^{d}	28.40±0.94 ^{e}	35.83±2.17 ^{f}
9- BGS 2%	89.04±0.42 ^{b}	0.06±0.007 ^{a}	45.67±2.49 ^{a}	86.87±3.54 ^{a}
10-BGS 4%	89.68±0.34 ^{b}	0.05±0.005 ^{b}	33.45±1.86 ^{d}	43.77±3.37 ^{e}
11- BGS 8%	102.74±3.07 ^{a}	0.04±0.003 ^{c}	26.26±2.73 ^{e}	35.09±1.71 ^{f}
12-WG Seed 2%	99.11±0.76 ^{a}	0.06±0.008 ^{a}	41.72±2.58 ^{abc}	83.11±4.06 ^{ab}
13- WG Seed 4%	100.02±0.49 ^{a}	0.05±0.005 ^{b}	32.99±1.62 ^{d}	36.95±1.75 ^{f}
14- WG Seed 8%	103.46±1.04 ^{a}	0.04±0.003 ^{c}	26.20±0.79 ^{e}	32.98±2.92 ^{f}

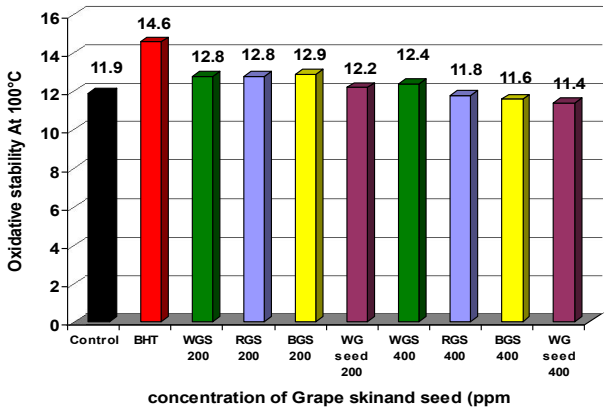

Fig (1): The effect of addition of different grape by-products samples on Oxidative stability of sunflower oil at 100°C by Rancimat

Conclusion

It could be concluded that the main phenolic compound in the three grape skins was Di-OH-cinamic acid. In the contrast, seeds are particularly rich in monomeric favan-2- ols (+) catechin and the dimeric procyanidin B1, B2 and B3. They also display a high level of Di-OH cinammic acid, salicylic acid. Our results indicated that all extracts showed remarkable DPPH radical scavenging activities with EC50 values ranged from 0.26-26.91µg extract/µg DPPH. The grape by-products (skins and seeds) could be used as good sources for natural antioxidant especially at low concentration.

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Designing of Incorporating Fuzzy-Sliding Mode Controller Based on Strategy Moving Sliding Surface for Two-Link Robot Manipulator

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Abstract: Sliding movement includes two phases; reaching phase and Sliding phase. In both phases problems are encountered. In sliding phase, the switching nature of control law leads to the undesirable chattering phenomenon whose high frequency oscillations excite the un-modeled dynamics of the system; this might damage the system under control .In this paper, as a solution to these problems one incorporating fuzzy-sliding mode controller (FSMC) is introduced. Also, during reaching phase, SMC is sensitive to parametric uncertainties and external disturbances. Throughout this paper a sliding mode fuzzy controller with moving switching surface (MSS) is provided to minimize or possibly eliminate the reaching phase.
[Sharifi S, Ahmadyan S, Ebrahimi S. **Designing of Incorporating Fuzzy-Sliding Mode Controller Based on Strategy Moving Sliding Surface for Two-Link Robot Manipulator**. *Life Sci J* 2012;9(4):3475-3480] (ISSN:1097-8135). http://www.lifesciencesite.com. 515

Keywords: fuzzy control, sliding mode, robot, incorporating control

1. Introduction

The robot manipulator dynamics is inherently nonlinear time-varying and has many uncertainties, such as payload parameters, frictions and disturbances. A well known approach to the control of uncertain system by nonlinear feedback laws is the sliding mode control [6-10]. Sliding mode control is a powerful control technology, which could handle the worst-case control environment. In a sliding mode control system, the control law is designed to drive the system states toward a specific sliding surface. Conventional sliding mode control introduces a static linear sliding surface with constant gain as the error variable in order to obtain globally asymptotically stable controllers for robot manipulators [11-13]. As the sliding surface is hit, the system response is governed by the surface; consequently the robustness to the Parameter variations or disturbances is achieved. In spite of the robust characteristics of controller, this controller has problems. One of the problems of the sliding mode control is the chattering phenomenon. Many techniques have proposed to eliminate these problems, as to define a bounded layer surrounding the sliding surface, but it leads to increase stability error. Further to this, in sliding mode control, the system only in Sliding phase is resistant to uncertainty and disturbance, while in reaching phase it is sensitive them. In this paper, a fuzzy sliding mode control (FSMC) is proposed to control of the chattering phenomenon. The fuzzy sliding mode control is applied in around the sliding surface. So one of the methods to minimize or eliminate the reaching phase is to use a moving switching surface (MSS) [2-3]. This paper resorts to fuzzy logic for designing of this moving surface. In next part of this paper the robot manipulator dynamics equations has presented then a sliding mode controller and a fuzzy controller has been designed for the robot manipulator. To this end, a incorporating fuzzy-sliding mode controller and a moving sliding surface with using of fuzzy technique has been designed.

2. The robot manipulator model

The dynamics of a serial –link robot can be written as [14]

$$M(q)\ddot{q} + C(q,\dot{q}) + G(q) + F(\dot{q},\tau) = \tau \quad (1)$$

Where, $M(q) \in R^{n\times n}$ is the symmetric positive–definite manipulator inertia matrix. $C(q,\dot{q})) \in R^{n\times n}$ is the vector of centripetal and Carioles torques, $G(q) \in R^{n}$ is the vector of gravitational torques. Also, $q, \dot{q}, \ddot{q} \in R^{n}$ are vectors of location, velocity and angular acceleration of robot links respectively.

The friction torque $F(\dot{q},\tau)$ is assumed to dissipate energy at all nonzero velocities and, therefore, its entries are bounded within the first and third quadrants. This feature allows considering the common Coulomb, viscous and static friction models [15] and [16]

$$f_i(\dot{q},\tau_i) = b_i\dot{q}_i + f_{ci}sgn(\dot{q}_i) + [1 - sgn(\dot{q}_i)]sat(\tau_i; f_{si}) \quad (2)$$

Where, b_i, f_{ci} and f_{si} denote the coefficients of the viscous, Coulomb, and static friction, respectively, with $i = 1,2,\dots,n$, The $sat(.;.)$ function is defined as follows

(3)

$$sat(\tau_i, f_{si}) = \begin{cases} f_{si} & \tau_i > f_{si} \\ \tau_i & -f_{si} \le \tau_i \le f_{si} \\ -f_{si} & \tau_i < -f_{si} \end{cases}$$

We assume the robot links are joined together with revolute joints. Three important properties are the following.

Property 1: The matrix $C(q,\dot{q})$ and the time derivative $\dot{M}(q)$ of the inertia matrix satisfy

$$q^T\left(\dot{M}(q) - 2C(q,\dot{q})\right)q = 0$$

Property 2: The friction torque vector $F(\dot{q},\tau)$ satisfies

$$\dot{q}^T F(\dot{q},\tau) > 0 \quad \forall \tau \in R^n$$

Property 3: The gravitational torque vector $G(q)$ is bounded such that

$$sup\{|g_i(q)|\} \le \bar{g}_i \quad \bar{g}_i \ge 0$$

Where, g_i stands for the elements of G . Assume that each joint actuator is able to supply a known maximum torque τ^{max} so that

$$|\tau_i| \le \tau^{max} \quad i = 1,2,\dots,n$$

We assume that each actuator satisfies the following condition

(4)

$$\tau^{max} > \bar{g}_i + f_{s_i}$$

G and M matrix is present as the following

(5)

$$C = \hat{C} + \Delta C$$

3. Designing of Sliding mode Fuzzy controller

In this part, our purpose is to design a sliding mode controller that can detect desired state vector q_d with existence of uncertainty and disturbance.

3.1. Designing of sliding mode controller

The first step at the designing of sliding mode controller is choice of slide surface. With considering a robot manipulator, slide surface is defined as follows

(6)

$$s = \dot{e} + \lambda e$$

Where $e = -\tilde{q} = q - q_d$ and λ are positive–definite matrixes, positive as it ensure stability $s = 0$. With defining of velocity vector as:

(7)

$$\dot{q}_r = \dot{q}_d - \lambda e$$

We may define slide surface as following:

(8)

$$s = \dot{q} - \dot{q}_r$$

For system states get to slide surface and remain in it, the following slide condition should establish [1].

(9)

$$\frac{1}{2}\frac{d}{dt}[s^T M s] < -\eta\,(s^T s)^{1/2}$$

Where η is positive–definite matrix, with defining of slide surface (2) and the following control rule for system (1), slide condition (9) is complied

(10)

$$\tau = \hat{\tau} - Ksgn(s)$$

That,

(11)

$$\hat{\tau} = M\ddot{q}_r + \hat{C}\dot{q}_r + G$$

and,

(12)

$$K_i \ge \|\Delta C\dot{q}_r\| + \Gamma_i$$

$\Gamma \in R^n$ is parameter of designing and should design as

(13)

$$\Gamma_i \ge F_{up} + \eta_i$$

Prove: with utilization of Lyapunov theory is proved that the control rule (10) resists system (1). Choose the Lyapunov function candidate to be

(14)

$$V = \frac{1}{2}s^T M s$$

Because M matrix is a positive–definite matrix so providing $s \neq 0$ then $V > 0$ and with deriving from V the following equation is obtained

(15)

$$\dot{V} = s^T M\dot{s} + \frac{1}{2}s^T\dot{M}s$$

By using of equation (3) the following result is supplied

(16)

$$\dot{V} = s^T(M\ddot{q} - M\ddot{q}_r) + \frac{1}{2}s^T\dot{M}s$$

With setting (1) in (16) and using of property 1 the following result is provided

(17)

$$\dot{V} = s^T(\tau - C\dot{q}_r - G - F - M\ddot{q}_r)$$

And with applying (10) and (11) in up bond we have

(18)

$$\dot{V} = -s^T(\Delta C\dot{q}_r + F) - \sum_{i=1}^{n} K_i|s_i|$$

And then from (12), (13) and (14) the following bond is proved

(19)

$$V \le -\sum_{i=1}^{n} \eta_i|s|_i$$

For decrease of the chattering phenomenon around slide surface, we define a bounded layer with

diameter φ around slide surface. So we replace saturation function in sgn at bond (10) and we have

(20)

$$sgn\left(\frac{s}{\varphi}\right)=\begin{cases} sgn\left(\frac{s}{\varphi}\right) & |s|\geq|\varphi| \\ \frac{s}{\varphi} & |s|<|\varphi| \end{cases}$$

3.2. Designing of Fuzzy controller

In this paper, we consider a sectorial fuzzy controller studied (SFC). Two-input one-output rules will be used in the formulation of the knowledge base. The IF–THEN rules are of the following form

(21)

$$\boldsymbol{IF}\ x_1\ is\ A_1^{l_j}\ and\ x_2\ is\ A_2^{l_2}\ \boldsymbol{THEN}\ y^l\ is\ B^{l_1 l_2}$$

Where

$$x=[x_1\ \ x_2]^T=[e\ \ \dot{e}]^T\in u=u_1\times u_2\subset R^2$$

For each input fuzzy set $A_j^{l_j}$ in $x_j\in u_j$ and output fuzzy set $B^{l_1 l_2}$ in $y\subset V$ exists an input membership function $\mu_{A_j^{l_j}}(x_j)$ and output membership function $\mu_{B^{l_1 l_2}}(x_j)$, respectively, with $l_j=-(N_1-1)/2,\ldots.,-(N_j-1)/2$; $j=1,2$; N_j being an odd number of membership functions associated to the input *j*. The total number of rules *M* is defined by the number of membership functions of each input $M=N_1\times N_2$. The output variable of a fuzzy logic controller FLC can have associated an odd number, say *N*, of membership functions $\mu_{B^l}(y)$, with $l=-(N-1)/2,\ldots.,-(N-1)/2$.

In the remainder of this paper, we consider the SFC class of fuzzy controllers studied in [4] and [5], where we have selected the following specifications: Singleton fuzzifier, N_j (odd) triangular membership functions for each input, with $j=1,2$ (see Fig.1), *N* (odd) singleton membership functions for the output, (see Fig. 2), rule base defined by (18) for two inputs, (table.1), product inference, and center average defuzzifier.

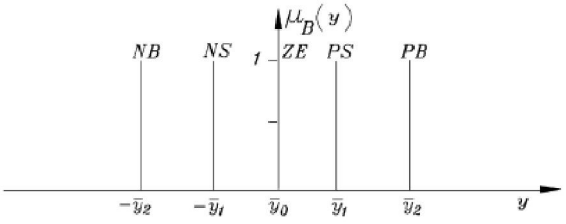

Figure. 1. Input membership functions

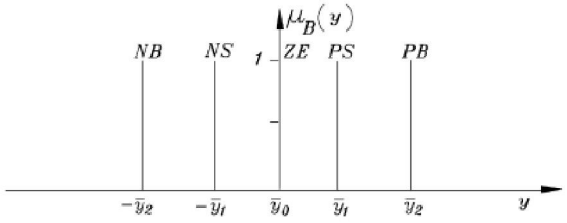

Figure. 2. Output membership functions

Table 1. Look-up the fuzzy rule base

x_2 \ x_1	NB	NS	ZE	PS	PB
NB	NB	NB	NS	ZE	ZE
NS	NB	NB	NS	ZE	ZE
ZE	NS	NS	ZE	PS	PS
PS	ZE	ZE	PS	PB	PB
PB	ZE	ZE	PS	PB	PB

3.3. Designing of incorporating controller

Because of we can synchronously use from premium of fuzzy and sliding mode controllers and minimize detects each of their, we propose the following incorporating controller:

(22)

$$\tau=\begin{cases} \hat{\tau}-Ksgn(s) & |\tilde{q}_i|\geq\alpha \\ \varphi(\tilde{q},\dot{\tilde{q}})+G(q) & |\tilde{q}_i|<\alpha \end{cases}$$

Where in this bond α is a positive parameter. in case $|\tilde{q}_i|\geq\alpha$, sliding mode controller works and fuzzy mode controller acts provided that $|\tilde{q}_i|<\alpha$. So the used controller will be as a robust sliding mode controller. Also the chattering phenomenon happens surrounding the sliding surface $(s=0)$ that it excite both high frequency oscillations the un-modeled dynamics of the system and it cause to increase input torque. So we apply the fuzzy sliding mode control in around the sliding surface for conquest of this problem.

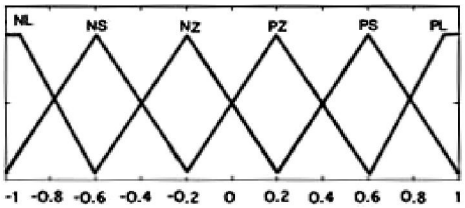

Figure. 3. membership functions for inputs $\tilde{q}$ and $\dot{\tilde{q}}$

4. Designing of moving sliding surface

In sliding mode control, the system only in Sliding phase is resistant to uncertainty and disturbance, while in reaching phase it is sensitive them and this is one of the problems of the classical

sliding mode controller. . So one of the methods to minimize or eliminate the reaching phase is to use a moving switching surface (MSS) [2-3]. In attention to studied robot that is a two-link robot, equation of moving sliding surface is defined as

(23)

$$s(e,\dot{e},t) = \dot{e} + \lambda e - \gamma$$

Surface rotation occurs along with $\lambda(t)$ which is surface slope and shifting along with the changes in $\gamma(t)$. In two degree systems if the representative point (RP) is the first or third quarter, we will shift the surface slope and in case RP is in the second or fourth quarter we rotate it. According to the above mentioned statements the control rule for sliding mode with bonded layer and moving sliding surface is as follows

(24)

$$\tau = \hat{\tau} - K\ sat\left(\frac{\dot{e} + \lambda e - \gamma}{\varphi}\right)$$

For setting $\lambda(t)$ and $\gamma(t)$, we use fuzzy logic and consider it as a function of errors and errors variation. Having two inputs and two outputs, the simple sognoy rule of IF-THEN will be

$$IF\ \tilde{q}\ is\ A_i\ and\ \dot{\tilde{q}}\ is\ B_i\ THEN$$
$$\tau = \hat{\tau} - K\ sat\left(\frac{\dot{e} + \lambda_i e - \gamma_i}{\varphi}\right) \qquad (25)$$

In order to determine λ_i, γ_i, first we define six membership function $\{NL, PS, PZ, NZ, NS, NL\}$ for each $\tilde{q}$, $\dot{\tilde{q}}$ input (see Fig 4). Based on sliding mode control, sognoy rule base is regarded for calculating λ_i, γ_i. This is shown in tables 2 and 3.

Table 2. Look-up the fuzzy rule base for λ_i

$\dot{e}$ \ e	PL	PS	PZ	NZ	NS	NL
PL	0/6	0/6	0/6	0/6	0/6	0/6
PS	0/6	0/6	0/6	5	5	5
PZ	0/6	0/6	5	8	8	8
NZ	8	8	8	5	0/6	0/6
NS	5	5	5	0/6	0/6	0/6
NL	0/6	0/6	0/6	0/6	0/6	0/6

Table 3. Look-up the fuzzy rule base for γ_i

$\dot{e}$ \ e	PL	PS	PZ	NZ	NS	NL
PL	*-10*	*-8*	*-4*	*0*	*0*	*0*
PS	*-8*	*-4*	*-2*	*0*	*0*	*0*
PZ	*-3*	*-2*	*0*	*0*	*0*	*0*
NZ	*0*	*0*	*0*	*0*	*2*	*4*
NS	*0*	*0*	*0*	*0*	*4*	*8*
NL	*0*	*0*	*0*	*4*	*6*	*10*

5. Results

The proposed methods in this paper were applied to a robot with the following parameters

(26)

$$m_1 = 10\ \hat{m}_2 = 5\ l_1 = 1\ l_2 = 0.5\ l_{c_1} = 0.5\ \hat{l}_{c_2} = 0.25$$
$$l_1 = 10/12\ \hat{l}_2 = 5/12$$
$$0 \le \Delta m_2 \le 2\ \ 0 \le \Delta l_{c_2} \le 0.25\ \ 0 \le \Delta l_2 \le 0.5$$

Desired vector is:

(27)

$$q_d = [\pi\ \ -\pi]^T$$

Designing parameters of sliding mode controller are:

(28)

$$\lambda = \begin{bmatrix} 2 & 0 \\ 0 & 4 \end{bmatrix}\quad K = \begin{bmatrix} 75 & 0 \\ 0 & 110 \end{bmatrix}$$

Bearing in mind that if input torques exceed a certain amount the problem of link saturation will show up, so we will face limitations in applying input torques. For the simulated robotic model, the maximum applied torques is 150 to the first link and 15 to the second.

The simulation result of sliding mode controller and also controller with moving sliding surface are given in Figs.6-12. As shown in the Figs. The problem of sliding surface oscillations is solved in incorporating controller. And, sliding surface is smoother than that of sliding mode controller. In addition, sliding phase in controller with moving sliding surface is in its least possible.

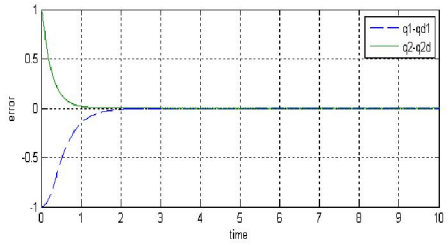

Figure. 4. Detection error of sliding mode controller

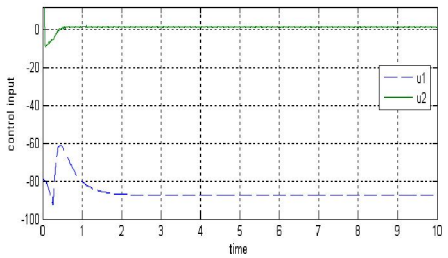

Figure 5. Control inputs of sliding mode controller

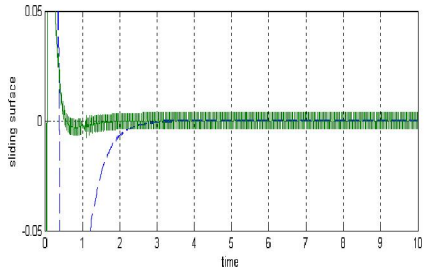

Figure. 6. Sliding surface of sliding mode controller

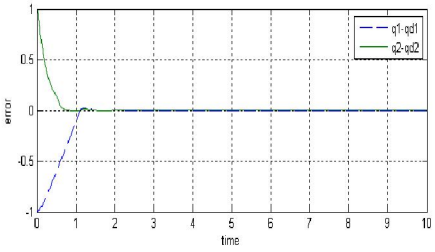

Figure. 7. Detection error of incorporating fuzzy-sliding mode controller

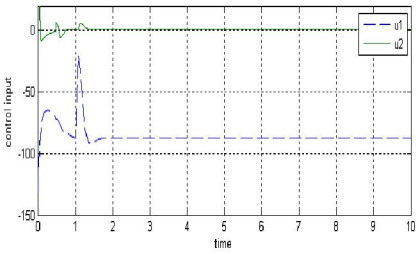

Figure. 8. control inputs of incorporating fuzzy-sliding mode controller

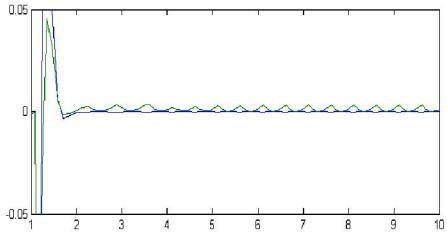

Figure. 9. Sliding surface of incorporating fuzzy-sliding mode controller

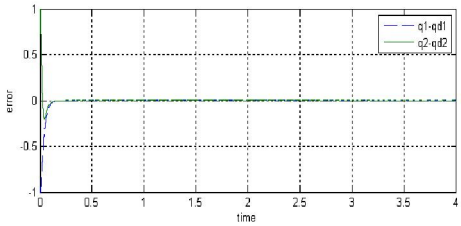

Figure. 10. Detection error of sliding mode controller with moving surface

5. Conclusion

In this paper, by using fuzzy logic two main problems of sliding mode control were removed. The first problem, sliding surface oscillation, was overcome by incorporated controller. And the second, lack of robust of controller in the reaching phase, is minimized with moving slide surface for robot manipulator link.

Acknowledgements:

The authors would like to thank the anonymous reviewers for their constructive remarks and suggestion for improving this paper.

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11/18/2012

Automatic Detection and Positioning of Power Quallity Disturbances using a Discrete Wavelet Transform

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Abstract: Voltage sag is one of the crucial problems of power quality that affects high power devices. It may cause sensitive devices to malfunction and may increase the failure in power systems. An appropriate algorithm for identifying and positioning the voltage sag disorder is suggested in this study. This procedure identifies the voltage sag online and automatically and can identify the exact time and position of this damaging circumstance. This method operates based on the analysis of wavelets and search blocks, and its procedure uses the discrete wavelet transform (DWT) to identify the changes in voltage signals with respect to the non-fault state. Simulation results on a nine-bus IEEE network confirm the validity and accuracy of the proposed method.
[Ramtin Sadeghi, Reza Sharifian Dastjerdi, Payam Ghaebi Panah, Ehsan Jafari**. Automatic Detection and Positioning of Power Quallity Disturbances using a Discrete Wavelet Transform.** *Life Sci J* 2012;9(4):3481-3486]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 516

Keywords: Power Quality, Discrete Wavelet Transform, Voltage Sag, Identification Techniques..

1. Introduction

Voltage sag is an unexpected reduction of voltage in a region of an electric system that, after a short time (from a half-cycle to a few seconds), returns to its original value. Generally speaking, during these situations, the voltages at the power frequency reduce to 0.1 - 0.9 (per unit) with a duration from 0.5 cycles to 1 minute [1].

Voltage sag is one of the most crucial problems because most devices in industrial plants are very sensitive to voltage reduction. Faults in transmission or distribution systems (like single phase to ground fault or two phase short circuits) are major causes of voltage dips in electrical systems. High frequency voltage sag might lead to damage to high power devices.

Voltage drop is one of the most important and most frequent power quality disorders in electrical systems. Apparatuses like chillers control units, laboratory and measuring devices, and DC or AC drives used in modern industrial factories are very sensitive to this phenomenon. Therefore, when a voltage dip occurs, they will not function properly. Voltage sags with 85% to 90% amplitude with respect to the nominal voltage amplitude with duration of 16 milliseconds can immediately interrupt important industrial processes [2].

Numerous researchers have worked on voltage sag and examined its general features and principles [3-5]. Some of them surveyed various retrievals (compensators), including SVCs and STATCOMs [6-8]. They also presented some methods for positioning faults and estimating the amplitude or frequency of voltage sags [9-13]. Of course, due to the importance of large loads, many of these studies concentrated on high power consumers to solve their problems.

The first step in recovering the power quality disorders in a power system and improving the form of voltage waves is using an appropriate and effective method to identify these disorders. Various methods can be used to recognise the distorted signals, and each method is based on a specific algorithm. These methods may include Fourier transforms (FT), Wavelet transforms (WT), abc-dq0 transforms, and neural network approaches. For instance, one of the traditional methods for identifying the voltage dip disorder is measuring the effective value (rms) of the voltage waveform and comparing it with thresholds. For example, when the effective value of the voltage is between 0.1 and 0.9 (per unit), the voltage sag disorder is acknowledged. However, this system is simple and inexpensive and has some inadequacies that may limit its uses. As an example, selecting voltage thresholds for such systems that work properly in all conditions is very sensitive because obtaining non-suitable amounts can cause the system to identify no faults in the fault condition or to categorise a non-fault signal as a fault [1].

Thus, the search to find methods that are more efficient has continued. Recognising the wavelet transform and its unique features in the analysis of non-stationary signals (most fault signals in the power systems are non-stationary) with different time and frequency resolutions is a new approach in power quality research.

With advancements in power quality observing devices, power quality raw data has increased. Therefore, the analysis of faults can be done only by an automatic procedure. The authors of

this paper tried to propose a novel method. This method identifies the exact time and position of the voltage sag disorder, and, in addition, it works online and automatically. The suggested method operates based on the analysis of wavelets and compares blocks for classifying faults. The advantage of this method over the others is using a search block for identifying faults instead of a complicated system like a neural network.

2. Main Causes of Voltage SAG Disturbance

Generally, voltage sag disturbances occur due to short circuit faults in distribution and transmission systems. Starting large motors, connecting large loads and switching capacitor banks can also be causes of voltage sag. Lightening is the major cause of most faults in aerial power lines. It can cause faults by direct collision with the phase or earth lines (or the tower body). Most of the equipment in a power system are located outdoors, and they can be easily threatened by lightening, especially in rainy seasons or regions where lightening frequently occurs. Because these faults are often temporary, fortunately, they will be removed automatically after a few seconds. In addition, the operation of protecting devices may affect the specifications of voltage sag trouble [14].

Faults in transmission systems can have more influence on various devices than faults in the distribution system. When a fault occurs in a transmission system, the voltage sag may affect all the consumers, even a hundred kilometres away from the position of the fault. The effects of faults on transmission systems are mentioned in detail in [15].

Generally, voltage sag is identified by magnitude (amplitude of voltage during the disorder), duration (interval in which the effective value is less than a threshold value, typically 0.9 pu or less), and frequency. Among these three specifications of voltage sag, the rate (or frequency) of voltage dip occurrence can cause greater damage to many devices.

3. Discrete Wavelet Transform

The fast Fourier transform (FFT) is the perfect tool for determining the frequency components in a waveform. A drawback of the FFT is that frequency components can only be extracted from the complete period of a waveform. The frequency components (harmonics) are obtained from an average over the whole period of the signal. Thus, it is not an appropriate tool for a non-stationary signal such as fault signals in power systems. These types of problems associated with FFT can be resolved by using wavelet analysis. Consequently, wavelet analysis has recently been considered for analysis of non-stationary signals. It provides a powerful tool to characterise the local (time dependent) features of a signal.

Unlike the Fourier transform, where the function used as the basis of decomposition is always a sinusoidal waveform, other basis functions can be selected as the wavelet according to the features of the original signal.

The wavelet transform is defined as transforming signals to a short wave or set of short waves. Thus, the decomposed signals (wavelets) have short duration with limited energy, and their integral over their time interval equals zero [16]. Fig. 1 compares a wavelet with a sinusoidal waveform [17, 18]. As this figure shows, the energy of the sinusoidal waveform is unrestricted and can be between minus and plus infinity.

Figure 1. Comparison of wavelet and pure sinusoidal waveforms [17]

The signal in DWT is passed through a series of high-pass filters to analyse the high frequencies and through a series of low-pass filters to analyse the low frequencies. In DWT, the signals can be characterised by approximations and details. The detail at level m is defined as:

$$D_m = \sum_{m \in Z} a_{m,n} \psi_{m,n}(t) \quad (1)$$

Where Z is the set of positive integers and ψ is the basis (mother) wavelet. The approximation at level m is defined as:

$$A_M = \sum_{m>M} D_m \quad (2)$$

Finally, the original signal f (t) can be represented as:

$$f(t) = A_M + \sum_{m \le M} D_m \quad (3)$$

As can be seen from these equations, by using the digital filter banks, the analysed signal can be disintegrated in several frequency levels [19, 20].

There are various wavelet families like Daubechies (dbN), Haar, and biorthogonal wavelets. In this study, a main db4 wavelet (which is from the Daubechies family) is used [21, 22]. DWT disintegrates the original signal into high-frequency and low-frequency components (Fig. 2). In the DWT, these components are called detail coefficients and approximate coefficients. High-scale approximate coefficients are low-frequency components of the original signal, whereas low-scale detail coefficients

are high frequency components of it. Lower-detail levels show more jumps in the original signal because they include high-frequency parts.

In this usage, the first level of the details is used for immediate identification of any disorder and occurrence time of the phenomenon. This output can be used as a trigger signal that identifies the existence of disorder in the system.

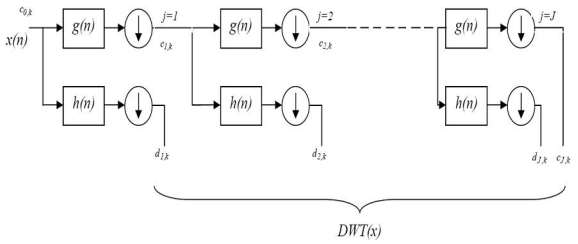

Figure 2. Obtaining the discrete time wavelet [22]

On the other hand, Equation (4) presents the relation between the energy of the original signal (f (t)) and the power of each component and the coefficients of wavelet transform.

$$E = \int |f(t)|^2 dt = \sum_{k=-\infty}^{+\infty} |c(k)|^2 + \sum_{j=0}^{+\infty} \sum_{k=\infty}^{+\infty} |d_j(k)|^2 \qquad (4)$$

Equation (4) demonstrates that the energy of the disordered signal is shared between different levels of its decomposed components. The amount of energy of each level depends on the types of power quality disorder occurring in the system.

In statistics applications, the standard deviation (Std) of a collection is calculated as:

$$Std = \sqrt{\sum_{i=1}^{k} (a_i - a_m)^2} \qquad (5)$$

In which am is the average value of ai , (i = 1,2,3,...,k) and Std indicates the standard deviation of samples (ai) from the average value (am).

By comparing Equations (4) and (5), the square of the coefficients should be added to calculate the energy in each sub band. Therefore, if an average value of a level is zero (in most cases it is zero or near zero), the Std of that level almost shows the energy of it. Thus, Std in different levels can be used for the classification of different power quality disorders.

4. Algorithim of Detection and Positioning of Voltage SAG Disturbance

The purpose of this study is to develop an automatic system that receives the fault signal as an input and automatically identifies the voltage sag and its position in the power system. In the proposed method, first, the input signal is sampled by a specific sampling frequency. To analyse any voltage sag phenomenon, some disorders are simulated and used. Five types of faults and events are investigated in this research: single phase to ground, three phases to ground, two phases to ground, two phase short circuit, and starting a large induction motor. A nine-bus IEEE standard network is used for analysis and simulation. The simplified single line diagram of the simulated system is shown in Fig. 3. This system is simulated by a combination of block sets of MATLAB/Simulink software. The Signal Processing block set is used for modelling of the suggested algorithm, and the Sim Power Systems block set is used for modelling of the nine-bus IEEE system. At first, features of the DWT are extracted, and, then, the system of detection and positioning of the voltage sag disturbance should be started.

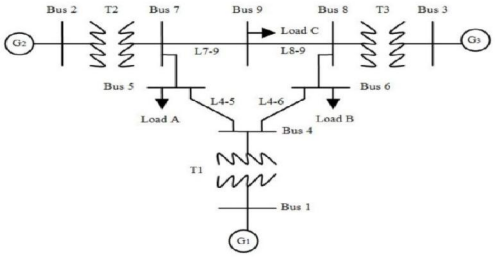

Figure 3. Standard nine-bus IEEE system

4.1 DWT Features Extraction

Simulation of the above mentioned faults and events identifies different and specific patterns for each of the voltage sag disorders. Therefore, recognition of these patterns in every disorder situation is a principal and essential step. A special technique is used to distinguish patterns. Firstly, in this procedure, one fault signal and one non-fault signal are analysed in ten levels using the discrete wavelet transform. Then, the Std of the energy in all decomposed levels and the Std of the differences between the details of fault signal and details of non-fault signal are calculated. The energy Std of the difference is not equal for any kind of disorder. Considering this specific property, an appropriate feature can be achieved for each disorder and can be used for pattern recognition.

Figures 4.a and 4.b show the Std curves of the normal (non-fault) signal energy and the disordered signal energy. By comparing these two curves, the energy of the disordered signal in the eighth level (which includes the main component of the signal) is lower than the energy of the normal signal. Figures 4.c to 4.i show energy Std difference curves for seven kinds of simulated faults and events. As can be seen from these figures, each fault or event has its specific feature and can be used for that pattern recognition.

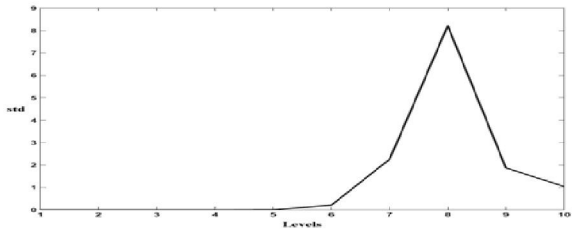

Figure 4.a. Standard deviation energy difference curve of normal signal

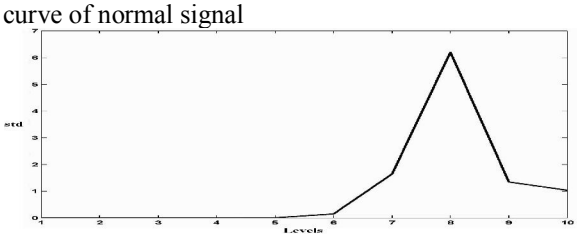

Figure 4.b. Standard deviation energy curve voltage sag disturbance

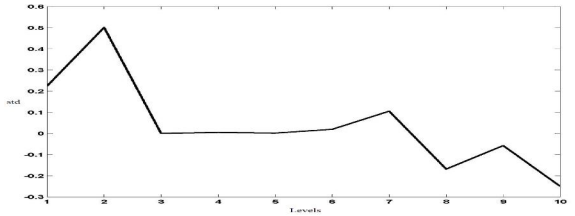

Figure 4.c. Standard deviation energy difference curve of oscillatory transient disturbance

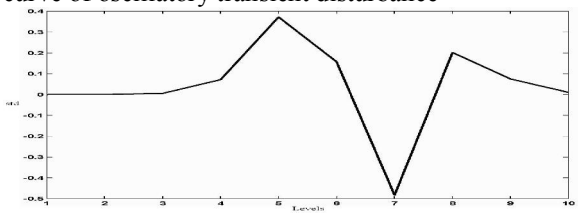

Figure 4.d. Standard deviation energy difference curve of voltage notch disturbance

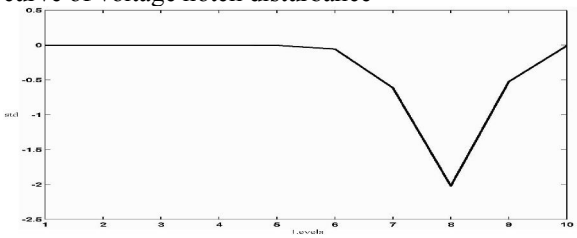

Figure 4.e. Standard deviation energy difference curve voltage sag disturbance

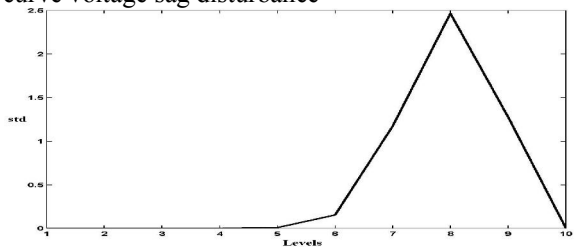

Figure 4.f. Standard deviation energy difference curve of voltage swell disturbance

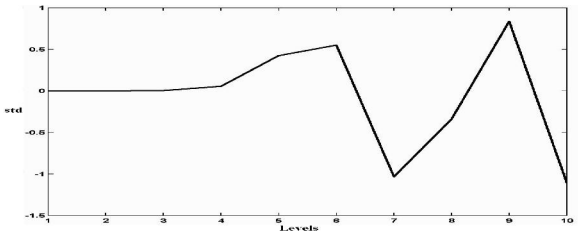

Figure 4.g. Standard deviation energy difference curve of harmonic disturbance

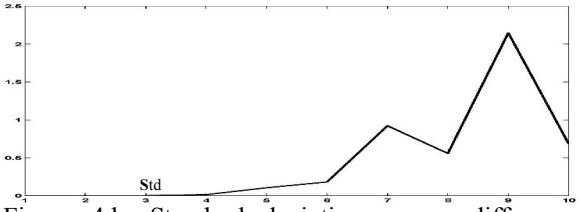

Figure 4.h. Standard deviation energy difference curve of flicker disturbance

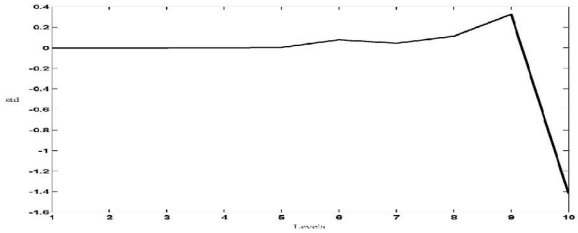

Figure 4.i. Standard deviation energy difference curve of impact transient disturbance

4.2. System of Detection and Positioning of Voltage SAG Disturbance

A novel technique is used for automatic and on-line identification and positioning of voltage sag disturbances. Fig. 5 shows the algorithm of this method that uses wavelet transforms. This algorithm gives the exact time and position of the disorder in addition to the voltage sag type.

In this algorithm, a monitoring device and a pattern synchroniser (that identifies type and time and estimates the position of the disorder) are used for each bus of the system to identify and locate the voltage sag disorder (based on the pattern of Std difference of energy levels in Figures 4.c to 4.i).

In Fig. 5, the processing system receives both normal and disordered signals online as inputs, analyses both signals into ten levels using a discrete wavelet transform, (vector D1 is for the normal signal, and vector D2 is for disordered signal) and then calculates the differences between these levels (vector A). If one of the components of vector A is not equal to zero, the system will announce the disorder and show its time.

The procedure is clear in Figures 6.a and 6.b, which show the wavelet analysis of the fault and non-fault signals in the 12 levels. It may increase the accuracy and speed of the system's response and also decrease the failures as a result of reducing extra

processes. Now, the "identifying type, time, and estimating the position of disorder" block starts to process. Any device that observes the fault earlier has the priority over the others to process the fault signal. Thus, the two monitoring device, which observes the fault earlier, will locate the disorder. Then the place of fault occurrence will be estimated using the two times recorded by the two monitoring devices.

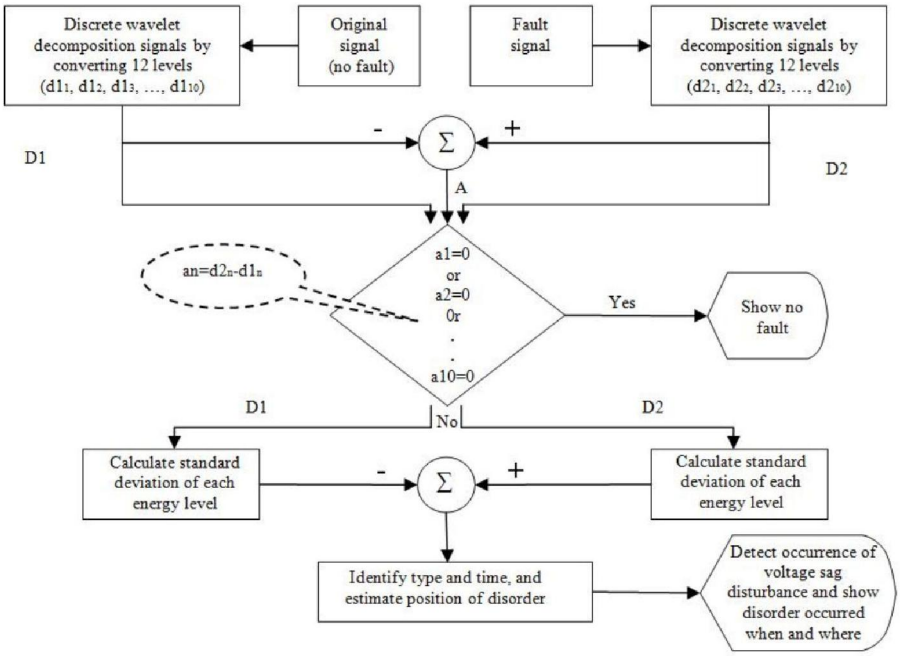

Figure 5. Automatic detection and classification algorithm of the power quality disturbance using the wavelet transform

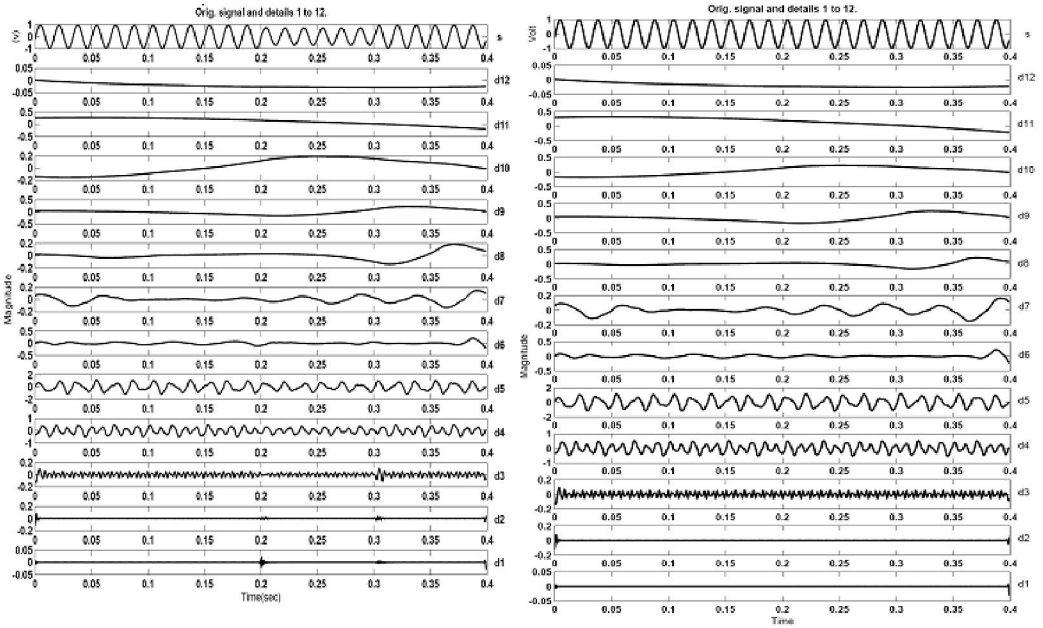

Figure 6. Discrete wavelet decomposition levels of a) a voltage signal containing voltage sag due to fault, b) the non-fault voltage signal

The synchronizer section starts to work simultaneously with other parts in this block. The pattern synchronizer section will work according to the maxima and minima (or their arrangement) of differences in energy Std of different levels. The task of this part is to declare the existence of voltage sag.

Sampling frequency in this method is very important, and, when it changes, new patterns for fault and non-fault signals must be collected. These signals must be decomposed, and the Std differences of fault signal energy levels and normal signal energy levels will be calculated again.

The proposed system can be used for positioning of voltage sag disorder compensators at suitable locations. This technique allows us to build a standard device for fast and accurate online identification and automatic positioning of voltage sag. The development of this method can reduce the power quality difficulties in power systems. It may help a system return to its primary condition (before the occurrence of the disorder) with minimum cost.

Various faults were put in different parts of the system to examine the accuracy of the algorithm and the designed system (including switching capacitors, starting large inductive motors, and several faults). The identifying system correctly declared the occurrence, type, and location of the disorders in all cases.

6. Conclusions

The technique applied in this study uses a wavelet transform to identify the type and location of voltage sag disorders. This method allows us to build a standard device for a fast, accurate online identification and automatic positioning of voltage sag. The only shortcoming of this method is its dependence on the sampling frequency. However, it is only necessary to acquire new synchronising pattern and new patterns for Std differences of the fault signal energy level and normal signal energy level based on the new sampling frequency.

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11/18/2012

Establishment and Biological Characteristic Research of Yuxizhiwei sheep Fibroblast Cell Bank

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Abstract: An ear marginal fibroblast cell bank was established from the Yuxizhiwei sheep which is an excellent Chinese livestock breed using attachment culture and freezing biotechniques. This bank included 30 ear samples and had stocks of 136 cryogenically preserved vials, each containing 1.7×10^7 cells. Establishment and biological characteristic research results of the cell bank showed that the cells revealed typical fibroblast morphology and grew well in vitro, the growth curve consisted of latent phase, logarithmic growth phase and stationary phase, the cell population doubling time (PDT) was 24 hours, and there was no microbe contamination (bacteria, epiphyte, virus or mycoplasma) in the culture. In addition, lactate dehydrogenase (LDH) and malate dehydrogenase (MDH) zymography indicated that this cell bank was free of cross-contamination. We also determined that the diploid rate of the cell bank was 90.2%~91.4% and measured the expression ratios of three fluorescent protein genes which were between 11.3% and 30.2%. The quality identity of this cell bank thus satisfied the standards of the American Type Culture Collection (ATCC). This study has not only opened up new ways to conserve genetic resources of important and endangered animal breeds in the form of somatic cells, but also provided valuable experimental materials for cell biology, medicine, genomics, post-genomics, embryo engineering and so on.
[Wang H, Li XC, Li CL. **Establishment and Biological Characteristic Research of Yuxizhiwei sheep Fibroblast Cell Bank**. *Life Sci J* 2012;9(4):3487-3493] (ISSN:1097-8135). http://www.lifesciencesite.com. 517

Keywords: Yuxizhiwei sheep; fibroblast cell; biological characteristics; genetic resource conservation

1. Introduction

China is one of the countries which has the world's most abundant resources of livestock and poultry breeds. For thousands of years, the working people have carefully selected, cultivated many excellent and distinctive local varieties of livestock and poultry. In recent years, with the social and economic development, China imported a large number of foreign varieties with local livestock and poultry species hybridization to improve production, while this also making a serious damage to the local genetic resources of our country. Some species are endangered, some have been extinct, and some reduced in number of individuals in varying degrees. Almost 596 livestock and poultry breeds are prevalent in China, of which 17 have become deracinated and 336 are under different levels of threat (Zhou et al., 2004). Therefore, the conservation of animal genetic resources and species diversity is one of the themes of today's biological researches.

At present, there are several conventional preservation methods, such as in vivo preservation of semen, embryos, genomic library, cDNA library and so on. For a long time live animal preservation is the main method to conserve genetic resources of domestic animals among the many strategies (Wu., 1999). Most cell banks emphasize conservation and uti-lization of animal resources,in particular animal generative cells and embryos (Ho et al., 1997; Simon, 1999; Park et al., 2009). Nevertheless, establishment of somatic cell banks using in vitro culture and low temperature biological techniques is a new effective approach to conserve and maintain the diversity of domestic animals (Shi, 1989). The development of somatic cell cloning techniques is one effective way to preserve animal genetic materials (Hong et al., 2005; Yuna et al., 2008). More and more articles were publicated on the development of fibroblast cell lines from various animals, including the Debao pony (Zhou et al., 2004), Beijing fatty chicken (Zhou et al., 2005), sheep (Chen et al., 2006), Taihu pig (Zhang et al., 2008), Luxi cattle (Liu et al.2008), Texel sheep (Li et al., 2009a) and Silkie Bantam (Li et al., 2009b).

Yuxizhiwei sheep is a Mongolian sheep originated from Central Asia and the Far East, and the breed is formed through a long-term domestication selection by Henan people. It is a good local breed of Henan Province. The breed has plump naked body, tender meat, evenly distributed fat, high production rate and early sexual maturity. Yuxizhiwei sheep is strongly resistant to crude feed, disease and heat, especially it is with strong climbing ability and suitable for mountain grazing. In this study we have established fibroblast cell bank of Yuxizhiwei sheep and studied on its biological characteristics with the aim of long-term preservation of somatic cells of this breed to provide valuable

material for further researches in cellular engineering, molecular biology and embryo engineering.

2. Material and Methods

2.1 Cell cultures

Ear tissue samples (about 1 cm^2 in size) were sampled from 30 individuals of Yuxizhiwei sheep and collected into separate tubes containing Dulbecco's modified Eagle media (DMEM) medium with Ampicillin (100U/ml) and Streptomycin (100μg/ml). Then the tissue samples were rinsed and chopped finely into pieces about 1 mm^3 in size. Afterwards the tissue pieces were seeded on bottom surface of a tissue culture flask and incubated invertedly at 37 ℃, 5% CO_2 and saturated humidity for 2-3 h, until the tissue pieces adhered spontaneously to the surface, the flask was then turned over and added DMEM medium containing 10% fetal bovine serum (FBS) to proceed the primary culture in a 37℃ incubator with 5% CO_2 (Guan et al., 2005). Cells were harvested when they reached 80-90% confluence using trypsinization, and split into prepared culture flasks under the ratio 1:2 or 1:3 (Freshney, 2000).

2.2 Cryogenic preservation and recovery

Cells in logarithmic growth phase were enumerated with a hemocytometer, and checked cell viability by trypan blue staining before freezing. The cells were next centrifuged to form a pellet at 1000 rpm for 8 min, the supernatant was removed. Harvested cells were re-suspended in freezing media (10% Dimethyl sulfoxide (DMSO)+50% FBS+40% DMEM) to reach a final cell density of 3-4×10^6 viable cells/ml. Cells were allocated 1ml each into sterile plastic cryogenic vials labeled with animal name, gender, freezing serial number, and the date. The vials were sealed and placed in 4℃ freezer for 20-30 min in order to let DMSO penetrate into cells adequately and after program freezing transferred to liquid nitrogen storage system quickly and efficiently （Werners et al., 2004; Ren et al.,2002）

To recover and reseed the cells, the frozen tubes were removed from liquid nitrogen and quickly thawed in a 42℃ water bath, and then the cells were transferred into a flask with complete medium. Cells were cultured at 37℃ with 5% CO_2 and the medium was renewed 24 h later.

2.3 Growth curve and Estimation of cell viability by Trypan Blue dye

According to Gu et al (2006) and Kong et al (2007) method, cells at the concentration of 1.5×10^4 cells/ml were seeded into 24 well plate. Monitor and record cell growth and density data per day until cells reached the plateau phase, and for each time point counting was carried out in three wells to get an average. Cell growth curve was then plotted and the Population doubling time (PDT) was calculated based on the curve. Cell viability before freezing and after recovery was determined using a hemocytometer to enumerate 1000 cells by Trypan Blue staining exclusion method (Butler., 1999).

2.4 Chromosome analysis

Chromosome fixation preparation and chromosome staining were performed following standard methods (Suemori et al., 2006). One hundred well-spread metaphases were prepared. The chromosome number per spread was counted under oil immersion objective after Giemsa staining. Relative length, arm ratio and centromeric index and type were calculated according to the protocols of Sun et al (2006) and Kawarai et al (2006).

2.5 Isoenzyme analysis

The electrophoretic mobilities of Lactate dehydrogenase (LDH) and Malate dehydrogenase (MDH) were determined using polyacrylamide gel. Electrophoresis protocol contributed by Marvin L. Macy at American Type Culture Collection (ATCC). Electrophoric mobility was defined by number and intensity of enzyme bands, as well as the distance of band migration from the point of origin for each sample (Freshney, 2000).

2.6 The measurement of microorganism

Detection of bacteria and fungus: The detailed procedure used for bacteria and fungus contamination test was referred to Doyle et al (1990).

Detection of viruses: Routine examination for cytopathogenic effects was performed using phase-contrast microscopy following Hay's haemadsorption protocol (Hay, 1992).

Detection of mycoplasmas: Cells were cultured in media free of antibiotics for at least one week, then fixed and stained with Hoechst 33258 according to DNA fluorescent staining of Freshney (2000). The ELISA Mycoplasma Detection kit (Roche, Lewes, East Sussex, UK) was used to confirm the results of DNA fluorescent staining.

2.7 Expression of three fluorescent protein genes in Yuxizhiwei sheep fibroblastic cells

To obtain the highest transfection efficiency and low cytotoxicity, transfection conditions were optimized by varying cell density as well as plasmid DNA (BD Bioscieces Clontech product) and Lipofectamine 2000 (Invitrogen) concentrations, according to lipofectamine media methods of Escriou et al (2001) and Tsuchiya et al (2002). The cells were observed 24 h, 48 h and 72 h after transfection under

excitation wavelength of 405 nm, 488 nm and 543 nm separately.

3. Results

3.1 Morphology of Yuxizhiwei sheep fibroblast cells

It could be observed fibroblastic-like or epithelial-like cells migrated from tissue pieces 5-12 d after explanted (Figure 1A). With the cultural time extended, cells then continued to proliferate and were subcultured when they reached 80~90% confluence (Figure 1B). After subculture, the fibroblast cells grew rapidly, outgrew and excluded other cells like epithelial cells gradually (Ren et al., 2002). After about 2-3 passages, we could gain the purified fibroblast cells (Figure 1C,D). The motility rate of fibroblast cells of Yuxizhiwei sheep before freezing and after recovery measured by trypan blue staining were 99.0% and 98.7%.

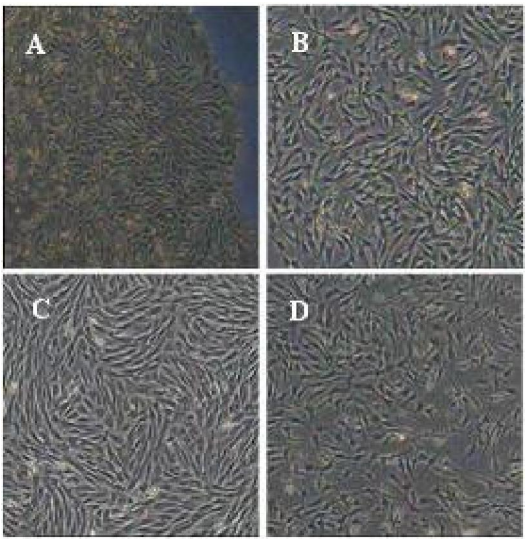

Figure 1. Fibroblast Cells of Yuxizhiwei sheep ear marginal explants. A: Primary Cells; B: Subcultured fibroblast cells; C: Fibroblasts cells before freezing; D: Fibroblasts cells after recovery.

3.2 Growth curve

The growth curve of Yuxizhiwei sheep ear marginal tissue fibroblast cells showed obvious "S" shape (Figure 2) and the PDT of the cells was about 24 h. There was a lag time or laterncy phase about 24 h after cells were seeded, corresponding to the adaptation of cells after recovery and repairment of the trypsin damage, then the cells proliferated rapidly and entered exponential phase. With the cell density accreted, cells growth was influenced by contact inhibition from the sixth day when the cells entered the plateau phase, and cells begun to degenerate.

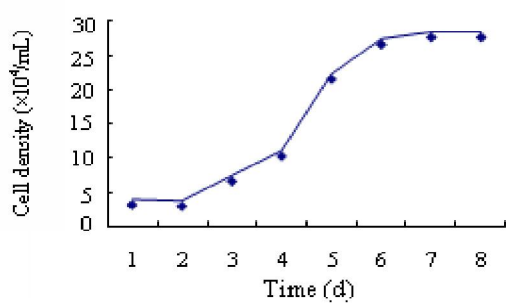

Figure 2. The growth curve of Yuxizhiwei sheep fibroblast cells

3.3 Karyogram and the chromosome number of Yuxizhiwei sheep

The chromosome number of Yuxizhiwei sheep was 2n=54, 52 autosomes and two sex chromosomes XY or XX (Figure 3). Somatic chromosomes No.1-3 were submetacentric chromosomes, No.4-26 and two sex chromosomes (X X) were acrocentric autosomes (Table 1). Chromosome numbers aberration rate showed increasing tendency following the increasing of passages, which indicated culture in vitro affected the heritage of cells slightly, supporting that the cell line was a steady diploid one.

3.4 Isoenzymes analysis of Yuxizhiwei sheep cell line

The distribution patterns of isoenzyme polymorphisms may be characteristic of a species or a tissue. Polymorphism analysis of isoenzymes is currently the standard method for the quality control of cell line identification and detection of interspecies contamination. Isoenzyme patterns for LDH and MDH in Yuxizhiwei sheep fibroblasts were obtained and compared with those from Texel sheep, Mongolian sheep, Angus bovine. Patterns of LDH were shown in figure 4A and revealed clear band differences.

For different livestock species, the same livestock species and different breeds, there are less band differences on the LDH isozymogram. These results show that there was no cross-contamination of the Yuxi Zhiwei sheep fibroblasts from different cell lines established in our laboratory at the same time. The order of LDH activity from low to high is LDH5＜LDH1＜LDH2＜LDH4＜LDH3.

The MDH patterns were shown in figure 4B for Black Grey goat， Black goat, Angora goat, Suffolk sheep, Texel sheep, and Yuxizhiwei sheep ear tissue fibroblasts. All the six domestic animals had two bands, and there was a single m-MDH band near the cathode and a single s-MDH bands near the anode, m-MDH had weaker activity. These results showed that there was no cross-contamination between different breeds.

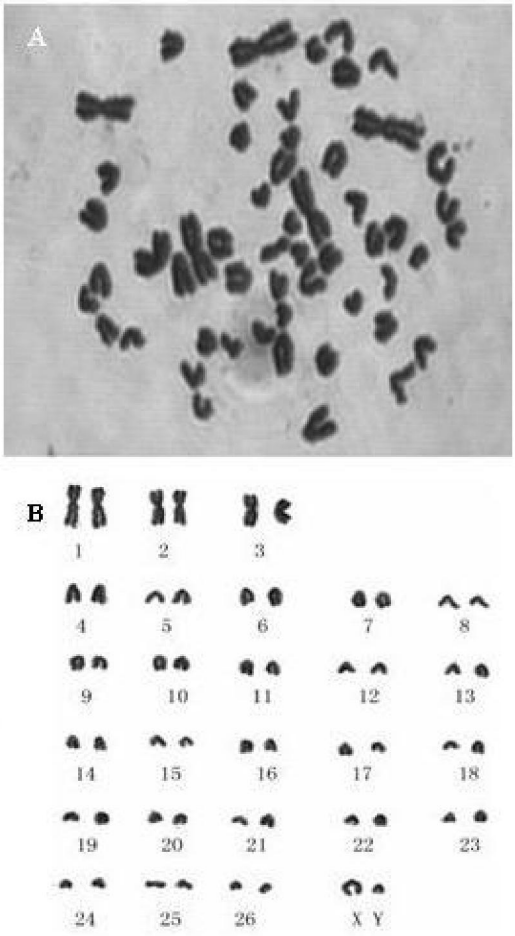

Figure 3. Chromosome metaphase and karyotype of Yuxizhiwei sheep (♂). A: Chromosome metaphase; B: chromosome karyotype

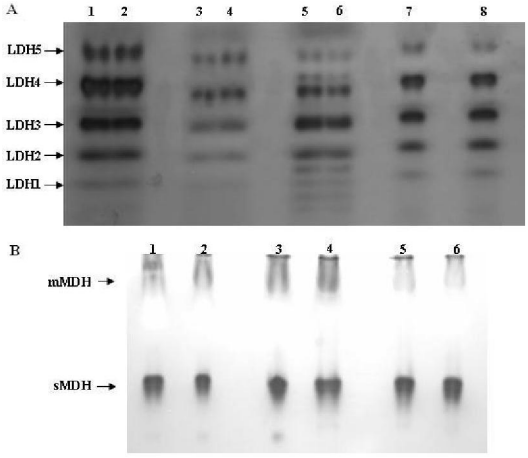

Figure 4. Lactate dehydrogenase (LDH) and malate dehydrogenase (MDH) zymotype for different subspecies. A: 1and 2 Texel sheep, 3and 4 Mongolian sheep, 5and 6 Yuxizhiwei sheep, 7and 8 Angus bovine. B: 1 Black grey Goat, 2 Black Goat, 3 Angora, 4 Suffolksheep, 5 Texel Sheep, 6 Yuxizhiwei sheep.

Table 1. Chromosome characters of Yuxizhiwei sheep (♂)

No.	Relative length（%）	Type
1	10.34±0.12	SM
2	9.03±0.14	SM
3	8.54±0.14	SM
4	5.34±0.12	T
5	412±0.20	T
6	4.25±0.25	T
7	4.21±0.14	T
8	3.42±0.02	T
9	3.23±0.14	T
10	3.32±0.15	T
11	3.34±0.31	T
12	3.17±0.12	T
13	2.95±0.21	T
14	2.71±0.14	T
15	2.78±0.15	T
16	2.68±0.13	T
17	2.51±0.42	T
18	2.49±0.10	T
19	2.43±0.01	T
20	2.33±0.05	T
21	2.14±0.31	T
22	2.13±0.12	T
23	1.95±0.21	T
24	1.71±0.14	T
25	1.78±0.15	T
26	1.68±0.13	T
X	5.01±0.42	T
Y	0.94±0.10	M

Note: M Metacetric chromosome;
SM Submetacentric chromosome;
ST Subtelocentric chromosome;
T Telocentric chromosome.

3.5 Microbial analysis

All results of bacteria, fungi and yeast contamination assays were negative, there were no microorganisms observed in culture media. No presence of viruses was indicated either by the cyto-pathogenic effect examination or by the haemadsorption test. DNA fluorescent staining by Hoechst33258 was most effective and frequently used mothod to detect mycoplasma contamination. Under fluorescent microscope after stained by Hoechst 33258, nuclear of the fibroblast appeared blue elliptic, which showed the established cell line was mycoplasma negative (Figure 5).

3.6 Transfection results of three fluorescent protein genes in Yuxizhiwei sheep fibroblastic cells

Under defined excitation wavelengths (pEGFP-N3, 488 nm; pDsRed1-N1, 543 nm; pEYFP-N1, 495 nm), the expression of pEGFP-N3,

pDsRed1-N1 and pEYFP-N1 was observed at 24 h, 48 h, and 72 h after transfection using laser confocal microscope. The result indicated that all the three fluorescent proteins were expressed in positive cells, and the maximum fluorescence intensity and transfection efficiencies of the exogenous genes appeared at 48 h after transfection. The expression efficiencies of the three fluorescent protein genes at 24 h, 48 h, and 72 h after transfection were all between 11.3% and 30.2% (Table 2).

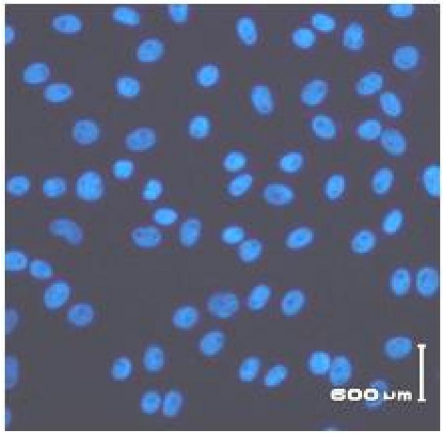

Figure 5. Mycoplasma negative Yuxizhiwei sheep fibroblasts stained by Hoechst 33258

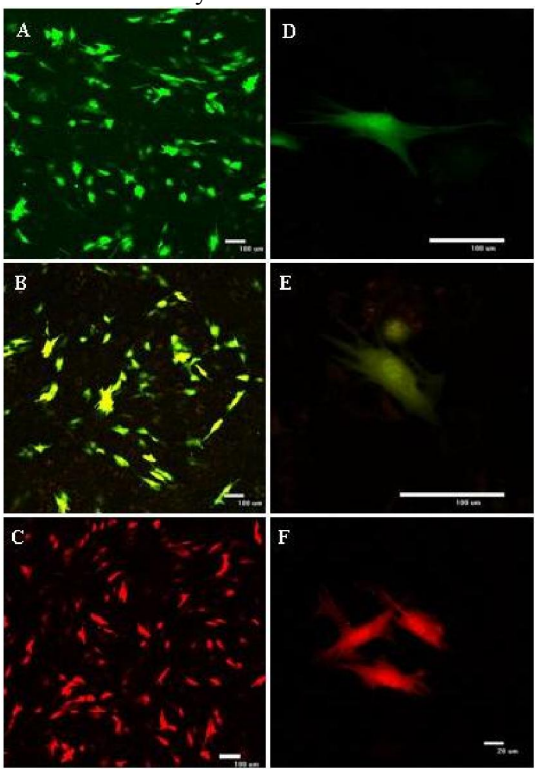

Figure 6. Comparative figures of pEGFP-N3,pEYFP-N1 and pDsRed1-N1 expression in Yuxi Zhiwei sheep fibroblasts. A and D pEGFP-N3, 48 h; B and E pEYFP-N1, 48 h; C and F pDsRed1-N1, 48 h.

At 24h and 48h after transferring, the 3 fluorescences could be observed in cytoplasm and nucleus well-distributed except cryptomere vesicle. At 72h after transferring, pEGFP-N3, pDsRed1-N1 and pEYFP-N1 gene still expressed steadily in cytoplasm and nucleus, which were nearly unchanged, but some cells morphous were irregular and semilism (Figure 6).

Table 2. Transfection efficiency for three fluorescent proteins.

Transfection time (h)	pEGFP-N3 (%)	pEYFP-N1 (%)	pDsRed1-N1 (%)
24	13.6	11.3	17.8
48	30.2	16.8	20.3
72	27.5	15.6	18.8

4. Discussions

4.1 Establishment of Yuxizhiwei sheep fibroblast cell line

We established the Yuxizhiwei sheep ear marginal tissue fibroblast cell line (LXCEM 2/2) using adherent culture method. All measured results indicated that the newly established cell line was stable and grew rather rapidly, and the identification for this cell line conformd to the requirement of quality control of ATCC. So we can conserve the Yuxizhiwei sheep fibroblast cell line by freezing the cells in liquid nitrogen for long-term conservation. In order to ensure the motility rate of cells after recovery, freezing should be keep within 5 generations, cell density should exceed 3×106/ml with cell morphous showing typical fibroblast. Because too many passages and trypsinization affect the biological characters of cells, especially the hereditary characters. Procedures we used in this study conformed to the protocals of ATCC technique bulletin for primary culture, subculture and freezing. Moreover, we characterized the established cell line according to ATCC quality control procedures and improved some techniques and methods, for example we added the transfection of 3 fluorescent protein genes.

4.2 karyotype analysis

In this experiment, the chromosome number of the Yuxizhiwei sheep was found to be 54, with 52 autosomes and 2 sex chromosomes. Because we want to conserve the genomic characteristics of the Yuxizhiwei sheep, the in vitro established fibroblast cell line must maintain diplont characteristics the same as in vivo. The result showed that the proportion of normal diploid cells was above 90%, indicating that the Yuxizhiwei sheep fibroblasts we cultured were stable diploid. Chromosome analysis relates to the gender of the animal from which cells derived. It is also an index to distinguish normal and

malignant cells. In experiment operation it is important to determine the proper time point at which to add colchicine, generally when 70%-90% of the cells are on dividing. It is also important to determine the hypotonic time, which is generally controlled within 25-40 minutes. We achieved the best results when the cells were subjected to colchicine at a final concentration of 0.1μg/ml for 1-2 h.

4.3 Isoenzymes analysis

Isoenzymes show polymorphisms between different species, races, individuals and tissues, and intercellular pollution can be detected by isoenzyme analysis when 10% of cells are polluted. ATCC use isoenzyme polymorphism analysis as a regular method to detect intercellular pollution.

LDH and MDH are very important enzymes participating in the two energy metabolic pathways of glycolytic cycle and citric acid cycle in the bodies of animals, and with different constancy and specificity in different species. LDH is a tetetrametric molecule consisted by the H and M subunits which separately are the ldha and ldhb genes expressed products, and each tissue has a characteristic composition of isoenzymes in a species-dependent manner. In our current experiment, the LDH isoenzyme pattern of Yuxizhiwei sheep fibroblasts showed that LDH-2, LDH-3, and LDH-4 were dominant.

MDH is a dimer enzyme and composed of cytosolic MDH(s-MDH) and mitochondria MDH (m-MDH). The MDH band mobilities among livestock were essential identical, and the same among poultry.

4.4 Mycoplasma detection

A pure cell culture can easily become contaminated with bacteria or fungi. Air, equipment, serum, tissue samples and handling errors can all be sources of such contamination. If contaminated by germ, eumycete and mycetes, the cell media could be turbid and observed by naked eye. Viruses could be observed under microscope. But mycoplasma contamination couldn't be found by naked eye and microscope.

The mycoplasmas have no nucleus and could grow and reproduce in media. It is hardly to be removed and could coexist with cells for long time. Thus it is more difficult to be found than germ, eumycete, mycetes and virus. The methods for mycoplasma detection include direct solid agar culture in microbiology, indirect DNA fluorescent staining and new DNA probe hybridization. Because DNA fluorescent staining is simple and quick, it was commonly used by some cell culture collection institutions like ATCC. Our measurement results of microbiological detections showed that the Yuxi Zhiwei sheep fibroblast cell bank was purified and free from microbial contamination.

4.5 Expression of fluorescent protein genes

The researches about fluorescent protein gene transfection are mainly focused on tumor cells, nerve cells and stem cells (Jung et al., 2001). DNA concentration, lipofectine concentration, the incubate time of the DNA and lipofectine combinant, and serum all can affect the transfection efficiency which is identical with the researches on Vero cell, Hela cell and some other cell lines (Tseng et al., 1999; Rui et al., 2006). In our experiment, the transfection efficiency could reach 30.6% with optimized ratio of plasmid and lipofactamine. The numbers of fluorescent cells reduced at 1 week, however, there remained a few dispersed positive cells after 2 weeks even 1 or 2 months. These fibroblasts can be widely used as tools for investigating the functions of exogenous genes.

Acknowledgements:

The work was supported by the "863" National Major Research Program (2007AA10Z170), the central level, scientific research institutes for R & D special fund business (2011cj-9), and the project National Infrastructure of Animal Germplasm Resources (2012 year).

Abbreviations:

ATCC, American Type Culture Collection; DMEM, Dulbecco's modified Eagle media; DMSO, Dimethyl sulfoxide; ELISA, Enzyme-linked immunosorbent assay; FBS, Fetal bovine serum; LDH, Lactate dehydrogenase; MDH, Malate dehydrogenase; PAGE, Polyacrylamide gel electrophoresis; PBS, phosphate buffered saline; PDT, Population doubling time; RF, Relative mobility front.

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11/19/2012

Effect of Cardiopulmonary Resuscitation Training Program on Nurses Knowledge and Practice

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Abstract The ability to respond quickly and effectively to a cardiac arrest situation rests on nurses being competent in the emergency life-saving procedure of cardiopulmonary resuscitation while the lack of resuscitation skills has been identified as a contributing factor to poor outcome in cardiac arrest victims. This study aimed to assess the impact of cardiopulmonary resuscitation training program on knowledge and performance of Tanta Cancer Institute nurses. The study was carried out in Faculty of Nursing, Tanta University and Tanta Cancer Institute, Ministry of Health. The sample consists of all nurses working in Tanta Cancer Institute. Two tools were used. Tool one was nurses' knowledge related to cardiopulmonary resuscitation questionnaire which was developed to assess nurses' knowledge and it comprises two parts; part one related to bio-socio-demographic characteristics of the nurse and part two related to information regarding cardiopulmonary resuscitation. Tool two was nurses' performance related to cardiopulmonary resuscitation observational check list; it was developed to measure nurses' skill regarding cardiopulmonary resuscitation. Data were collected over a period of three months started from May to July 2012.The results revealed that majority of nurses had poor knowledge and performance related to CPR pre the training program which has been improved immediately, and deteriorated one month post the program and the only positive correlation was found between knowledge and nurses' socio-demographic characteristics was related to educational level pre and one month after the program. Conclusion explained that training program was effective in improving nurses' knowledge and performance related to CPR which has been sharply increased immediately post the program and then decreased one month later, the study recommended annually assessment and refreshing courses to nursing staff in accordance with up- to- date guidelines to impart both cognitive knowledge and psychomotor skills of CPR and to provide a standardized care to cardiac arrest victim.

[Hend M. Elazazay, Amany L. Abdelazez and Omibrahem A. Elsaie. **Effect of Cardiopulmonary Resuscitation Training Program on Nurses Knowledge and Practice**. *Life Sci J* 2012;9(4):3494-3503]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 518

Keywords: Cardiopulmonary Resuscitation, Training Program.

1. Introduction

Cardiopulmonary resuscitation (CPR) is an important medical procedure which is needed for individuals who face sudden cardiac arrest. It is a combination of rescue breathing and chest compressions which is delivered to the victims who are thought to be in cardiac arrest [(1)]. Sudden cardiac arrest (SCA) is life threatening condition and a leading cause of death among adults over the age of 40 years in the United States and other countries [(2)]. Modern published studies reported that about 1,000,000 people die of cardiac arrest every year in the United States and Europe, almost one every 30 second with approximately 200,000 treated cardiac arrests among United States hospitalized patients annually. Cardiopulmonary resuscitation (CPR) will be administered to some of them by emergency medical services. Unfortunately only 1 in 5 adults survive in-hospital cardiac arrest [(3)]. In addition, cardiopulmonary resuscitation is a critical component of basic life support and the established first line of response to a cardiac arrest in the interim before defibrillation and advanced life support are available, it is an important life-saving first-aid skill and an effective method of keeping someone who is experiencing a cardiac arrest alive long enough for definitive treatment to be delivered [(4)]. CPR cannot usually restart the heart, but it makes sure that blood and oxygen continue to circulate through the body, keeping the patient active until help arrives [(5)]. The aim of CPR is to ensure that body functions are maintained so that the brain and other vital organs receive a sufficient supply of oxygen and nutrients to maintain their functions and that the waste products of metabolism are removed [(6)].

A numbers of studies have confirmed that CPR can be life-saving when provided by a well-trained person. In several large investigations, the prompt delivery of CPR has served as an important predictor of survival. In addition, CPR might almost double the chance of survival [(7)]. The probability of survival from cardiac arrest falls by 10–15% per minute without treatment, and well-performed CPR likely shifts this curve towards a higher probability of survival[(8)]. Furthermore, other investigations have suggested that CPR maintains the heart in a state favorable for defibrillation. A randomized trial in Norway suggested that in cases of prolonged cardiac arrest, delaying defibrillation in order to first provide

several minutes of CPR significantly improved patient survival[9]. Cardiopulmonary resuscitation measures vary according to the needs of the patient and the knowledge of the nurse giving the treatment. Knowing what to do in an emergency situation is as important as knowing what not to do, because CPR measures misapplied might lead to serious complications such as broken ribs, ineffective lung inflation and cardiac output resulting in brain damage or death[2]. The importance of performing CPR immediately after cardiac arrest has been demonstrated in numerous studies around the world [3-5, 7].

Despite the proven importance of CPR, survival rates remain low, mostly due to its ineffective administration. Good-quality CPR is highlighted in resuscitation guidelines. The survival benefit for cardiac arrest victims receiving high quality CPR has been well documented [10, 11]. Moreover, prompt CPR makes an important impact on outcomes, but the quality of CPR also matters greatly [12]. On the other hand, the quality of CPR is often poor in the clinical setting and the lack of resuscitation skills of nurses and doctors in basic life support (BLS) and advanced life support (ALS) has been identified as a contributing factor to poor outcomes of cardiac arrest victims [13]. Improvements in CPR skills should therefore have considerable impact on mortality [14]. The ability to respond quickly and effectively to a cardiac arrest situation rests on nurses being competent in the emergency life-saving procedure of cardiopulmonary resuscitation (CPR) [15]. So, cardiopulmonary resuscitation training is mandatory for nursing staff and is important as nurses often discover the victims of in-hospital cardiac arrest [16, 17].Moreover; nurses are an integral part of the healthcare system and are perceived to be knowledgeable in providing institutional care to the patients. Many times, nurses take care of the patients when the doctor is not present in the ward and also in the community settings, the nurses have to play a major role in the emergency handling of the patients, thus, CPR becomes a fundamental requirement of any nurse[1].

In hospitals worldwide, it is usually the nurse who discovers a cardiac arrest (loss of consciousness, absence of pulse and breathing) and initiates the procedure of CPR. Nurses need to know the skills and theories behind CPR as performing quality CPR might improve the patient's chance of survival and increase the opportunity of recovery, thus, nurse's competency in CPR is a critical factor in determining successful patient outcomes from a cardiac arrest [11]. In addition, nurses should exhibit the knowledge and skills necessary in an emergency to help sustain life until medical help arrives. Nurses are usually the first to respond at the scene of a cardiac arrest and their ability to provide care might well be critical to the successful outcome of a resuscitation attempt [10]. Being important members of the healthcare team, nurses are deemed to possess the basic skills and expertise which are needed to perform CPR. It is documented that a timely performed CPR can largely prevent sudden death and it is hence considered to be an important medical procedure [18]. Many times, the doctor may not be present near the patient and hence the nurses are expected to provide this emergency care. To perform the procedure in a meticulous manner, the nurses should be knowledgeable and they should have expertise in the procedure. Contrary to their roles, studies from different countries have reported a poor knowledge among the nurses regarding CPR [11, 19 - 21].

Poor knowledge and skill retention following cardiopulmonary resuscitation training for nursing and medical staff has been documented over the past 20 years [22].The development of knowledge and skills is an essential component of professional development in nurse education programs. There is universal evidence to suggest that CPR knowledge is poorly recalled by nurses [23]. Acquisition and retention of CPR knowledge and skills are vital in ensuring that nurses can respond quickly and effectively to patients in cardiopulmonary arrest [24]. Education is a way of dealing with both the actual and perceived complexities of CPR. Furthermore, various international organizations on resuscitation have emphasized the importance of education on providing high quality CPR and thus improving survival from cardiac arrest [25, 26].

Aim of the study:

The study aims to determine the effect of cardiopulmonary resuscitation training program on the knowledge and practice of nurses working at Tanta Cancer Institute.

Research hypothesis:

1- Nurses attending training program will exhibit higher knowledge and practice scores immediately post the program than the pre ones.
2- Knowledge and practice scores immediately post the training program will be higher than one month later.

2. Material and Method

Design:

The study was a quasi-experimental research study.

Setting:

The study was conducted in Faculty of Nursing, Tanta University for the pre-and immediate post training program assessment and in Tanta Cancer Institute, Ministry of health for one month post training program assessment.

Subjects:

The subjects of this study were consists of all nurses who are working in Tanta Cancer Institute, Ministry of health (111 nurse).

Inclusion and exclusion criteria:

All nurses who were on duty during the study period were enrolled. The ones on leave were excluded from the study.

Tools: Two tools were used in this study:

Tool I: Nurses' knowledge related to cardiopulmonary resuscitation questionnaire sheet: Questionnaire sheet was prepared by the researchers after review of literature [27] related to CPR for data collection and was comprised two parts:

Part A: Nurses' bio-socio-demographic data: It includes: sex, age, level of education, years of experience, working unit, and previous places of work if any.

Part B: Nurses' knowledge related to cardiopulmonary resuscitation: it includes 21 yes or no, true or false, and multiple choice questions related to: having knowledge or attending of any previous training program related to CPR, importance of CPR training program, patients' and rescue' position during CPR, how to assess cardiac and respiratory system of the victims, how to open air way, depth and rate of chest compression for adult, child and infant victims, ratio of chest compression to breathing rate in case of one and two rescue for adult, child and infant victims, when to stop CPR and complication of CPR. A scoring system was created, allocating one point to each correct answer while zero score was given to wrong answers. A total score was given to each participant (0 being the lowest and 21 being the highest possible score); the total scores then converted into total score percent. The level of knowledge were categorized as poor (<50%), fair (50-75%) and good (>75%).

Tool II: Nurses' performance related to cardiopulmonary resuscitation observational checklist: It includes 22 steps for adult and child victims, and 8 steps for infant victims related to CPR procedure to assess psychomotor skills of the nurses, the possible responses for each step were done or not done. A scoring system was created, allocating one point to each correctly and completely done step, while zero score was given to incomplete, wrong or not done steps. A total score was given to each participant, (0 being the lowest and 30 being the highest possible score), the total scores then converted into total score percent. The level of performance were categorized as poor (<50%), fair (50-75%) and good (>75%).

Method:

1. An official Permission to carry out the study was obtained from the responsible authorities.
2. Nurses' written consent to participate in the study was obtained after explaining the purpose of the study.
3. Nurses' confidentiality was ascertained.
4. The tools of the study were developed after review of literature containing the knowledge and skills related to CPR procedure.
5. Questionnaire sheet was tested for content validity for clarity and applicability by presenting to 6 experts in medical surgical nursing field and necessary modification was done.
6. A pilot study was conducted on five nurses to test the reliability of the tools, test-retest was calculated at interval of two weeks period, and consistency was .82.
7. Tool I and II were used three times, pre, immediate and one month post implementation of training program related to CPR.
8. The study was conducted on three phases:

A- **Assessment phase:** Nurses knowledge and skills were assessed using tool I and tool II at the beginning and prior to implementation of the training program; the questionnaire sheet was given to all nurses included in the study to assess their CPR knowledge, while they were observed during the procedures to assess their skills.

B- **Implementation phase:** Training program was implemented through two strategies:

9. Educational session: was given to all nurses in the study in 11groups, one group every day, 10 nurses each, the educational session was given for a duration of two hours using lecture, data show, discussion, video tapes, and handout which given to all nurses included in the study. The handout related to CPR was written in Arabic language to be easily understood by all nurses and it includes all knowledge needed regarding; causes and signs of cardiac arrest, steps before and during CPR for adult, child and infant, CPR complication, when to stop CPR and when not to start CPR, handout was tested for content validity for clarity and applicability by presenting to jury of 5 experts in medical surgical nursing field and necessary modification was done.

- Training session: was given once to all groups immediately after the educational session, each group was subdivided into two groups, 5 nurses each for two hours, CPR steps demonstration was done in nursing laboratory by lecturer, and assistant lecturer using Resusci Anne, Torso and full body manikin for adult and children victim, and infant doll for infant victim, each nurse demonstrate and re-demonstrate the steps individually until she correctly and completely performed the steps, and then evaluated by using tool II.

C- **Evaluation phase:** The evaluation of the training program was carried out twice:

- Immediately post the application of the training program using tool I and II.
- One month post the application of the training program using tool I and II.

Statistical analysis:

For quantitative variables, mean and standard deviation were calculated; comparison of the difference between two means was done using students t test. The difference in percentage of correct knowledge and performance items of CPR pre and post training program was tested using Wilcoxon signed rank test (z&p). The Pearson's correlation coefficient (r) was calculated for numerical variables. When one or two variable were ordinal, Spearman's test (rho) was used. The level of significance was adopted at $p < 0.05$.

3. Results:

The subjects comprised of 111 nurses working at Tanta Cancer Institute, with age ranged from 20-44 years and years of experience ranged from 1-22 years. As for sex, majority of nurses were females (87.4%), more than half of them (61.3%) had diploma level of education, and less than one third of them had from 11-15 years of experience (31.5%), while majority of them (95.5%) working in inpatient departments.

In relation to nurses' previous information and training related to CPR, the study revealed that 73% of them don't have previous training and 27% of them don't have any information about CPR and the main source of the information was gained through training program more than one year ago (22.5%), while the majority of them (98.2%) reported that CPR training program should be included in nursing school and faculties curricula, also (99.1%) and (94.6%) of them were willing to attend CPR training program and reported that they have the capacity to perform CPR respectively .

Table (1): Comparison of percentage of correct CPR knowledge items pre and post training program. In this table, the percentage of correct answers pre the program ranged from 23.4% to 82.0% while there was statistically significant differences in nurses knowledge pre, immediate and one month post training with $P = 0.001$ in all knowledge items, with highest percentage of correct answers pre the program were related to; breathing assessment of arrested patient and rescue position related to the patient with (82%) and (73%) respectively.

Table (2): Comparison of percentage of correct CPR performance items pre and post training program. This table revealed that nurses' performance related to CPR steps were very poor pre the program, which had been sharply increased to ultimate level immediately post the program and decreased one month later, the percentage of correct answers immediately post the program ranged from 97.3% to 100% and there was statistically significant differences in nurses performance pre, immediate and one month post training program with $P = 0.001$ in all performance items and the lowest percentage of performance items at one month post the program were related to; applying of face mask (21.6%), insertion of air way(24.3%) and using of proper size face mask for ambo bag(28.8%).

Table (3): Distribution of nurses according to their total percentage score of knowledge and performance pre and post training program. This table illustrated that more than one third of the nurses (35.1%) had poor knowledge pre the program while (89.2%) and (72.1%) of them had good knowledge immediately post and one month later post the program respectively. Regarding nurses' performance related to CPR, it was found that, all nurses had poor performance pre the program(100%), while (98.2%) of them had good performance immediately post the program and (71.2%) had fair performance one month post the program.

Table (4): Comparison of mean knowledge and performance total score related to CPR pre and post training program. It was noticed that there were statistically significant differences between knowledge and performances pre the program in relation to immediately and one month post the training program with P value = 0.001.

Table (5): Correlation between nurses' knowledge and performance related to CPR pre and post training program. It can be seen that the only statistically significant correlation was found between CPR knowledge and performance one month post the program with p value = 0.001.

Table (6): Correlation between nurses' knowledge and performance related to CPR and their socio-demographic characteristics. This table showed that there was statistically significant positive correlation between nurses' knowledge related to CPR and their level of education pre and one moth post the program with $p = 0.008$ and 0.033 respectively, while there was statistically significant negative correlation between nurses' performance and their educational level pre the program with $p = 0.018$

Table (7): Correlation between nurses' knowledge and performance related to CPR and their workplace. This table showed that there were no statistically significant differences between nurses' knowledge and performance related to CPR and their workplace since p value > 0.05.

4.Discussion:

Being important members of the healthcare team, nurses are deemed to possess the basic skills and

expertise which are needed to perform CPR. Cardiopulmonary resuscitation training is mandatory for nursing staff and is important as nurses often discover the victims of in-hospital cardiac arrest. People who suffer from sudden cardiac arrest (SCA) depend on prompt basic life support (BLS). Patients who receive bystander cardiopulmonary resuscitation (CPR) have a two to three times higher survival rate [17].

Bio-socio-demographic characteristics of the nurses showed that about one third of them have age from 20 to 25 years, with years of experience ranged from 1-22 years, less than one third of them had from 11-15 years of experience, and about two third of them have diploma, while most of them working in inpatient departments . **Hussain *et al.* (2009)** [11] reported that majority of the study sample were female, with age ranged from 20-50 years while the majority had general diploma in nursing with average years of experience of 12 years. Also **Parajulee *et al.* (2011)** [28] stated that the mean age of respondents was 22.07 years and the mean of years of experience was 11.45.The result of the present study also revealed that more than third of the nurses don't have any previous information regarding CPR, and mostly all of them were willing to attend training program and reported that they have the capacity to perform CPR. This result is in accordance with **Damjan *et al.* (2012)** [29] who mentioned that university students showed poor theoretical knowledge and demonstrated willingness and motivation for courses on basic life support. Whereas, **Nagashema *et al.* (2012)** [30]was in contrast with the present study and stated that the majority of the nurses are much interested in CPR, and most of them had received education and training in CPR as students or after the graduation.

The nurses 'competency in CPR is a critical factor in patient outcome from cardiac arrest. CPR competency is defined as possessing cognitive knowledge and psychomotor skills to be able to perform CPR in a cardiac arrest situation [31]. The finding of the present study proved that nurse's knowledge scores were poor in all knowledge items pre the training program which has been strongly increased immediately post the program and then decreased one month later which may be explained that the nurses lacked the motivation to review the handout which has been given to them in the implementation phase, and that the retention of knowledge quickly deteriorates if not used or updated regularly, it was noticed that the lowest score of knowledge items in the pre training assessment were related to initial assessment criteria for arrested patient, when to stop CPR, ratio of infant chest compression per minute and breathing rate for pulsated, breathless child, moreover the finding of the present study proved that the majority of the nurses had poor and fair total percentage score of knowledge related to CPR pre the training program while most of them had good knowledge immediately and one month later post the program. **Bakhtiar *et al.* (2007)** [32] supported this present finding and stated that experiences showed that in many critical situation, nurses don't have sufficient basic CPR knowledge, also **Hussain *et al.* (2009)** [11] stated that the majority of the nurses have poor CPR knowledge and **Damjan *et al.* (2009)** [29] mentioned that the study revealed a disappointing level of knowledge of the fundamentals of basic life support in both study groups, also **Devlin (1999)** [33], **Crunden (1991)** [34] and **Badger *et al.* (1998)** [35] found that CPR knowledge score of the subjects was low and below the passing mark. However the present study showed sharply increased in nurses knowledge immediately post the training program with little decrease one month post the program these result was in agreement with **Madden (2006)** [17] , **Broomfield (1996)** [36], **Inwood (1996)** [37] and **Moule (1997)** [38] who stated that following CPR training program, there was a significant acquisition in nurses CPR cognitive knowledge and added, when comparing nurses post test score of knowledge with re- test score, the decrease in score was statistically significant and the questions with lowest score were related to CPR ratio of infant, CPR ratio of adult and depth of chest compression.

Regarding CPR performance, the present study proved that nurses performance was very poor in all performance items pre the program which has been strongly increased immediately post the program and then decreased again one month later with the lowest score of performance items at one month post the training program were related to; applying of face mask, insertion of air way and using of proper size face mask for ambu bag, this may be attributed to the fact that the complex of resuscitation procedures and there was no exposure to actual clinical situation which require demonstration of CPR , moreover the study showed that all nurses had poor total percentage score of performance and none of them had good or fair total percentage score related to CPR performance pre the program while majority of them had fair and good total percentage score immediately and one month later post the program, this result was disagreed with **Meissner (2012)** [39] who observed significant improvement and good retention rate of CPR performance four months after training, in addition **David *et al.* (1983)** [40] founded that after 6 month of training program, the nurses has significant decrease only in knowledge, whereas, **Madden (2006)** [17] , **Broomfield (1996)** [36],**Handly (2003)** [41], and **Timsit (2006)** [42] supported the present study and demonstrated a positive training effect and a

significant acquisition in psychomotor skills that decreased with time and added that there was a significant deterioration in CPR skills' performance 10 weeks following CPR training and the ventilation volume and depth of chest compression was the poorest performance skill.

The American Heart association suggests that knowledge retention does not decline at the same rate as skills. Acquisition and retention of CPR knowledge and skills are vital in ensuring that nurses can respond quickly and effectively to patients in cardiopulmonary arrest [43].

The finding of the study indicated a positive significant correlation between nurses knowledge and performance related to CPR pre and one month post the training program, these result are in line with the result reported by **Amer (2001)** [44] who found that the relation between performance and knowledge is so close, which means that if the level of knowledge is high, the level of practice will be also high, also **Akel (1997)** [45] added that correlation between knowledge and performance scheduling was a positive one, and **Aly (2010)** [46] reported that there was significant correlation between total basic life support knowledge and practice scores, moreover, **Gomma (1992)** [47] stated that; basic scientific knowledge of CPR has significant effect in the management and successful skill in performance of CPR. On the other hand, this finding is contraindicating with the result reported by **Moule *et al.* (2002)** [48] who identified that no correlation found between knowledge of basic life support and skill attainment, also **Gould (1996)** [49] reported that there was discrepancy between nurses' knowledge and practice.

Regarding to correlation between knowledge and age, the present study proved that there was a significant negative correlation between knowledge pre, immediately and one month later post the program and nurses' age which may be explained by the fact that younger nurses were freshly graduated, more interested and motivated to learn and much active than the older ones, in this context; **Parajulee (2011)** [28] reported that there was no significant association between the total knowledge score and age of the respondent, while **Aly (2010)** [46] contradicting this result and stated that there is significant correlation between age and total basic life support knowledge scores. In relation to correlation between knowledge and years of experience, the finding shows negative correlation pre, immediately post and one month post the program, this might be attributed that nursing education system is not preparing nurses to be effective in CPR especially and knowledge will be forgotten and deteriorated by time, **Parajulee *et al.* (2011)** [28] did not found significant association between the total knowledge score and the duration of experience, and **Mohamed (1998)** [50] found that no significant differences between knowledge of nurses with different years of experience, also, **Hussain *et al.* (2009)** [11] stated that significant differences were found in terms of knowledge and the demographic variable of working area and years of experience, on the other hand; the finding was in disagreement with **Al Kandary *et al.* (2011)** [20] who proved significant correlation between years of experience and knowledge scores. Regarding to correlation between knowledge and educational level; the present study proved that there was significant correlation in the pre and one month post the program which was in contrast with **Aly (2010)** [46] who reported that no significant correlation between educational level and total basic life support knowledge.

In relation to correlation between nurses' performance and their age, the present study proved that there was a negative correlation pre and one month post the training program and as regarding to correlation between nurses' performance and years of experience, there was a negative correlation pre, immediately and one month post the training program which may be attributed to that nurses rarely helped in CPR even with more age and more years of experience; **Aly (2010)** [46] supported this result and mentioned that there was significant negative correlation between age and total basic life support practice score, also **Moule *et al.* (2002)** [48] stated that the level of performance appeared to decrease in those greater than 50 years of old,. The result of the present study was contradicting with **Gohary (2001)** [51] who stated that there was an improvement in the level of nurses' performance with the increase in the years of experience. Regarding to correlation between nurses' knowledge and performance and their work place, the present study proved that there was no statistically significant correlation could be detected between nurses' knowledge and performance pre and post the program and their work place, in this context, **Hussain (2009)** [11] and **Parajulee (2011)** [28] detected significant differences between knowledge and working area of the respondents.

4. Conclusion:

Based on the findings of the present study, it can be concluded that:

- Most of the nurses have poor knowledge and performance related to CPR pre the training program.
- Nurses' knowledge and performance related to CPR was strongly increased immediately and slightly decreased one month post training program.
- There was negative correlation between nurses' knowledge and performance pre and post the

program in relation to their age, years of experience and educational level.

Recommendation:

Based on the findings of this study, it can be recommended that:

- CPR educational program should be included in all nursing schools and curricula
- Structured CPR training program to train and educate all nurses.
- Repetitive periodic CPR training courses to ensure that nurses are competent, up to date and confident responders in the event of a cardiac arrest.
- Annual assessment and certification of CPR according to the latest guidelines.

For further studies:

- Further research is needed in this area for nursing staff in OR, ER, ICUs, CCU, and pediatric units.
- Further studies are needed to determine other factors influencing CPR knowledge and practice.
- Further research to determine the effect of training program by using different methods of teaching strategies.

Table (1): Comparison of percentage of correct CPR knowledge items pre and post training program

Items of knowledge	Percentage of correct knowledge			Z_1	p_1	Z_2	p_2
	Pre program	Immediately post	One month later				
1. Rate of breathing to chest compression	67.6	97.3	97.3	5.245	0.001	5.358	0.001
2.Complication of CPR	45.0	91.0	86.5	7.141	0.001	6.782	0.001
3.Assessment of breathing of arrested patient.	82.0	95.5	93.7	3.441	0.001	3.153	0.002
4.Pulse assessment during CPR	49.5	79.3	75.7	5.154	0.001	5.048	0.001
5.Method of air way opening	71.2	98.2	97.3	5.477	0.001	5.209	0.001
6.When to didn't start CPR	62.2	97.3	91.0	6.091	0.001	5.488	0.001
7.Chest compression ratio with one rescue	68.5	91.0	88.3	4.490	0.001	4.315	0.001
8.Intial assessment criteria	23.4	56.8	37.8	5.181	0.001	3.138	0.002
9.Pulse assessment artery for adult and child	64.0	97.3	92.8	5.925	0.001	5.333	0.001
10.CPR pause time	53.2	84.7	79.3	5.000	0.001	4.422	0.001
11.Hand placement site during adult CPR	64.0	89.2	85.6	4.802	0.001	4.243	0.001
12.Position of rescue to patient	73.0	96.4	87.4	4.914	0.001	3.578	0.001
13. When to stop CPR	33.3	63.1	55.9	4.371	0.001	3.727	0.001
14.Ratio of chest compression for infant/minute	24.3	75.7	72.1	6.862	0.001	6.677	0.001
15. Ratio of chest compression to breathing for infant by two rescue	47.7	91.9	82.0	6.379	0.001	5.729	0.001
16.Using of one hand for CPR on infant	44.1	60.4	56.8	2.546	0.011	2.333	0.020
17. When to stop infant CPR	64.9	84.7	81.8	3.569	0.001	3.182	0.001
18.Site of chest compression of infant	42.3	91.0	82.0	6.971	0.001	6.351	0.001
19.Breathing rate for breathless child with pulse	28.8	63.1	53.2	5.078	0.001	4.217	0.001
20. Hand placement site during child CPR	43.2	89.2	85.6	6.640	0.001	6.581	0.001
21. When to stop child CPR	40.5	78.4	73.0	5.612	0.001	5.308	0.001

Z_1,p_1 = Comparison between pre and immediately after the program

Z_2,p_2 = Comparison between pre and one month after the program

Table (2): Comparison of percentage of correct CPR performance items pre and post training program

Item of performance	Percentage of items of CPR			Z_1	p_1	Z_2	p_2
	Pre program	Immediately post	One month later				
1.Determine patient consciousness	18.9	100.0	92.8	9.487	0.001	8.741	0.001
2.Call emergency medical service	8.1	100.0	54.1	10.100	0.001	6.877	0.001
3.Determine pulse and breathing	9.9	100.0	83.8	10.000	0.001	8.947	0.001
4.Place victim on hard surface	9.9	99.1	75.7	9.950	0.001	8.111	0.001
5.Assume correct position	10.8	98.2	49.5	9.652	0.001	6.143	0.001
6.Position victim correctly	10.8	98.2	76.6	9.849	0.001	8.319	0.001
7.Kneeling parallel to the victim head	9.0	98.2	54.1	9.950	0.001	6.682	0.001
8.Apply face shield	5.4	98.2	21.6	9.957	0.001	3.530	0.001
9.Intiate chest compression	9.9	98.2	68.5	9.800	0.001	7.407	0.001
10.(For adult) Hands 1-2cm above xiphoid, interlock fingers off chest wall	11.7	98.2	71.2	9.600	0.001	7.672	0.001
11.Proper position of hands	9.9	98.2	70.3	9.800	0.001	7.736	0.001
12.Use head tilt, chin lift method	2.7	99.1	57.7	10.344	0.001	7.685	0.001
13.Use of jaw thrust maneuver	5.4	99.1	45.0	10.198	0.001	6.102	0.001
14.Insert oral airway, if available	0.9	98.2	24.3	10.297	0.001	5.099	0.001
15.Adminster artificial respiration	0.0	98.2	40.5	10.440	0.001	6.708	0.001

16.Pinch victim nose with thumb and index fingers	5.4	98.2	65.8	9.957	0.001	8.066	0.001
17.Maintain head tilt, chin lift during breathing	6.3	98.2	58.6	10.002	0.001	7.366	0.001
18.(Mouth to nose)Seal lips around victim' nose	4.5	98.2	47.7	10.101	0.001	6.658	0.001
19.(Ambu bag) use proper size face mask	1.8	98.2	28.8	10.294	0.001	5.477	0.001
20.Observe chest wall movement	4.5	97.3	40.5	9.866	0.001	6.325	0.001
21.Suction secretion if necessary	2.7	97.3	30.6	10.057	0.001	5.568	0.001
22.Check for carotid or brachial pulse	5.4	97.3	65.8	10.002	0.001	8.066	0.001
23.(For infant)determine responsiveness	4.5	97.3	86.5	10.052	0.001	9.436	0.001
24.Call emergency medical service	5.4	97.3	44.1	9.815	0.001	6.410	0.001
25.proper position of the infant	4.5	99.1	78.4	10.247	0.001	8.947	0.001
26.Open the airway	7.2	98.2	45.0	10.050	0.001	5.715	0.001
27.Check for breathing	9.9	97.3	58.6	9.652	0.001	6.548	0.001
28.Using appropriate barrier device	11.7	98.2	41.4	9.600	0.001	4.714	0.001
29.Determine brachial pulse presence	8.1	99.1	60.4	10.050	0.001	6.932	0.001
30.Provide correct chest compression	7.2	100.0	70.3	10.149	0.001	7.926	0.001

Z_1,p_1 = Comparison between pre and immediately after the program
Z_2,p_2 = Comparison between pre and one month after the program

Table (3): Distribution of nurses according to their total percentage score of knowledge and performance pre and post training program

Variables	Poor (<50%)		Fair (50-75%)		Good (>75%)	
	n	%	n	%	n	%
Knowledge pre training program	39	35.1	59	53.2	13	11.7
Knowledge immediately post training program	1	0.9	11	9.9	99	89.2
Knowledge one month post training program	2	1.8	29	26.1	80	72.1
Performance pre training program	111	100.0	0	0.0	0	0.0
Performance immediately post training program	1	0.9	1	0.9	109	98.2
Performance one month post training program	26	23.4	79	71.2	6	5.4

Table (4): Comparison of mean knowledge and performance total score related to CPR pre and post training program

Variables	Mean	±SD	t	*p*
Knowledge pre training program	52.04	±19.39	-------	-------
Knowledge immediately post training program	84.34	±9.44	14.912	0.001
Knowledge one month later	78.59	±11.61	15.738	0.001
Performance pre training program	7.09	±8.43	--------	--------
Performance immediately post training program	98.41	±7.76	70.145	0.001
Performance one month later	56.94	±11.79	39.094	0.001

Table (5): Correlation between nurses' knowledge and performance related to CPR pre and post training program

Total performance score	Total knowledge score	
	r	*p*
Performance pre training program	0.111	0.245
Performance immediately post training program	-0.028	0.770
Performance one month later	0.334	0.001

Table (6): Correlation between nurses' knowledge and performance related to CPR and their socio-demographic characteristics.

Variables	Age in years		Years of experience		Educational level	
	rho	*p*	rho	*p*	rho	*p*
Knowledge pre training program	-0.339	0.001	-0.394	0.001	0.250	0.008
Knowledge immediately post training program	-0.199	0.037	-0.133	0.165	-0.017	0.860
Knowledge one month later	-0.233	0.014	-0.219	0.021	0.203	0.033
Performance pre training program	-0.108	0.261	-0.68	0.480	-0.224	0.018
Performance immediately post training program	0.005	0.960	-0.005	0.959	0.181	0.057
Performance one month later	-0.167	0.079	-0.080	0.407	0.007	0.939

Table (7): Correlation between nurses' knowledge and performance related to CPR and their workplace.

Variables	Inpatient	ICU	Outpatient clinic	Operating rooms	F	*p*
	Mean±SD	Mean±SD	Mean±SD	Mean±SD		
Knowledge pre training program	51.2±19.1	55.0±21.3	44.2±20.0	58.2±16.7	1.283	0.284
Knowledge immediately post training program	84.8±9.3	84.8±8.0	80.9±14.9	84.4±6.8	0.525	0.666
Knowledge one month later	78.9±11.6	80.2±9.7	70.1±15.7	81.3±8.2	2.447	0.068
Performance pre training program	7.2±8.3	8.0±11.5	6.4±5.5	5.7±6.2	0.229	0.876
Performance immediately post training program	98.08±9.2	99.7±1.0	99.7±1.0	97.6±8.9	0.386	0.764
Performance one month later	56.0±11.7	58.7±11.7	53.6±10.7	61.4±12.8	1.235	0.294

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11/18/2012

The Effect of Chemotherapy on Quality Of Life of Colorectal Cancer Patients before and 21 Days after the First Chemotherapeutic Sessions

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Abstract: Colorectal cancer and its treatment may cause adverse effects to the social function, including work and productive life, relationship with the family, partners and friends, and other interests and social activities, the disease and treatment impact to patients' well-being and functional results is a topic of growing interest for the colorectal cancer researches. Although improvements in treatment regimens have beneficially impacted the prognosis of colorectal cancer, several quality of life issues result from potential side effects of such aggressive treatment. This study aimed to assess the effect of chemotherapy on quality of life for colorectal cancer patients before the beginning and 21 days after the first session of chemotherapy. The study was carried out in outpatient of the Cancer Institute. The sample consists of 80 patients diagnosed as colorectal cancer, postoperatively and undergoing chemotherapy. The European Organization for Research and Treatment of Cancer-Quality of life Core-30 (EORTC QLQ-C30) questionnaire was used to assess patient's quality of life. Data were collected over a period of seven months started from September 2009 to March 2010. The results revealed that all symptoms dimensions except fatigue, and functional dimensions related to physical, role, and cognitive functioning as well as overall functioning was significantly decreased post the chemotherapeutic session. Conclusion and recommendation explained that; for the improvement of quality of life, patients with colorectal cancer undergoing chemotherapy should be included in program to help them find out adopt, and deal with function and symptoms complication of chemotherapy.
[Omibrahem A. Elsaie, Hend M. Elazazy and Seham A. Abdelhaie. **The Effect of Chemotherapy on Quality Of Life of Colorectal Cancer Patients before and 21 Days after the First Chemotherapeutic Sessions**. *Life Sci J* 2012;9(4):3504-3514]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 519

Key words: Quality of Life; Chemotherapy; Colorectal Cancer.

1. Introduction

Cancer is a disease that affects people in the whole world and may bring some impacts to patients and families' lives in different ways, since the diagnosis acknowledgement until the treatment choice, its process, and the rehabilitation. Colorectal cancer, the third leading cause of cancer death worldwide, represents 10% of cancer diagnoses and deaths [(1)].More than 800,000 new cases are diagnosed annually, including 300,000 in the U.S. and Europe alone [(2)]. Estimated new cases of colorectal cancer in United States in 2012 are 103.170 while deaths are 51.690 [(3)].In Egypt, colorectal cancer is the 7th most common cancer with reported incidence of 1/100.000 cases [(4)]. An increasingly important issue in oncology is to evaluate quality of life in cancer patients [(5)]. The cancer-specific quality of life is related to all stages of the disease [(6,7)]. In fact, for all types of cancer patients general quality of life instruments can be used to assess the overall impact of patients' health status on their quality of life [(8)].

Health-related quality of life (HRQOL) is an important outcome of cancer therapy, currently; quality of life has been introduced as an endpoint for treatment comparisons on many cancer types, particularly in advanced stages[(9)]. Quality of life also, as an early indicator of disease progression could help the physician on daily practice to closely monitor the patients [(10)].In addition, quality of life may be considered to be the effect of an illness and its treatment as perceived by patients and is modified by factors such as impairments, functional stress, perceptions and social opportunities [(11, 12)]. According to the World Health Organization (WHO), quality of life is defined as individual perception of life, values, objectives, standards, and interests in the framework of culture. Quality of life is increasingly being used as a primary outcome measure in studies to evaluate the effectiveness of treatment[(13-16)].Colorectal cancer and its treatment may cause adverse effects to the social function, including work and productive life, relationship with the family, partners and friends, and other interests and social activities [(17)].

Physical and emotional integrity alterations, such as discomfort, pain, disfigurement, dependence and self-esteem loss are reported by patients who realize deep changes to their quality of life in a short-term [(18)]. The disease and treatment impact to patients' well-being and functional results is a topic of growing interest for the colorectal cancer researches. The main problems facing long-term cancer survivors are related to social/emotional support, health habits, spiritual/ philosophical view of life, and body image concerns [(17)]. Recently, several studies have been developed in order to assess such alterations in individuals' lives through the Quality of Life (QOL) and Health Related Quality of Life (HRQL) Assessments [(17-19)].Accurate assessment

of health-related quality of life in patients with advanced colorectal cancer is essential to improve our understanding of how cancer and chemotherapy influence patients' life and to adapt treatment strategies [20]. A range of factors influence health-related quality of life assessments, and they may vary according to each study, however, health-related quality of life may be considered having a great mental, physical and social function level, as well as real life position (social role), which includes relationships, health perception, abilities, satisfaction with life and well-being. They may also include assessments of the patients' satisfaction level regarding the treatment, results, health state, and future perspectives [21].

Currently, there are several therapeutic modalities for cancer treatment, such as: surgery (curative, palliative) chemotherapy, and radiation therapy, which may be used isolated or associated, and an increasing number of researches assesses the quality of life of colorectal cancer patients going through different treatment types[18,22,23]. When assessing the value of a particular treatment, it is important to consider the impact it may have on the quality of life of those being treated. This is particularly so for cancer patients, whose life expectancy may be short [24].The relationship between colorectal cancer risk and physical activity and dietary habits has been well-established, but less is known about the relationship between these behaviours and quality of life post-diagnosis. Moreover, it is unknown whether this relationship is consistent across cancer stage or treatment setting [25]. Although improvements in treatment regimens have beneficially impacted the prognosis of colorectal cancer, several quality of life issues result from potential side effects of such aggressive treatment. Consequently, shifting part of our focus in research and program development to address issues of quality of life and survivorship has become essential [26, 27]. Moreover, quality of life measurements are considered essential to assess the impact caused by the treatment to patients' lives.

Nurses, in their decision and actions, can influence their patient's quality of life. In addition, quality of life certainly has relevance of nursing; often patients consult nurse regarding how to obtain the best possible quality of life for themselves or for their family members. Moreover, quality of life is an important indicator of the success of nursing, medical, or health care intervention. Therefore, improving the health related quality of life for colorectal patients should be an interdisciplinary goal of physician, nurses; patients care technician, social worker and dietitians [28]. Focusing nursing intervention on decreasing chemotherapy treatment symptoms, or to improve the patient ability to deal with them, improving functional abilities, decreasing limitation and identifying issues that affect general health perception could increase a patient's overall health related quality of life[29].Because nurses and other health professionals are interested in the influence that health and illness have on quality of life, the evaluation of the positiveness or negativeness of attributes that characterize one's quality of life appears to be of pertinent value[30].

Aim of the study:

The study aim to assess quality of life, to identify the domains affected in colorectal cancer patients undergoing chemotherapeutic treatment and to examine the relationship between socio-demographic characteristics and quality of life and correlate them with the quality of life domains.

Research hypothesis:

1. Colorectal patients undergoing chemotherapy; will have higher scores of quality of life and global health status before chemotherapy than 21 days after.
2. Colorectal patients undergoing chemotherapy will have higher level of symptom or problems 21 days after first chemotherapeutic session than before.

2. Materials and Method:

Design:

The study was quasi experimental design.

Setting:

The study was carried out on outpatient of Cancer Institute affiliated to Ministry of Health. Tanta City.

Subjects:

A convenience sample of 80 patients diagnosed with colorectal cancer, post operatively, who attended the outpatient clinic for follow up and prior to the beginning of the first chemotherapeutic session.

Inclusion criteria:

Subjects were selected according to the following criteria: Adult, 18 years or older, both sex with colorectal cancer diagnosis, post operatively, for chemotherapy treatment, free from other chronic diseases, willing and able to communicate verbally and nonverbally, and have stable vital signs.

Exclusion criteria:

Subjects were excluded from the study if they had chronic disease such as renal failure, heart failure, diabetes mellitus, or hepatic failure, and if they had other types of cancer.

Tool of the study:

Quality of life interview questionnaire: It consists two parts:

Part one:

Related to patient's socio-demographic data which includes; age, sex, marital status, level of education, occupation and place of residence.

Part two:

This part was adapted to asses quality of life of colorectal patients using the quality of life questionnaire-C30 QLQ-C30 (Version 3.0) with functional/ symptom scale indicated [31]. QLQ-C30 has been found to be a valid, reliable and useful research tool for Egyptian culture, it is a health related quality of

life questionnaire validated specifically for cancer patients by the European Organization for research and treatment of cancer (EORTC). Its quality of life model is multi-dimensional and European Organization for research and treatment of cancer group defines it according to the central elements of the functional status, cancer and treatment specific symptoms, psychological distress, social interaction, financial impact, perceived health status and overall quality of life. It is comprised of both multi item scale and single item measures. These include 30 questions which cover five functional scales: physical, emotional, cognitive, social, and role functioning, a global health or overall quality of life, three symptom scales in order to measure fatigue, pain, nausea and vomiting, and five single items to assess symptoms such as: dyspnea, insomnia, appetite loss, constipation, diarrhea; and one single item which assesses financial difficulties. Each of the multi-item scales includes a different set of items, no item occurs in more than one scale.

Scoring system:

QLQ-C30 generates scores in the functional and symptoms scales. The principles of the scoring these scales is done as follow:

1. Estimating the average of the items that contribute to the scale; this is the raw score.
2. Using of the linear transformation to standardize the row score, each score is transformed in a scale from 0 to 100. According to EORTC guidelines, a high scale score represents a higher response level, thus a high score for a functional scale represents a high or healthy level of functioning, and high score for the global health status represents a high QOL, but a high score for a symptom scale items represents a high level of symptom or problems.

Method:

1. An official Permission to carry out the study was obtained from the responsible authorities.
2. Patient's written consent to participate in the study was obtained.
3. Patient's confidentiality was ascertained.
4. The original English language copy of EORTC scale was adoptive and modified by the researchers; it was tested for validity and applicability, necessary modifications were done.
5. The reliability of the interview questionnaire has been acceptable and was tested by using Cronbuch's Alpha test and it was greater than .70.
6. Patient who fulfilled the inclusion criteria was selected, and the purpose of the study was explained to each patient.
7. The interview questionnaire was conducted individually by the researchers for data collection twice:
   - Post operative and prior to the beginning of the first chemotherapeutic session.
   - 21 days after the first chemotherapeutic session.
8. The interview questionnaire lasts for 20-30 minutes with little clarification to some patient if needed.

Statistical analysis:

For categorical data the number and percentage were calculated. For calculating the difference in frequency of functions and symptoms before and after chemotherapy median, Interquartile range, mean rank and Wilcoxon signed rank test were used. The differences between median values were calculated for each dimension and the effect of different variables on this mean difference was tested using median, Interquartile range, mean rank, Mann- Whitney and Kruskal-Wallis Test. The level of significance was adopted at $p \leq 0.05$.

3. Results:

The subjects comprised of 80 patients attending outpatient clinic, Tanta Cancer Institute, with age ranged from 41-76 years. As for sex, more than half of the subjects were female (57.5%), and majority of them (92.5%) were married, while (40%) of them were housewives and illiterate, and only (12.5%) and (10%) of them were retired and have university level of education respectively. Regarding to place of residence, about three quarters of the subjects (72.5%) were from rural area.

Table (1): Total score of QOL items for colorectal cancer patient pre and 21 days post chemotherapy. In this table, it can be seen that the highest score of functioning dimensions before chemotherapy was related to role and cognitive functioning with a medium of 100.00 each and Interquartile range of 50.00, 20.00 respectively. The table also showed that functional dimension of QOL related to physical, role, and cognitive functioning as well as overall functioning was significantly decreased post chemotherapy with p value = 0.00 each, a negative rank of 40.64, 27.50, 42.15, 40.96 and positive rank of 13.50, 0.00, 21.5, 12.5 respectively. This table also shows that global health status was decreased post chemotherapy with a median of 66.67 and 50 and Interquartile range of 50.0, 33.33 before and after the chemotherapy respectively, although the decrease was not significantly with p = 0.135.

Concerning symptom dimension of QOL of colorectal cancer patients, the same table revealed that there was a significant increase in symptom dimension 21 days after the chemotherapy as related to pain, nausea and vomiting, diarrhea and constipation, dyspnea, insomnia, and anorexia and overall symptom with a median of 40.00, 0.00, 16.67, 57.97, and 57.02 respectively pre chemotherapy and 60.00, 66.67, 50.00, 72.46, 96.49 respectively post chemotherapy ,negative rank of 16.50, 0.00, 19.00, 26.89, and 6.00 respectively

and a positive rank of 37.28, 38.50, 40.79, 40.59, and 42.32 respectively with *p* value = 0.00 each.

Table (2): Correlation between function, symptom, and global dimensions of QOL of colorectal cancer patients. It is obvious that no significant correlation was found between function, symptom, or global dimensions of QOL of colorectal cancer patient since *p* value = 0.474, 0.836 and 0.638 respectively.

Table (3): Correlation between QOL items of colorectal cancer patients and their age pre and 21 days post chemotherapy. This table illustrate that, the only significant correlation of QOL items was found between role functioning and nausea and vomiting with patient age pre the first chemotherapeutic session with *P* = 0.031 and 0.047, respectively.

Table (4): Correlation between QOL items of colorectal cancer patients and their place of residence pre and 21 days post chemotherapy. From this table, it can be concluded that the only significant correlation was found between role functioning of QOL and patients from rural area pre chemotherapy with a median of 100.00, interquartile range of 25.00, a mean rank of 21.91 with *p*= 0.00.

Table (5): Correlation between QOL items of colorectal cancer patients and their gender pre and 21 days post chemotherapy. The table illustrated that, there was a significant correlation was found between female patients and physical function of QOL items pre chemotherapy with a mean rank of 44.67with *p*= 0.052, and global health status with a mean rank 46.11, 22.89 pre and post chemotherapy respectively with *p*= 0.010. For male patient the significant correlation was found between cognitive functioning and diarrhea and constipation pre and post chemotherapy with mean rank of 45.79, 48.15 in the pre and 21.12, 21.21in the post chemotherapy respectively with *p* = 0.053 and 0.007, respectively.

Table (6): Correlation between QOL items of colorectal cancer patients and their occupation pre and 21 days post chemotherapy. This table demonstrated that the there was a significant correlations were found between patient occupation and; role, emotional and cognitive functioning of QOL with *p*= 0.007, 0.022 and 0.002 respectively. In addition the same table shows that there was significant correlation was found between patient occupation and nausea and vomiting and diarrhea and constipation with *p*= 0.028 and 0.001, respectively.

Table (7): Correlation between QOL items of colorectal cancer patients and their level of education pre and 21 days post chemotherapy. In this table, the only significant correlation was found between physical functioning and patients education pre chemotherapy with a median of 60, 80, 60, 30 and Interquartile range of; 20,60, 20, 35 for illiterate, read and write, diploma and university level of education respectively with *p* = 0.001.

Table (1): Total score of QOL items for colorectal cancer patient pre and 21 days post first chemotherapeutic sessions

QOL Items	Pre		Post		Mean Rank (Post - Pre)		Wilcoxon Signed Ranks Test	
	Median	Interquartile Range	Median	Interquartile Range	Negative Ranks	Positive Ranks	Z	*P*-value
Function dimensions 1.Physical	60.00	35.00	20.00	20.00	40.643	13.500	-7.248	0.000
2.Role	100.00	50.00	50.00	50.00	27.500	0.000	-6.804	0.000
3.Emotional	12.50	25.00	12.50	25.00	21.700	19.300	-0.340	0.734
4.Social	0.00	29.17	0.00	33.34	28.083	28.813	-1.023	0.306
5.Cognitive	100.00	20.00	60.00	35.00	42.147	21.500	-6.755	0.000
Overall functions	-23.46	21.22	-50.46	23.15	40.959	12.500	-7.437	0.000
Symptom dimensions 1.Fatigue	85.84	39.34	92.99	39.34	35.429	33.850	-1.113	0.266
2.Pain	40.00	40.00	60.00	20.00	16.500	37.278	-5.897	0.000
3.Nausea& vomiting	0.00	29.17	66.67	33.33	0.000	38.500	-7.602	0.000
4.Diarrhea& constipation	16.67	33.33	50.00	0.00	19.000	40.794	-6.875	0.000
5.Dyspnea, insomnia& anorexia	57.97	28.98	72.46	28.98	26.885	40.591	-3.200	0.001
Overall symptoms	57.02	15.36	96.49	20.84	6.000	42.316	-7.667	0.000
Global health status	66.67	50.00	50.00	33.33	39.935	38.875	-1.496	0.135

Table (2): Correlation between quality of life dimensions of colorectal cancer patients pre and 21 days post first chemotherapeutic sessions

Correlations			
		Function dimensions	Symptom dimensions
Symptom dimensions	r	0.117	
	p-value	0.474	
Global Health	r	-0.034	-0.077
	p-value	0.836	0.638

Table (3) Correlation between quality of life dimensions of colorectal cancer patients and their age pre and 21 days post first chemotherapeutic sessions

QOL dimension	Age			
	Pre		Post	
	r	*P*-value	r	*P*-value
Function dimension 1.Physical	0.091	0.420	-0.04	0.78
2.Role	-0.241	0.031	-0.18	0.28
3.Emotional	-0.118	0.296	-0.11	0.50
4.Social	-0.110	0.331	0.01	0.94
5.Cognitive	0.034	0.762	-0.04	0.81
Overall functions	-0.134	0.237	-0.16	0.33
Symptom dimension 1.Pain	-0.012	0.916	0.05	0.76
2.Fatigue	-0.127	0.260	-0.09	0.57
3.Nausea and vomiting	0.222	0.047	-0.08	0.60
4.Constipation and diarrhea	0.026	0.817	0.05	0.77
5.Dyspnea, insomnia& anorexia	-0.003	0.981	-0.12	0.47
Overall symptoms	0.026	0.819	-0.07	0.65
Global health status	-0.193	0.087	0.29	0.06

Table (4): Correlation between quality of life dimensions of colorectal cancer patients and their place of residence pre and 21 days post first chemotherapeutic sessions

QOL Items	Residence	Pre		Mean rank	Post		Mean rank	Mann-Whitney Test (P-value)	
		Median	Interquartile Range		Median	Interquartile Range		pre	post
Function dimensions 1.Physical	Rural	60.00	30.00	20.48	20.00	20.00	40.397	0.947	0.99
	Urban	60.00	40.00	20.55	20.00	20.00	40.773		
2.Role	Rural	100.00	25.00	21.91	50.00	100.00	45.810	0.000	0.18
	Urban	50.00	50.00	16.77	0.00	50.00	26.500		
3.Emotional	Rural	12.50	31.25	19.19	12.50	25.00	38.845	0.291	0.24
	Urban	12.50	25.00	23.95	25.00	37.50	44.864		
4.Social	Rural	0.00	33.33	19.36	0.00	33.33	40.155	0.823	0.31
	Urban	0.00	16.67	23.50	16.67	33.33	41.409		
5.Cognitive	Rural	100.00	20.00	20.93	60.00	30.00	40.052	0.757	0.69
	Urban	100.00	40.00	19.36	60.00	60.00	41.682		
Overall functions	Rural	-23.46	30.86	19.84	-54.32	23.15	41.224	0.646	0.56
	Urban	-23.46	15.43	22.23	-38.89	23.15	38.591		
Symptom dimensions 1.Fatigue	Rural	85.84	42.92	20.36	85.84	35.77	38.603	0.228	0.90
	Urban	100.14	28.61	20.86	100.14	42.92	45.500		
2.Pain	Rural	40.00	40.00	19.07	60.00	20.00	38.776	0.260	0.19
	Urban	40.00	60.00	24.27	80.00	40.00	45.045		
3.Nausea& vomiting	Rural	0.00	16.67	20.91	66.67	33.33	39.259	0.321	0.71
	Urban	0.00	33.33	19.41	66.67	33.33	43.773		
4.Diarrhea& constipation	Rural	16.67	33.33	20.97	50.00	0.00	39.879	0.681	0.59
	Urban	16.67	33.33	19.27	50.00	0.00	42.136		
5.Dyspnea, insomnia& anorexia	Rural	57.97	28.99	21.17	72.46	14.49	39.603	0.560	0.54
	Urban	57.97	14.49	18.73	57.97	43.48	42.864		
Overall symptoms	Rural	57.02	15.35	20.59	96.49	19.74	38.741	0.264	0.94
	Urban	57.02	13.16	20.27	96.49	26.32	45.136		
Global health status	Rural	66.67	50.00	19.43	50.00	16.67	40.500	1.000	0.33
	Urban	50.00	50.00	23.32	50.00	66.67	40.500		

Table (5): Correlation between quality of life dimensions of colorectal cancer patients and their gender pre and 21 days post first chemotherapeutic session.

QOL Items	Sex	Pre		Mean rank	Post		Mean rank	Mann-Whitney Test (P-value)	
		Median	Interquartile Range		Median	Interquartile Rang		z	*p*
Function dimensions 1.Physical	Male	60.000	40.000	34.853	40.00	20.00	23.21	-1.939	0.052
	Female	80.000	20.000	44.674	20.00	20.00	18.5		
2.Role	Male	100.000	50.000	40.324	50.00	100.00	23.09	-0.069	0.945
	Female	100.000	50.000	40.630	50.00	0.00	18.59		
3.Emotional	Male	12.500	43.750	44.500	12.50	31.25	20.65	-1.351	0.177
	Female	12.500	25.000	37.543	25.00	12.5	20.39		
4.Social	Male	0.000	33.333	44.500	0.00	33.33	22.35	-1.375	0.169
	Female	0.000	16.667	37.543	50.00	0.00	19.13		
5.Cognitive	Male	100.000	20.000	45.794	60.00	30.00	21.12	-1.936	0.053
	Female	80.000	40.000	36.587	40.00	60.00	20.04		
Overall functions	Male	-23.457	19.290	45.088	-38.89	19.29	24.65	-1.539	0.124
	Female	-23.457	30.864	37.109	15.43	-54.32	17.43		
Symptom dimensions 1.Fatigue	Male	85.837	35.765	43.441	100.14	42.92	22.24	-0.990	0.322
	Female	85.837	42.918	38.326	28.61	85..84	19.22		
2.Pain	Male	40.000	40.000	41.912	60.00	30.00	21.03	-0.488	0.625
	Female	40.000	40.000	39.457	20.00	60.00	20.11		
3.Nausea& vomiting	Male	0.000	0.000	36.441	66.67	41.67	21.56	-1.718	0.086
	Female	0.000	33.333	43.500	33033	66.67	19.72		
4.Diarrhea& constipation	Male	16.667	25.000	48.147	50.00	0.00	21.21	-2.685	0.007
	Female	0.000	16.667	34.848	0.00	50.00	19.98		
5.Dyspnea, insomnia& anorexia	Male	57.971	28.986	43.500	57.97	28.99	15.68	-1.034	0.301
	Female	57.971	28.986	38.283	28.99	72.46	24.07		
Overall symptoms	Male	57.018	17.544	44.265	96.49	26.32	20.79	-1.267	0.205
	Female	57.018	13.158	37.717	17.54	96.49	20.28		
Global health status	Male	33.333	50.000	32.912	50.00	16.67	17.26	-2.571	0.010
	Female	66.667	33.333	46.109	33.33	50.00	22.89		

Table (6): Correlation between quality of life dimensions of colorectal cancer patients and their occupation pre and 21 days post chemotherapeutic session.

QOL Items			Occupation					Kruskal-Wallis Test	
			Housewife	Farmer	Employee	Free work	Retired	X2	*P*-value
Function dimension 1.Physical	Pre	Median	80	60	60	60		2.12	0.206
		IQR	60	40	20	55			
	Post	Median	20	20	20	40	40		
		IQR	20	20	20	30	30		
2.Role	Pre	Median	75	50		100	100	10.47	0.007
		IQR	50	50		37.5	75		
	Post	Median	0	0	50	75	0		
		IQR	50	50	50	50	50		
3.Emotional	Pre	Median	12.5	12.5	12.5	37.5	0	2.30	0.022
		IQR	39.563	39.929	36.375	65	31.3		
	Post	Median	12.5	0	18.75	25	0		
		IQR	25	25	43.75	28.13	31.25		
4.Social	Pre	Median	-8.333	0	8.333	-8.333	0	1.20	0.463
		IQR	16.667	16.667	29.167	29.167	25		
	Post	Median	0	0	0	-8.33	33.33		
		IQR	33.33	33.33	33.33	29.17	75		
5.Cognitive	Pre	Median	80		90	100	100	1.85	0.002
		IQR	40		35	45	30		
	Post	Median	60	60	60	40	60		
		IQR	35	20	30	45	40		
Overall functions	Pre	Median	-23.457	-23.457	-23.457	-15.741	-31.173	1.75	0.151
		IQR	28.935	23.148	21.219	28.935	27.006		
	Post	Median	-54.32	-46.60	-46.60	-42.75	-62.04		
		IQR	15.43	46.30	28.94	25.08	50.15		
Symptom dimensions 1.Fatigue	Pre	Median	78.684	85.837	85.837	78.684	71.531	6.65	0.569
		IQR	50.072	42.918	21.459	42.918	50.072		
	Post	Median	85.84	85.84	107.30	85.84	100.14		
		IQR	28.61	71.53	39.43	71.53	50.07		
2.pain	Pre	Median	40	20	40	50	40	0.67	0.503
		IQR	60	40	30	50	20		

	Post	Median	70	60	60	70	60		
		IQR	20	40	50	35	60		
3.Nausea& vomiting	Pre	Median	0	0		0	33.333	4.05	0.028
		IQR	33.333	16.667		25	33.333		
	Post	Median	66.67	66.67	83.33	75	83.33		
		IQR	33.33	33.33	45.83	29.17	41.67		
4.Diarrhea& constipation	Pre	Median	0	33.333	25	16.667	0	4.84	0.001
		IQR	16.667	16.667	45.833	25	50		
	Post	Median	50	50	50	41.67	50		
		IQR	0	0	0	29.17	25		
5.Dyspnea, insomnia& anorexia	Pre	Median	57.971	57.971	57.971	65.217	57.971	7.57	0.306
		IQR	21.739	43.478	28.986	25.362	36.232		
	Post	Median	72.46	57.97	72.46	43.48	57.97		
		IQR	10.87	28.99	28.99	32.61	57.97		
Overall symptoms	Pre	Median	57.018	57.018	63.596	65.789	57.018	7.20	0.531
		IQR	20.833	17.544	13.158	27.412	4.386		
	Post	Median	94.30	83.33	100.88	85.53	96.49		
		IQR	19.74	21.93	18.64	35.09	37.28		
Global health status	Pre	Median	66.667	33.333	66.667	50	50	2.08	0.068
		IQR	33.333	16.667	33.333	66.667	66.667		
	Post	Median	50	50	50	41.67	50		
		IQR	33.33	16.67	16.67	41.67	41.67		

Table (7): Correlation between quality of life dimensions of colorectal cancer patients and their education pre and 21 days post first chemotherapeutic session.

QOL Items			Education				Kruskal-Wallis Test	
			Ill.	R&W	Dip.	Univ.	X^2	*P*-value
Function dimensions 1.Physical	Pre	Median	60	80	60	30	16.979	0.001
		IQR	20	60	20	35		
	Post	Median	30.00	20.00	20.00	30.00	0.12	0.99
		IQR	20.00	20.00	20.00	50.00		
2.Role	Pre	Median	100	50	100	100	2.887	0.409
		IQR	50	50	50	37.5		
	Post	Median	50.00	0.00	50.00	50.00	1.86	0.60
		IQR	100.00	50.00	50.00	100.00		
3.Emotional	Pre	Median	6.25	12.5	12.5	18.75	5.32	0.15
		IQR	46.875	37.5	25	21.875		
	Post	Median	12.50	25.00	0.00	18.75	3.99	0.26
		IQR	25.00	37.50	25.00	12.50		
4. Social	Pre	Median	0	0	-16.667	0	3.459	0.326
		IQR	33.333	16.667	33.333	25		
	Post	Median	0.00	0.00	0.00	-8.33	1.03	0.80
		IQR	33.33	50.00	50.00	29.17		
5. Cognitive	Pre	Median	90	80	100	100	2.794	0.425
		IQR	35	40	20	30		
	Post	Median	60.00	40.00	60.00	60.00	3.22	0.36
		IQR	20.00	40.00	10.00	40.00		
Overall function	Pre	Median	-23.457	-15.741	-31.173	-31.173	4.471	0.215
		IQR	19.29	15.432	38.58	21.219		
	Post	Median	-50.46	-46.60	-54.32	-46.60	0.22	0.97
		IQR	23.15	23.15	30.86	44.37		
Symptom dimensions 1.Fatigu	Pre	Median	71.531	100.143	85.837	78.684	5.129	0.163
		IQR	25.036	57.225	21.459	53.648		
	Post	Median	100.14	85.84	71.53	85.84	7.38	0.06
		IQR	39.34	28.61	50.07	71.53		
2.Pain	Pre	Median	40	40	20	50	3.726	0.293
		IQR	35	60	50	35		
	Post	Median	70.00	60.00	60.00	70.00	0.55	0.91
		IQR	40.00	20.00	30.00	35.00		
3.Nausea& vomiting	Pre	Median	0	0	0	16.667	6.02	0.111
		IQR	33.333	0	25	33.333		
	Post	Median	66.67	66.67	83.33	66.67	1.24	0.74
		IQR	29.17	33.33	41.67	37.50		
4.Diarrhea& constipation	Pre	Median	16.667	16.667	0	8.333	1.526	0.676
		IQR	50	16.667	33.333	29.167		
	Post	Median	50.00	50.00	50.00	50.00	5.90	0.12
		IQR	0.00	0.00	33.33	25.00		

5.Dyspnea, insomnia& anorexia	Pre	Median	57.971	57.971	57.971	65.217	3.795	0.284
		IQR	28.986	0	36.232	47.101		
	Post	Median	72.46	72.46	72.46	65.22	0.56	0.91
		IQR	39.86	28.99	21.74	36.23		
Overall symptom	Pre	Median	57.018	57.018	57.018	67.982	2.236	0.525
		IQR	8.772	30.702	8.772	26.316		
	Post	Median	96.49	92.11	96.49	85.53	3.78	0.29
		IQR	21.93	21.93	21.93	43.86		
Global health status	Pre	Median	58.333	50	66.667	75	0.804	0.849
		IQR	50	66.667	41.667	54.167		
	Post	Median	50.00	50.00	50.00	33.33	3.40	0.33
		IQR	29.17	33.33	25.00	25.00		

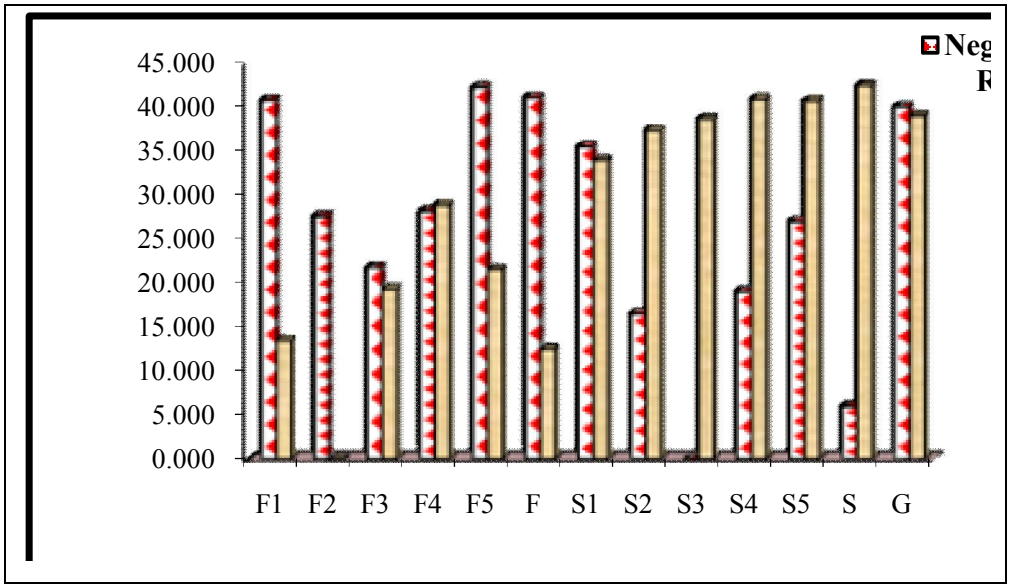

Figure (1) Quality of life dimensions of patients with colorectal cancer before and 21 days after the first chemotherapeutic sessions

4. Discussion:

Quality of life is an important issue for patients with colorectal cancer; accurate assessment of health related quality of life in patients with colorectal cancer is essential to improve our understanding of how cancer and chemotherapy influence patients, life and to adopt treatment strategies. The results of the present study proved that; for functional dimensions of QOL, physical, role, and cognitive functioning as well as overall functioning was significantly decreased post the chemotherapeutic session and the decreased wasn't significantly as related to emotional and social functioning, regarding symptoms dimension of QOL; the result of the present study also proved that; all symptoms dimensions was significantly decreased post the chemotherapeutic session except fatigue and the global health status wasn't significantly decreased after chemotherapy, this result in accordance with **Turgay et al (2008)** [32] who mentioned that all of the post chemotherapy mean scores from the quality of life instrument were statistically significant lower at day of 21 except for the cognitive functioning subscale and added that overall, initial chemotherapy was found to have a significantly negative effect on the quality of life of cancer patients**,** the result also in agreement with **Hurny et al (1996)** [33] who proved that chemotherapy had an measurable adverse effect on QOL in women with node positive operable breast cancer, also **Pagano et al (2008)** [34] added that chemotherapy is a treatment known to have a significant impact on QOL, moreover, **Arndt et al (2005)** [18] stated that there was statistically differences with cognitive function, pain, and appetite loss and the global health status was considered satisfactory. In contrast of the present study, **Conroy (2003)** [20] stated that more than half of the patients treated with palliative chemotherapy have an improvement or at least preservation of their health related quality of life, also **Bouvier (2008)** [35] mentioned that patient receiving adjuvant chemotherapy for colon cancer actually had better physical functioning than patient not receiving adjuvant chemotherapy, in addition, **Tsunoda et al (2009)** [36] added that overall health related QOL didn't deteriorate during adjuvant chemotherapy with colorectal cancer despite the effect from surgical damage. Also the result of the present study was disagreed with **Dehkordi et al**

(2009) [37] who stated that chemotherapy can lead to better sleep pattern in cancer patients and **Chen et al (2008)** [38] who found that QOL in lung cancer patients during the chemotherapy has been improved slightly over the baseline values, and **Heras (2009)** [39] who mentioned that fatigue intensity increased gradually during chemotherapy, also **Barras et al (2001)** [40]contradict this result and added that there was no differences between groups in quality of life at the initial assessment or once the treatment was completed and insomnia was the symptom with the highest impact on the quality of life.

According to the world health organization, QOL is defined as individual perception of life, values, objectives, standard, and interests in the framework of culture [23], the result of the present study shows that QOL domains which affected significantly by patient' age were related to; role functioning and nausea and vomiting, and also there was correlation between role functioning of QOL and patients from rural area which may be attributed by the fact that patient from rural area encountered travel related difficulties and transportation financial burden particularly during treatment as outpatients which may affect their role functioning, this result is in constant with **Kafa (2010)** [41] who found that there is a statistical significant correlation between age and psychological dimension of quality of life, in addition, **Kamal (2008)** [42] stated that the residency doesn't correlate with the indicies of quality of life and **Nicolussi et al (2009)** [43] found no correlation between QOL and age, gender, social status, marriage and job, moreover, **Dehkordi et al (2009)** [37] who mentioned that there was no correlation between QOL and variables such as age, sex, marital status duration of disease, economic condition and occupational function, also the result of the present study is in disagreement with **Mokabel (1997)** [44], **Bouvier *et al* (2008)** [35] who indicated that there was a weak correlation between age and quality of life domain.

The result of the present study illustrated that there was a significant correlation between female patient and physical and global health status where these domains are most affected and for male patient the significant correlation was found between cognitive functioning and diarrhea and constipation, this may be attributed to the fact that women are physically weaker than men and they are more affected by the dramatic effect of surgery as well as the side effect of the chemotherapy, these result is in agreement with **Schmidt (2005)** [45] who reported that global health status and physical functioning were significantly worse for women than for men also **Kafa (2010)** [41] found a statistical significant differences between sex and total score of physical functioning and psychological status. In addition **Nicolussi et al (2009)** [43] supported this result and added that lower QOL scores were observed among women specifically related to pain, insomnia, fatigue, constipation and appetite loss while men have reported better score in the emotional and cognitive function scale than women, on the other hand the result of the present study was in disagreement with **Dehkordi et al (2009)** [37], **Nicolussi et al (2009)** [43] who proved no correlation between QOL and gender.

In relation to occupation, the result of the this study showed that; occupation affects greatly and significantly role, emotional, and cognitive functioning post chemotherapy which may be explained by the fact that due to their disease and its treatment, patients are at leave from the work, away from home and family responsibilities which may affect their role, cognitive and emotional status, the result of the present study also showed that, for symptom dimensions of QOL, nausea and vomiting, diarrhea and constipation are most affected symptoms by occupation post the chemotherapy which may be explained that these symptoms are the most common adverse effect of chemotherapy. The result of the present study is in disagreement with **Uwer et al (2011)** [46] who found that there was no correlation between QOL and the type of job, and with **Kamal (2008)** [42] who stated that occupation as a patients' variable, hadn't correlate with the patients QOL.

In relation to level of education, the present study revealed that; only correlation was found between physical functioning and patients level of education, this result is in accordance with **Kamal (2008)** [42] who stated that level of education is not correlate with indices of QOL, **and Uwer et al (2011)** [46] and **Dehkordi et al (2009)** [37] who mentioned that no correlation was found between QOL and patients' educational level, in contrast to the finding of the present study, **Nicolussi et al (2009)** [43] mentioned that concerning educational level, patients who had completed superior education reported having more social difficulties of QOL.

Conclusion and recommendations

Conclusion: Based on the findings of the study, it can be concluded that:

- Most function dimensions of QOL for colorectal cancer patient significantly decreased post the first chemotherapeutic session.
- All symptom dimensions except fatigue and overall symptoms have been increased post the first chemotherapeutic session.
- No significant correlation was found between function, symptom, or global dimensions of QOL of colorectal cancer patient
- Role function affected by patients from rural area, female patients affected more than males as

related to physical function and global health status.

- **Recommendations:** based on the findings of this study, it can be recommended that:
  - Nursing stuff should be encouraged to attend up to date scientific conferences and workshops related to improving QOL of cancer patients undergoing chemotherapy.
  - Patients with colorectal cancer for chemotherapy should be included in program to help them find out and adopt with function and symptoms complication of chemotherapy.
  - Using of different strategies to improve the patient ability to deal with function and symptoms complication of chemotherapy.
  - Integrate the quality of life of patient with chronic illness and cancer in nursing curriculum for under and postgraduate students.
  - Nursing curriculum should be directed towards the importance of nurse's role in different stages of cancer including diagnosis, treatment and rehabilitation.

(2) Recommendations for future studies:

- Further research is needed in this area for nursing staff to provide more comprehensive evaluation of quality of life for patients with cancer, patients who are receiving other complementary therapy for cancer treatment, and patient with non-operable cancer types.
- Development of strategy to help patients' improvement of their quality of life.

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11/18/2012

A Feasibility Study on Combined RCS Moment Frames with Concrete and Steel Frames in Upper Level Management

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ABSTRACT: RCS structures refer to construction built using a system of reinforced concrete (RC) supports and steel frame (S) beams have been recognized to possess several advantages in terms of structural performance and economy compared to pure RC and steel frames. All of the materials are of the highest quality in order to achieve rational structures, withstand great force and at the same time allow wide spaces between supports. This type of construction allows for large open structures like warehouses for heavy loads and shopping centers. In the present paper the design procedure is validated through the testing of a real case study in Tehran which aims to achieve the management targets. For this reason a detailed comparison feasibility study on technical, economical and management conditions between usual structures (steel and concrete) with RCS were performed. At the first by ETABS three models for steel, concrete and RCS structure with similar basic characteristics were constructed. Then by MSP the performance timing of each of them with total required costs, time and personnel were extracted. At the end to clear the obtained results, by use of finite element method, a C# computer code namely "J.A.D" was generated to design the structures and project timing performance. The obtained results showed that the generated code can detect and process of civil operation data and capable to provide higher quality output diagrams with an upper resolution and accuracy.

[Hamed Jami, Abbas Abbaszadeh Shahri and Heidar Dashti. **A Feasibility Study on Combined RCS Moment Frames with Concrete and Steel Frames in Upper Level Management.** *Life Sci J* 2012;9(4):3515-3521]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 520

Keywords: Management, RCS structure, "J.A.D" C# computer code

INTRODUCTION:

RCS frames are one of the most recent practical bending frames in cases of large spans and moderate height. Reinforced concrete frames, due to increasing in depth of beam and loss of architectural space, are not suitable; therefore RCS frames were proposed to improve these systems (Chopra, 1995).

From the construction viewpoint, these systems are usually built by first erecting a steel skeleton, which allows the performance of different construction tasks along the height of the building (Griffis, 1986). Structurally, the connections between steel beams and RC columns have been reported to possess a good strength and stiffness retention capacity when subjected to large load reversals (Kanno, 1993; Parra-Montesinos and Wight, 2000a).

Utilizing compressive strength of concrete in columns and stiffness and strength of steel beams which makes them suitable for long spans, results in a cost effective hybrid system, which behave well under both gravity and lateral loads (ASCE ,1994).

In seismic design, reduced forces due to different causes like, damping, ductility, excess resistance and …, are calculated from dividing linear seismic spectra to a factor named is behavior coefficient (ATC, 1996; C.M.Uang, 1991). Several researchers such as Deierlein et al. (1988), Kanno (1993), Kim and No-guchi (1997) and Parra-Montesinos and Wight (2000b) were compared the accuracy of design equations to predict the shear strength of RCS joints between ultimate experimental and predicted strength. However, their use has been limited to low or moderate seismic regions due to lack of appropriate design guidelines for RCS frames in high seismic risk zones.

DATA GATHERING AND MODELS

Structural steel members, have high second moments of area, which allow them to be very stiff in respect to their cross-sectional area. Concrete is a material with relatively low tensile strength and ductility. The reinforcement is usually, though not necessarily, steel reinforcing bars (rebar) and is usually embedded passively in the concrete before it sets. The studied building which is located in Tehran was modeled by ETABS for three kinds of structures (Steel, Concrete and RCS) with similar basic characteristics as shown in figures1 to 3.

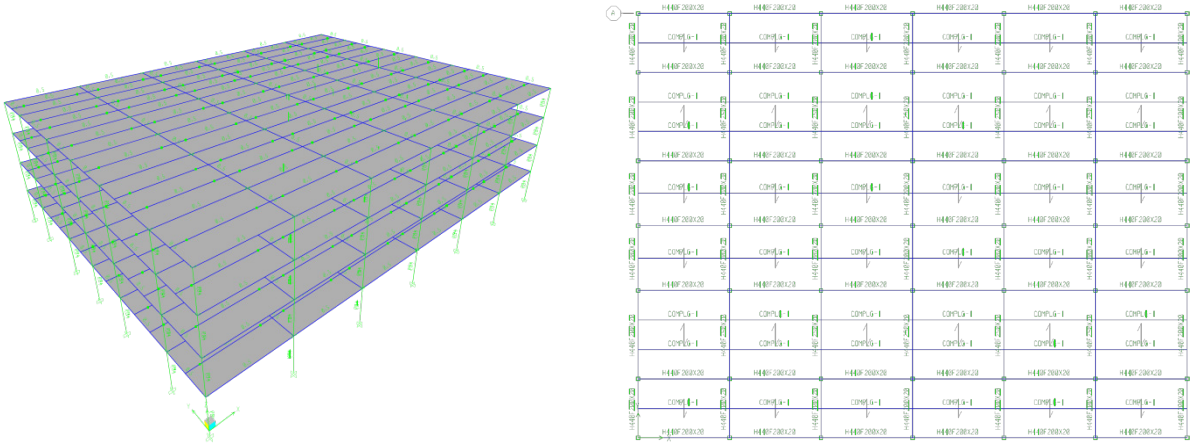

Figure1. ETABS model of steel structure for the case study

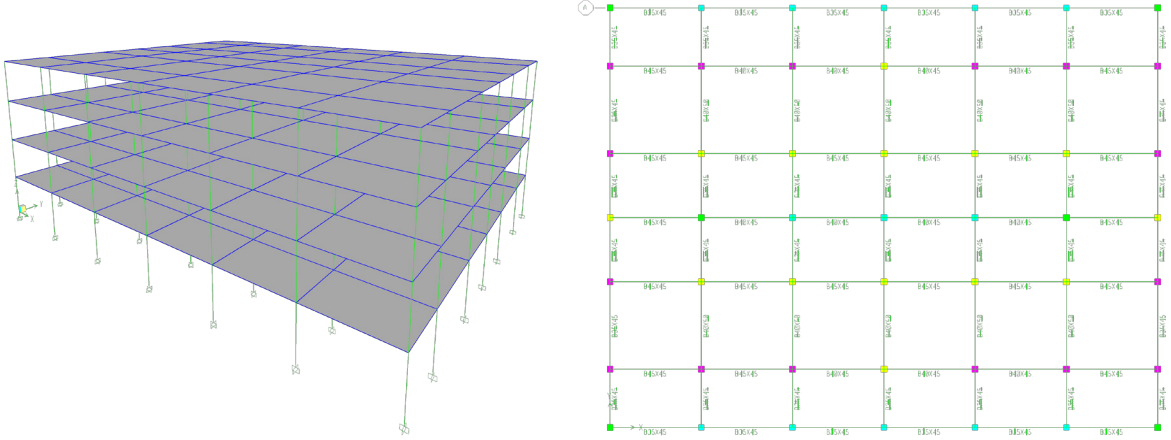

Figure2. ETABS model of concrete structure for the case study

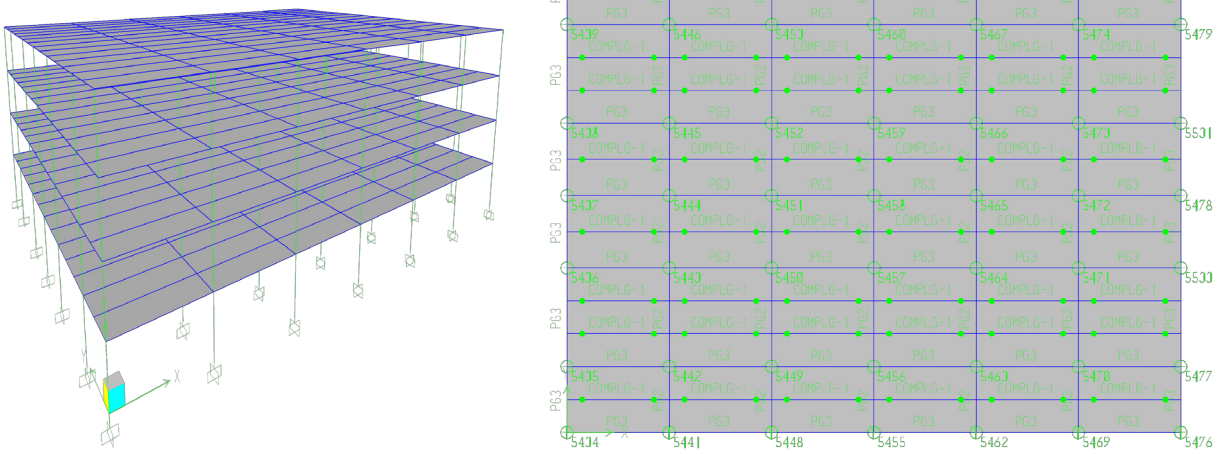

Figure3. ETABS model of RCS structure for the case study

By obtained results of the constructed models, the authors would be decided to generate a C# computer code namely "J.A.D" to analyze the results of the models and MSP software outputs. This code is capable to draw the requested diagrams and can analyze the applied earthquake loads on the structure. The start screen of the generated code is shown in figure4.

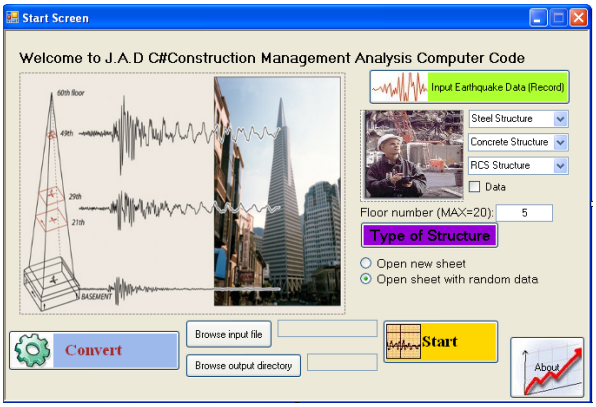

Figure4. Start screen of generated computer code

Obtained results of the mentioned code are given in tables (1) to (3) and comparative plotted diagrams by "J.A.D" are indicated in figures 5 to 7.

Table (1). Comparison of physical progress

date	12/04/02	12/04/09	12/04/16	12/04/23
Steel structure	0.71	16.23	31.29	43.32
Concrete structure	2.26	6.64	8.24	10.64
RCS structure	0.77	10.96	14.37	17.16

12/04/30	12/05/07	12/05/14	12/05/21	12/05/28
54.74	62.74	68.5	75.28	82.2
13.68	24.12	31.79	33.15	35.88
27.71	37.96	40.77	49.87	61.86

12/06/04	12/06/11	12/06/18	12/06/25	12/07/02	12/07/09
89.62	97.01	100			
38.18	45.1	54.98	58.11	60.6	62.8
64.84	69.19	85.96	89.37	92.16	97.84

12/07/16	12/07/23	12/07/30	12/08/06	12/08/13	12/08/20	12/08/23
68.97	78.68	83.15	85.43	87.47	92.82	100
100						

Table (2). Comparison of financial progress

date	12/04/02	12/04/09	12/04/16	12/04/23	12/04/30	12/05/07	12/05/14
Steel structure	0.15	19.74	38.55	52.36	65.19	72.27	75.63
Concrete structure	4.19	7.04	7.43	8.59	13.83	25	31.98
RCS structure	0.66	13.95	16.6	17.49	31.71	40.71	42.19

12/05/21	12/05/28	12/06/04	12/06/11	12/06/18	12/06/25	12/07/02	12/07/09
80.67	85.96	92.06	98.16	100			
32.36	32.75	37.98	43.22	55.92	57.3	57.68	62.15
50.39	64.21	66.9	69.9	88.95	91.6	92.49	98.29

12/07/16	12/07/23	12/07/30	12/08/06	12/08/13	12/08/20	12/08/23
67.38	79.93	82.24	82.63	86.21	91.44	100
100						

By consideration of the performed analysis and to show better resolution of obtained results a detailed separately comparison was executed and the results are given in tables (4) to (6) and figures 8 to 10 respectively.

Table (3). Development of human resources

date	12/04/02	12/04/09	12/04/16	12/04/23
Steel structure	0.14	5.97	22.69	43.4
Concrete structure	0.69	6.14	11.26	16.14
RCS structure	0.19	4.09	8.24	17.59

12/04/30	12/05/07	12/05/14	12/05/21	12/05/28	12/06/04	12/06/11	12/06/18	12/06/25
61.42	67.63	73.1	79.01	85.64	91.54	97.41	100	
20.24	23.77	30.66	35.78	40.9	44.99	49.09	54.47	60.29
26.29	31.04	39.47	47.86	54.87	61.36	70.2	79.09	83.24

12/07/02	12/07/09	12/07/16	12/07/23	12/07/30	12/08/06	12/08/13	12/08/20	12/08/23
65.41	69.75	73.84	78.46	84.93	90.05	94.42	98.52	100
92.59	98.76	100						

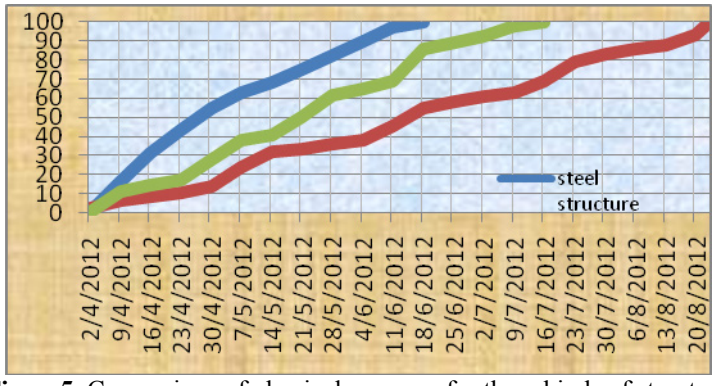

Figure5. Comparison of physical progress for three kinds of structure

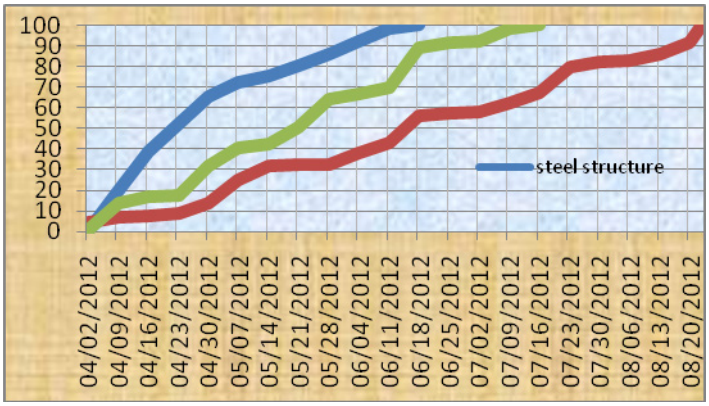

Figure6. Comparison of financial progress for three kinds of structure

Table (4). Comparison of the number of required personnel for three kinds of model

Steel structure	Concrete structure	RCS structure
224	---	---
---	852	---
---	---	624

Table (6). Comparison of the required performance time (day) for three models

Steel structure	Concrete structure	RCS structure
64	---	---
---	124	---
---	---	87

Table (7). Comparison of the required cost (Rials) for three models

Steel structure	Concrete structure	RCS structure
8660000000	---	---
---	5160000000	---
---	---	7600000000

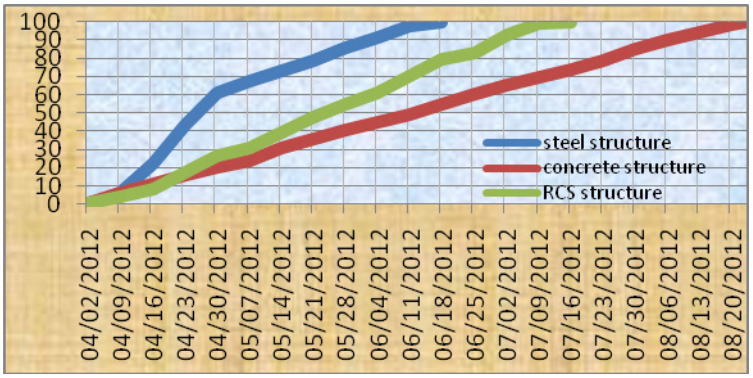

Figure7. Comparison of development of human resources for three kinds of structure

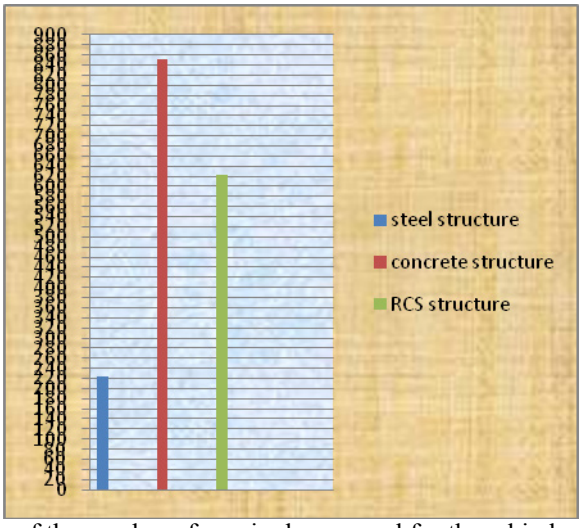

Figure8. Comparative diagrams of the number of required personnel for three kinds of model

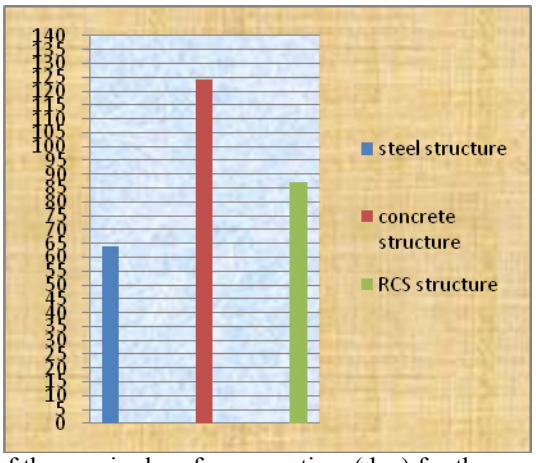

Figure9. Comparative diagrams of the required performance time (day) for three models

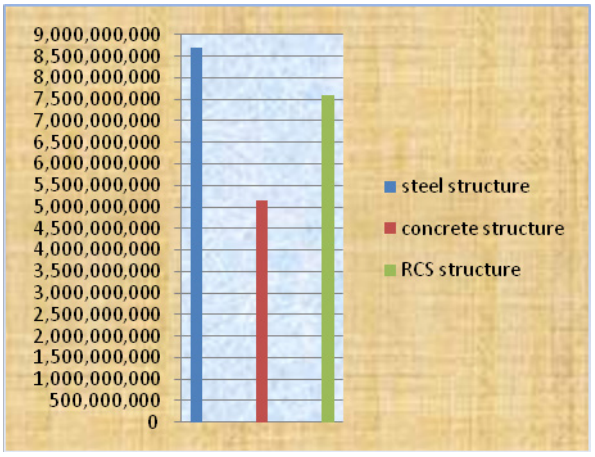

Figure10. Comparative diagram of the required cost (Rials) for three models

CONCLUSION AND DISSCUSION:

This paper presents a practical model to predict the advantages of RCS structures versus steel and concrete ones. The experimental program included the testing of real case study RCS connections in Tehran. The proposed model was based on the state of generated GUI computer code, which was defined through the development of a detailed analysis of a case study. In addition, the generated code and model was capable of predicting the earthquake loads in three discussed structures. Results from the testing of physical progress, required costs and development of human resources in RCS versus steel and concrete structures show that hybrid structures consisting of RC columns and steel beams are suitable for use with lower risk in upper level of construction management. In addition, good agreement was found between experimental results and the calculated and predicted by the proposed model.

The results and resolution of outputs of the generated GUI in comparison with other available softwares shows good agreement with practical and indicated that this code can employed as a good, strong and reliable tool for this type of analysis.

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The relationship between culture and traffic technology development and the effect of culture on reducing the road accidents

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Abstract: The increasing growth of modern technology with the fundamental changes in international system during past fifty years has changed the view of modern world completely. These changes in addition to social and cultural transitions cause to make the critical different rates of challenges in different areas of human community and this is a ground to occur the knowledge crisis in describing the living conditions and human compatibility. In this condition, the system experts know that the social security needs a dynamic, flexible and conclusive program and also a strong will. This study tries to explain every effective factor in improving the common culture of road users and its effect on reducing road accidents. The correct and regulation based driving lead to increase transportation security. The hasty drivers who break the safe speed will cause the accidents. So, it is important to train the principals of how to use roads correctly because it is the effective factor to reduce accidents and cost of them and finally, it cause to satisfy countrymen and also traffic officers.

[Arshad Farahmandian, Rasol Nasiri, Hasan Eivazzadeh, Davood Gharakhani. **The relationship between culture and traffic technology development and the effect of culture on reducing the road accidents.** *Life Sci J* 2012;9(4):3522-3525]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 521

Keywords: culture, technology transfer, training, road accidents

1. Introduction

According to W.H.O studies, about 1,170,000 people will die because of road accident in world each year and also about 50 million will losses partly or full of their physical abilities because of accident injuries. Due to statistical comparison of the injured and dead ones, it can be said that the ratio of the dead to injured ones is 1:42 unfortunately, this ratio has increased to 1:12 in Iran and this represents the accident severity. It is obvious that the speed is main reason of accidents, so it is necessary to find a solution by national willpower. Culture is an entity of material and spiritual specifications, as a social group and the origin of social identity which it can be transformed by different transitions (social, political, economic and technological). But, what can influence societies especially developing societies is anti-culture and its effect. Anti – culture is micro culture that rejects social values and norms and it is looking for an alternative life style. It is common in adults.

2. Definitions of culture and cultural dimensions

"Culture" has been defined in many ways. My own preferred definition is that culture is the collective programming of the mind which distinguishes the members of one group or society from those of another. Culture consists of the patterns of thinking that parents transfer to their children, teachers to their students, friends to their friends, leaders to their followers, and followers to their leaders. Culture is reflected in the meanings people attach to various aspects of life; their way of looking at the world and their role in it; in their values, that is, in what they consider as "good" and as "evil"; in their collective beliefs, what they consider as "true" and as "false"; in their artistic expressions, what they consider as "beautiful" and as "ugly." Culture is a fundamental determinant of ethical decision making. It directly affects how an individual perceives ethical problems, alternatives, and consequences (Hunt and Vitell, 1986, 1992).Organizational culture is a collection of the beliefs, values and norms that exist in an organization. They are expressed in various ways such as symbols, ceremonies, myths, rituals, language and stories, which influence the behavior of employees (Schein, 1992). This culture, showing the correct way to think, act and do things within the organization, is passed on to new employees (Sankar, 1988; Vecchio et al. 1996).

Research of organizational culture changes is possible only within a consistent theoretical framework, since acceptance of some theoretical perspective leads and frames any empirical research and presents framework for discussion and interpretation of research findings. For an organizational culture change analysis theoretical approach to organizational culture research is especially important, since different perspectives in various ways define organizational culture, its sources,

content and structure, its roles within an organization and the potential for its change. However, any classification of theoretical perspectives must be accepted conditionally, since different authors suggest different categorizations, although often with different names for the same things. In order to provide for a deeper understanding of organizational culture research, we present some of them, since differences between various perspectives may explain for sources of contradictoriness of different statements and results offered in the relevant literature. Schultz (1994) also identifies three theoretical perspectives. Rationalism assumes that culture is an instrument for efficient achievement of defined goals. Culture is only one among many organizational variables which significantly influence organizational efficiency and performance. Functionalism studies functions of the culture in dealing with problems that an organization is facing with through the processes of internal integration and external adaptation. Having established that organizational culture comprises a range of complex social phenomena, it is not surprising that scholars have identified corporate culture as a multi-layered construct which can be divided into layers according to these phenomena's observability and accessibility. Organizational culture has been defined as patterns of shared values and beliefs over time which produces behavioral norms that are adopted in solving problems (Schein, 1990). Organizational Culture manifested in beliefs and assumptions, values, attitudes and behaviors of its members is a valuable source of firm's competitive advantage (Hall, 1993) since it shapes organizational procedures, unifies organizational capabilities into a cohesive whole, provides solutions to the problems faced by the organization, and, thereby, hindering or facilitating the organization's achievement of its goals (Yilmaz, 2008).

3. Definition of Technology

Technology is widely accepted as necessary for improving development programs to achieve higher living standards, especially in developing countries where industrial growth plays a very significant role. The word "technology" originates from the Greek words 'techne" and "logos", "techne" meaning the skill of hand or technique, and "logos" meaning a knowledge or science (Willoughby, 1990). From these two words, technology may be defined as the knowledge or science of skill or technique. Technology, from a very broad perspective, is defined as the capability of human society to transform natural resources into useful products for human consumption (Storper and Walker, 1989). The implementation of technology in businesses is commonly associated with the automation of bulk processes of data management (e.g. invoice transfers). The application of information technology is an important driving force behind many socioeconomic changes. In trade and industry, the application of IT stimulates innovation in all possible fields. Companies can thus offer their customers a faster, more individual and reliable product or service on a more regular basis. Often the entire internal labor and organizational structure of a company has to be transformed into a flatter and more flexible organization in order to realize such innovations. This leads to new forms of labor such as teleworking and freelance work, and new forms of independent work

4. History of technology

The history of technology is the history of the invention of tools and techniques, and is similar in many ways to the history of humanity. Background knowledge has enabled people to create new things, and conversely, many scientific endeavors have become possible through technologies which assist humans to travel to places we could not otherwise go, and probe the nature of the universe in more detail than our natural senses allow. The TT process is a complex matter that includes legal issues, technical complexities, financial calculations, and marketing. Institutions of higher learning have developed a number of approaches. Some authors suggest a purely linear model of TT. The linear model of TT suggests a process from discovery, disclosure, evaluation, patent, market, negotiation and then license. However, Minutolo and Lipinski (2006) suggest that the linear model of TT is outdated and that a network theory approach is more appropriate. A general overview of the steps of the network theory approach is presented bellow as discreet units; however, we acknowledge that the process is not as isolated as this process suggests.

5. Technology transfer

Technology and knowledge accumulation, transfer, application, and diffusion are key to sustainable economic prosperity in the emerging global economy of the 21st century. Rapid advances in Information and Communication Technologies (ICT) and declining costs of producing, processing and diffusing knowledge are transforming social and economic activities worldwide. Rapid advances in Information Technologies (IT) and declining costs of producing, processing and diffusing knowledge and technologies are transforming social and economic activities worldwide. Technology revolution is critically different from the past industrial ones in that it is based upon a shift of wealth creating assets from physical things to intangible resources based on technologies. Thus, effective management and transfer of technologies are believed to be increasingly critical for individuals, organizations, and nations in the globalized knowledge society of the 21st century.

Technology transfer is the process in which technology is moved from one source that developed it to another that uses it (Karlsson, 2004; Rouach, 2003; Martyniuk, Jain & Stone, 2003). Using technology transfer as a business strategy has had positive effects on business operation. Some businesses had experimented with technology transfer to increase their potential revenue; at the same time, technology providers or developers in the public sector and the academia which engage in technology transfer have also made increasing profits.

6. Technology Transfer Process

Technology transfer in different countries and organizations with various' levels of technical knowledge covers limitations and problems for the less developed recipient. Technology transfer is a complex and challenging processes which needs deep and all out study. In case of overlooking of different aspects of the technology transfer; it may lead to weaknesses of the national technology. Technology transfer process includes some preventive scales, which should be addressed, before selecting the technology transfer method. Included in these factors (Malekifar, 1999) are:

- Awareness of fundamental and important factors required for technology transfer.
- Awareness of failure factors of technology transfer.
- Effort to acquisition of the appropriate technology for achieving organizational appropriate position.
- Consideration of existing and old technologies.

7. Promotion the society culture in stressing on transportation field

In transportation area, we will face to human factors, automobiles, road and regulation and traffic rules. Since human is the producer, designer, road performing and rule enactment, so, the human factor plays main role to solve problems. Thus it can be said that if roads are designed and performed in standard way, automobiles designed and produced standard and regulation and rules performed strictly but human factor doesn't considered well, the problem will be continued . So, it is important to consider the improvement of human behaviors (teaching and correcting the behavior culture). We can divide the effective elements on teaching people and correcting the behavioral culture in three classes:

1-effective educational places environmentally

2-effective educational tools in regard to mass media

3-effective educational organizations and institutions in regard to education development and growth

4-effective educational methods

1-effective teaching places environmentally: the teaching places can be effective on human organizational behavior because of its inclusiveness on human behavior and mutual effect between environments and individual. It can be mentioned the following environments:

1-1 family

1-2 kindergarten

1-3 schools (elementary schools, high schools)

1-4 universities and colleges

2-effective educational tools in regard to mass media: today , there are many different effective teaching tools in mass media area , and each of them have many effects on people such as:

2-1 radio

2-2 TV

2-3 cell mobile phone

2-4 newspapers, magazines, brushers and textbooks.

3-effective educational organizations and institutions in regard to education development and growth: there are some effective and efficient organizations in studying and finding the new educational ways as followings:

3-1 Cultural Revolution supreme council

3-2 education

3-3 technology ministries, medical teaching, treatment and health, university jihad, Islamic Azad University

3-4 TV and radio organization

3-5 municipalities

3-6 traffic organization

4-effective educational methods: the most important factor to improve the behavioral culture is to use education in different methods. The more different human labor teaching methods will influence on more people.

8. Conclusion

The summation and relationship between sufficient technology transfer in order to produce different automobiles and to improve the dominance culture in using transportation tools is referred as following:

1-improve the general culture by classic direct and indirect teachings (modeling and avoidance incorrect behaviors and broadening the correct behaviors)

2-traffic teaching in all education levels and between families

3- Find the reason of rule avoidance and incorrect behaviors by psychologists and traffic experts, then the approving strict traffic rules and regulations against the lawbreakers

4-the continued correction and reviewing of traffic rules in all education levels and driving license, then encounter with lawbreakers.

5- Correct structure and engineering of police force in order to attract people thrust to cooperate with police completely.

6-establish special radio and TV networks to report accidents and its costs, the necessary measures to prevent it, informing about outcomes of incorrect driving and explain driving advantages in regard to traffic laws.

7-More cooperate of transportation ministry and municipality to remove accident susceptible intersections and points, the continued repair of road asphalt, improving and maintaining the traffic signs and road signals.

8-perform research studies in universities about how to improve the general culture, especially in departments related human behaviors

9- Effort of decision making institutions such as Cultural Revolution council to find cultural reasons of current conditions and necessary procedures.

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11/19/2012

Impact of Macroeconomic variables on stock returns Case Study: Companies Accepted in Tehran Stock Exchange

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Abstract: This study investigates the relationship between Macroeconomic variables and stock returns of Companies Accepted in Tehran Stock Exchange. In this paper, 4 macroeconomic variables are selected (interest rates, Import, Liquidity and Profit margins). Also the correlation coefficient and multiple regressions are used for surveying research hypothesis. The results indicates that Liquidity and Profit margins have a positive impact on stock returns of Companies and interest rates, Import Have a negative impact on stock returns of Companies Accepted in Tehran Stock Exchange.

[Davood Gharakhani, Forooz Pishgar, Mahdi Beedel, Arshad Farahmandian. **Impact of Macroeconomic variables on stock returns Case Study: Companies Accepted in Tehran Stock Exchange.** *Life Sci J* 2012;9(4):3526-3529]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 522

Keywords: stock returns, interest rates, Import, Liquidity, Profit margins

1. Introduction

Financial managements' goal is shareholders 'wealth maximization, which means maximizing the value of the company as measure by the price of common stock. This goal can be achieved by giving the shareholders a fair payment on their investments. The objective of the finance management should be to discover an optimal dividend policy that will increase value of the firm. It is often argued that the stock price tend to be reduce whenever there is a decrease in the dividend payments. Several empirical researches on the relevance of the relationship between the dividends and stock prices, it is inconclusive (Kadir, 2011). Jensen and Meckling (1976) and Black (1976) propose that dividends play a rule in decreasing agency conflict between manager and shareholder. When manager decision to pay out dividends for used to remove the free cash from the control and pay it off to shareholders. John and Williams (1987) predict a positive relationship between dividends and stock prices. Another opinion is that dividend changes signal permanent change in current earnings.

Stock returns are a unique measure of performance that is comparable across firms and countries, forward-looking, comprehensive in scope, and insensitive to differences in accounting rules. In normal times, a firm's stock returns reflect a combination of expected returns (its loadings on risk factors) and residual returns that are associated with firm-specific news. At times of significant economy-wide shocks, however, the cross-section of residual returns can be understood as reflecting the exposure or sensitivity of firms to unexpected shocks. There have been numerous studies of the effects of the crisis and the role of credit contraction and illiquidity crisis-induced selling on the redemptions of money market debts and the widening of bond spreads. These studies identify important effects of correlated selling pressure traceable to illiquidity problems in generating the contraction of quantities and the declines in prices in different debt markets. Billio et al. (2010) examine correlations in returns across different equity investors and document apparent crisis-specific linkages in returns that they argue reflect this selling pressure. Previous research on the effects of financial constraints on stock returns confirms that the effects are relatively pronounced during macroeconomic downturns. Lamont et al. (2001) surprisingly found "no evidence that the relative performance of constrained firms reflects monetary policy, credit conditions, or business cycles". Subsequent research by Campello and Chen (2010), however, shows that macroeconomic conditions do affect the magnitude of the financial constraint factor, once one properly identifies cross-sectional variation in the extent of financing constraints, which they show Lamont et al. (2001), did not do. There were some studies where the imports were also taken as variables. Thus, as the study pointed out, imports had played a major role in deriving such relation & conclusion. The next useful contribution was by Dutta & Ahmed (2000). They gave more importance to imports and apart from considering real GDP; they also considered two more variables – imports and import price. Other studies related to Basel III have mainly focused on its macroeconomic impact. The Basel Committee

(BCBS, 2010) while analysing the long-term effect of the new capital rules on economic output found it to be positive. On one hand, they conclude that as higher capital requirements will make it more expensive for banks to fund their operations, the costs will be passed on to the borrowers through higher lending rates which will translate in reduced new lending activity.

Dutta and Ahmed (1997) study Bangladesh import performance and use quarterly data for the period 1974-1994. They applied cointegration and error correcting modeling approaches and find unique equilibrium relationship exists among the real quantity of imports, real import prices, real GDP and real foreign exchange reserves. Erlat and Erlat (1991) study Turkish export and import performance and use annual data for the period 1967-87. The demand for imports in an economy is a crucial macroeconomic relationship with significant implications for the design and conduct of economic policy. When economists and business managers use statistical forecasting methods, they tend to overly favor regression analyses (Koop, 2006; Lindsey & Pasvur, 2005; Septhon, 2009). However, the increasing use of computers, data repositories, and ubiquitous data over the last 20 years are demanding more computational and automatic ways to efficiently mine, analyze, and forecast future economic conditions to provide information that afford a competitive advantage to firms in this ever changing dynamic business environment.

2. Literature review and hypotheses

Banks are required to have a minimum amount of capital to be able to absorb losses and still operate as going concerns. However, during the recent crisis, the losses that banks suffered in their trading books have far exceeded minimum capital requirements (BCBS, 2009). Stock returns are a unique measure of performance that is comparable across firms and countries, forward-looking, comprehensive in scope, and insensitive to differences in accounting rules. In normal times, a firm's stock returns reflect a combination of expected returns (its loadings on risk factors) and residual returns that are associated with firm-specific news. At times of significant economy-wide shocks, however, the cross-section of residual returns can be understood as reflecting the exposure or sensitivity of firms to unexpected shocks.

2.1. Interest rate

An interest rate is the rate at which interest is paid by a borrower for the use of money that they borrow from a lender. Specifically, the interest rate (I/m) is a percent of principal (I) paid at some rate (m). For example, a small company borrows capital from a bank to buy new assets for their business, and in return the lender receives interest at a predetermined interest rate for deferring the use of funds and instead lending it to the borrower. Interest rates are normally expressed as a percentage of the principal for a period of one year. Interest rates targets are also a vital tool of monetary policy and are taken into account when dealing with variables like investment, inflation, and unemployment. Although most of the assumptions and expectations made by the Central Banks or Reserve Banks by countries (and economies) that by technically lowering the interest rate would produce the effect of increasing investments and consumptions (Adllan, 2005).

2.2. Import

The term import is derived from the conceptual meaning as to bring in the goods and services into the port of a country. The buyer of such goods and services is referred to an "importer" who is based in the country of import whereas the overseas based seller is referred to as an "exporter". Thus an import is any good (e.g. a commodity) or service brought in from one country to another country in a legitimate fashion, typically for use in trade. It is a good that is brought in from another country for sale. Import goods or services are provided to domestic consumers by foreign producers. An import in the receiving country is an export to the sending country. Imports, along with exports, form the basis of international trade. Import of goods normally requires involvement of the customs authorities in both the country of import and the country of export and are often subject to import quotas, tariffs and trade agreements. When the "imports" are the set of goods and services imported, "Imports" also means the economic value of all goods and services that are imported. The macroeconomic variable I usually stand for the value of these imports over a given period of time, usually one year (Lequiller and Blades, 2006).

2.3. Liquidity

In business, economics or investment, liquidity is an asset's ability to be sold without causing a significant movement in the price and with minimum loss of value. Money, or cash, is the most liquid asset, and can be used immediately to perform economic actions like buying, selling, or paying debt, meeting immediate wants and needs. However, currencies, even major currencies, can suffer loss of market liquidity in large liquidation events. For instance, scenarios considering a major dump of US dollar bonds by China or Saudi Arabia or Japan, each of which holds trillions in such bonds, would certainly affect the market liquidity of the US dollar and US dollar denominated assets. There is no asset whatsoever that can be sold with no effect on the

market. An act of exchange of a less liquid asset with a more liquid asset is called liquidation. Liquidity also refers both to a business's ability to meet its payment obligations, in terms of possessing sufficient liquid assets, and to such assets themselves. Liquidity is defined formally in many accounting regimes and has in recent years been more strictly defined. For instance, the US Federal Reserve intends to apply quantitative liquidity requirements based on Basel III liquidity rules as of fiscal 2012. Bank directors will also be required to know of, and approve, major liquidity risks personally. Other rules require diversifying counterparty risk and portfolio stress testing against extreme scenarios, which tend to identify unusual market liquidity conditions and avoid investments that are particularly vulnerable to sudden liquidity shifts. A liquid asset has some or all of the following features. It can be sold rapidly, with minimal loss of value, any time within market hours. The essential characteristic of a liquid market is that there are ready and willing buyers and sellers at all times. Another elegant definition of liquidity is the probability that the next trade is executed at a price equal to the last one.

2.4. Profit margin

The profit margin is mostly used for internal comparison. It is difficult to accurately compare the net profit ratio for different entities. Individual businesses' operating and financing arrangements vary so much that different entities are bound to have different levels of expenditure, so that comparison of one with another can have little meaning. A low profit margin indicates a low margin of safety: higher risk that a decline in sales will erase profits and result in a net loss, or a negative margin. Profit margin is an indicator of a company's pricing strategies and how well it controls costs. Differences in competitive strategy and product mix cause the profit margin to vary among different companies**.**

Based on the literature review and research objectives, the following hypotheses were derived:

Hypothesis1. Interest rate is positively related to stock returns of Companies Accepted in Tehran Stock Exchange.

Hypothesis2. Import is positively related to stock returns of Companies Accepted in Tehran Stock Exchange.

Hypothesis3. Liquidity is positively related to stock returns of Companies Accepted in Tehran Stock Exchange.

Hypothesis4. Profit margin is positively related to stock returns of Companies Accepted in Tehran Stock Exchange.

3. Research methodology

The population of the present study consists of Companies Accepted in Tehran Stock Exchange and time Period is December 2008- April 2010. The correlation coefficient and multiple regressions are used for surveying research hypothesis.In this paper the independent variables are interest rates, Import, Liquidity and Profit margins and the dependent variable is stock returns. The correlation coefficient and multiple regressions are used for surveying research hypothesis.

4. Analysis and results

This study attempts to understand the relationships among Macroeconomic variables and stock returns in Companies Accepted in Tehran Stock Exchange. Table 1 displays the standard deviations, correlations and regression analysis of all variables. Coefficients of Liquidity and Profit margins are positive and significant for stock returns (0.65, 0.11, respectively). These findings indicate that companies would achieve a higher level of stock returns if they have well-developed Liquidity, and Profit margins. Accordingly, the results moderately support Hypothesis 3 and 4, which states that Liquidity and Profit margin are positively related to stock returns. Coefficients of interest rates and Import are negative for stock returns (-0.34, and -0.65, respectively). Accordingly, the results reject Hypothesis 1 and 2.

Table 1. Impact of Macroeconomic variables on stock returns by multiple regressions

variable	Coefficient	t	S.E
interest rates	-034	3.62	5.8
Import	-0.65	-4.12	0.68
Liquidity	0.65	-3.16	0.002
Profit margins	0.11	2.55	0.007
Moving Average	-032	-033	0.05
F		5.24	P=0.005
$R^2 = 0.56$	0.68	D.W	1.95

5. Discussion and conclusions

This study examines the role of Macroeconomic variables on stock returns in Companies Accepted in Tehran Stock Exchange. Our results indicate that Liquidity and Profit margin have positive and significant effects on stock returns. These findings highlight the critical roles of Liquidity and Profit margin on stock returns. Also our results indicate that interest rates and Import have negative impact for stock returns. As shown by Kealhofer et al. (1998) and Kealhofer (2003) there is a substantial difference in migration and default patterns between point-in-time (PIT) ratings and through the cycle (TTC) ratings. A through-the-cycle rating is typically produced by rating agencies and evaluates the performance of a

company over the medium to the long-term. The objective is to arrive at a stable rating that is not affected by changes in a company's outlook due to temporary variations in economic conditions. The implications for banks' profitability, availability of credit, financials stability and economic growth may be substantial and deserve further research. This study only investigates Iranian companies, hence, the findings and conclusions drawn from this research are representative of the Iranian companies, and the findings may not generalize to other geographic regions or cultures. Future studies can also examine the proposed relationships in other countries. Future study can examine the role other Macroeconomic variables on stock returns in Companies Accepted in Tehran Stock Exchange. Future study can examine the role other of Macroeconomic variables on stock returns in other Companies Accepted in Iran Stock Exchange.

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11/19/2012

Poverty and Charity Promotion in Hafez Ibrahim Poems

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Abstract: Poverty has been a favorite subject for socially responsible and alarming activists and poets. Poverty has been a social problem in many societies since ancient times. Social strata and economic classification have existed in all societies. Poverty may manifest itself in various dimensions of a society including cultural, religious, affectionate, economic, and so forth. Economic poverty is the most prevalent form. Many factors contribute in the spread of this infelicitous phenomenon including conflicts, natural calamities, mismanagement, economic fiasco, and social turmoil. Poverty is the root of persisting corruptions, crimes, and decadences. Poverty is remonstrated in religious narrations such as "poverty is analogous to blasphemy." People may adapt different standpoint against poverty. For instance, sociologists, scientists, philosophers, clergymen, poets, and the like have their own views on poverty. However, the main issue is what approaches a society takes to address it. Poets have addressed poverty as a social problem. Their sensitivity makes it difficult to accept this ominous and unfortunate condition. They always undertake and strive to promote its eradication through their work. Hafez Ibrahim is one poet who had personally experienced poverty throughout his life from his early days, during education, in his productive life, and till the end. He attempted to redress his unfortunate situation by expression of sympathy with people.
[Vahid Mousanataj,Mehranghiz Raisinezhad dobene. **Poverty and Charity Promotion in Hafez Ibrahim Poems.** *Life Sci J* 2012;9(4):3530-3533] (ISSN:1097-8135). http://www.lifesciencesite.com. 523

Keywords: Hafez Ibrahim, Poet, Qasida, Poem, Caring for Children, Poverty, Charitable Organizations, Child, Misery, Orphan, Wealthy, Social, Economic

Mit Ghamr Fire *Qasida*

City of Mit Ghamr in Egypt burnt in a huge fire in 1902 and left behind many dead and lots of damaged homes and businesses. A large group of elders and wealthy individuals formed a commission to collect donations for those who suffered from this unfortunate incident[1].

Poets who were present on the scene took the opportunity to compose about the disaster. Hafez Ibrahim used his unique abilities to depict the severity of the fire, the fear people had experienced during the accident, and their misery after everything settled.

"Fire has destroyed everything. Many children lost their parents. Only a heavy rain or flood of Noah can put out the flame. Fire is burning everywhere. Misery and despair have brought about poverty and calamity. People have lost their dwellings and life savings.

People left their homes for their lives without taking anything. Hafez Ibrahim *uses Ara* (عراة) meaning bare to describe the scene: "they opt for night as a cover for themselves. When morning comes, they put on the day as clothes. They do not have any clothing to save them from heat or cold. Or, keep dust away. Ground serves them as bed and sky is their roof."

Hafez Ibrahim changes his tone a little to address the wealthy and well to do. He compares their lives with indigents. He tries to bring the wealthy out of ignorance. He adapts a tone of tranquility because he believes to have higher effect. We witness the same when Moses confronted Pharaoh by speaking softly. Hafez Ibrahim encourages the wealthy to be sympathetic to the deprived. He may have deeply felt the suffering people were experiencing and put them into words. He earned the title "Social and Patriotic Poet" for his work[2].

Hafez Ibrahim addressed the well to do and wrote: "All of you who wear colorful clothing and live in a state of proud and arrogance. Your clothes hung out of the same proud and arrogance. He highlights the hunger and lack of proper clothing of the poor by this characterization of the rich. He continues by stating that you wealthy people live in comfort but there are people who spend the night with hunger and remain in continued hardship and misery. He compares the affluent with the poor: you wear expensive and colorful clothing while poor do not have enough for their daily meal. They hide because of the hardship they experience. Hafez Ibrahim hopes that his comparison would encourage the rich to rise in support of misfortunate and sufferers.

[1] Complete Works of Hafez Ibrahim (1998), Beirut: Dar al Fekr al Arabi, p. 200

[2] Hana Al-Fakhori, A Complete Book of Arab Literature and History, p. 138

He addresses Manshavi Pasha, a well-known wealthy Egyptian who was jailed. He writes: "being in jail should not interfere with charity of a generous individual." His writing is actually addressing every wealthy individual. Referring to a person in jail would in fact increase the burden on those who are out.

He makes another analogy and uses it to influence the rich to come forward and help the needy. He writes: "we witnessed a wedding ceremony yesterday with lots of squander. The cost of this wedding was extremely high to everyone's amazement. Money was pouring in from every direction." He was writing about the wedding ceremony held for three nights at Ali Fahmi Pashi's residence.

He described the Mit Ghamr fire so eloquently that made every one voice out in protest. People started questioning why the state of community was such that a group of people lived mirthfully while others lived in dire despair. He finally states that this is not surprising. There might be a night that serendipity and indigence lump together. There is always this potential that a similar incident may happen in another area. A similar occurrence may happen to you one night.

Caring for Children *Qasida* (*Ra'ayat al Atfall*)[3]

Regard Children is a Hafez Ibrahim *Qasida* (a long storytelling poem) that gives an account of a bitter reality. It tells the story of a girl who was pushed by poverty into depravity and fornication. She is a girl consumed by depauperation and misfortune. Shame and pudency prevents her from talking about her misery. She heals her hidden inner pain only with tears. Is she a specter or merely a phantasm? No, she is a girl in a vast plain in front of me. She has faced many problems and left without a caretaker. She is helpless and powerless. She spends the night with sorrow tears.

Hafez Ibrahim depicts an orphan girl without support. She is full of sorrow and poet describes her case by emphasizing that she is without protection and caretaker or she is facing difficulty and misery. He uses *Fatah* (girl) in his depiction because people are more compassionate toward girls when compared to boys. The depiction he makes from an orphan girl makes induces heartache and makes the reader craving to help her.

Poet says: "I could hear her groaning and wailing. It feels like getting hit by gunfire barrage. Her harrowing moan hurts like a penetrating bullet." Poet asks her who she is. She responds like an inanimate mound of ashes with no sign of the burning fire that once was. She describes her searing pains and says that she is pregnant with no place to go. Hafez Ibrahim mentioned her pregnancy to influence the reader. A pain suffering pregnant girl without support or place is definitely facing misfortune.

Poet uses sensual depictions to influence reader. Most poems use this approach when they deal with poverty. He goes further to state that her parents and uncles had passed away and she does not have anyone to turn to show girl's misfortune at the highest level.

Shame and pudency stops her from telling her story. Poet hits the fact by declaring she has been sexually assaulted and feels ashamed about discussing it. She only cries. I understand why she tries to conceal her situation. People like me show empathy to orphans like her and rush to help. Poet sees himself as a people oriented individual who advocates for the poor and is proud of it. This is a problem in almost every society and is a sign of injustice. The fellow citizens of deprived individuals not only do not help, they might take advantage of them. The girl was forced to accept the intrusion and she regrets the incident.

Hafez Ibrahim likened her visage to a statue. He may have had one of the possible two objectives in his analogy.

1. The girl was frail in cause of illness, poverty, and difficulty and resembled a statue.
2. The girl resembled a cathedral statue or painting. She was beautiful but the incidents and tragedies she had experienced destroyed her beauty.

As the story goes, the girl is skinny and feeble in cause of extreme poverty and ailment. She is on the verge of eternal rest. I cannot do anything for him. He resembles her flimsiness to a mirage. The reason for such metaphor is that the girl walks abnormally and wobbly. She trembles like a mirage.

Poet then turns to the girl and tells her to get up. She responds by asking if a dead could rise from grave and walk away. How could a trity beather bottle move?

Hafez Ibrahim uses two metaphors here:

1. Her feebleness and leanness made her look like a corpse; and
2. Her skinny body looks like a trity beather bottle

Poet continues by alluding there is not much he can do. He decides to take her to an orphanage. He carries her on his back and rushes to the orphanage. He provides further description of her frailty and meagerness. He uses another metaphor comparing her to a light toothpick.

He says that he is carrying two poor and miserable beings. One is the unborn baby inside the orphan girl. He refers to the unborn as "طارق باب الحياة" who is expected to enter to this world. The other being

[3] Complete Works of Hafez Ibrahim (1998), Beirut: Dar al Fekr al Arabi, p. 264

is the mother whom he refers to as "مؤذن بزوال" who is expected to leave this world. Poet cannot stand the scene and burst into tears. He is not concerned about questions and answers when he finally arrives at the doorstep of the orphanage.

With question and answer, he is referring to the questioning process that the person who takes an injured or sick person to the hospital is subjected to. The helping person may end up in jail till the culpable person is found. That is the reason many pass the injured and do not do anything to help. A similar situation existed at the time of Hafez Ibrahim.

He points to the humane treatment rendered to the girl. Orphanage officials accept the sick girl with a Godly gesture. They give a caring treatment to the girl. He indirectly addresses people and let them know that they could provide proper treatment to a given individual in a similar situation just like the treatment rendered by the responsible individuals at orphanage.

He then tells about the time when the physician came to treat the orphan girl. The doctor had come with medications. He would go around her like a butterfly and treat her wounds as if she was a relative.

Hefez Ibrahim continues further: I leave her alone with her new family fully satisfied and with peace of mind. He writes about feeling handicapped in expressing his gratitude to the orphanage officials for all the good they offered her. And, to thank them for the time and efforts they put into charitable works.

Hafez Ibrahim offers two wise conclusions:

1. The best favor is when the offering person does not belittle and degrade the receiver.
2. Doing good should save face for receiver.

It is better for the person who is doing good to render help to the target individuals before they ask and to help them without making them feel indebted. This is the acceptable way in view of Islam. Hafez Ibrahim's advices tell us about the fact that at the time of poet many people would engage in charity works and help the needy but without honoring their respect.

Hafez Ibrahim continues with his own characterization of the poor: hungry, bare, ill, sleepless, heartbroken, moneyless, meager, etc. He mentions the important role played by those who establish charity institutions. He comments that poverty and misery would destroy the needy without the help of charitable people. He believes charitable people save the weak from demise. He praises the orphanage officials at the end with the intention to encourage more people to engage in charitable works.

He characterizes orphanage employees as:

1. They are always attentive to sickly and hungry addressing their needs while many rich live comfortably in own ignorance.
2. They do many good works recommended by religion and generations of civilization while many leisurely engage in wealth accumulation.
3. They support and help the needy families without breadwinner. They do not avoid needy and rush to relieve their poverty and misery.

He refers to Quran at the end to remind the outcome of doing good and declares: The benevolent individuals are compensated 10 fold in Judgment Day and the Heavenly Reward is limitless.

Children Shelter *Qasida*[4]

Hefez Ibrahim composed a *Qasida* inspired by a ceremony held by Caring Association for Children in an attempt to encourage helping the needy. He depicts a train in his poem and expects it to encourage others to come forward and help the misfortunate. His objective in composing this poem was to help the poor.

Poet characterizes a train in this poem. He speaks about a steam train and praises its speed, its glitter, and its supremacy over animals. A steam train shares the same qualities of a Poet. But, there is a vast difference between the two. One difference is that a train is not affectionate but poet is full of affection and has a burning heart.

Hafez Ibrahim says that he witnessed a strange incident in the train that he could not put it into words and provide a description. He goes on with the story. One dark night we witnessed a bizarre accident over a bridge. A person was thrown out of the train into a turbulent river rushing through underneath. Another person jumped into water at a speed of an eagle, swam up to the drowning person, and pulled him out of water at no time.

People circled around the rescuer and praised his action at awe and wondered how could undertake such miraculous act. It became more perplexing when people found out that the drowning person was a charitable individual and the person who saved him was a member of Caring Association for Children.

A young girl cried out load: "he was saved because of his caring for orphan children." Poet here undertakes to call the rich indirectly and without commanding to provide help to orphan. He puts his belief across that wealthy individuals should expect to see the reward not only afterlife but also in this world.

Notwithstanding the rescuer's life was in danger, he hit the waters and saved the drowning person with bare hands. He, then, stresses the consequences of good deeds. Helping poor people stands tall like a stronghold against disaster and mischief. It takes the mischief away.

[4] Complete Works of Hafez Ibrahim (1998), Beirut: Dar al Fekr al Arabi, p. 306

Hafez Ibrahim mentions charity as the cause of saving the man's life. Poet explains man's good deeds in words of the women who summed up the cause of saving the drowning man in few words by saying "save your afterlife by caring for orphans." Poet then lists the reasons for escaping the eminent demise. His objective is to encourage others to step forward and provide help to fellow countrymen.

1. The first reason is that the charitable man always respected the needy person and helped them at time of illness. His help was without expecting anything in return. He helped before anyone asked.
2. The second reason is his role in caring for orphans. He provided food and clothing plus monetary assistance to satisfy their needs.
3. The third reason is his membership in a charitable institution. He was saved by his commendable help he rendered to the poor, his generosity, and payment of religious dues or *zakat*. The prayer of orphans and the children with no caretaker was always with him.

Poet describes the charitable organization. It is a place for peace and tranquility. They would not embarrass the needy by questioning them. They only attend to the problems and try to relieve the pain.

He repeats his belief that the drowning person was saved because of his good deed and payment of his dues. His intention here is to alert the rich and well to do. He invites them to work with charitable organizations. He also advises them to pay their religious dues. He utters the benefits of doing so. He reminds them that it is an Islamic principle and Quran has highlighted its importance.

Hafez Ibrahim offers another approach for eradication of poverty as infelicitous phenomena. He invites people to respect their duty and pay religious dues or *Zakat*. He considers *zakat* as being more important than prayer and fasting. The reason for his argument is that prayer and fasting benefits the individual. But, *zakat* has public as well as private benefits. Therefore, poet considers it more important than prayer and fasting. He reminds his readers that it is an important principle of Islam and God has mentioned it repeatedly in Quran[5] to promote the payment of *zakat*,

He offers an additional reasoning. He says *zakat* is the foundation for religious belief and a proper base for public order. He advocates that the payment of *zakat* contribute to society perpetuity and provides for eradication of poverty and misery.

He explains and states why he believes if rich people were to pay their religious dues, we would no longer witness poverty and hunger - the root of all evil. He declares that society suffers from crime and corruption because of poverty. Then, he concludes that the payment of *zakat* can eradicate poverty and corruption.

Hafez Ibrahim recollects his own problems and difficulties. He remembers the orphans and tries to be kind with them.

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[5] Quran, Rome Sura, verse 39 and other similar suras.

11/19/2012

A Study of Nutritional Status of Saudi Pregnant Women Comparing with Non Saudi in King Abdul Aziz University Hospital in Jeddah

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Abstract: Pregnant women have been widely recognized as a vulnerable group from health point of view. They need more food than a normal person for the proper nourishment of the growing fetus. The field of nutrition of the pregnant women, especially in general hospitals, has been sadly. Methods: Against this backdrop, our study was carried out among 104 pregnant women Saudi and non- Saudi (86, 18, respectively) with second and third trimester attends to Obstetrics and Gynecology clinic at (KAUH). The goal of this study was to investigate the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain, gestational age and prevalence of anemia as a compare between Saudi and non - Saudi pregnant women. A pre-tested structured interview schedule was used for the collection of general information. Twenty four hours recall method of diet was applied for the collection of dietary information. Hemoglobin and Hematocrit levels collected from a doctor's report for observing the anemic condition. Results: It was found that the energy intake was significantly different between Saudi and non-Saudi pregnant women at ($p< 0.05$). Also for protein, fat, and carbohydrate were significant difference between the two groups at ($p<0.05$). Regard to the differentiation of vitamin A, niacin and folat intake was highly significant at ($p<0.001$) between the two groups. However, the difference in vitamin D, riboflavin intake was highly significant at ($p<0.01$) while for vitamin C and thiamin intake were significant at ($p< 0.05$) between Saudi and non-Saudi Pregnant women. Pregnant women in their second and third trimester (Saudi and non-Saudi pregnant women) had a low dietary intake for most nutrients especially for nutrient crucial during pregnancy such as iron, folate, calcium, selenium, magnesium, and niacin; the difference between Saudi pregnant and non-Saudi pregnant women were highly significant. It was observed that mean daily dietary intake of iron and folic acid for the anemic pregnant were significantly lower than those of non anemic pregnant women. Also we observed that as trimester increase, the hemoglobin and hematocrit levels increases perhaps because a substantial proportion of pregnant women consumed iron and folic acid tablets or syrups regularly. Conclusion: This study highlights the need to develop programs to improve the dietary intake of non Saudi pregnant women which living in Kingdom Saudi Arabia. It is concluded from the findings of this study that pregnant women need to increase their intake of food rich in iron, folate, niacin, protein and energy. The results suggest that pregnant women need guidance in selecting nutrient dense food. The upraise for nutrition awareness programs among pregnant women is recommended. More emphasis should be given to the cheap, local, commonly consumed food that are nutrient rich so that these women are assisted in making the best use of their economic resources to improve their diet.
[Thaana A. El -kholy, Dina Qahwaji, and Sahar A. Antar. **A Study of Nutritional Status of Saudi Pregnant Women Comparing with Non Saudi in King Abdul Aziz University Hospital in Jeddah.** *Life Sci J* 2012;9(4):3534-3543]. (ISSN: 1097-8135). http://www.lifesciencesite.com. 524

Key words: Second trimester –Third trimester- Dietary intakes–energy intake - nutritional anemia - Hemoglobin – Hematocrit.

1. Introduction

Maternal nutrition and health is considered as the most important regulator of human fetal growth. A healthy mother can produce a healthy child. If women are not well nourished, they are more likely to give birth to weak babies resulting in a high infant mortality rate. Pregnancy is the period of dynamic change for a mother requiring a lot of care. During this period the fetus is nourished directly by the mother through the placenta **(Subarnalata and Basumati ,2006)**.

Pregnancy is the most nutritionally demanding times of a woman's life. The body needs enough nutrients every day to support the growth of the baby and the maintenance of the mother's body. All the nourishment this developing baby need comes from mom, either through the food she eats or the supplements she takes. Pregnant women need more essential nutrients than other women. The body needs an additional 300 calories each day to support the growth of the baby. It is important to eat the right foods every day since tissues and organs develop during certain weeks of pregnancy and baby is always growing. Mom's health depends on diet, too. While the mother's body is supplying the nutrients the baby needs **(Jaime *et al.*, 2009).**

Poor nutrition can lead to a range of health problem for mothers including cardiovascular disease, diabetes, cancer, and overweight and obesity **(Li Ming et al, 2010**). Proper dietary balance is necessary to ensure sufficient energy intake for adequate growth of the fetus without drawing on mother's own tissues to maintain her pregnancy (**Mridula *et al.*, 2003**).

Without adequate nutrition during pregnancy, fetal growth and infant health are compromised. In general, consequences of malnutrition during pregnancy including fetal growth retardation, congenital malformation. Besides malnutrition, a variety of lifestyle factor and social demographic can adverse effect on pregnancy **(Sharon et al, 2006).**

In pregnancy anemia has a significant impact on the health of the fetus as well as that of the mother. It is the most widespread nutritional disorder in the world effecting 30 percent of the world's population. It is more common among the expectant mother (**Thangaleela and Vijayalaxmi, 1994**). In many developing countries, its prevalence is reported even as high as 75 % **(Ai-Guo *et al.*, 2009).** Some studies show that the prevalence of anemia during pregnancy is 10% to 20 % **(Jin *et al.*, 1995)**. Anemia during pregnancy has been attributed not only to increased iron requirements during the second and the third trimester of gestation, but also to micronutrient deficiency **(INACG, 1981).**

Poor nutrition, frequent labor, multiparty, abortions, parasitic infestations, consuming excess tea or coffee after meals determined as the predictors of anemia in reproductive age women. Studies well indicated the association of anemia with maternal morbidity and mortality **(Klaus and Michael, 2007**). The positive relationship between maternal nutrition and birth weight has been reported under acute starvation (**Gruenwald and Funakawa, 1967**) but less clear with moderate levels of malnutrition. (**Chase, 1969; Mate, and Urrutia, 1972; and McCance, and Widdowson, 1975)** In general, some studies have included dietary factors (**Philipps and Johnson,1977& Higgins , 2003)** and/or examine overall dietary quality as an independent variable (**Lechtig , *et al.*, 1975)** . Assessment of dietary intake during pregnancy is important because it is well established that both nutrient deficiencies and excesses can have adverse effects on pregnancy outcome **(Worthington, 1975).**

The purpose of this study was to investigate the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain , gestational age and prevalence of anemia as a compare between Saudi and non Saudi pregnant women .

2. Subjects and Methods

Subjects:

This cross- sectional study was carried out among 104 pregnant women who come to randomly chosen from Obstetrics and Gynecology outpatient clinic in king Abdul-Aziz University Hospital (KAAUH) to be included in the study to represent Saudi and non-Saudi pregnant. The aim of the study was explained to the subjects. The mother's nationality was Saudi (82.7%) and non - Saudi (17.3%). Pregnant women 32.7 % (N=34) mothers at 2nd trimester and 67.3% (N= 70) mothers at 3rd trimester**.** The data collection was initiated in October 2009 and completed in January 2010.

Methods

Questioners:

A face-to-face interview was conducted with each participating mother by the students. The interview was of 20 to 30 minutes duration. The tool used for research was a personally designed questionnaire to collect the previous data; we met the pregnant women in KAUH Obstetrics and Gynecology Clinic individually during our regular follow up. In every meeting the participating mothers were asked about Socio-economic data (age, employment status, education level, type of family); Food habits of pregnant women, where the pregnant asked about (usual diet, snacks, supplements, caffeine intake, preferences. Nutritional status of pregnant women, which evaluated by using anthropometric measurements (weight, height, BMI before and after pregnancy), six days food intake and nutritional and healthy awareness. Mothers also reported their pre-pregnancy weight and height. Hemoglobin and hematocrit levels Health problems and her contact number (mobile or telephone number) to record the six days of food intake, also pregnant was given instruction about serving size.

Daily intake of nutrients:

In the study we met pregnant women in KAUH Obstetrics and Gynecology Clinic and asked them to fill the questionnaire then we educated the pregnant women about 7 day's dietary records method to record the food intake. We give the pregnant women 7 days dietary records and were asked to write every food, drink or snacks that she takes and the amount in units or parts then conformed these units or parts into grams to calculate the daily intake of different nutrients and by using food composition tables**.** (**National Nutrition Institute, 2006).**

Anthropometric measurements:

Weight (Wt):

The plate from scale was used to measure weight for pregnant women. The scale should be placed on a flat, hard surface. We should make sure that the scale is at zero before measuring pregnant women weight. The lady should stand in the middle of the scale's platform without touching anything and with the body weight equally distributed on both feet. The weight should be read to the nearest 100g (0.1Kg) and should be recorded. The lady should wear light clothes as possible. Weight was taken during the three trimesters of pregnancy**. (Robert, *et al.*, 2003).**

Height (Ht):

The pregnant woman was standing in front of the wall which is scaled by using the flexible non-stretchered fiberglass tape. The tape is put co-fluently over the head with her shoulder and buttocks pressed against the wall. The shoulder should be relaxed and arms at the side with feet on the bar, flat on the floor and heels close together and against the wall, the measure's eye level with headboard. The measurements are read to the nearest 0.1cm **(Robert, *et al.*, 2003).**

Body Mass Index (BMI):

This index was obtained by calculating Weight by Kg / square height by meter (Kg/m^2), and maternal BMI was then categorized as underweight <18.5 Kg/m^2), healthy weight (18.5-24.9 Kg/m^2), overweight (25-29.9 Kg/m^2), obesity (30-34.9 Kg/m^2), over obesity (35-39.9 Kg/m^2), and morbid obese (≥40 Kg/m^2). **(Jimmam *et al.*, 1998).** Weight-gain during pregnancy was calculated by subtracting the pre-pregnancy weight from the pregnancy weight in the second and third trimester. The pre-pregnancy BMI was calculated using the measured height and self reported pre-pregnancy weight.

Laboratory Investigations

Level of hemoglobin (HB) and hematocrit (HCT): The results were taken from records of KAUH Obstetrics and Gynecology Clinic files.

Ethical Considerations:

Permission was attained from the head of the department of Obstetrics and Gynecology in King Abdul-Aziz university hospital (KAUH).

Statistical Analysis:

The statistical analysis of data was conducted using SPSS Version 15; **(Arrmitage *et al.*, 2002; Betty, 2003;)**. The statistical differences among the two groups were analyzed by ANOVA, and when significant, they were verified through the Scheffe's test. The results presented are the mean with standard deviations. The Chi-square test was used to test the significance of the distribution rate within the groups and the results presented are the percentages. Results were considered significant if $p<0.05$.

3. Results:

General characteristics of the study population are shown in Table (1). The mean of the mother's age, family size, and husband's income were ascertained to be 28.08±5.54, 2.45± 1.003, and 4,207 ± 3,109 respectively. Most of the mothers (82.7%) were Saudi and the reaming (17.3%) were non-Saudi. The same table also showed the frequency distribution of study sample according to age; it was observed that 65.4. percent respondents belong to 20 and 29 years age group, followed by respondents of 30 -34years of (17.3) age group, while (15.4%) for 35 and above years of age , while (1.9%) were under 20 years of age.

On the basis of family size 22.1 percent a family size had less than 3 members , 26 percent had a family size up to three , while 36.5 percent had a family size between 4 and 6 members , and the rest (15.4%) were from large sized family having members 6 or above . The educational status revealed that only 1.9 per cent of mothers were illiterate, 28.8 per cent had a college education whereas the remaining had either high or middle school level education.

Respondents were divided into four groups according to the income of family per month. The majority of the respondent's monthly income were 3000 RS (39.4%) followed by (32.7%) earned 1000 to < 3000RS where 23.1 percent were earning 6000 RS and above per month , while the main Source of family income / RS was from husband's income were ascertained to be 89.4 percent as shown in table (1).

Table (2) shows that the majority percent distribution of weight before pregnancy was (73.6% and 61.4% respectively) in 2nd and 3rd trimester weighted 50- 69 kg, while fewer percent (11.8% and 10% respectively) in 2nd and 3rd trimester weighted <50kg; and 14.7percent and 28.6percent respectively in 2nd and 3rd trimester were weighted 70 to above 8o kg. Most of the pregnant women (44.1% and 48.1%) gained 5-9 kg respectively in 2nd and 3rd trimester, while (5.9 % &16. 3%) gained 10 -14 kg respectively in 2nd and 3rd trimester and (35.3 %) of pregnant gained <5 kg, , and 14.7 %&17. 3% of pregnant gained about 15-20 kg and above , respectively in 2nd and 3rd trimester were ascertained as shown in table (1).

The percent distribution of body mass index of women pre pregnancy ascertained in figure (1) 46.2 percent of the pregnancies were at normal weight prior to pregnancy, while (5.8%), (30.8%) and (17.2%) of pregnant were underweight, overweight, and obese, respectively.

Data presented in table (3) noticed that mean of energy and macronutrient intake of studied were different asterisks denote significantly different at ($p< 0.05$) between Saudi and non-Saudi pregnant women by1522. 79±595.52, 1170,57±450.14 for energy, 54.34±21.79, 42.78±13.46 for protein, 50.27±20.06, 37.95±10.77 for fat and 195.66 ± 77.99, 152.45±49.95 for carbohydrate respectively.

Table (1): Socioeconomic Status of Studied Sample of Pregnant women (N=104)

Variables			Pregnant		
Age in years (mean ± SD)			28.08±5.54		
Family size (mean ± SD)			2.45± 1.003		
Husband Income/RS (mean ± SD)			4207 ± 3109		
Characteristics	**No.**	**%**	**Characteristics**	**No.**	**%**
Nationality:			**Family size**		
Saudi Arabian	86	82.7	<3	23	22.1
Non Saudi Arabian	18	17.3	3-	27	26.0
			4-	38	36.5
			6+	16	15.4
Age groups:			**Pageant's Education**		
<20	2	1.9	Illiterate	2	1.9
20-24	25	24.0	Primary	4	3.8
25- 29	43	41.4	Middle	13	12.5
30- 34	18	17.3	Secondary	55	52.9
35and above	16	15.4	University	30	28.8
Working Pregnant			**Husband Income/RS**		
Yes	8	7.7	<1000	5	4.8
No	96	92.3	1000-	34	32.7
			3000-	41	39.4
			≥6000	24	23.1
Working Husband			**Family Income/RS**		
Yes	102	98.1	Husband	93	89.4
No	2	1.9	Husband + wife	8	7.7
			Relative	1	1.0
			Father	2	1.9

Table (2): Anthropometric measurements by trimester of Studied Sample of Pregnant women:

Characteristics	2nd trimester		3rd trimester	
Pregnancy Weight Before (Kg)	**No.**	**(%)**	**No.**	**(%)**
<5o	**4**	**11.8**	**7**	**10**
50 – 59	**11**	**32.4**	**25**	**35.7**
60 – 69	**14**	**41.2**	**18**	**25.7**
70 – 79	**2**	**5.9**	**10**	**14.3**
80 +	**3**	**8.8**	**10**	**14.3**
Pregnancy Weight gain (Kg)				
<5	**12**	**35.3**	**7**	**18.3**
5 – 9	**15**	**44.1**	**35**	**48.1**
10 – 14	**2**	**5.9**	**15**	**16.3**
15– 19	**4**	**11.8**	**9**	**12.5**
20 +	**1**	**2.9**	**4**	**4.8**

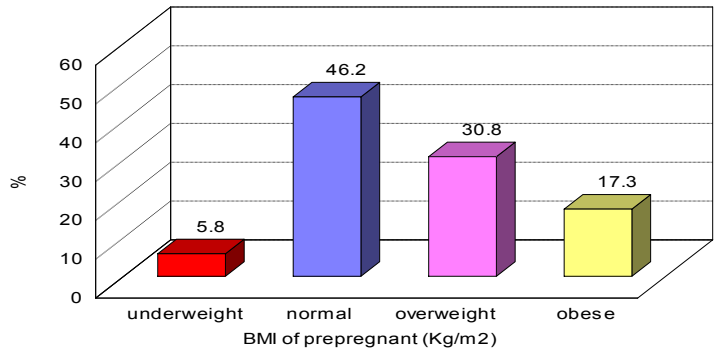

Figure (1): Percent Distribution of BMI of women prepregnancy (Kg/m^2).

Table (3): Mean ± SD of Energy and Macronutrients Intakes of Studied Subjects.

Variables / Nutrients	Saudi Arabian Mean ± SD	Non Saudi Arabian Mean ± SD	t. test	P
Energy (kcal)	1522.79 ±595. 52	1170.57 ± 450.14	2.36	0.020*
Protein(gm)	54.34 ± 21.79	42.78 ± 13.46	2.16	0.033*
Fat(gm)	50.27 ± 20.06	37.95 ± 10.77	2.525	0.013*
Carbohydrate(gm)	195.66 ±77.99	152.45±49.95	2.251	0.026*

This table (4) of vitamins and minerals intake of those studied indicated that mean for vitamin A, niacin and folate and calcium were highly significant at ($p<0.001$) by1077. 312±335.057and 648.40±164.65 of vitamin A; 14.07±4.08 and 9.72±1.07 of niacin; 501.72±95.389 and 380.95±54.51 of folate and 905.87±189.85 and 715.00 ±112.68 of calcium for Saudi and non-Saudi pregnant women respectively. Also, 5.55±3.35 and 3.01±1.96 for vitamin D; 1.8250 ±0. 91, 1.02 ±0. 63 for riboflavin; 867.43±253.99 and 694.54±176.54for phosphorus; 232.33± 42.95 and 201.22±42.52 for magnesium; 19.73±5.595 and 15.92 ± 3.829, 12 for iron, and12. 16±3.139 and 9.44 ± 1.844 for zinc, were highly significant at ($p<0.01$) for Saudi and non-Saudi pregnant women respectively. While vitamin C and thiamin were different asterisks denote a significant difference at ($p<0.05$) by 96.779±113.11 and 42.230±14.171, 1.755±0.831, 1.298±0.637 for Saudi and non-Saudi pregnant women respectively. But Selenium was not Significant by 50.651±12.91and 48.041±15.28 for Saudi and non-Saudi pregnant women respectively.

Table (5) shows Mean of Iron Intakes by Hemoglobin and Hematocrit Analysis of Studied Pregnant women. The mean± SD of the iron level by normal and anemic pregnant women was 19.94 ±5.87 and 17.66±4.59, respectively and the difference between the two groups was significant at $p<0.5$. While the Mean of the iron level for normal and anemic pregnant woman was 20.54 ±5.00 and 16.501±3.23 respectively and the difference between the two groups was highly significant at $p<0.001$.

Prepregnancy (Kg/m^2).

Figure (1) depicts the percent distribution of normal and anemic pregnant women by the percentage of Hemoglobin and Hematocrit of pregnant women. The majority of studied sample were normal (61.5%), while (38.5%) were anemic.

Table (6) indicates that the mean of biochemical analysis by nationality and by trimester of study pregnant women. The mean of hemoglobin was 11.633±1.3946 and 10.539±1.7177 for Saudi and non Saudi pregnant women respectively, and the differences between them were highly significant at $p<0.01$. Also 34.963±3.961 and 31.60±3.729 respectively for hematocrit in Saudi and non Saudi pregnant women, and the differences between the two groups were highly significant at $p<0.01$. While mean of biochemical analysis by trimester of this study were 10971±1.4696 and 11.673±1.478 respectively for hemoglobin level in the 2nd and the 3rd trimester , the difference between them was significant at $p<0.05$. As can be seen in the same table the mean of the hematocrit level in 2nd and 3rd trimester was 32.991± 4.2527and 35.0557±3.889, respectively, and the different asterisks between them denote significance at $p<0.05$.

Table (4): Vitamins and Minerals Intakes of Pregnant women by nationality (Mean ± SD)

Nutrients	Saudi Arabian Mean ±SD	Non Saudi Arabian Mean ±SD	t.value	P
Vitamins				
Vitamin A (mcg)	1077.312±335.057	648.407±164.650	5.284	0.000***
Vitamin D (mcg)	5.553.35	3.019±1.96	3.093	0.003**
Vitamin C (mg)	96.77±113.11	42.23± 14.17	2.035	0.044*
Thiamin (mg)	1.75±0.83	1.29±0.6367	2.193	0.031*
Riboflavin (mg)	1.82 ±0. 91	1.02 ±0. 63	3.509	0.001**
Niacin (mg)	14.07±4.08	9.72±1.0740	4.465	0.000***
Folate (mcg)	501.72±95.38	380.95±54.514	5.184	0.000***
Minerals				
Calcium (mg)	905.87 ±189. 85	715.00 ±112. 68	4.107	0.000***
Phosphorus (mg)	867.43±253.99	694.54±176.54	2.747	0.007**
Magnesium (mg)	232.33± 42.95	201.22±42.52	2.80	0.006**
Iron (mg)	19.73±5.595	15.92 ± 3.82	2.747	0.007**
Zinc (mg)	12.16±3.139	9.44 ± 1.84	3.539	0.001**
Selenium (mg)	50.65±12.91	48.041±15.28	0.755	0.452 (NS)

* Differences are significant at P<0.0 **Differences are highly significant at P<0.01

***Differences are highly significant at P<0.001 NS: Not Significant

Table (5): Iron Intakes by Hemoglobin and Hematocrit Analysis of Pregnant women (Mean ± SD)

Variables / Characteristics	Non - anemic Mean ± SD	Anemic Mean ± SD	t. Value	P
Hemoglobin Iron (mg)	19.94±5.87	17.66±4.59	2.089	0.039*
Hematocrit Iron (mg)	20.545 ±5. 00	16.50 ± 3.23	3.839	0.000***

* Differences are significant at P<0.05; ***Differences are highly significant at P<0.001

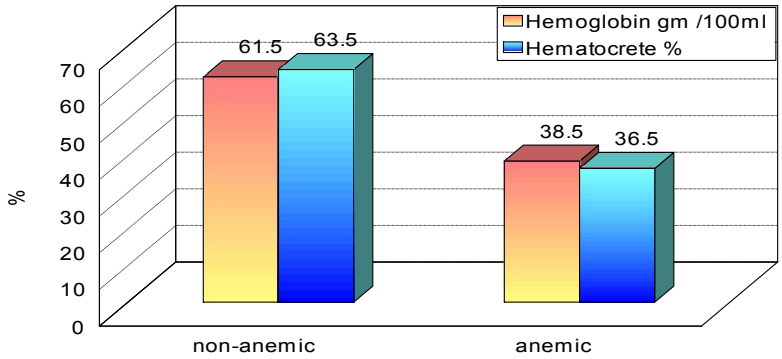

Figure (2): Percent Distribution of non- anemic and anemic pregnant women by Hemoglobin and Hematocrit percent

Table (6): Mean ± SD of Biochemical Analysis by Nationality and Trimester of Pregnant women

Variables / Biochemical Analysis	Saudi Arabian Mean ± SD	Non Saudi Arabian Mean ± SD	t. Value	P	2nd Trimester Mean ± SD	3rd Trimester Mean ± SD	t. Value	P
Hemoglobin	11.633±1.39	10.539±1.718	2.903	0.005**	10.971±1.46	11.673±1.478	2.277	0.025*
Hematocrit	34.963±3.961	31.60 ± 3.729	3.307	0.001**	32.991±4.25	35.0557±3. 88	2.462	0.015*

* Differences are significant at P<0.05; **Differences are highly significant at P<0.01

4. Discussion:

The Gestation represents a period of increased metabolic demands, and nutritional sufficiency is very important not only for outcome of pregnancy but also for the development of the fetus and the preservation of the pregnant reserves **(King, 2000, Rogers *et al.*, 1998).** There is a clear evidence to support the importance of optimal nutritional status in the prevention of both broad subgroups of low birth weight , small for gestational age births (which result from intrauterine growth retardation) and prematurity (which accounts for lower birth weight births in developing countries **(Caulfield, 1998, Bailey, 2000; Steer, 2000, Hess *et al.*, 2001, Green, 2002,).**

This cross sectional study was conducted with 104 mothers attending Obstetrics and Gynecology clinic at (KAUH). The mother's nationality was Saudi (82.7%) and non - Saudi (17.3%). Pregnant women 32.7 % (N=34) mothers at 2nd trimester and 67.3% (N= 70) mothers at 3rd trimester. This study has identified dietary patterns obtained from data collected by food frequency questionnaire from pregnant woman conducted in the second and third trimester. The goal of this study was investigated the nutrient intake of pregnant woman and find factors affecting pregnancy outcomes such as weight gain, gestational age and prevalence of anemia as a compare between Saudi and non - Saudi pregnant women.

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Sociodemogrophic profile:

In our study we found that one demographic characteristic and the number of family members affected gain weight .We thought that the greatest number of family members might increase maternal stress, as shown in table (1) which show that (15%) of pregnant women had a family size up to six members. It was observed that (37%) earned (1000 SR or less per month). Our study was agreement with a study conducted by **(Seo won and sang sun, 2009)** which found that one demographic characteristic and the number of family members affected birth weight. They thought that the greatest number of family members might increase maternal stress, but instead, it seems that pregnant women benefit from their family members' assistance**.** Also family economics and nutrition related problems need to be investigated in detail in such households to determine the contributing

effects of social structure and lifestyles on morbidity **(leyla *et al.*, 2010).**

Anthropometric Measurements:

One of the anthropometric measurements, pregnancy weight, affected birth weight. Weight-gain during pregnancy was calculated by subtracting the pre-pregnancy weight from the pregnancy weight in the second and third trimester. The pre-pregnancy BMI was calculated using the measured height and self reported pre-pregnancy weight. In most studies, being overweight is an important risk factor indicating possible pregnancy according to pregnancy outcome complications (**Galtier-Dereure and Boulot, 1994; Galtier-Dereure *et al.*, 2000**), the greater the weight gain, the greater the risks (**Kajantie, et, al, 2005**). Women who are underweight may also be at risk for adverse pregnancy outcomes (**Stewart *et al.*, 1987; Treasure, 1988; Conti *et al.*, 1998; Micali *et al.*, 2007)**. Thus, it is especially important to follow the weight gain recommendations. Pregnant women should seek counseling and extra support to ensure appropriate weight gain.

Our results as presented in table (2) revealed that the major percent distribution of weight before pregnancy was (73.6% and 61.4% respectively) in 2nd and 3rd trimester weighted 50- 69 kg, while few percent (11.8% and 10% respectively) in 2nd and 3rd trimester weighted <50kg; while (14.7% and 28.6% respectively) in the 2nd and 3rd trimester were weighted 70 to above 8o kg before pregnancy. Also our results represent the distribution of body mass index of women before pregnant ascertained in figure (1) 46.2 percent of the pregnancies were at normal weight prior to pregnancy, while (5.8%), (30.8%) and (17.2%) of pregnancies were underweight, overweight, and obese, respectively.

Energy and Macronutrients Intake:

An appropriate eating pattern is essential throughout the childbearing years and during pregnancy to ensure a healthy pregnancy and baby**, (Pick *et al.*, 2005).** In a country such as Saudi Arabia where food is easily available, nutritional status of woman during the course of pregnancy is expected to be compatible with those in other societies with similar standards of living **(Ahamd, 2007)**.

In our study the average energy and macronutrients intake of Saudi and non - Saudi pregnant woman of energy, were compared. All Saudi pregnant women included had a level of calorie intake more than another group of non-Saudi pregnant women. Mean ±SD of energy and macronutrient intake of studied were different asterisks denote significantly different at ($p< 0.05$) between Saudi and non-Saudi pregnant women as shown in table 3. A judicious combination of various food groups is required to ensure that nutrient demands of individuals are fully met. In interpreting the insufficient intake of nutrient in non - Saudi pregnant women, certain factors are worth mentioning. **First**, this study was carried out at a government hospital of which a larger percentage of deliveries are non-Saudi woman of low and middle socioeconomic levels. **Second**, the level of nutrition education among non Saudi pregnant women about their necessary requirements is inadequate; they lacked correct and adequate nutritional knowledge. Our study confirmed with the study by **(Ahmad, 2007).**

Micronutrients Intake

Regarding to the other nutrient intake (vitamins and minerals) of the respondents; our finding showed that the different intake between Saudi and non - Saudi pregnant women from vitamin A, Niacin, Folate, and Calcium were highly significant at ($p<0.001$). While the different intake of vitamin D, Riboflavin, Phosphorus, Magnesium, Iron and Zinc between Saudi and non - Saudi pregnant was significantly high at ($P<0.01$). It was also found that the mean daily dietary intake of iron i.e. **15.92 ± 3.829 (mg)** and folic acid i.e. **380.95±54.514 (mcg)** for non – Saudi pregnant women was significantly low as a compared to those of the Saudi pregnant women i.e., & **19.73±5.595** (mg) **for iron intake and 501.72±95.389 (mcg) for folate**. However the different intake among Saudi and non - Saudi pregnant women from vitamin C and Thiamin was different asterisks denote a significant difference at ($P <0.05$) as shown in table (4).

Nutritional Anemia:

The definition of *anemia* recommended by the Centers for Disease Control and Prevention is hemoglobin (Hgb) or hematocrit (Hct) value less than the fifth percentile of the distribution of Hgb or Hct in a healthy reference population based on the stage of pregnancy. A classification derived from an iron-supplemented population lists the following levels as anemic: Hgb (g/dL) and Hct (percentage) levels below 11 g/dL and 33%, respectively, in the first trimester; 10.5 g/dL and 32%, respectively, in the second trimester; and 11 g/dL and 33%, respectively, in the third trimester **(CDC, 1998).**

Our results represent Mean ± SD of level of iron intakes by Hemoglobin and Hematocrit Analysis of Studied Pregnant women in table (5). The mean± SD of the iron level by hemoglobin analysis for non-anemic and anemic pregnant women was 19.945±5.8744 (mg) and 17.663±4.5947 (mg) respectively and the difference between the two groups was significant at $p<0.5$. While the Mean ± SD of the iron level by hematocrit analysis for non - anemic and anemic pregnant woman was 20.5453±5.0058 and 16.501±3.2323 respectively and the difference between the two groups was highly significant at $p<0.001$. Our

results agreement with the study of **Subarnalata and Basumati, (2006)** which found that mean daily dietary intake of iron, of the anemic pregnant women were significantly lower than those of the non-anemic pregnant women. Since they consume sufficient quantities of dairy products, meats, fruits and vegetables

Our findings revealed that the prevalence of anemia was (38.5%) of the pregnant women as shown in figure (2). It was observed that mean daily dietary intake of iron for the anemic pregnant was significantly lower than those of non - anemic pregnant women as presented in table (5). Iron deficiency anemia is believed to be a common health problem in the Arabian Gulf **(Musaiger, 1987).** Our resulting agreement with other studies by **(Subarnalata and Basmati, 2006)** and **(Khalid Almurshed et al, 2007).** Thirty eight point half percent anemic pregnanant women in our study considered higher than other results of the study conducted by (**Leyla Karaoglu *et al.,* 2010**) in Malatya, which is an eastern Anatolian province with 800 000 inhabitants, which showed a moderate prevalence of anemia (27.1%). Even though our study showed 38.5 % prevalence anemic pregnant women , this is also higher than the prevalence's in European countries (25.1%) and in the Americas (24.1%) or averaging 18% in developed countries (**Allen, 1997**) and, **(WHO, 2008**). Therefore, it is necessary to continue anemia control programs. Anemia prevalence in our study was also higher than those reported from different parts of the country such as 29.4% in Afyon **(Bes, *et al.,* 2002).** Anemia prevalence in our study was lower than those reported by **Pirinçci *et al.,* 2001** from different parts of the country was 42.4% in Elaziğ provinces; the latter is in the eastern Anatolia near Malatya. Other studies report that high prevalence of anemia (66.67%) was observed in their study where as **Saxena *et al.* (2000) and Gautam *et al.* (2002)** observed incidence of 36.1% and 96.5% respectively in their study.

Biochemical Analysis by Nationality and Trimester of Pregnant women:

Data presented in table (6) indicates that the mean ± SD of biochemical analysis by nationality and by trimester of study pregnant women which revealed that the mean ± SD of hemoglobin content of the pregnant women in the blood was 11.633±1.3946 and 10.539±1.7177 for Saudi and non - Saudi pregnant women respectively, These results show that the differences between the two groups were highly significant at ($p<0.01$). The mean value of hemoglobin content in the blood of all pregnant women in the second trimester of pregnancy was below normal (<11 g/dL) but in the third trimester was normal. Our results agreement with the study of **(Subarnalata and Basmati , 2006)** which their results show that the mean hemoglobin content in the blood of all pregnant women in 2nd trimesters of pregnancy was below normal (<11g/dl) but in 3rd trimester it was normal, he observed that as trimester increases the hemoglobin level also increases**.**

In the same table the mean± SD of the hematocrit level in 2nd and 3rd trimester was 32.991± 4.2527and 35.0557±3.889, respectively, and the different asterisks between them denote significance at $p<0.05$.Such findings were largely confirmed by the normal results of the Biochemical laboratory serum blood tests performed. These results confirmed the report with researches made by **(Fujimori, *et al.,* 1999, Meier, *et al.,* 2003; Alevizos *et al.,* 2006)**.

Conclusion:

Pregnant women participating were in their second and third trimester (Saudi and non-Saudi pregnant women). They had a low dietary intake for most nutrients especially for nutrients crucial during pregnancy such as iron, float, calcium, selenium, magnesium, and niacin. The difference between Saudi and non-Saudi pregnant women was highly significant. It is concluded from the findings of this study that pregnant women need to increase their intake of food rich in iron, floats, niacin, protein and energy. These studies highlight the need to develop programs to improve the dietary intake, guidance in selecting nutrient rich foods by pregnant women in Saudi Arabia Kingdom. Emphasize the importance of the nutritional profile of pregnant women, so that proper nutrition counseling and education could be given by a clinical dietitian. The results also suggest that dietary intervention or education should be provided for pregnant women. More emphasis should be given to the cheap, local, commonly consumed food that are nutrient rich so that these women are assisted in making the best use of their economic resources to improve their diet. The upraise for nutrition awareness programs among pregnant women is recommended. Food preferences should be encouraged to accommodate suitable sources in term of adequate energy; macronutrient and micronutrient intakes

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Volume 9, Number 4, (Cumulative No.31) Part 23 December 25, 2012 ISSN:1097-8135

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