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Acta Zhengzhou University Oversea Version

(*Life Sci J*)

Life Science Journal, the Acta Zhengzhou University Oversea Version, is an international journal with the purpose to enhance our natural and scientific knowledge dissemination in the world under the free publication principle. The journal is calling for papers from all who are associated with Zhengzhou University-home and abroad. Any valuable papers or reports that are related to life science - in their broadest sense - are welcome. Other academic articles that are less relevant but are of high quality will also be considered and published. Papers submitted could be reviews, objective descriptions, research reports, opinions/debates, news, letters, and other types of writings. Let's work together to disseminate our research results and our opinions.

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CONTENTS

Teamwork Characteristics, Communication Structures, Supervision and Patient Safety in Special Care Units and General Wards in El-Minia University Hospital

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Abstract: Aim of the work: To assess the opinion of nurse about patient safety, to compare the differences between the opinions of nurses working in general wards and special care units about patient safety and to determine the correlations between teamwork characteristics, communications, supervision and patient safety. **Methods:** The sample include of all nurses (n=60) working at medical (n=10) and surgical (n=12) wards and Intensive Care Unit (ICU) (n=12), Cardiac Care Unit (CCU) (n=18) and Renal Dialysis Unit (n=8). Data collected was done through questionnaire forms of socio-demographic variables, Nursing Characteristics Questionnaire and Patient safety Questionnaire. **Results:** The majority of the nurses (65%) had experience attainment of 1-7 years. There was significant difference between the staff of general wards and special units regarding experience attainment. The majority of the nurses (81.7%) had educational attainment of Baccalaureate degree. Patients' safety is significantly correlated with teamwork characteristics, communication structures, and supervision. It also is significantly correlated with overall Nursing response. Patient safety was significantly correlated with special units. The responses of the nurses ranged from undecided to disagree. There were significantly higher mean values of Teamwork characteristics, Communication structures and Patient safety of nurses who works at special units than nurses who works at general wards. **Conclusions:** The study confirmed the hypothesis that patient safety is showing significant positive correlations with teamwork characteristics, communication structures, and supervision of the studied nurses. Teamwork characteristics, Communication structures and Patient safety were higher in special care units than in general wards.**Recommendations:** (1) Cost-effective enhancement of the work environment of units and wards, focusing on management, leadership and teamwork could result in safer patient care. (2) Focus on the educational make-up of the workforce on wards in order to ensure the highest possible proportions of nurses educated to degree level would be beneficial.

[Wafaa Abd El-Azeem El-Hosany and Sanaa M. Araef. **Teamwork Characteristics, Communication Structures, Supervision and Patient Safety in Special Care Units and General Wards in El-Minia University Hospital**. *Life Sci J* 2012;9(4):5398-5406] (ISSN:1097-8135). http://www.lifesciencesite.com. 800

Keywords: Teamwork; Communication Structure; Patient Safety; Hospital

1. Introduction

Patient safety has become a primary focus for healthcare organizations worldwide, and a prerequisite for the provision of effective quality care **(Gardner *et al.*, 2002).**

The international healthcare management program is currently concerned with reducing the risks to which patients are exposed in care settings. Improving patient safety, and thereby improving the quality of healthcare provided, has emerged internationally as a challenge for health care services **(Department of Health and Children, 2008).**

Investigations and inquiries carried out internationally **(Department of Health and Children, 2006; Health Information and Quality Authority (HIQA), 2008; House of Commons UK, 2010)** have consistently identified common deficiencies in patient safety structures. These include poor communication structures, leadership, and teamwork, along with a lack of reporting systems and analysis of adverse events. Insufficient staff knowledge around safety processes, and an acknowledged unsupportive safety culture in healthcare, has been identified as areas to be addressed for the advancement of patient safety **(Department of Health and Children, 2008).**

Central to patient safety strategy internationally is the systems approach to safety. The systems approach is dependent on full and open reporting of adverse events, to maximize organizational learning around the incident, and to prevent its reoccurrence. **Mouillin (2002)** describes adverse events in healthcare as those which either harm, compromise or threaten the safety of patients. Incident reporting remains the first step to finding out what happened in the case of an adverse event, and to promoting patient safety **(Johnstone and Kanitsaki, 2006; Burkoski, 2007).** While this approach to safety in high risk industries such as the aviation industry has been widely acknowledged as a success, its suitability to healthcare is often debated. **Kaplan (2003)** notes that in healthcare it remains a challenge to create a culture

where information about safety can be shared without fear of reprisal. There remains significant reluctance amongst healthcare providers to share information around errors thus giving rise to a climate of guilt, shame, and silence **(Volker and Clark, 2004).**

In a recent report **Levinson (2012)** notes that adverse events often go unreported because healthcare staff either do not know what to report or how to report it.

Nurses play a key role in patient safety, with nurse staffing levels and workload clearly linked to safety **(Aiken *et al.,* 2002a; 2002b; Institute of Medicine (IoM), 2004; Agency for Healthcare Research and Quality, 2007a; 2007b).** In addition the nature of nurses' work is vital to ensuring patients' safety as it routinely involves patient surveillance and co-ordination of care **(Brady *et al.,* 2009).**

Patient safety continues to be the responsibility of all working in healthcare, but the reality is that nurses are the most frequent reporters of adverse events by virtue of their proximity to patients **(Kingston *et al.,* 2004; Cook *et al.,* 2004; Johnstone and Kanitsaki, 2006).**

However, historically nurses have suffered when they have attempted to take a stand on issues of patient care or inadequate standards **(Department of Health and Children, 2006; Matthews and Scott, 2008).**

Such experiences may cause nurses to fear recrimination when they identify adverse events, and therefore chose to forego reporting or, at the very least, allow events to go under-reported **(Johnstone and Kanitsaki, 2006).**

The International Council of Nurses, **(ICN, 2012**) states that nurses have a responsibility to address patient safety in all aspects of their work with patients, including reporting adverse events promptly to the appropriate authority. If errors go unreported they may result in avoidable harm occurring to patients, an undermining of the nurse–patient trust relationship or an undermining of the reputation of the profession **(Johnstone and Kanitsaki, 2006).**

2. Subjects and Methods

The methodology pursued in the conduction of the study is portrayed according to the following

Designs:

1-Technical design
2-Operational design
3-Admisterative design
3-Statistical design

1-TECHNICAL DESIGN

Research design:

An exploratory descriptive research design was adopted to fulfill the purpose of the study.

Aim of study:

The aim of this work is to assess the opinions of nurses about patient safety in El-Minia University Hospital, to compare the differences between the opinions of nurses working in general and special care units about patient safety and to determine the correlations between teamwork characteristics, communication structures, supervision and patient safety.

Research questions:

What are the opinions of nurses about patient safety in El-Minia University Hospital?

Are there any differences between the opinions of nurses working in general and special care units about patient safety?

What are the correlations between teamwork characteristics, communication structures, supervision and patient safety?

Research hypotheses:

It was hypothesized that there are significant differences between the opinions of nurses working in general and special care units about patient safety.

It was also hypothesized that patient safety is significantly correlated with teamwork characteristics, communication structures, and supervision.

Setting:

The study was carried out in El-Minia University Hospital. The hospital wards and units were divided into two groups; general ward including medical and surgical departments as selected for the study and special care units including Intensive Care Unit (ICU), Cardiac Care Unit (CCU) and Renal Dialysis Unit.

Subjects and sample:

The sample include of all nurses (n=60) working at medical (n=10) and surgical (n=12) wards and ICU (n=12), CCU (n=17) and Renal Dialysis Unit (n=9).

Tools of data collection:

Data collected was done through a questionnaire form.

A-Socio-demographic questionnaire form:

This was designed for collection of socio-demographic study variables including wards, experience and educational attainments, work hours and system.

B- Nursing Characteristics Questionnaire:

This was consisted of three sections that reflect teamwork characteristics, communication structures, and supervision. For teamwork characteristics and supervision sections, the level of agreement or disagreement was indicated by chosen the response that best represents the opinion. The available responses for each item range from "Strongly Disagree" with a value of "1", "Disagree" with a value of "2", "Undecided" with a value of "3", "Agree" with a value of "4" and "Strongly Agree" with a value of "5". For communication structures

section, the level of agreement or disagreement was indicated by chosen the response that best represents the opinion. The available responses for each item range from "Never" with a value of "1", "Rarely" with a value of "2", "Sometimes" with a value of "3", "Most of the Times" with a value of "4" and "Always" with a value of "5". The instrument was divided into three subscales; the first was identified as "teamwork characteristics" and included 18 items, the second was identified as "communication structures" and included 11 items, and the third was identified as "supervision" and included 3 items.

C- Patient safety Questionnaire:

Patient safety issues to present patients' injuries and incidents are included in separate section consists of 10 items. The level of agreement or disagreement was indicated by chosen response that best represents the opinion. The available responses for each item range from "Strongly Disagree" with a value of "1", "Disagree" with a value of "2", "Undecided" with a value of "3", "Agree" with a value of "4" and "Strongly Agree" with a value of "5".

2- Operational Design:

Field work:

The actual data collection from the nurses of different wards and units was started, aiming of research. Data collection was conducted by the investigators. The whole duration for data collection tool was about one month.

3- Administrative Design:

An official permission was taken from director of El-Minia University Hospital and oral agreement and consent was taken from practice nurses.

Pilot study was carried out on nurses to find out the differences in the question design in order to modify or clarify them. Modifications were done and final final from was developed.

3- Statistical Design:

Collected data were coded, entered and analyzed using Microsoft Office Excel (2007) software.

Data were then imported into Statistical Package for the Social Sciences (SPSS) version 16.0 and MedCalc version 12.1.3.0 software for analysis. Baseline characteristics of the study population were presented as frequencies and percentages (%) in qualitative data or mean values and standard deviations (SD) in quantitative data. Differences between frequencies were compared by Chi-square or Fisher exact tests. Differences between means were compared by t-test. *P* value of < 0.05 was considered significant. Pearson correlation coefficient test was used to evaluate the inter-correlations between the studied variables.

3. Results

The total number of participants was 60 nurses from different wards and units. Nurses working at medical department were 16.7% (n=10), working at surgical department were 20% (n=12), working at ICU were 20% (n=12), working at CCU were 28.3% (n=17) and working at Renal Dialysis Unit were 15% (n=9).

The majority of the nurses (65%) had experience attainment of 1-7 years. There was significant difference between the staff of general and special units regarding experience attainment. The majority of the nurses (81.7%) had educational attainment of Baccalaureate degree. There was no significant difference between the staff of general and special units regarding educational attainment (Table 1).

Table (1) Socio-demographic characteristics of nurses of general wards and special units of El-Minia University Hospital.

		Special units (n=38)		General wards (n=22)		Total units (n=60)		*Used test, P value*
		No.	%	No.	%	No.	%	
Wards and units	Dialysis unit	9	23.7	-	-	9	15.0	--
	ICU	12	31.6	-	-	12	20.0	
	CCU	17	44.7	-	-	17	28.3	
	Surgical	-	-	12	54.5	12	20.0	
	Medical	-	-	10	45.5	10	16.7	
Experience attainment (years)	1-7	29	76.3	10	45.5	39	65.0	X^2=8.25, *P*=0.016*
	>7-15	6	15.8	4	18.2	10	16.7	
	>15-40	3	7.9	8	36.4	11	18.3	
Educational attainment	Diploma	9	23.7	2	9.1	11	18.3	Fisher exact, *P*=0.19
	Baccalaureate degree	29	76.3	20	90.9	49	81.7	
Work hours	36-<42	18	47.4	6	27.3	38	40.0	X^2=3.35, *P*=0.188
	42-<48	8	21.1	9	40.9	14	28.3	
	48-60	12	31.6	7	31.8	7	31.7	
Work system	Day shift	-	-	-	-	24	40.0	--
	Night shift	-	-	-	-	17	28.3	
	Day-night shift	-	-	-	-	19	31.7	

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level

Table (2) Means, Standard Deviations, and Inter-correlations among the Studied Variables in total nurses.

		Mean	SD	1	2	3	4	5	6	7	8	9
1- Units	***Pearson Correlation***	1.37	.486									
	P-value											
2- Experience attainment	***Pearson Correlation***	1.53	.791	.425**								
	P-value			.002								
3- Educational attainment	***Pearson Correlation***	1.82	.390	.213	.181							
	P-value			.130	.199							
4- Work hours	***Pearson Correlation***	1.92	.850	.064	-.225	-.026						
	P-value			.651	.109	.857						
5- Teamwork	***Pearson Correlation***	2.53	.445	-.421**	-.125	-.004	-.050					
	P-value			.002	.378	.977	.723					
6- Communication	***Pearson Correlation***	2.9	.688	-.434**	-.090	-.072	.061	.782**				
	P-value			.001	.526	.613	.665	.000				
7- Supervision	***Pearson Correlation***	3.06	.855	.029	.060	.190	.192	.601**	.540**			
	P-value			.840	.670	.178	.174	.000	.000			
8- Patient safety	***Pearson Correlation***	2.83	.644	-.381**	-.184	-.030	.044	.612**	.666**	.306*		
	P-value			.005	.193	.835	.756	.000	.000	.028		
9- Overall response	***Pearson Correlation***	2.67	.682	-.328*	-.086	.042	.098	.875**	.892**	.781**	.759**	
	P-value			.018	.546	.768	.489	.000	.000	.000	.000	

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level

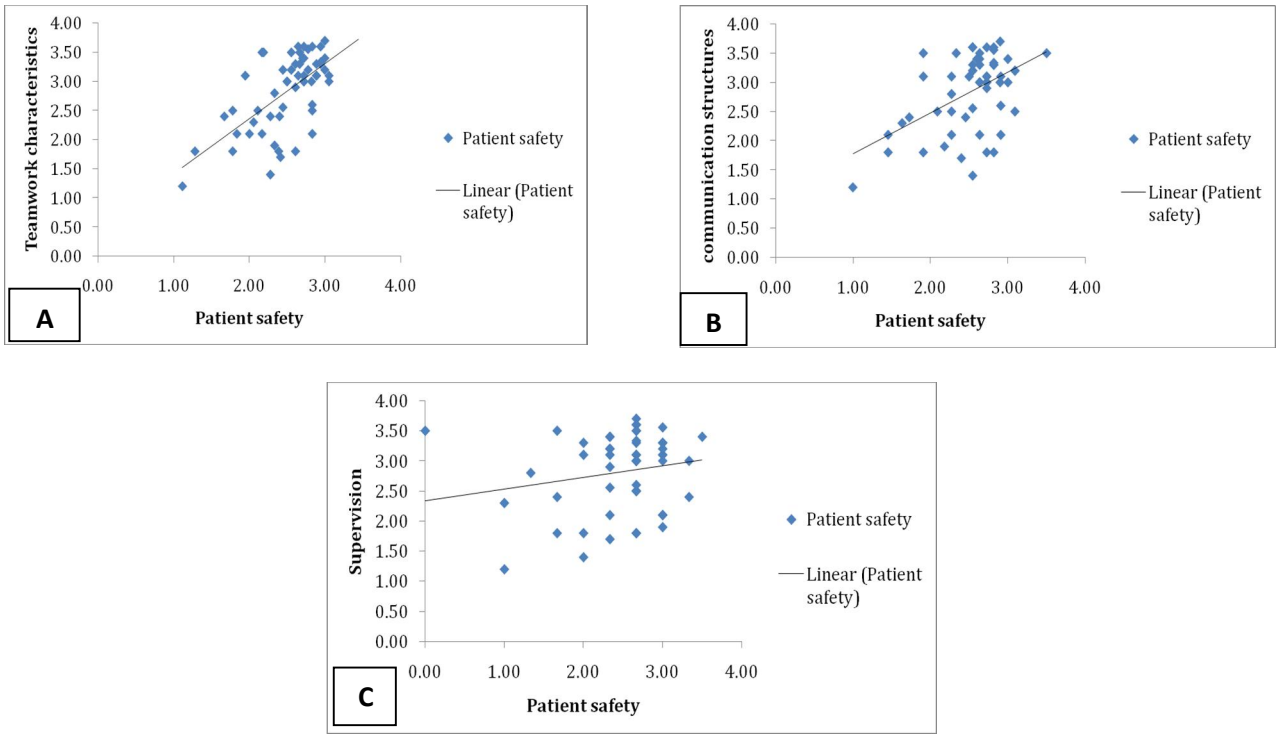

Figure (1) Correlations between Patient Safety and Teamwork characteristics (A), Communication structures (B) and Supervision (C).

The correlations among the study variables are shown in Table 2. Patients' safety is significantly correlated with teamwork characteristics, communication structures, and supervision. It also is

significantly correlated with overall Nursing response. From control demographic variables, patient safety was significantly correlated with special units (Table 2).

Figure (1) shows the significant positive correlations between Patient Safety and Teamwork characteristics (A), Communication structures (B) and Supervision (C).

Table (3) showed the Teamwork characteristics of nurses of general and special units of El-Minia University Hospital. The responses ranged from undecided to disagree. The mean values of the nurses of general and special units of were calculated. There were statistically significant differences between both groups in questions number (3, 4, 7 and 16). There were significantly higher mean values of Teamwork characteristics of nurses of special than general units.

Table (4) showed the Communication structures of nurses of general and special units of El-Minia University Hospital. The responses were mainly undecided. There were statistically significant differences between both groups in questions number (2, 3, 4, 5, 7 and 9). There were significantly higher mean values of Communication structures of nurses of special than general units.

Table (5) showed the Supervision of nurses of general and special units of El-Minia University Hospital. The responses were mainly undecided. There were no significant differences between both groups.

Table (6) showed the Patient safety of nurses of general and special units of El-Minia University Hospital. The responses were mainly undecided. There were statistically significant differences between both groups in questions number (1, 2, 5, 8, 9 and 10). There were significantly higher mean values of Patient safety of nurses of special than general units.

Table (3) Teamwork characteristics of nurses of general wards and special units of El-Minia University Hospital.

	Special units (n=38)		General wards (n=22)		Total units (n=60)		*P value*	*Response*
	Mean	SD	Mean	SD	Mean	SD		
1. Staff treat each other with respect	2.68	.662	2.73	.767	2.70	.696	0.83	*Undecided*
2. Staff support one another	2.79	.843	2.55	.671	2.70	.788	0.26	*Undecided*
3. We have enough staff to handle the workload	2.61	.946	1.91	.921	2.35	.988	0.007**	*Disagree*
4. Staff follow standard procedures to care	2.76	.751	1.91	.811	2.45	.872	<0.0001**	*Disagree*
5. Staff feel like they are part of a team	2.59	.896	2.32	.945	2.49	.917	0.27	*Disagree*
6. Staff use shortcuts to get their work done faster	2.58	.793	2.36	1.00	2.50	.873	0.35	*Disagree*
7. Staff get the training they need	2.58	.919	2.05	.999	2.38	.976	0.042*	*Disagree*
8. Staff have to hurry because they have too much work to do	2.71	.654	2.36	.953	2.58	.787	0.11	*Undecided*
9. When someone gets really busy, other staff help out	2.97	.645	2.57	.978	2.83	.798	0.06	*Undecided*
10. Staff are blamed when a patient is harmed	2.43	.778	2.38	.973	2.41	.848	0.83	*Disagree*
11. Staff have enough training on how to handle difficult patients	2.56	.843	2.15	.988	2.41	.910	0.09	*Disagree*
12. Staff are afraid to report their mistakes	2.61	.704	2.55	1.10	2.58	.865	0.80	*Undecided*
13. Staff understand the training they get	2.58	.874	2.40	.995	2.52	.914	0.47	*Undecided*
14. To make work easier, staff often ignore procedures	2.31	.758	2.45	.999	2.36	.847	0.54	*Disagree*
15. Staff are treated fairly when they make mistakes	2.58	.692	2.40	.883	2.52	.763	0.38	*Undecided*
16. Patients' needs are met during shift changes	2.72	.779	2.05	.826	2.48	.853	0.003**	*Disagree*
17. It is hard to keep patient safe because so many staff quit their jobs	2.58	.841	2.35	.745	2.50	.809	0.29	*Disagree*
18. Staff feel safe reporting their mistakes	2.63	.910	2.40	1.142	2.55	.997	0.39	*Undecided*
Total	2.63	.297	2.35	.592	2.53	.445	0.018*	*Undecided*

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level
Response categories based on the following scale: 1.5 or less= Strongly Disagree; 1.51 to 2.50 =Disagree; 2.51-3.49 Undecided; 3.50 to 4.49= Agree; 4.50 = Strongly Agree.

Table (4) Communication structures of nurses of general wards and special units of El-Minia University Hospital.

	Special units (n=38)		General wards (n=22)		Total units (n=60)		*P value*	*Response*
	Mean	SD	Mean	SD	Mean	SD		
1. Staff are told what they need to know before taking care of a patient for the first time	3.17	.878	2.95	1.32	3.09	1.05	0.44	*Undecided*
2. Staff are told right away when there is a change in a patient's care plan	3.31	.951	2.65	1.23	3.07	1.09	0.02*	*Undecided*
3. We have all the information we need when patients are transferred from the hospital	3.22	.989	2.35	1.04	2.91	1.08	0.002**	*Undecided*
4. When staff report something that could harm a patient, someone takes care of it	3.19	.822	2.60	1.14	2.98	.981	0.02*	*Undecided*
5. We talk about ways to keep incidents from happening again	3.00	.791	2.25	1.12	2.72	.988	0.004**	*Undecided*
6. Staff tell someone if they see something that might harm a patient	3.06	.914	2.80	1.36	2.96	1.10	0.38	*Undecided*
7. Staff ideas and suggestions are valued	2.91	.914	2.00	.745	2.58	.957	0.0002**	*Undecided*
8. We discuss ways to keep patients safe from harm	2.75	.880	2.32	1.00	2.59	.942	0.07	*Undecided*
9. Staff opinions are ignored	3.25	1.05	2.35	.933	2.90	1.09	0.002**	*Undecided*
10. Staff are given all the information they need to care for patients	3.10	.908	3.00	1.16	3.06	.998	0.71	*Undecided*
11. It is easy for staff to speak up about problems	3.15	.834	2.74	1.05	3.00	.929	0.1	*Undecided*
Total	3.08	.537	2.57	.818	2.896	.688	0.005**	*Undecided*

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level
Response categories based on the following scale: 1.5 or less= Strongly Disagree; 1.51 to 2.50 =Disagree; 2.51-3.49 Undecided; 3.50 to 4.49= Agree; 4.50 = Strongly Agree.

Table (5) Supervision of nurses of general wards and special units of El-Minia University Hospital.

	Special units (n=38)		General wards (n=22)		Total units (n=60)		*P value*	*Response*
	Mean	SD	Mean	SD	Mean	SD		
1. My supervisor listens to staff ideas and suggestions about patient safety	3.06	.704	3.10	1.07	3.08	.851	0.86	*Undecided*
2. My supervisor says a good word to staff who follow the right procedures	2.85	.834	3.35	1.35	3.04	1.07	0.08	*Undecided*
3. My supervisor pays attention to patient safety problems	3.15	.906	2.95	1.28	3.08	1.05	0.48	*Undecided*
Total	3.02	.661	3.13	1.12	3.06	.855	0.63	*Undecided*

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level
Response categories based on the following scale: 1.5 or less= Strongly Disagree; 1.51 to 2.50 =Disagree; 2.51-3.49 Undecided; 3.50 to 4.49= Agree; 4.50 = Strongly Agree.

Table (6) Patient safety according to the nurses' opinions of general wards and special units of El-Minia University Hospital.

	Special units (n=38)		General wards (n=22)		Total units (n=60)		*P value*	*Response*
	Mean	SD	Mean	SD	Mean	SD		
1. Patients are well cared for in this unit	3.16	.958	2.55	.759	2.95	.934	0.013*	*Undecided*
2. Management asks staff how the unit can improve patient safety	2.89	1.02	2.15	.988	2.63	1.06	0.008**	*Undecided*
3. This unit lets the same mistakes happen again and again	3.35	.978	3.10	1.33	3.26	1.11	0.41	*Undecided*
4. It is easy to make changes to improve patient safety in this unit	3.11	.936	2.85	1.27	3.02	1.06	0.37	*Undecided*
5. This unit is always doing things to improve patient safety	3.05	.970	2.30	.865	2.79	.995	0.004**	*Undecided*
6. This unit does a good job keeping patients safe	2.86	.867	2.42	.902	2.71	.896	0.07	*Undecided*
7. Management listens to staff ideas and suggestions to improve patient safety	2.68	.973	2.45	.945	2.60	.961	0.38	*Undecided*
8. This unit is a safe place for patients	3.00	.956	2.40	1.05	2.79	1.02	0.028*	*Undecided*
9. Management often walks around the unit to check on patient care	2.92	.924	2.20	.834	2.67	.951	0.005**	*Undecided*
10. When this unit makes changes to improve patient safety, it checks to see if the changes worked	3.11	1.02	2.50	.889	2.89	1.01	0.023*	*Undecided*
Total	3.02	.600	2.49	.595	2.832	.644	0.002**	*Undecided*

*Statistical significant P-value at the 0.05 level, **statistical significant P-value at the 0.01 level
Response categories based on the following scale: 1.5 or less= Strongly Disagree; 1.51 to 2.50 =Disagree; 2.51-3.49 Undecided; 3.50 to 4.49= Agree; 4.50 = Strongly Agree.

4. Discussion

Previous research studies have identified factors which can enhance patient safety outcomes, such as nurse staffing levels and nurse workload **(Kirwan *et al.*, 2012).**

Currently in many countries, the reality for hospitals is actually reduced levels of funding. Healthcare staff and the public in general continue to expect ever-increasing levels of safety and high quality patient care. To meet these demands hospitals need to examine how services operate at the point of care delivery in order to address factors at a local level which can result in improvements to patient safety and quality of care. This research study assessed the opinions of nurses working in special care units and general wards environment, as the point of patient care delivery, to identify locally modifiable factors which can result in safer care for patients in those units and wards.

The study utilized Multi-sectional questionnaire in order to examine the impact of nursing characteristics factors on patient safety outcomes. Such characteristics enabled identification of staff factors which impact safety, and to which, modifications can be achieved with minimal cost implications for hospitals.

The results of this study are consistent with the idea that patient safety outcomes are associated with the teamwork characteristics within which nurses' practice. The teamwork environment has been linked to patient safety outcomes through previous research studies **(Laschinger and Leiter, 2006; Friese *et al.*, 2008; Aiken *et al.*, 2011; 2012).**

The evidence of such studies suggests that when nurses perceive their teamwork environment to be supportive patient safety outcomes are enhanced. The Institute of Medicine's 2004 publication Keeping Patients Safe highlighted the importance of nurses and their teamwork environment to the patient safety process.

In this study a positive teamwork characteristics, specifically at ward and unit level, has been shown to result in higher levels of nurse reported patient safety. The study provides empirical evidence that an optimal teamwork characteristic in a ward/unit can increase patient safety within that ward/unit. Nurses are reliable reporters and the Nursing Work Index has also been validated in one study for use in the measurement of ward/unit level (Mulvey-Boyle, 2004).

Nursing staff in this study documented that they disagree (nurses in general wards) or undecided (nurses in special care units) about the question of feeling safe to report their mistakes.

For the first time, in Kirwan and his colleagues (2012) study, the work environment of nurses is linked to their adverse event reporting rates; specifically it was found that a more positive work environment results in higher levels of adverse event reporting rates by nurses. Under-reporting of adverse events in healthcare is an acknowledged problem and has been linked to fear of punishment or retribution. However adverse event occurrence in healthcare is common and most errors are preventable. Open and transparent reporting of such events facilitates organizational learning and minimizes the chances of reoccurrence.

A recent report from the Department of Health and Human Services (Levinson, 2012) which looks at 195 hospitals suggests that 86% of adverse events which occur to patients in hospital go unreported. Higher adverse event reporting rates are therefore not seen to be indicative of increased event occurrence, but instead indicate a move away from the under reporting which has been a limitation of patient safety schemes up to now. Increased reporting by nurses demonstrates a greater understanding of the systems approach to safety, the worth of full and open investigations of incidents, and a greater willingness to facilitate organizational learning. Investment in the work environment of nurses may reduce levels of under-reporting of adverse events in health care.

Recent work by **Aiken *et al.* (2011)** suggests that improving staffing levels in an inadequate teamwork environment may be counterproductive. It may simply add to costs without having a substantial impact on patient outcomes.

The findings of this study didn't support the associations in previous literature between higher nurse education levels and improved patient safety outcomes outcomes **(*Aiken et al.*, 2003; Estabrooks *et al.*, 2005; Bruyneel *et al.*, 2009).**

This may be because the majority of the nurses (81.7%) included in this study had educational attainment of Baccalaureate degree.

The proportion of nurses with a degree on a ward impacts, both nurse reported patient safety in the unit, and the number of adverse event reports submitted. The Institute of Medicine in the US recommends increasing the proportion of nurses with degrees in wards to 80% by 2020 (IoM, 2010).

Many studies have demonstrated that degree level education contribute towards improved patient safety **(Kirwan *et al.*, 2012)**. Future hospital workforce planning should heed the relationship between the proportion of nurses with degrees at ward level and patient safety outcomes.

Our data revealed that Patients' safety is significantly correlated with teamwork characteristics, communication structures, and supervision.

These findings are consistent with the identified factors of patient safety structures reported by

Department of Health and Children, (2008). These include communication structures, leadership, and teamwork, along with reporting systems and analysis of adverse events. Sufficient staff knowledge around safety processes, and an acknowledged supportive safety culture in healthcare, has been identified as areas to be addressed for the advancement of patient safety.

One of the advantages of this study was the sampling process where between five wards and units of the hospital were included. In this research two general wards were included and three special care units were included. The generalize-ability of the results outside of general wards may be possible.

This study has advanced on previous work investigating the relationships between teamwork characteristics, communication structures, supervision and patient safety outcomes.

The challenge for nurse managers lies in harnessing the nurses' knowledge and using it to enhance patient safety in hospitals and in wards. It would seem that a focus on the educational make-up of the workforce on wards in order to ensure the highest possible proportions of nurses educated to degree level would be beneficial. Furthermore, cost effective enhancement of the work environment of wards, focusing on management, leadership and teamwork could result in safer patient care.

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Prognostic Assessment of P-Glycoprotein over Expression in Refractory and / or Relapsed Acute Myeloid Leukemia and Response to Cyclosporine A

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Abstract: Acute myeloid leukemia (AML) is a malignant hematopoietic neoplasm characterized by clonal proliferation of tumor cells that arise from the hematopoietic stem/progenitor population within the bone marrow. ***Objectives*** our study was enrolled to assess p-glycoprotein overexpression in refractory and /or relapsed acute myeloid leukemia and response to addition of cyclosporine A to chemotherapy. ***Patients and Methods*** this study was carried out at Hematology and Medical Oncology Unit, Internal Medicine Department, Zagazig University hospital during the period between July 2010 and July 2011. Forty patients with refractory or relapsed acute myeloid leukemia were classified into two groups, group (A**):** included 20 adult patients, their ages ranged from 18 to 60 years with median age 39 years, and they were treated with chemotherapy alone, group (B) included 20 adult patients with, their ages ranged from 20 to 61 years with median 40 years, they were treated with oral cyclosporine A in addition to the same chemotherapy protocol given in group A. All patients subjected to thorough medical history, physical examination, routine laboratory and radiological investigations and flowcytometry to assess p-glycoprotein overexpression. All patients had severe cardiac, pulmonary, hepatic, renal, neurological, metabolic disease, concomitant malignancies or uncontrolled infections were excluded from the study .***Results*** P-glycoprotein was overexpressed in 22 patients with refractory or relapsed AML (55%), when the unpaired (t) test was applied to test the significance of difference between the mean value ± S.D of percentage of bone marrow blasts and Pglycoprotein overexpression, there was not any significant difference detected (t=0.08 and *p*=0.91). Chi square test (χ^2) test was applied to test the significance of difference among different variables and P-glycoprotein overexpression. A statistically significant difference was found with cytogenetic study ($\mathbf{X^2}$ =8.5 and *P*=0.03) and response to treatment ($\mathbf{X^2}$ =8.02 and *P*=0.018). 13 patients were achieved CR (33%), 8 patients with PR (20%) and 19 patients with NR (47%) and when Chi square (χ^2) test was applied to test the significance of difference among variables associated with response to treatment, a high significant difference was found with cytogenetic study ($\mathbf{X^2}$ =33.93 and *P*= 0.001) The mean overall survival in group B was more than group A but wasn't significantly different (*P*= 0.25) also no significant difference between overall survival and P-glycoprotein overexpression (*P*= 0.15), but there was highly significant difference between overall survival and response to treatment (*P*= 0.0014), also Chi square (χ^2) test was applied to test the significance of difference among different toxicities which were occurred during therapy with patient groups, there is no significant difference was found ***conclusion*** P-glycoprotein was overexpressed in 55% of patients with refractory or relapsed acute myeloid leukemia and provide prognostic indicator for response to treatment and addition of oral cyclosporine as P-glycoprotein modulator doesn't improve response to chemotherapy or overall survival.

[Ashraf M. El Hefni, Fouad M. Abu Taleb, Khaled M.Hadhoud, Mahmoud A. Ashour and Amal Ahmed Zidan. **Prognostic Assessment of P-Glycoprotein over Expression in Refractory and / or Relapsed Acute Myeloid Leukemia and Response to Cyclosporine A.** *Life Sci J* 2012;9(4):5407-5416] (ISSN:1097-8135). http://www.lifesciencesite.com. 801

Key words:- Acute myeloid leukemia (AML), P-glycoprotein (Pgp),Treatment response.

1. Introduction

Cancer is a major public health problem in many parts of the world [(1)] and advancements in early detection and cancer treatments have yielded significant progress [(2)]**.** Multidrug resistance (MDR) represents a major obstacle in successful therapy of neoplastic diseases so, despite of treatment with invasive chemotherapy, a considerable number of patients with acute myeloid leukemia die because of occurrence of resistance [(3)]**.** P-glycoprotein (Pgp) is a 170 kDa plasma protein, belongs to the ATP-binding Cassette (ABC) transporters, which are associated with several (in excess of 40) family members that share sequence and structural homology protecting cancer cells from apoptosis and they use the energy that is released when they hydrolyze ATP to derive the movement of various (exogenous and endogenous) molecules across the cell membrane [(4, 5)]**.** Since the discovery of P-glycoprotein (Pgp) there had been an enormous effort to generate clinically applicable inhibitors to restore sensitivity of cancer cells to chemotherapy [(6)] and many agents that

modulate the Pgp transporter were identified in the 1980s, including Cyclosporine A [7]. Cyclosporine A is a widely used immunosuppressant drug who's therapeutic and toxic actions are mediated through inhibition of calcineurin, a calcium and calmodulin-dependant phosphatase[8]. The clinical efficacy of Cyclosporine A as a modulator in AML might in part reflect a broad spectrum of activity against the MDR proteins expressed in AML cells[9]. In addition to broad spectrum modulation, CsA has been reported to have other effects that may be beneficial, including induction of apoptosis in at least some cell types as well as anti-angiogenic effects [10]. So our study had been enrolled to evaluate p-glycoprotein over expression in patients with refractory or relapsed acute myeloid leukemia and response to cyclosporine A in addition to chemotherapy.

2. Patients and methods:-

This study was carried out at Hematology and Medical Oncology Unit, Internal Medicine Department, Zagazig University Hospital during the period between July 2010 and July 2011. It was included 40 patients with refractory or relapsed acute myeloid leukemia and was classified into two groups. Group (A) included 20 adult patients, their ages ranged from 18 to 60 years with median age 39 years and they were treated with chemotherapy alone (Ara-C 1 gm/ m^2/12 hour, 3 hours Intravenous infusion from day 1 to day 3 and Novantron 10 mg/ m^2 intravenous infusion from day 3 to day 5) [11]. Group (B) included 20 adult patients their ages ranged from 20 to 61 years with median age 40 years, they were treated with oral Cyclosporine A (5 mg/kg/d orally for 5 successive days) in addition to the chemotherapy given in the same protocol as in group A . Well informed consent was obtained , also the protocol of therapy was reviewed and accepted by our institutional board. All patients had severe cardiac, pulmonary, hepatic, renal, neurological, metabolic disease, concomitant malignancies or uncontrolled infections were excluded from the study and all patients were subjected to complete clinical history and physical examination, routine laboratory investigations includes (complete blood picture, liver & kidney functions, PT, PTT/ INR and ESR). Virology studies including (HBs Ag, HCV Ab, HIV Ab), bone marrow aspiration and biopsy with immunophenotyping and Cytogenetic study, routine radiology (chest X-ray and CT chest if indicated, pelvi-abdominal ultrasonography and CT abdomen & pelvis if indicated and echocardiography). while detection of P-glycoprotein expression level was done by anti-P-glycoprotein monoclonal antibody which was used to detect the mean fluorescence intensity (MFI) of Pgp on blast cells using Becton Dickinson FAC scan flowcytometery and the intensity of staining of mean fluorescence index (MFI) was used in the detection of the Pgp expression level which represents the ratio between the mean fluorescence intensity of cells stained with the specific antibody and that of cells stained with the isotype matched control antibody[12] and the response to treatment was evaluated according to revised recommendations of the international working group for standardization of response criteria, the complete remission (CR), when the cellularity of the bone marrow (BM) after regeneration was near normal with <5% blast cells, the peripheral blood recovered completely, and no extra-medullary leukemic infiltrates were present. When the BM blast cell count remained between 5 and 25% but was reduced by at least 50% in comparison to the initial value, and the peripheral blood levels recovered completely, a patient was be considered to be in partial remission (PR) and failure to attain CR or PR will be consistent with failure or non response (NR) [13] as well as toxicity of treatment was evaluated according to WHO common toxicity Criteria.

Statistical Analysis

Data were collected, entered and checked to a SPSS version 15. Data were expressed as mean ± standard deviation in quantitative variables, number and percentage for qualitative variables, Chi square and correlation coefficient were used for analysis of data and for all above mentioned statistical test, the threshold of significance is fixed at 5% level (P-value).Kaplan-Meier used mainly in survival studies of patients and confidence intervals were calculated using Greenwood's estimate of the standard error and differences in overall survival were tested for significance using the log-rank statistic [14].

3. Results

Patient characteristics of study are showed in table (1) and P-glycoprotein was overexpressed in 22 patients with refractory or relapsed AML (55%) in figures: 1, 2, and 3).

Chi square test (χ^2) test was applied to test the significance of difference among different variables and Pgp overexpression. A statically significant difference was found with cytogenetic study ($\mathbf{X^2}$ =8.5 and *P*=0.03) and response to treatment ($\mathbf{X^2}$ =8.02 and *P*=0.018) Table (3) Figure (4).

The patient response to treatment was as follow: 13 patients achieved CR (33%), 8 patients with PR (20%) and 19 patients with NR (47%) and when Chi square (χ^2) test was applied to test the significance of difference among variables associated with response to treatment, a high significant difference was found with cytogenetic study ($\mathbf{X^2}$ =33.93 and *P*= 0.001) Table (4) Figure (5).

Kaplan-Meier method was used to estimate one year over all survival of patients of the study. The mean overall survival in group B was more than group A but there wasn't significant difference (*P*= 0.25) also no significant difference between overall survival and Pgp over expression (*P*= 0.15), but there was highly significant difference between overall survival and response to treatment (*P*= 0.0014) Tables (5, 6, 7) Figures (6, 7, 8).

Chi square (χ^2) test was applied to test the significance of difference among different toxicities which were occurred during therapy and patient groups, there was no significant difference was found (Table 8).

Table(1)

Character	No.	%
Age(in years):		
Range(18-61)		
Median (41)	40	100
Sex:		
Male	18	45
Female	22	55
Clinical presentation:		
CNS infiltration	3	7.5
Pallor	8	20
Fever	10	25
Gum hypertrophy	6	15
Purpura	6	15
Lymphadenopathy	1	2.5
Spleenomegaly	1	2.5
Hepatomegaly	3	7.5
Chloroma	2	5
Virology:		
Hcv Ab +ve	14	35
HBsAg +ve	3	7.5
Hcv/Hbv -ve	23	57
Bone Marrow (B.M) Blasts (%):		
Range (48-95)		
$\bar{X}$± SD (74.87±13.85)	40	100
Immunophenotyping:		
+ve myeloid markers	40	100
FAB classification:		
M0	3	7.5
M1	4	10
M2	6	15
M4	10	25
M5	17	45
Cytogenetic study:		
Unfavorable	13	33
Intermediate	11	27
Favorable	8	20
Unknown	8	20

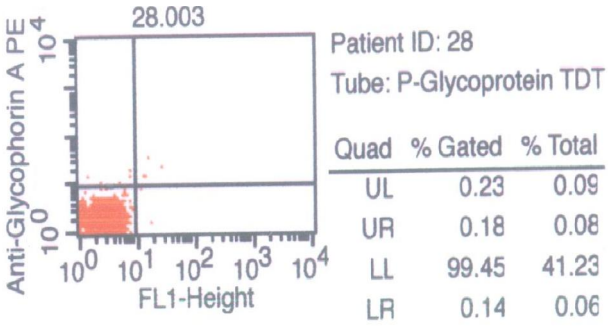

Figure (1): Histogram of patient showing –ve Pgp expression.

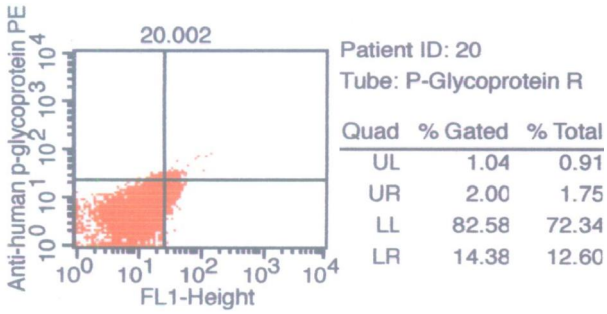

Figure (2): Histogram of patient showing +ve Pgp expression.

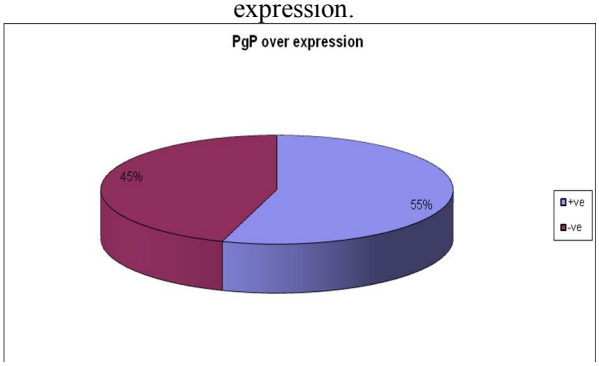

Figure (3): Distribution of cases according to Pgp over expression.

Table (2): Comparison between PgP overexpression and percentage of Bone Marrow blasts:

	Pgp -ve	Pgp +ve	T	*P*
B.M blasts $\bar{X}$± SD	71.77±11.79	74.95±15.61	0.08	0.91

Table (3): Comparison between PgP overexpression with FAB classification, cytogenetic study and response to treatment:

	Pgp –ve		Pgp +ve		X^2	*P*
	No.	%	%	No.		
FAB:						
M0	1	33.3	2	66.7		
M1	2	50	2	50		
M2	4	66.6	2	33.3	3.92	0.41
M4	6	60	4	40		

M5	5	29.4	12	70.5		
Cytogenetic:						
Unfavorable	2	15.3	11	84.7		
Intermediate	5	45.4	6	54.6	8.5	0.03*
Favorable	6	75	2	25		
Unknown	5	62.5	3	37.5		
Response:						
CR	10	76.9	3	23.1		
PR	2	25	6	75	8.02	0.018*
NR	6	31.5	13	68.4		

Significant*

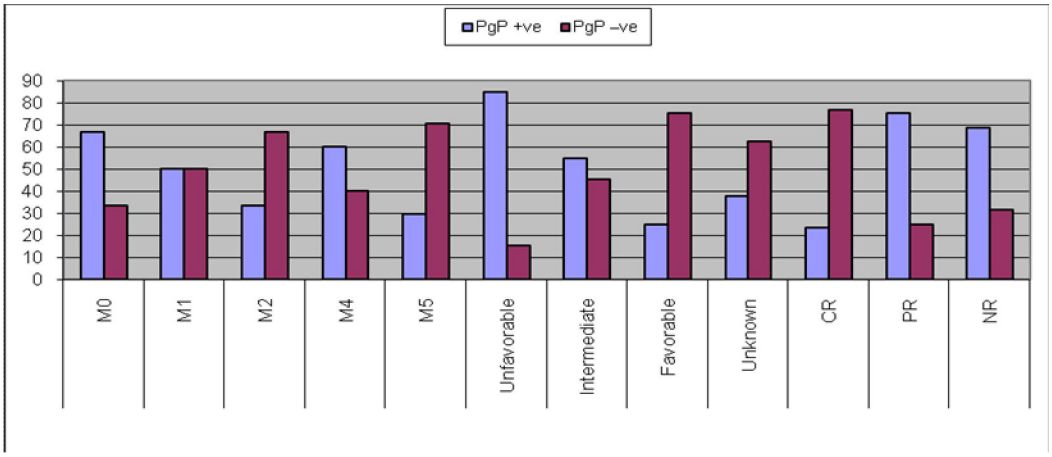

Figure (4): Comparison between Pgp overexpression with FAB classification, cytogenetic study and response to treatment

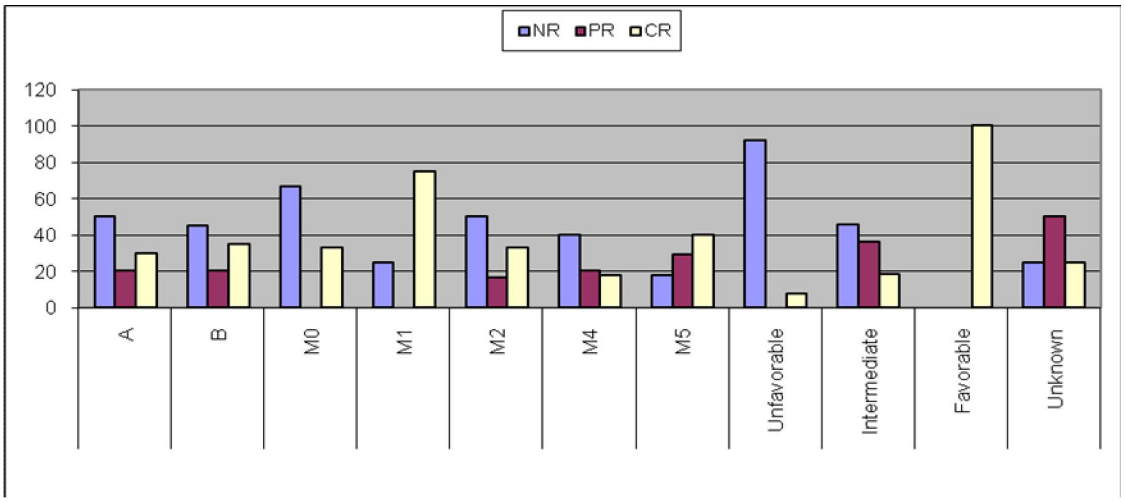

Figure (5): Comparison between treatment response with studied groups, FAB classification and cytogenetic study.

Table (4): Comparison between response to treatment with studied group, FAB classification and cytogenetic study:

	CR		**PR**		**NR**		**X2**	***P***
	NO.	%	NO.	%	NO.	%		
Patient group:								
A	6	30	4	20	10	50	0.13	0.93
B	7	35	4	20	9	45		
FAB:								
M0	1	33.3	0	0	2	66.6	6.62	0.57
M1	3	75	0	0	1	25		

M2	2	33.3	1	16.7	3	50	
M4	4	40	2	20	4	40	
M5	3	17.6	5	29.4	9	52.9	
Cytogenetic:							
Unfavorable	1	7.7	0	0	12	92.3	
Intermediate	2	18.2	4	36.4	5	45.5	33.93 0.001**
Favorable	8	100	0	0	0	0	
Unknown	2	25	4	50	2	25	

Table (5): Comparison between overall survival and patient groups:

	Group A		Group B		Log rank	
	No.	%	No.	%		
Censored	6	30	10	50	1.3	0.25
Event	14	70	10	50		
Mean survival ±SD	4.90 ± 0.46		6.83 ± 0.88			
95% confidence interval	4.00 – 5.81		5.10 – 8.57			

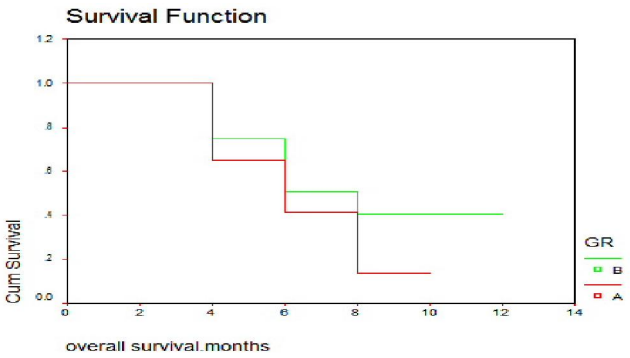

Figure (6): comparison between overall survival and patient groups.

Table (6): Comparison between overall survival and Pgp over expression:

	Pgp –ve		Pgp +ve		Log rank	
	No.	%	No.	%		
Censored	9	50	7	31.82	2.04	0.15
Event	9	50	15	68.18		
Mean survival ± SD	7.31 ± 0.87		5.08 ± 0.59			
95% confidence interval	5.60 – 9.01		3.92- 6.23			

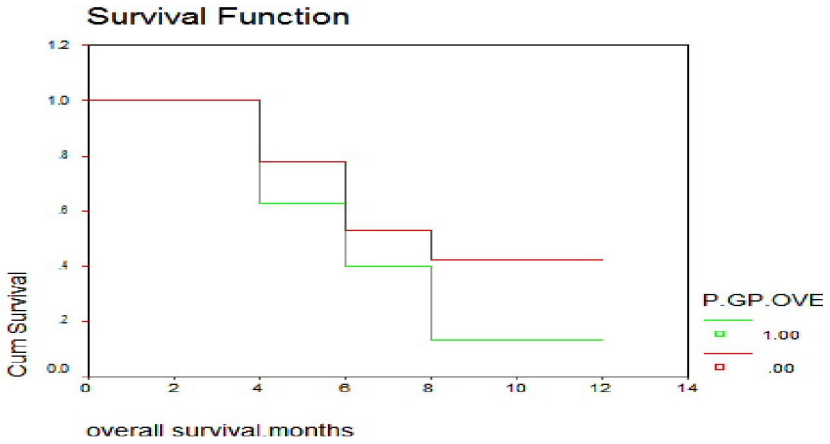

Figure (7): Comparison between overall survival and PgP over expression.

Table (7): Comparison between overall survival and response to treatment:

	CR		PR		NR		Log rank	
	No.	%	No.	%	No.	%		
Censored	5	83.33	1	25	0	0	13.3	0.0014**
Event	1	16.76	3	75	10	100		
Mean survival ± SD	7.33 ± 0.54		5.25 ± 1.09		3.5 ± 0.40			
95 % confidence interval	6.27 – 8.40		3.11 – 7.39		2.7 – 4.29			

** Highly significant

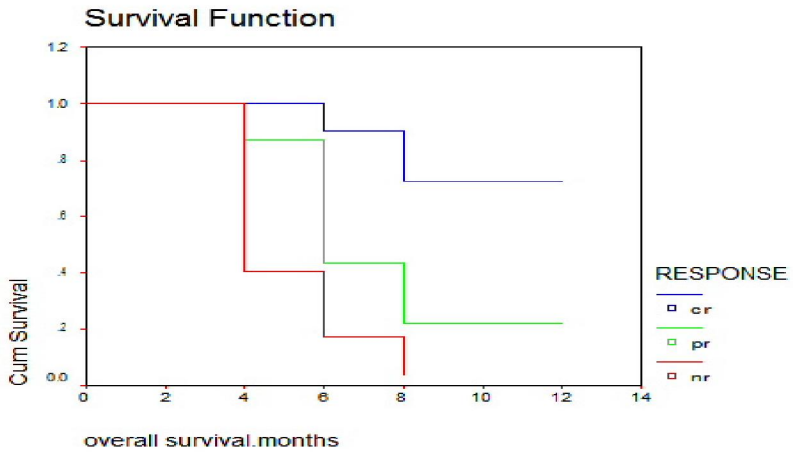

Figure (8):comparison between overall survival and response to treatment.

Table (8): Comparison between patient groups as regard common toxicity criteria :

Toxicity & grading	Group A		Group B		X_2	*P*
	No.	%	No.	%		
Hematological:						
Neutropenia						
II	1	5	0	0		
III	4	20	4	20	1.32	0.72
IV	15	75	16	80		
HB %						
I	1	5	0	0		
II	3	15 12	4	20	1.03	0.59
III	60 4	20	13	65		
IV			3	15		
Thrombocytopenia	2	10				
III	18	90	3	15		
IV			17	85	0.22	0.63
Gastrointestinal:						
Nausea/vomiting						
I	3	15	2	10		
II	8	40	5	25	4.69	0.19
III	7	35	13	65		
IV	2	10	0	0		
Diarrhea						
0	9	45	9	45		
I	3	15	4	20	1.14	0.76
II	1	5	0	0		
III	7	35	7	35		
Constipation						
0	10	50	8	40		
I	1	5	1	5		
II	4	20	2	10	5.89	0.21
III	3	15 2	9	45		
IV	10		0	0		
Liver:						
AST/ ALT						

0	15	75	13	65		
I	4	20	4	20	1.14	0.56
II	1	5	3	15		
Bilirubin						
0	18	90	14	70		
I	1	5	3	15	2.5	0.28
II	1	5	3	15		
Clinical status						
No coma	20	100	20	100	0.0	1
Cardiac:						
Rhythm						
0	17	85	20	100	3.2	0.07
I	3	15	0	0		
Ejection fraction						
0	20	100	19	95		
I	0	0	1	5	fisher	1.0
Renal:						
Creatinine						
0	18	90	17	85		
I	2	10	3	15	fisher	1.0
Infection:						
I	4	20	4	20		
II	4	20	8	40	2.1	0.34
III	12	60	8	40		
Stomatitis:						
0	3	15	6	30		
I	4	20	7	35	4.15	0.24
II	7	35	5	25		
III	6	30	2	10		
Alopecia:						
I	1	5	1	5		
II	4	20	6	30	0.54	0.76
III	15	75	13	65		

4. Discussion

Acute myeloid leukemia (AML) is a malignant hematopoietic neoplasm characterized by clonal proliferation of tumor cells that arise from the hematopoietic stem/progenitor population within the bone marrow [(15)].

AML is the most common acute leukemia in adults and accounts for approximately 69 percent of cases in this group, AML accounts for less than 1% of all cancers and 29% of all leukemia, approximately 12,950 new cases of AML are diagnosed annually in the United States[(1)].

In NCI, Cairo University, AML accounts for approximately 41.5% of newly diagnosed cases with acute leukemia registered in the time period between January 2002 and December 2003[(16)]. The incidence of AML increases with age, and is most frequently observed in older adults, the median age at diagnosis was 67 years of age [(17)] but in our study, the patient median age was 41 years and the range was 18-61 years and in both patient groups the median age was nearly equal. The incidence of AML is higher in males than in females with male to female ratio of 1.1:1.0[(1)] but in our study, males were 45% of patients and females were 55% with female to male ratio of 1.2:1.1.

This difference of demographic data might be attributed to difference in selection criteria as in our study the patients were refractory or relapsed AML cases not de novo cases.

The clinical signs and symptoms of AML are diverse and nonspecific, but they are usually directly attributable to the leukemic infiltration of the bone marrow, with resultant cytopenia[(18)].

Fever was the most common clinical manifestation of patients in our study followed by pallor, purpuric eruption and gum hypertrophy and this is consistent with data published by Weinblatt [(19)] who noted that fever and manifestations of bone marrow failure represent the most common initial clinical presentation followed by manifestations of extra-medullary involvement.

The FAB morphologic classification names the AML according to the normal marrow elements that they most closely resemble [(20)].

M5 was the most common in our study (45%) followed by M4 (25%), in Bassan *et al.* [(21)], M1 was the commonest (27%) followed by M2 (22%), in List *et al.* [(22)], M2 was the commonest (27%) followed by M4 (23%) and this difference might be attributed to difference in selection criteria.

Karyotype analysis is a key component of the initial evaluation of a patient with AML[(23)]. In our study, Cytogenetic analysis of patients revealed that 33% of them were with unfavorable cytogenetics , 27% were with intermediate cytogenetics, 20% were with favorable cytogenetics and 20% were unknown and this reflect the aggressiveness of the disease from the start and explain the poor response of these

patients to initial chemotherapy, furthermore, patients with normal karyotyping must be classified into favorable or unfavorable cytogenetic according to e.g. NPM1/FLT3mutations in order to give more accurate data.

In List *et al.* [22], Cytogenetic analysis of patients reveal that 34% of them were with unfavorable cytogenetics, 29% were with intermediate cytogenetics, 8% were with favorable cytogenetics and 29 % were unknown and this was approximately consistent with our data.

Although the clinical outcome of acute leukemia has been improved by recent progress in chemotherapy, it stills a difficult disease to treat. One major problem is the emergence of leukemic blast cells that are resistant to anticancer drugs and it is obvious that this resistance of leukemic blast cells to chemotherapeutic agents eventually will lead to treatment failure [24].

The overproduced P-glycoprotein that extrudes anti cancer drugs from cells is the most common mechanism of multi-drug resistance [25].

In our study Pgp was overexpressed in 55% of patients and normally expressed in 45% reflecting overexpression of MDR1 gene. In List *et al.* [22], Pgp was over expressed in 30% of patients and normally expressed in 57% and there was 13% with unknown expression level.

In Leith *et al.* [26], Pgp was overexpressed in 35% of patients and normally expressed in 65%, In Damiani *et al.* [27], Pgp was over expressed in 33% of patients and normally expressed in 67%.

P-glycoprotein expression level, in the present work didn't show any significant difference with FAB subtypes and this is consistent with data reported by Senent *et al.* [28]. In contrast with these results, many authors found that the frequency of Pgp expression is significantly correlated with certain AML subtypes. Motoji *et al.* [29] found that Pgp expression level was low in M3 subtypes and the difference in these results may be attributed to absence of AML (M3) patients in our study. There was significant relationship between P-glycoprotein over expression with poor cytogenetic of patients of our study and this is consistent with data reported by Wüchter *et al.* [30].

The development of agents able to modulate MDR mediated by Pgp and other ABC transporters remained a major goal for the past 20 years including Cyclosporine A (CSA) which was the first immune suppressor that have been shown to modulate Pgp activity and entered very early into clinical trials for reversal of MDR [31].

The main purpose of our study is to evaluate oral cyclosporine A as a Pgp modulator, so it was given in addition to chemotherapy then response was evaluated in the CsA and non CsA arms and was as follow: 33% of patients achieved CR, 20% PR, 47% NR and there was no significant difference between patient groups (addition of cyclosporine A doesn't improve response to chemotherapy).

In List *et al.* [22], significant greater proportion of patients treated with cyclosporine A achieve CR after one course of induction treatment compared to the non CsA arm, also percentage of refractory disease in the non CsA arm was 47% compared with 31% in the CsA arm.

In Bassan *et al.* [21], infusional cyclosporine A was used with HiDAC and Idarubicin in treatment of refractory or relapsed AML patients and results was as follow: 61% of patients achieve CR, 16% achieve PR and 23% were non responders. In List *et al.* [22], infusional cyclosporine A was used with HiDAC and Daunorubicin in treatment of Patients with poor-risk acute myeloid leukemia (AML) and results was as follow: 62% of patients achieve CR,7% achieve PR and 31% were non responders. In all of these previous studies, cyclosporine A which was used as p-glycoprotein modifier was given by the intravenous route but in our current study it was used by the oral route which is available and easy administered, and this may explain the absence of significant response to cyclosporine. FAB subtypes of patients didn't affect the response to treatment and in contrast with these results Daenen *et al.* [32] who found that M0,M6 and undefined FAB subtypes was associated with poor response, also Meletis *et al.* [33] found that M0 and M1 was associated with poor response to treatment.

P-Glycoprotein is associated with poor outcome in acute myeloid leukemia [34] and its expression on leukemic blast cells at initial presentation affects the responsiveness to induction chemotherapy.it has become apparent from many studies that the remission rate is significantly lower in Pgp +ve patients than in Pgp -ve patients [35].

In our study there was significant relationship between PgP expression and response to treatment (Pgp over expression is associated with poor response) and this matched with Wüchter *et al.* [30] who found that CR after induction chemotherapy was correlated with significant lower PgP function. In contrast to these results List *et al.* [22] found that there was no significant relationship between PgP expression and response to treatment. In our study there was highly significant relationship between cytogenetics of patients and response to treatment (unfavorable cytogenetics were associated with poor response) and these results are matched with those of List *et al.* [22] and Meletis *et al.* [33]. Cytogenetics remains the most important disease related prognostic factor [36]. In our study there was highly significant relationship between cytogenetics of patients and

response to treatment; unfavorable cytogenetics are associated with poor response and these results are matched with those of List *et al.* [22] and Meletis *et al.* [33].

Overall survival for all patients of a trial is measured from the date of entry into a study to the date of death from any cause and patients not known to have died at last follow-up are censored on the date they were known to be a live[13]. In our study the mean one year over all survival in group B was more than group A but wasn't significantly different and this was consistent with Daenen *et al.* [32] who found no significant difference between the two patient arms (CsA and non CsA) as regard overall survival, In contrast to these results List *et al.* [22] found that overall survival was significantly improved in the cyclosporine arm. PgP over expression didn't significantly affect overall survival in our study, and this is matched with results of List *et al.* [22]. In contrast to these results Meletis *et al.* [33], found that PgP over expression was associated with short duration of overall survival. There was highly significant relationship between overall survival and response to treatment in our study (patients with good response are associated with longer overall survival) and this was matched with List *et al.* [22] and as regard toxicity criteria, all toxicities were acceptable and there was no significant difference between patient groups as regard toxicity, this is may be due to short time of administration of cyclosporine A to cause a significant grades of toxicities and difference between studies might attributed to difference in selection criteria of patients.

Conclusion

P-glycoprotein was overexpressed in 55% of patients with refractory or relapsed acute myeloid leukemia and provides prognostic indicator for response to treatment and addition of oral Cyclosporine as P-glycoprotein modulator doesn't improve response to chemotherapy or overall survival.

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Seismic Rehabilitation of Strengthened Reinforced Concrete Exterior Beam-Column Joints Using FRP Composites

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Abstract: Unsuitable performance of concrete joints are important factors of destruction of concrete structures due to earthquake; thus strengthening and improvement of concrete joints can be a good solution to overcome with these factors. In this research, reinforced concrete joints strengthened with FRP composites are investigated. Also, by ABAQUS software, the effect o fusing different kinds of polymer composites sheets (FRP) with different reinforcing models on bearing capacity and displacement of plastic hinge location at the same time. To do this, at first a concrete connection in ABAQUS software with a CFRP layer is reinforced according to lab specifications and after the comparison of the results of software with the already done lab specimen, validity and precision of the software performance was considered. Then, 58 specimens of reinforced concrete joints were modeled in two states of reinforced and non-reinforced by FRP sheets with different reinforcement models, in addition by considering the effects of length, along fibers, binding and the material of fiber (CFRP-GFRP) were considered and their final bearing capacity was determined. The results reveal that using FRP for shear strengthening and increasing bearing capacity can be a good choice to reinforce and treat the structures. Also, the results show the maximum bearing increasing of reinforced connection according to reinforcement model in all the connection as entirely.
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Keywords: Concrete joints; reinforcement; FRP; shear strengthening; bearing capacity

1. Introduction

Joints play important role in behavior of frame against lateral loads. When bending frame of reinforced concrete is influenced by lateral forces of earthquake, considerable sharing forces are created in its joints, creating these shearing forces is along with many deformations. Thus, the joints of reinforced concrete structures in addition to strength should have adequate ductility [1]. Major effect of joints on their structural behavior was observed after earthquakes of 1989 in Lomaprinta, 1994 Nourtrij, Kube in Japan and Turkey in August 1999. The investigation of damaged structures and the existing reports showed that the main reason of failure of damaged structures in these earthquakes were the failure of their joints.

The first laboratory researches about the behavior of reinforced-concrete beam-column joints in 1960 was done by American Portland cement society. The result of these researches was published in 1967 by Hansen and Conner [2]. In 1982, Ronald, Minhayt and Jirsa as the members of ASCE society, carried out a research about shear strength of reinforced concrete joints [2]. These researchers believed that the existing researches were not adequate to that time to present a value for shear strength of reinforced-concrete connection. In 1983, Ehsani and White published their research about the behavior of external reinforced concrete under seismic load [3]. In 2003, Pantazopoulou and Bonacci in their analysis studies responded some questions about reinforced concrete joints [4]. These researchers by investigating joints mechanic under lateral loads, proposed special formulation for the behavior of joints based on strains, similarity, and stresses equilibrium. In 1992, Ha et al investigated the response of joints made by high strength concrete against forward and return [5]. The study of the behavior of these joints, development of a new attitude for designing them and investigating the attracted energy in them are the major purposes of this research. In 1992, Tesunus et al studied about the seismic behavior of type 2 external joints in which traverse diagonal reinforcement was used in joint core[6]. In 1994, Lou et al in a laboratory research on the joints made with the scale of 1/1, investigated the details of tensile reinforcement in joints of corner of reinforced-concrete frames [7]. In 1994, Cramer and Shahruz investigated the seismic response of corner joints [8]. In this laboratory study, 4 corner joints were studied. The difference of these joints was in the details of connection execution. Scat is one of the researchers who carried out some studies about joints in 1996 to 2000 [9-11]. In 2004, Nahadi et al published an article about analytic solution to find the relation between cohesion and reinforcement s

sliding in reinforced concrete joints [12]. In this comprehensive research, to investigate the behavior of reinforcement, the underlying differential equations were written. In 2009, Bing lee et al presented a valuable article about anchorage sliding of reinforcements under cyclic loads [13]. In this paper, an analytical model was presented to express the equation between force- displacement of reinforcement anchored in concrete. In 2010, the recent researches are related to internal joints done by Abdol and Busel [14] and after that at the same year (2010), some experiments were done to assess the joints under seismic loading under cyclic loading by Saloy and Marati and in these experiments, concrete connection with high performance reinforced with FRP were tested and maximum absorbed energy by FRP layers was dependent upon the type and the number of layers [15]. Other researches done about the reinforcement of joints are Bideh et al researches in 1997[16]. This research is published with the title of improving the properties of inductile joints in reinforced-concrete forms. Another method is used today to strengthen reinforced-concrete joints and it is FRP composites. There are various researches about using these materials in strengthening other structural components namely columns, but regarding the FRP- strengthened reinforced concrete joints by there aren't many researches such that the major researches in this regard dates back to 2000. In addition the existing researches are mostly related to Pantlaydez (2008), Moslem and Parvin (17). Moslem carried out many researches in California University about composites [18]. A part of researches of this researcher is about strengthening joints by composites. The major purpose of this research that is done in 2007 is the investigation of flexural strength and ductility of joints reinforced by FRP sheets. Another researcher whose researches about FRP-strengthened joints are more than others is an Iranian researcher and lecturer of Toldedo University in Ohayo city, Parvin. He and his colleagues, Granata, did many researches in this regard [19-20]. Besides these researches, a valuable research about analysis of FRP- strengthened reinforced concrete joints was done by Antonopoulos and Tanazis [21-22]. In this research, an analytic model is presented for FRP-strengthened reinforced concrete joints. By suitable plan of ductile flexural structural joints, failure of structures is avoided and its major reason of their failure is weakness in joints. The designer should design a limited joint area that its dimensions are determined based on the sizes of beam and columns connected to it, this small area receive various forces of beam and column. Thus, a joint should tolerate these forces along with its displacements and transfer them but the design of beam-column joints are difficult for civil engineers [2]. Researchers attempt in recent years is for strengthening to reinforce old buildings and it is for increasing the bearing capacity of reinforced concrete members caused that new solutions are presented in engineering science of treatment of structures that replacing new methods of strengthening to facilitate strengthening and increasing the capacity of structures caused that civil engineers consider FRP system. Most of the researches about strengthening and repair with FRP are focused on beam and columns and here less researches are done about reinforcement concrete joints that compromise the main framework and retaining of reinforced concrete structures against lateral loads and earthquake.

The properties of the element introduced for reinforcement behavior

To introduce longitudinal reinforcements, truss element is used. In this research, to model longitudinal and transverse reinforcements, T3D2 elements are used that are 3D, two nodes element with linear displacements and these elements are embedded in concrete elements and their behavior will be like them. This element is consisted of 3 translational degree of freedom and 3 rotational degree of freedom. Generally, truss element points are constrained in three translational degrees of freedom including (ux, uy, uz) and by this capability, supporting conditions are imposed on the specimens.

2. Modeling of anchorage sliding of rebar and concrete

Rebar sliding inside the concrete and stress change is an important fact that has considerable influence in final period of connection and final results. A good model to consider this influence in modeling limited components of joints is in ABAQUS software, model of defining constraints between concrete and rebar [23]. In this model, beam longitudinal reinforcement (in negative anchor area) in joint area, don't have total cohesion with concrete. Thus, it is necessary that these reinforcements are created in the connection area between nodes except concrete nodes and then the nodes of reinforcements connect to concrete nodes by the required constraints. To do this, in interaction area, embedded region is used. These modes and the required choices to define them are shown in figure (1).

The properties of the introduced element for FRP sheets

In this research, for modeling FRP, S4R element of SHELL elements family and General purpose are used. General purpose four-node shell

element can reduce integral points to make the calculations minimum and reduce analysis time. As the effect of transverse shear is considered in this element, it can be used in models with thin and thick structures. This element is consisting of three translation degrees of freedom and three rotational degrees of freedom.

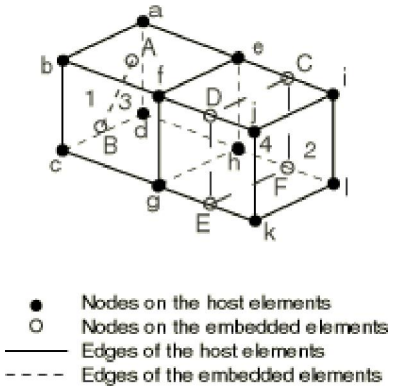


Figure 1- Common nodes to consider constraint

General properties of the built models

The first general property is the material of the substances defined in modeling:

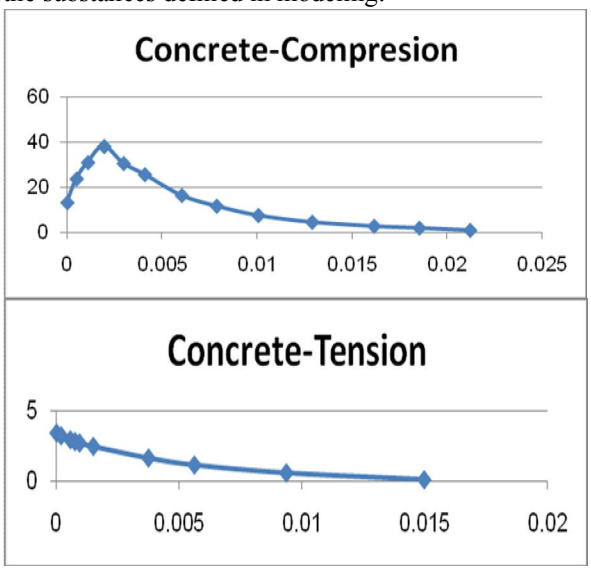


Figure 2- The material of substances used in concrete [23]

The concrete defined in modeling is with the strength of 38 Mpa. The defined reinforcements in the studied models are of two types. Longitudinal reinforcements are of reinforcements with high strength with yield stress 500 Mpa and transverse reinforcements are of normal reinforcements with yield stress 382MPa.

The properties of FRP sheets used for strengthening are considered according to reference [24-25] in table (1). In this research, the sheets used in reinforcement are 3mm thick. The metal sheets used in supports and loading place is made of steel with linear elastic properties and elasticity module 200000 MPa. FRP is modeled by S4R element and in this modeling non- isotropic material ANISO is used. To use FRP in different directions in models, the definition of local axles is used.

Table 1- Mechanical properties of FRP used in reinforcement of the studied specimens [24-25]

The type of material	Poisson ratio	Elasticity module (MPa)	Shear module (MPa)	Strength (MPa)
σ ult(ten)=2493 σ ult(comP)=1318 τ ult (12)=43.3	G_{12}=350 G_{13}=3500 G_{23}=2340	E_1=131600 E_2=8700 E_3=8700	$\nu_{12}=0.33$ $\nu_{13}=0.33$ $\nu_{23}=0.3$	CFRP Laminate
σ ult(ten)=1280 σ ult(comp)=525 τ ult(12)=48.6	G_{12}=5600 G_{13}=5600 G_{23}=3740	E_1=49500 E_2=15900 E_3=15900	$\nu_{12}=0.26$ $\nu_{13}=0.26$ $\nu_{23}=0.3$	GFRP Laminate

Figure 4 shows general view of supporting conditions and loading in this research. In these figures, vertical load as constant values P2 and horizontal load P1as statistics at the end of column till the failure of connection are imposed gradually on the specimen, they are imposed on the model as loading steps and sub steps and they are entered as cyclic chart on ABAQUS software (Figure 3). To avoid stress concentration in supports and load imposing location, steel plates are used.

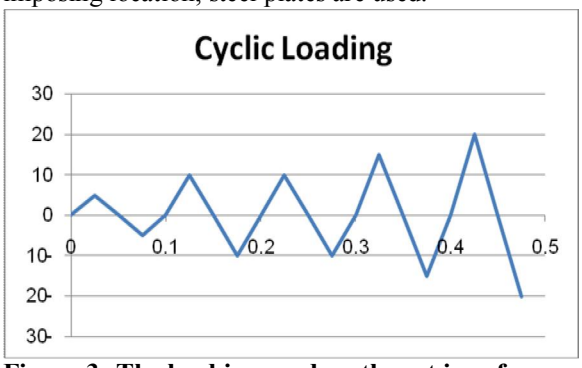


Figure 3- The load imposed on the set in reference point of rigid material [26]

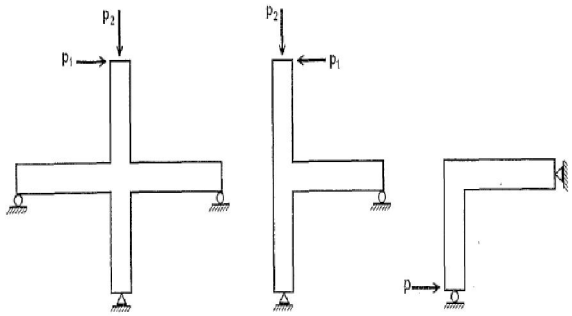


Figure 4- Loading method and support conditions in the modeling

Reinforced specimens of external joints

To name reinforced external joints, we used "E" for simplicity and the subscript indicates the number of joint.

E_1-E_{14} joints: (First type strengthening model)

E_1-E_{14} joints are shown in figure 5, also the method of naming is indicated in table 2. The sheets are used in L form in angle of beam and column in three different lengths. 200 mm length that is the half of measurements of beam and column cross section. The length 400mm that is equal to the dimensions of beam and column cross section and the length 600mm that is near to the required length of regulation for joint region.

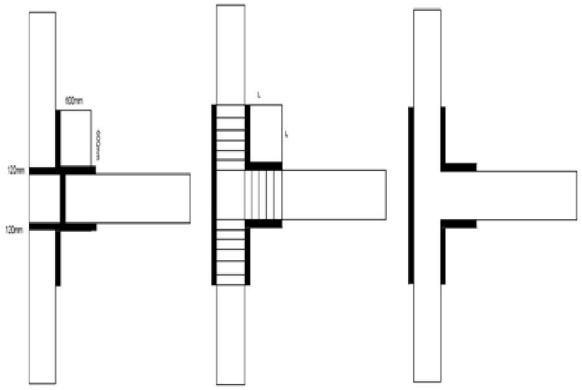


Figure 5- The specimen of strengthened external joints E_1-E_{14}, before and after beam and column wrapping

Table 2- The properties of E_1-E_{14} strengthened specimens

Name	E1, E7	E2. E8	E3, E9	E4, E10	E5, E11	E6, E12
Type of material	CFRP laminate	CFRP laminate	CFRP laminate	GFRP laminate	GFRP laminate	GFRP laminate
L(mm)	200	400	600	200	400	600

Table 3- The properties of E_{22}-E_{33}strengthened specimens

Name	E22, E28	E23. E29	E24, E30	E25, E31	E26, E32	E27, E33
Type of material	CFRP laminate	CFRP laminate	CFRP laminate	GFRP laminate	GFRP laminate	GFRP laminate
L(mm)	200	400	600	200	400	600

E_{15}-E_{21} joints: (Type 2 strengthening model)

Fibers direction is shown in figure 6. It is worth to mention that in E_{21} specimen, we changed the direction of fibers and we investigate its effect in joint performance. In E_{21} specimen, the used sheets are of carbon. It is expected that E_{21} specimen bearing is reduced in comparison with E_{17}, as there is one good solution to avoid extension of cracks after the strengthened length.

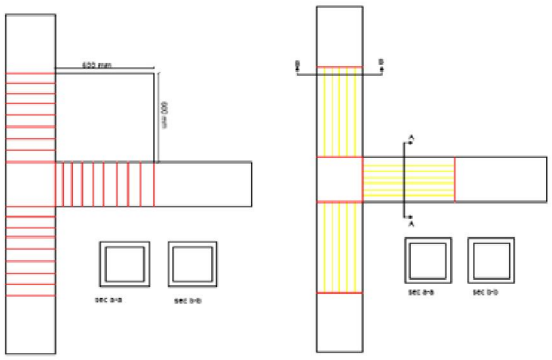


Figure 6- The specimen of E_{15}-E_{21} external strengthened joints

E_{22}-E_{33}joints: (Type 3 strengthening model)

In definition of these specimens, the sheets used in the sides of beam and column are uniform. The reinforcement method and placement of fibers are shown in figure 8. Table 3 shows the properties of reinforcement used in E_{22}-E_{33} specimens.

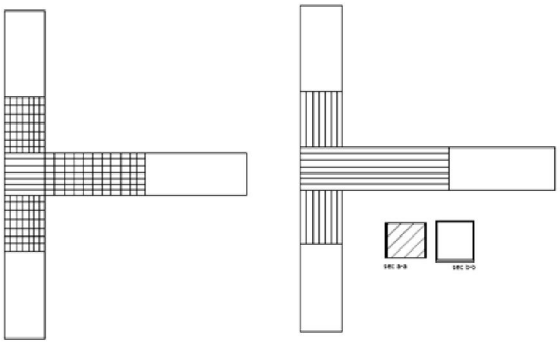


Figure 7- The specimen of strengthened external joints E_{22}-E_{33}, before and after beam and column wrapping

E_{34}-E_{45}joints: (Type 4 strengthening model)

In defining specimens like previous specimens, FRP sheets are used in the sides of beam and column in joint region with this difference that in this case, sheets of beam and column of joint are not uniform and strengthening in beam and column is done separately. It is obvious that this strengthening can be in external frames.

3. Results

The first conclusion of the specimen's analysis is load- displacement curves of the specimens. The following figures show some of these curves for strengthened specimens made of carbon and glass separately beside the basis specimen. Viewing load- displacement curves, it is seen that the discussing curves are consisted of some sections that shows joint condition in different cycles of loading. The first section of curves is linear and it shows

linear behavior of joint before cracking. The second section of joint behavior curve is linear and this behavior is considered as joint behavior after concrete cracking and before tensile reinforcement's yield of beam. Partial jumps in this part of curve, normally don't lead into complete change in the slope of load-displacement curve of joint and then we observe sudden drop of curve to return and start next cycles. This section is related to non- elastic displacements of beam tensile reinforcements. The summary of results for external joints specimens is shown in table 4. The first issue is the investigation of final load in joints failure moment, the second issue is the final displacement like final load.

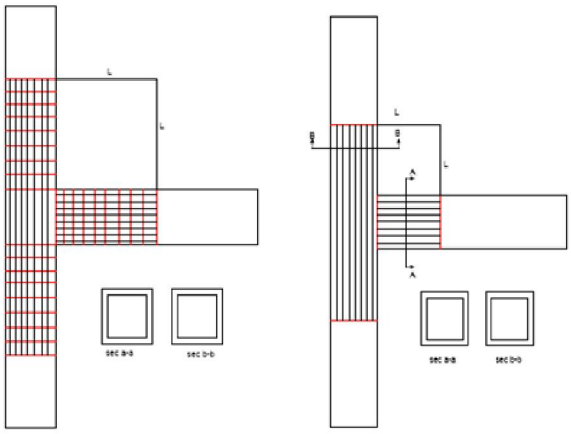


Figure 8- The specimen of strengthened external joints E_{33}-E_{45}, before and after beam and column wrapping

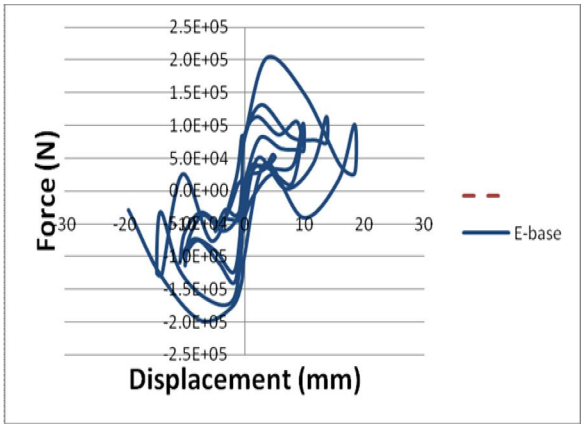


Figure 9- Behavior curve of lateral non-strengthened joint

Strengthening concrete joints according to first type reinforcement model in comparison with the non-strengthened specimen increased the bearing capacity of joint1 to 21%. Also, the maximum increased in final strength in this model is occurred in E_3 specimen that is equal to 248. 917 KN. Behavior curve of these specimens show that stiffness, bearing capacity and final displacement in this strengthening model are improved considerably.

Table 4- non-linear results for strengthened external joints

Type of joint	Final load		Final displacement
	Value (P) (KN)	Changes (%)	Value (mm)
E-base	205.362	0	4.912
$E_{1\text{-}L200\text{-}CF}$	231.342	13.5	3.610
$E_{2\text{-}L400\text{-}CF}$	239.885	17.73	3.6
$E_{3\text{-}L600\text{-}CF}$	248.917	20.9	3.589
$E_{4\text{-}L200\text{-}GF}$	205.995	1	3.611
$E_{5\text{-}L400\text{-}GF}$	219.172	6.82	2.608
$E_{6\text{-}L600\text{-}GF}$	235.627	14.6	3.607
$E_{7\text{-}L200\text{-}CF}$	259.275	26.3	3.611
$E_{8\text{-}L400\text{-}CF}$	270.428	31.7	3.607
$E_{9\text{-}L600\text{-}CF}$	285.277	39.04	3.606
$E_{10\text{-}L200\text{-}GF}$	251.444	22.43	3.611
$E_{11\text{-}L400\text{-}GF}$	260.014	26.82	3.609
$E_{12\text{-}L600\text{-}GF}$	276.769	34.63	3.608
$E_{13\text{-}CF}$	295.008	43.9	3.608
$E_{14\text{-}GF}$	278.168	35.60	3.606
$E_{15\text{-}L200\text{-}CF}$	235.883	14.6	3.612
$E_{16\text{-}L400\text{-}CF}$	239.986	17.74	3.611
$E_{17\text{-}L600\text{-}CF}$	250.710	21.95	3.608
$E_{18\text{-}L200\text{-}GF}$	229.800	12.09	3.611
$E_{19\text{-}L400\text{-}GF}$	238.518	16.09	3.609
$E_{20\text{-}L600\text{-}GF}$	247.877	20.48	3.608
$E_{21\text{-}L600\text{-}CF}$	222.402	8.29	3.610
$E_{22\text{-}L200\text{-}CF}$	286.375	39.51	3.609
$E_{23\text{-}L400\text{-}CF}$	310.743	51.21	3.608
$E_{24\text{-}L600\text{-}CF}$	339.594	65.36	3.605
$E_{25\text{-}L200\text{-}GF}$	274.212	33.65	3.610
$E_{26\text{-}L400\text{-}GF}$	302.683	47.31	3.609
$E_{27\text{-}L600\text{-}GF}$	328.444	60	3.607
$E_{28\text{-}L200\text{-}CF}$	324.701	58.04	3.6
$E_{29\text{-}L400\text{-}CF}$	330.883	60.97	3.585
$E_{30\text{-}L600\text{-}CF}$	341.411	66	3.568
$E_{31\text{-}L200\text{-}GF}$	315.209	53.65	3.611
$E_{32\text{-}L400\text{-}GF}$	328.151	60	3.609
$E_{33\text{-}L600\text{-}GF}$	336.620	63.9	3.606
$E_{34\text{-}L200\text{-}CF}$	271.028	32.19	3.610
$E_{35\text{-}L400\text{-}CF}$	286.522	39.52	3.609
$E_{36\text{-}L600\text{-}CF}$	304.332	48.29	3.608
$E_{37\text{-}L200\text{-}GF}$	266.061	29.75	3.610
$E_{38\text{-}L400\text{-}GF}$	278.917	36.09	3.610
$E_{39\text{-}L600\text{-}GF}$	289.165	40.97	3.609
$E_{40\text{-}L200\text{-}CF}$	283.750	38.04	3.610
$E_{41\text{-}L400\text{-}CF}$	297.458	44.87	3.609
$E_{42\text{-}L600\text{-}CF}$	319.258	55.61	3.608
$E_{43\text{-}L200\text{-}GF}$	269.025	31.21	3.610
$E_{44\text{-}L400\text{-}GF}$	288.903	40.48	3.609
$E_{45\text{-}L600\text{-}GF}$	306.394	49.26	3.608

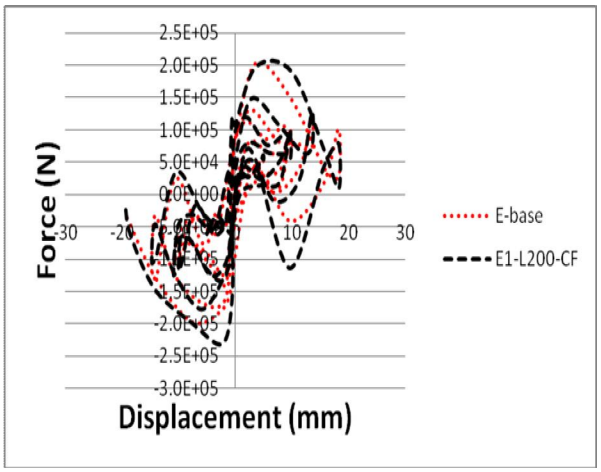


Figure 10- Behavior curve of external joint strengthened by CFRP sheets with the length of 200 mm

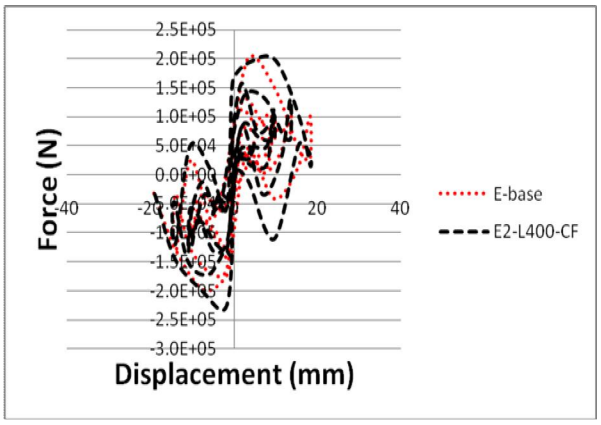


Figure 11- Behavior curve of external joint strengthened by CFRP sheets with the length of 400 mm

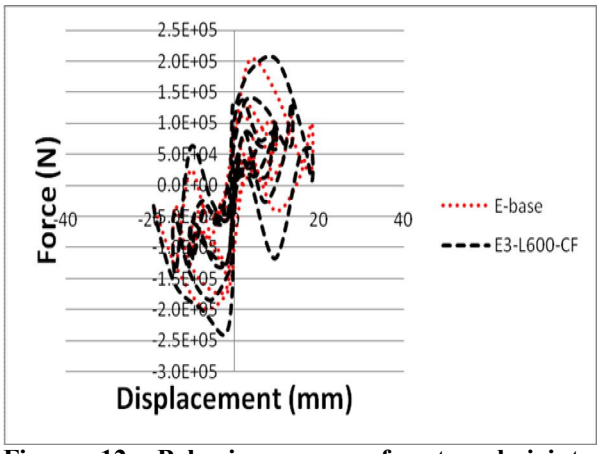


Figure 12- Behavior curve of external joint strengthened by CFRP sheets with the length of 600mm

It is worth to mention that for other specimens we only resort to the investigation of the their results and explain as model by model:

Strengthening concrete joints according to the strengthening model (E7-E14) in comparison with the non-strengthened specimen increases 22 to 43% the bearing capacity of joint. Also the maximum increase in final strength in this model is occurred in E_{13} specimen that is equal to 295008KN. Also, strengthening specimen by FRP strop gives some similar results with FRP wrapping and the only difference is in easy execution of strop to wrapping.

Strengthening concrete joints according to type 2 strengthening model increases 12 to 21% of bearing capacity of joint. Also, the maximum increase in final strength in this model in strengthened specimen with CFRP and the length of 600mm and KN is 250. 710. It is worth to mention that in E_{21} specimen, as it was predicted, due to the fact that direction of fiber despite previous specimens was parallel to shear cracks, we saw weaker performance and less bearing capacity in this specimen.

Strengthening concrete joints according to type 3 strengthening model (E22-E27) increases 33 to 65% of bearing capacity of joint. Also, the maximum increase in final strength in this model in E_{24} model and KN is 339. 594. Behavior curve of these specimens shows that stiffness, bearing capacity and final displacement in this strengthening model are improved considerably.

Strengthening concrete joints according to strengthening model (E28-E33) increases 53 to 66% of bearing capacity of joint. Also, the maximum increase in final strength in this model in strengthened specimen with CFRP at the same time with wrapping with the length of 600mm and its final strength is 341.411KN. Behavior curve of these specimens shows that stiffness, bearing capacity and final displacement in this strengthening model is improved considerably.

Strengthening concrete joints according to type 4 strengthening model in comparison with non-strengthened specimen increases 29 to 49% of bearing capacity of joint. Also, the maximum increase in final strength in this model is occurred in E_{36} model and it is 304.332 KN. Behavior curve of these specimens shows that stiffness, bearing capacity and final displacement in this strengthening model are improved considerably in comparison with the previous model that strengthening is uniformly in all over the beam and column and joint core.

Strengthening concrete joints according to strengthening model (E40-E45) increases 31 to 55% of bearing capacity of joint. It is worth to mention that the results in this model are similar to the strengthening model of the previous type in which strengthening was used in all over the beam and column as entirely with a little difference in final bearing capacity of specimens. Also, the maximum

increase in final strength in this model is occurred in E_{42} specimen that is 319.258 KN.

E_1-E_{14} joints

Considering the investigation of performance of specimens, it is observed that by the strengthening used in E_1-E_{14} specimens in the form of L, behavior properties of joints such as bearing capacity and final displacement are improved and the results of analysis are shown in table 4. In basis joint, due to the fact that there is weak beam- strong column, critical section is located at the end of beam and is exactly located beside the column. By considering strain of beam tensile reinforcement in this joint, such issue is observed.

By using sheets in form of L, two important influences are created on the behavior of joint. The first important effect is reducing strain of reinforcement in the final section of beam. This effect is similar to the influence of percentage of beam tensile reinforcements. The second effect that placement of composite layers affects the behavior of joint such that, is location change of critical section. Critical section is the section in which the maximum longitudinal reinforcement strain occurs. In these specimens joint failure is occurred still in the beam. By comparing cracking and investigation of tensile reinforcements strain, it is obvious that critical section is occurred for basis connection beside the column and for connecting E2 in strengthening length in the form of L.

Considering behavior curves of figure 13 and the results presented in table 4, it is seen that increasing behavioral properties such as final bearing and final displacement in CFRP-strengthened specimens, were more considerable than GFRP-strengthened specimens.

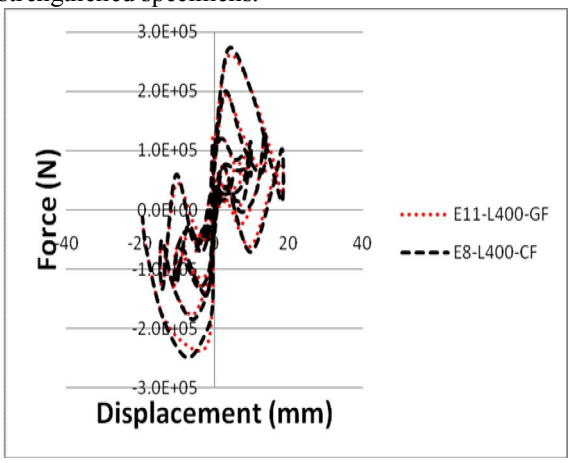
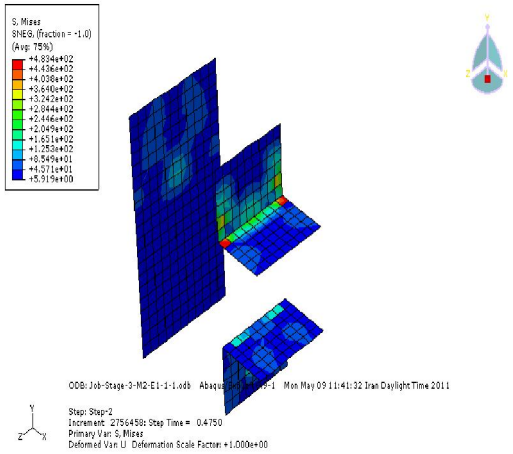
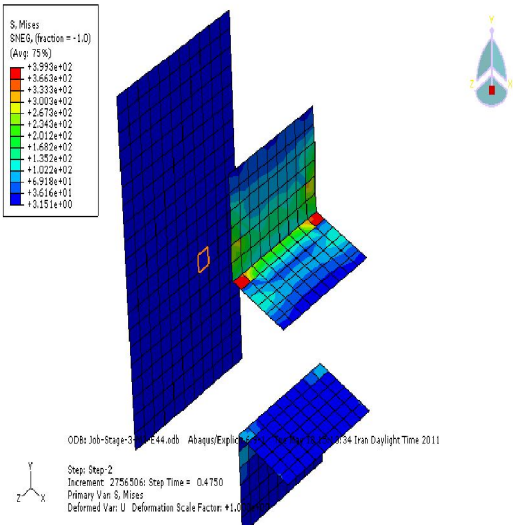


Figure 13- The comparison of the chart of specimen E_8 as strengthened by CFRP sheets and E_{11} specimen by CFRP sheets.

This difference is justified by investigating the stresses created in FRP sheets. Due to the difference in mechanical properties of some sheets of carbon and sheets made of glass, the stress values are different. The major reason of this difference is due to higher elasticity module in the direction of CFRP fibers in comparison with GFRP. For example, in figure 14, the created stresses in FRP sheets in direction of X (beam axle) for E1 specimen in which CFRP sheets are used and E4 specimen in which GFRP sheets are used for strengthening are compared. Considering the stress values in figure 14, it is shown that the created tensile stresses in sheets made of carbon have great values and due to this great number of stress of beam tensile reinforcement beside column are reduced and they have better performance of CFRP-strengthened specimen (E1 specimen) in comparison with GFRP-strengthened specimen (E4 specimen).



(a) E_1 specimen (made of CFRP)



(b) E_4 specimen (made of GFRP)

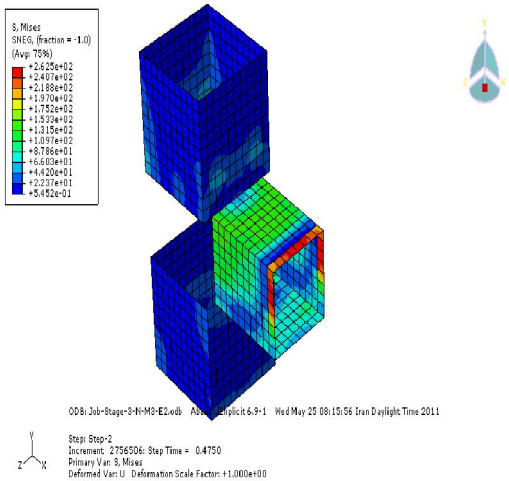
Figure 14- The stressed created in FRP sheets in E_1 and E_4 along beam axle (Mpa).

It is worth to mention that by increasing loading in these specimens, yield region is approached gradually to the edge of column and strain of beam tensile reinforcements is increased on the column and yield region is extended to inside the joint core and by increasing cracking in joint region, joint failure is caused. Considering the drawn curves the results presented in table 4, it is seen that by increasing the length of strengthening of FRP sheets of 200mm to 400mm and 600mm, bearing capacity and final displacement of the specimens are improved.

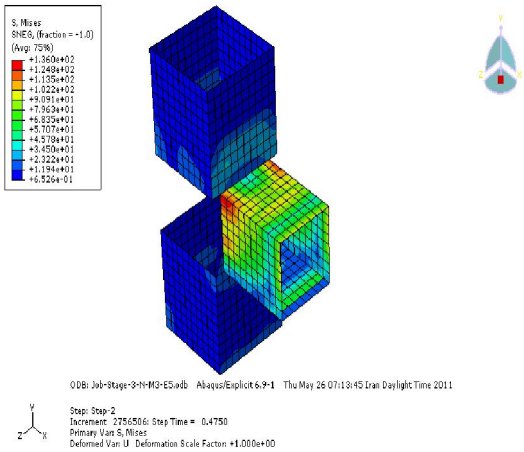
E_{15} and E_{21} joints

In these specimens, due to the presence of strengthening sheets in beam and column as it was seen in E_1-E_{12}, critical section in some of the specimens is not transferred to the region after the column, with this difference that due to avoiding the increase of the depth of cracks created in critical section, in some stages of loading due to using some sheets in two sides of beam, bending displacements of beam around critical section of their similar E_1,E_4 specimens are limited (where only L shape sheets with the length of 200mm are used). This issue is clarified by investigating the stresses created in the sheets used in two sides. For example, figure 15 shows the condition of stresses created in direction of beam axle in FRP sheets in E_{16} and E_{19} specimens.

Thus, as it is shown in load-displacement curves of these specimens, although stiffness and bearing of specimens are increased in comparison with L shape specimens without wrapping (E_1 to E_6) but critical section is created beside the column.



(a) E_{16} specimen



(b) E_{19} specimen

Figure 15- The stresses created in FRP sheets in E_{16} and E_{19} specimens along beam axle (MPa)

As it is shown in figure 16, in this stage of strengthening in E_{16} specimen, direction of fiber is changed and its effect is compared with the similar specimens in the form of hysteresis curves that is shown in the following.

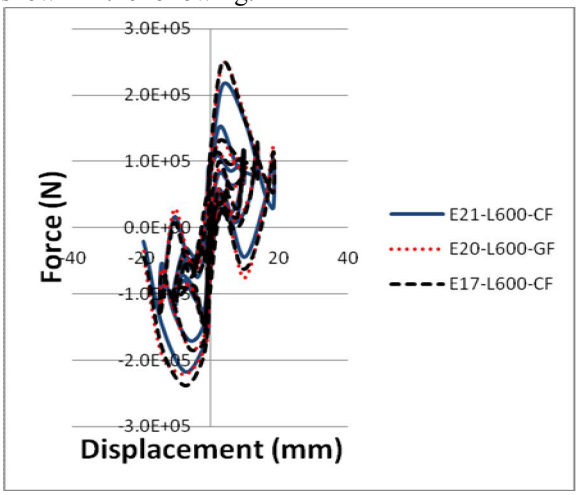
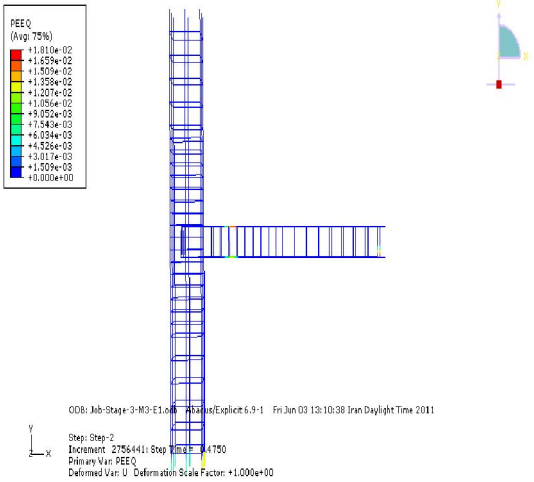


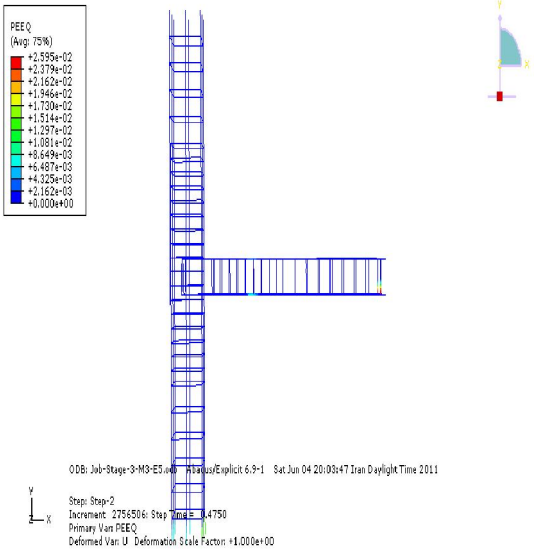
Figure 16- The comparison of E_{17}, E_{20} and E_{21} specimens (The investigation of the effect of material and changing the direction of fiber)

E_{34} and E_{45} joints

The results of analysis in these kinds of joints show that in some stages of loading, we see beam bending displacement around critical section in comparison with previous specimens. These issues are tangible by investigating cracking and strain of reinforcements in these joints (Fig. 17).

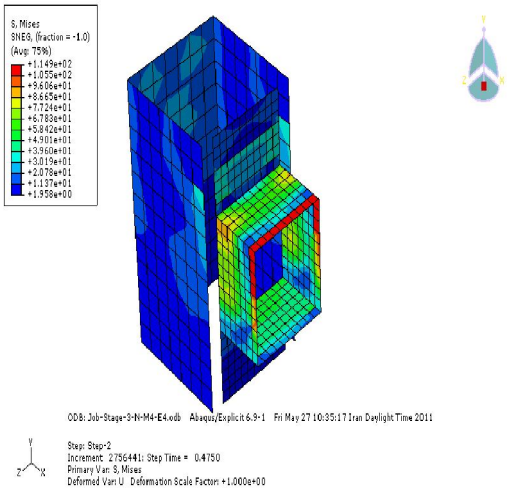


(a) E_{36} specimen

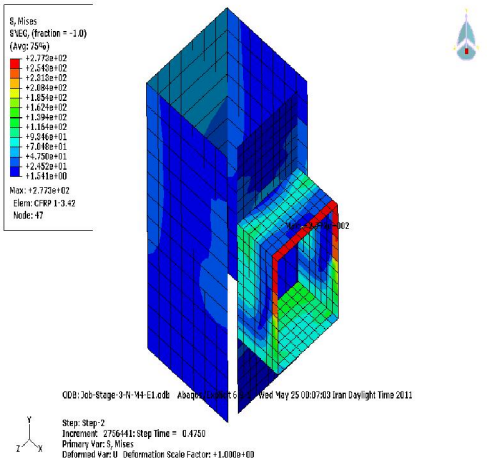


(b) E_{42} specimen

Figure 17- The strain of created plastic in the joint of E_{36} and E_{42} in the last sub-step of loading



(a) E_{34} specimen (made of carbon)



(b) E_{37} specimen (made of glass)

Figure 18- The stresses created in FRP sheets in E_{34} and E_{37} specimens along beam axle (MPa)

Figure 18 shows the condition of stresses in FRP sheets in these specimens. It is seen that carbon sheets attracted more stress in comparison with glass sheets. Also, the condition of flowing longitudinal reinforcements as specimen for $E_{36}$and E_{42} in the final stage of loading in figure 18.

Behavior curve of these specimens shows that stiffness, bearing capacity and final displacement are improved. For example, in figures 19 and 20, load-displacement curves of some specimens are compared that are shown as the followings.

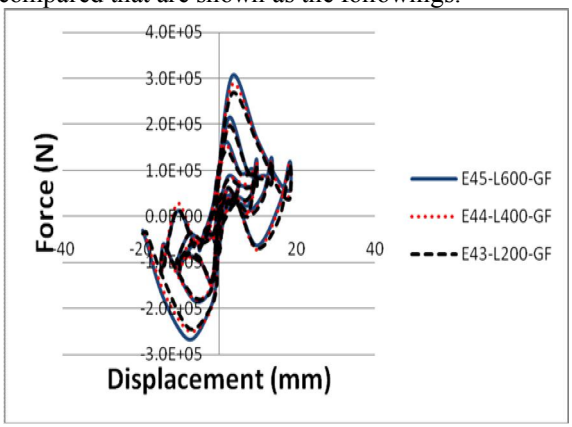


Figure 19- The comparison of the effect of length in E_{43}, E_{44} and E_{45} specimens

Considering the above figures, the change in stiffness of joints is tangible. It is shown that by increasing the length of strengthening of 200 mm to 400 mm and 600 mm, bearing capacity and final displacement of the specimens are improved. While, strengthening specimen is wrapped, this increasing trend is improved. Also, in strengthening with CFRP sheets in comparison with GFRP, more stiffness and bearing are observed.

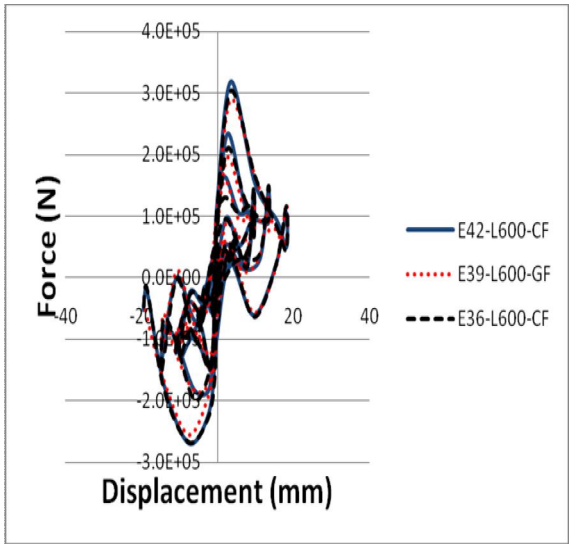


Figure 20- The comparison of the effect of FRP wrapping and length and material of sheet in E_{36}, E_{39} and E_{42} specimens

4. Conclusion

By considering structure component including connecting of a flexural frame and investigating the effects of strengthening by CFRP and GFRP sheets on it we find different results. Of these results we can refer to the increase of bearing capacity of the specimens. In the strengthening in the existing joint in inner frame, to 22% (in E17 specimen) and in external frame to 66% (in E30 specimen) we observed bearing capacity increase in comparison with basis specimen. Also, final displacement at the end of column is increased in strengthened specimens in comparison with basis specimen that according to table 4 to 28% was observed in the existing joints. As it is shown in the investigation of the results of joints analysis, the values of created stresses in the sheets, in CFRP-strengthened specimens are greater than GFRP-strengthened specimens and it is due to the great value of elasticity module of carbon sheets in comparison with glass sheets. Thus, in CFRP-strengthened specimens have better behavior in comparison with GFRP –strengthened specimens. For example, in E22 specimen (CFRP-strengthened sheets) and E25 (GFRP –strengthened specimens) that shape and strengthening length are similar and the only difference is in the material of sheets. Bearing capacity is increased respectively 40% and 33.65 %. It is worth to mention that these conclusions for other specimens are like this.

- By strengthening in basis specimen, increasing trend of stiffness, bearing capacity and final ductility are increased.

The results of this research show that strengthening by fiber composites (FRP) can increase some loads such as cracking and final yield considerably and it is effective in increasing energy loss and opening hysteresis loops.

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Seismic Rehabilitation of Strengthened Reinforced Concrete Interior Beam-Column Joints Using FRP Composites

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Abstract: Unsuitable performance of concrete joints are important factors of destruction of concrete structures due to earthquake; thus strengthening and improvement of concrete joints can be a good solution to overcome with these factors. In this research, reinforced concrete joints strengthened with FRP composites are investigated. Also, by ABAQUS software, the effect o fusing different kinds of polymer composites sheets (FRP) with different reinforcing models on bearing capacity and displacement of plastic hinge location at the same time. To do this, at first a concrete connection in ABAQUS software with a CFRP layer is reinforced according to lab specifications and after the comparison of the results of software with the already done lab specimen, validity and precision of the software performance was considered. Then, 58 specimens of reinforced concrete joints were modeled in two states of reinforced and non-reinforced by FRP sheets with different reinforcement models, in addition by considering the effects of length, along fibers, binding and the material of fiber (CFRP-GFRP) were considered and their final bearing capacity was determined. The results reveal that using FRP for shear strengthening and increasing bearing capacity can be a good choice to reinforce and treat the structures. Also, the results show the maximum bearing increasing of reinforced connection according to reinforcement model in all the connection as entirely.
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Keywords: Concrete joints; reinforcement; FRP; shear strengthening; bearing capacity

1. Introduction

Joints play important role in behavior of frame against lateral loads. When bending frame of reinforced concrete is influenced by lateral forces of earthquake, considerable sharing forces are created in its joints, creating these shearing forces is along with many deformations. Thus, the joints of reinforced concrete structures in addition to strength should have adequate ductility [1]. Major effect of joints on their structural behavior was observed after earthquakes of 1989 in Lomaprinta, 1994 Nourtrij, Kube in Japan and Turkey in August 1999. The investigation of damaged structures and the existing reports showed that the main reason of failure of damaged structures in these earthquakes were the failure of their joints.

The first laboratory researches about the behavior of reinforced-concrete beam-column joints in 1960 was done by American Portland cement society. The result of these researches was published in 1967 by Hansen and Conner [2]. In 1982, Ronald, Minhayt and Jirsa as the members of ASCE society, carried out a research about shear strength of reinforced concrete joints [2]. These researchers believed that the existing researches were not adequate to that time to present a value for shear strength of reinforced-concrete connection. In 1983, Ehsani and White published their research about the behavior of external reinforced concrete under seismic load [3]. In 2003, Pantazopoulou and Bonacci in their analysis studies responded some questions about reinforced concrete joints [4]. These researchers by investigating joints mechanic under lateral loads, proposed special formulation for the behavior of joints based on strains, similarity, and stresses equilibrium. In 1992, Ha et al investigated the response of joints made by high strength concrete against forward and return [5]. The study of the behavior of these joints, development of a new attitude for designing them and investigating the attracted energy in them are the major purposes of this research. In 1992, Tesunus et al studied about the seismic behavior of type 2 external joints in which traverse diagonal reinforcement was used in joint core [6]. In 1994, Lou et al in a laboratory research on the joints made with the scale of 1/1, investigated the details of tensile reinforcement in joints of corner of reinforced-concrete frames [7]. In 1994, Cramer and Shahruz investigated the seismic response of corner joints [8]. In this laboratory study, 4 corner joints were studied. The difference of these joints was in the details of connection execution. Scat is one of the researchers who carried out some studies about joints in 1996 to 2000 [9-11]. In 2004, Nahadi et al published an article about analytic solution to find the relation between cohesion and reinforcement s

sliding in reinforced concrete joints [12]. In this comprehensive research, to investigate the behavior of reinforcement, the underlying differential equations were written. In 2009, Bing lee et al presented a valuable article about anchorage sliding of reinforcements under cyclic loads [13]. In this paper, an analytical model was presented to express the equation between force- displacement of reinforcement anchored in concrete. In 2010, the recent researches are related to internal joints done by Abdol and Busel [14] and after that at the same year (2010), some experiments were done to assess the joints under seismic loading under cyclic loading by Saloy and Marati and in these experiments, concrete connection with high performance reinforced with FRP were tested and maximum absorbed energy by FRP layers was dependent upon the type and the number of layers [15]. Other researches done about the reinforcement of joints are Bideh et al researches in 1997[16]. This research is published with the title of improving the properties of inductile joints in reinforced-concrete forms. Another method is used today to strengthen reinforced-concrete joints and it is FRP composites. There are various researches about using these materials in strengthening other structural components namely columns, but regarding the FRP- strengthened reinforced concrete joints by there aren't many researches such that the major researches in this regard dates back to 2000. In addition the existing researches are mostly related to Pantlaydez (2008), Moslem and Parvin [17]. Moslem carried out many researches in California University about composites [18]. A part of researches of this researcher is about strengthening joints by composites. The major purpose of this research that is done in 2007 is the investigation of flexural strength and ductility of joints reinforced by FRP sheets. Another researcher whose researches about FRP-strengthened joints are more than others is an Iranian researcher and lecturer of Toldedo University in Ohayo city, Parvin. He and his colleagues, Granata, did many researches in this regard [19-20]. Besides these researches, a valuable research about analysis of FRP- strengthened reinforced concrete joints was done by Antonopoulos and Tanazis [21-22]. In this research, an analytic model is presented for FRP-strengthened reinforced concrete joints. By suitable plan of ductile flexural structural joints, failure of structures is avoided and its major reason of their failure is weakness in joints. The designer should design a limited joint area that its dimensions are determined based on the sizes of beam and columns connected to it, this small area receive various forces of beam and column. Thus, a joint should tolerate these forces along with its displacements and transfer them but the design of beam-column joints are difficult for civil engineers [2]. Researchers attempt in recent years is for strengthening to reinforce old buildings and it is for increasing the bearing capacity of reinforced concrete members caused that new solutions are presented in engineering science of treatment of structures that replacing new methods of strengthening to facilitate strengthening and increasing the capacity of structures caused that civil engineers consider FRP system. Most of the researches about strengthening and repair with FRP are focused on beam and columns and here less researches are done about reinforcement concrete joints that compromise the main framework and retaining of reinforced concrete structures against lateral loads and earthquake.

The properties of the element introduced for reinforcement behavior

To introduce longitudinal reinforcements, truss element is used. In this research, to model longitudinal and transverse reinforcements, T3D2 elements are used that are 3D, two nodes element with linear displacements and these elements are embedded in concrete elements and their behavior will be like them. This element is consisted of 3 translational degree of freedom and 3 rotational degree of freedom. Generally, truss element points are constrained in three translational degrees of freedom including (ux, uy, uz) and by this capability, supporting conditions are imposed on the specimens.

2. Modeling of anchorage sliding of rebar and concrete

Rebar sliding inside the concrete and stress change is an important fact that has considerable influence in final period of connection and final results. A good model to consider this influence in modeling limited components of joints is in ABAQUS software, model of defining constraints between concrete and rebar [23]. In this model, beam longitudinal reinforcement (in negative anchor area) in joint area, don't have total cohesion with concrete. Thus, it is necessary that these reinforcements are created in the connection area between nodes except concrete nodes and then the nodes of reinforcements connect to concrete nodes by the required constraints. To do this, in interaction area, embedded region is used. These modes and the required choices to define them are shown in figure (1).

The properties of the introduced element for FRP sheets

In this research, for modeling FRP, S4R element of SHELL elements family and General purpose are used. General purpose four-node shell element can reduce integral points to make the

calculations minimum and reduce analysis time. As the effect of transverse shear is considered in this element, it can be used in models with thin and thick structures. This element is consisting of three translation degrees of freedom and three rotational degrees of freedom.

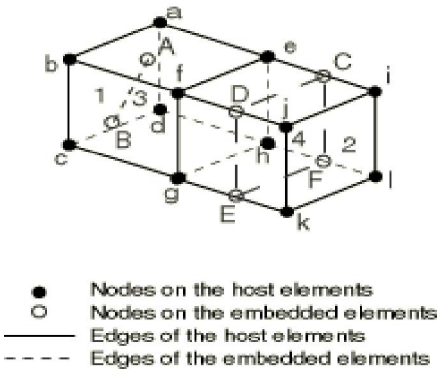


Figure 1- Common nodes to consider constraint

General properties of the built models

The first general property is the material of the substances defined in modeling:

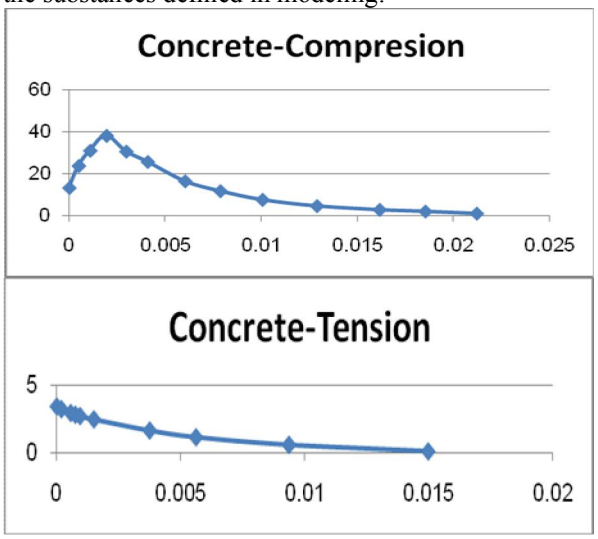


Figure 2- The material of substances used in concrete [23]

The concrete defined in modeling is with the strength of 38 Mpa. The defined reinforcements in the studied models are of two types. Longitudinal reinforcements are of reinforcements with high strength with yield stress 500 Mpa and transverse reinforcements are of normal reinforcements with yield stress 382MPa.

The properties of FRP sheets used for strengthening are considered according to reference [24-25] in table (1). In this research, the sheets used in reinforcement are 3mm thick. The metal sheets used in supports and loading place is made of steel with linear elastic properties and elasticity module 200000 MPa. FRP is modeled by S4R element and in this modeling non- isotropic material ANISO is used. To use FRP in different directions in models, the definition of local axles is used.

Table 1- Mechanical properties of FRP used in reinforcement of the studied specimens [24-25]

The type of material	Poisson ratio	Elasticity module (MPa)	Shear module (MPa)	Strength (MPa)
σ ult(ten)=2493 σ ult(comP)=1318 τ ult (12)=43.3	G_{12}=350 G_{13}=3500 G_{23}=2340	E_1=131600 E_2=8700 E_3=8700	$\nu_{12}=0.33$ $\nu_{13}=0.33$ $\nu_{23}=0.3$	CFRP Laminate
σ ult(ten)=1280 σ ult(comp)=525 τ ult(12)=48.6	G_{12}=5600 G_{13}=5600 G_{23}=3740	E_1=49500 E_2=15900 E_3=15900	$\nu_{12}=0.26$ $\nu_{13}=0.26$ $\nu_{23}=0.3$	GFRP Laminate

Figure 4 shows general view of supporting conditions and loading in this research. In these figures, vertical load as constant values P2 and horizontal load P1as statistics at the end of column till the failure of connection are imposed gradually on the specimen, they are imposed on the model as loading steps and sub steps and they are entered as cyclic chart on ABAQUS software (Figure 3). To avoid stress concentration in supports and load imposing location, steel plates are used.

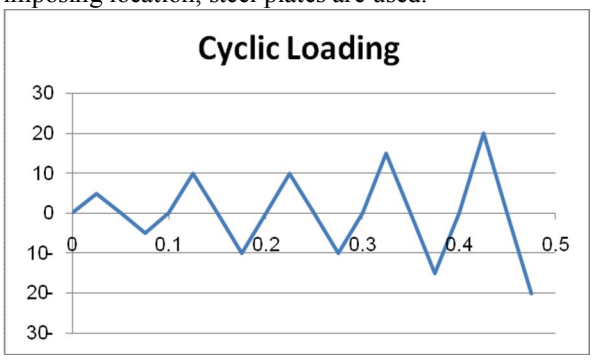


Figure 3- The load imposed on the set in reference point of rigid material [26]

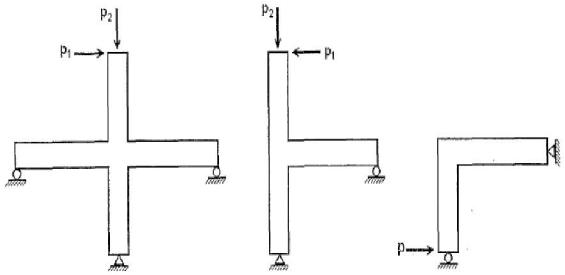


Figure 4- Loading method and support conditions in the modeling

Strengthened specimens of intermediate joints

To name intermediate strengthened joints, C symbol is used. The idea of defining these joints is done based on failure and ductility idea.

Joints: (Type 1 strengthening model of length effect) C_1-C_2

Strengthening method and direction of placement of fibers are shown in figure 5 and naming method is shown in table (2).

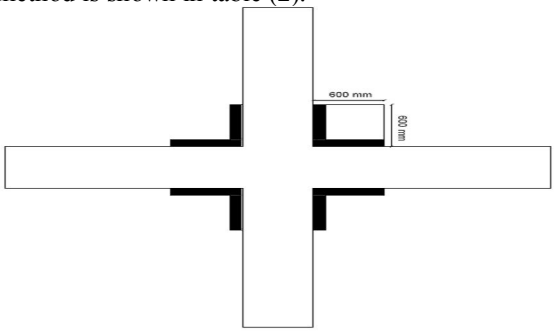


Figure 5- specimen of C_1-C_2 intermediate strengthened joints before and after beam and column wrapping

Table 2- The properties of C_1-C_2 strengthened specimens

Name	C_1	C_2
Type of material	CFRP laminate	CFRP laminate
L(mm)	200	600

Joints: (Type 2 strengthening model of the effect of material of sheets and FRP wrapping) C_3-C_5

Strengthening method and direction of placement of fibers are shown in figure 6. Table 3 shows strengthening properties used in C_3-C_5 specimens.

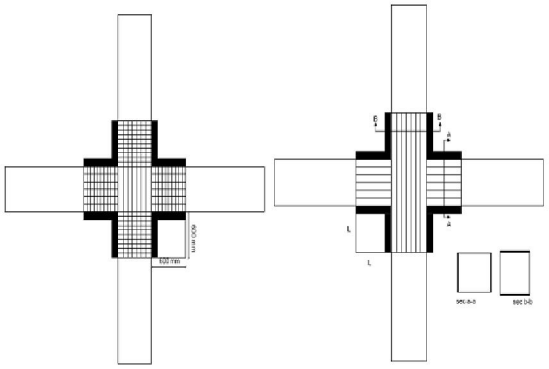


Figure 6- specimen of C_3-C_5 intermediate strengthened joints before and after beam and column wrapping

Table 3- The properties of C_3-C_5 strengthened specimens

Name	C_3	C_4	C_5
Type of material	CFRP laminate	GFRP laminate	CFRP laminate
L(mm)	600	600	600

3. The results of analysis of inner joints specimens

The first result that is investigated in the analysis of inner joints specimens is load-displacement curves of specimens.

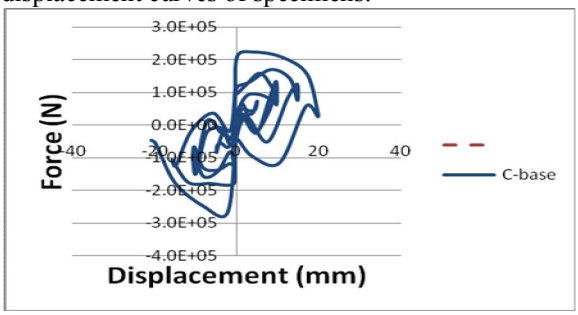


Figure 7- Behavior curve of un-strengthened inner joint

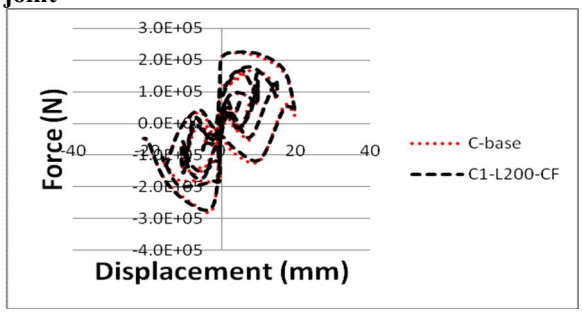


Figure 8- The behavior curve of CFRP - strengthened inner joint with the length of 200 mm

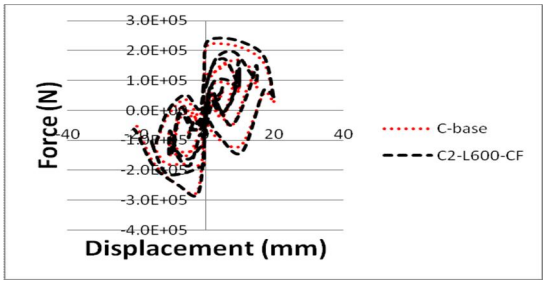


Figure 9- The behavior curve of CFRP - strengthened inner joint with the length of 600 mm

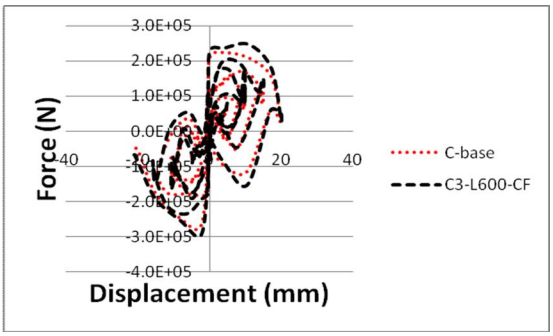


Figure 10- The behavior curve of CFRP - strengthened inner joint with the length of 600 mm

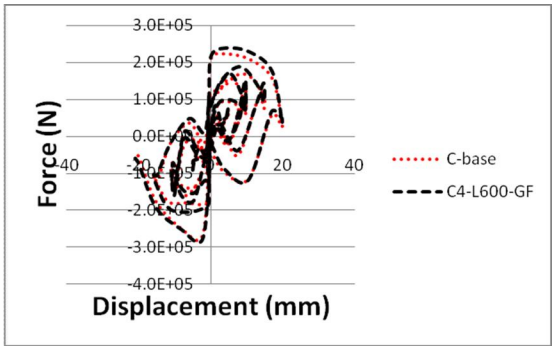


Figure 11- The behavior curve of GFRP - strengthened inner joint with the length of 600 mm

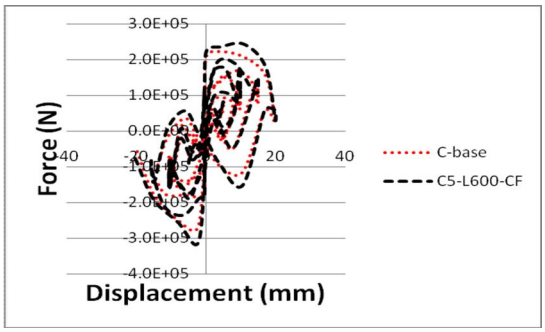


Figure 12- The behavior curve of CFRP - strengthened and FRP wrapping inner joint with the length of 600 mm

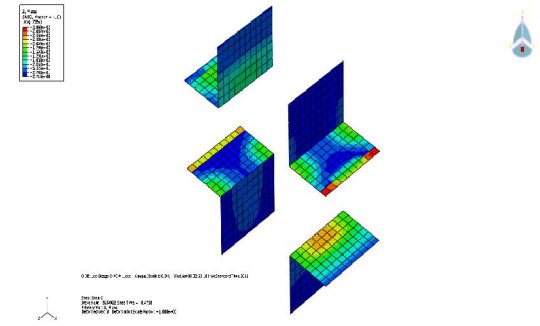
Figure 7 to 12 show these curves for strengthened specimens of carbon and glass as separately beside basis specimen. The summary of analysis results for inner joints specimens is shown in figure 4.

Table 4- The results of non-linear analysis for strengthened inner joints

Type of joint	Ultimate load		Ultimate displacement
	value (P) (KN)	Changes (%)	Value (mm)
C-base	270.503	0	3.581
$C_{1\text{-L200-CF}}$	272.388	0.74	2.385
$C_{2\text{-L600-CF}}$	280.593	3.70	2.381
$C_{3\text{-L600-CF}}$	295.357	9.25	2.380
$C_{4\text{-L600-GF}}$	281.546	4.07	2.382
$C_{5\text{-L600-CF}}$	315.068	17	2.379

C_1-C_2 joints

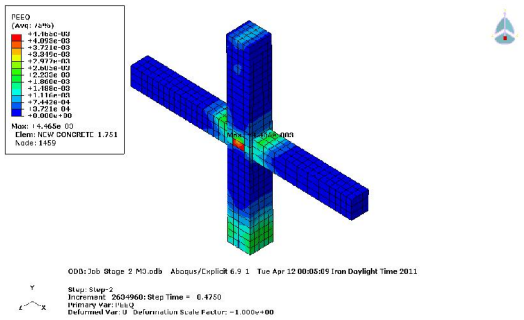
As it is shown in the investigation of strengthened inner joints specimens, by reinforcement used in C_1-C_2 specimens in L-form, behavioral properties of joints such as bearing capacity and ultimate displacement are improved that results of the analysis are shown in table 4. Critical sections in these joints are transferred to the points after beside the column. For example, the values of stresses in L-shape sheet in tensile section for C1 and C2 specimens are shown in figure 13.



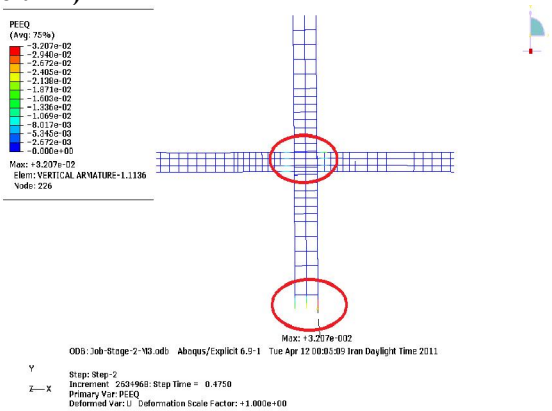
(a) C1 specimen (200mm length)

(b) C2 specimen (600mm length)

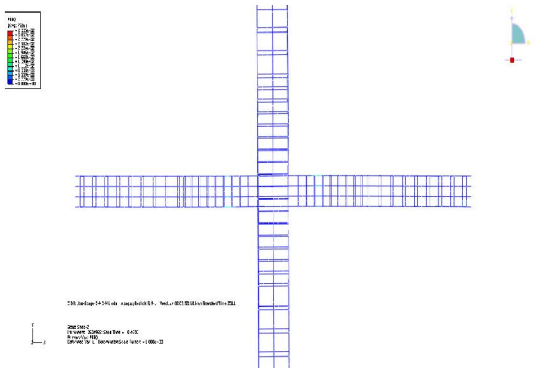
Figure 13- The stresses created in FRP sheets in C1 and C2 specimens along beam axle in final stage of loading (MPa)



(a) Basis specimen (failure in joint core and column)



(b) C1 specimen



(c) C2 specimen

Figure 14- Plastic strain created in basis samples, C1 and C2 specimens in final sub step of loading

For example, figure 14 shows the flowing place of longitudinal reinforcements in C1 and C2 specimens beside basis specimen. By increasing loading in these specimens, yield region is approached gradually to the edge of column and strain of beam tensile reinforcements is increased beside the column and yield region is extended to the inside of joint core and by increasing cracking in joint region leads into joint failure.

Considering the drawn cures and the results presented in table 4, it is shown that by increasing reinforcement length of FRP sheets of 200mm to 600mm, bearing capacity and ultimate displacement are improved.

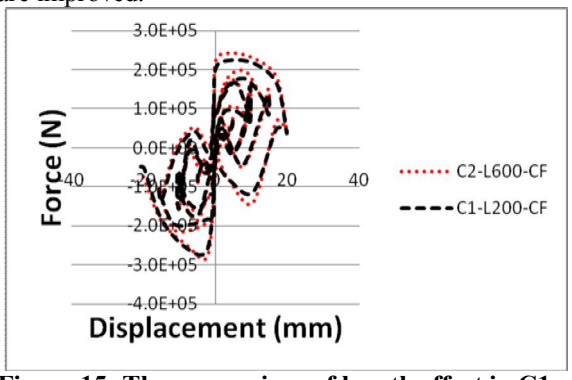
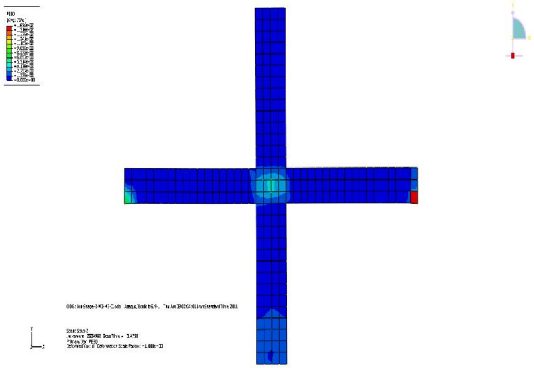


Figure 15- The comparison of length effect in C1 and C2 specimens

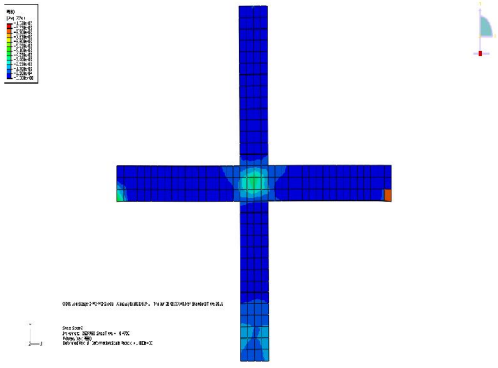
Strengthening concrete joints according to this reinforcement model increases 1 to 4% bearing capacity of joint. Also, the maximum increase in ultimate strength in this model is 272.388 KN.

C_3-C_5 joints

As it is shown, using lateral sheets reduces the depth of cracks in critical section and by this kind of reinforcement, joint failure is postponed and in C_3, C_4 and C_5 specimens we observed more stiffness and bearing capacity in comparison with $C_1$and C_2 specimens. The process of formation of plastic strain and flowing longitudinal reinforcements in this strengthening are shown in figure 16. According to the figure, it is seen that in the final loading sub step, besides critical section, strong cracking is occurred in joint core and in CFRP-strengthened joints, this is seen less. Thus, CFRP-strengthened joints are failed later. Also, figure 17 shows the stresses created in reinforcement sheets. Here it is observed that due to the great value of elasticity module, carbon sheets have more stress than glass sheets and due to this improvement of properties of joints are more in C_3-C_5 joint specimen.

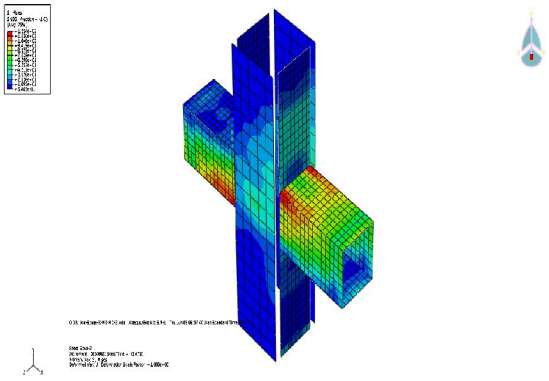


(a) C3 specimen (made of carbon)

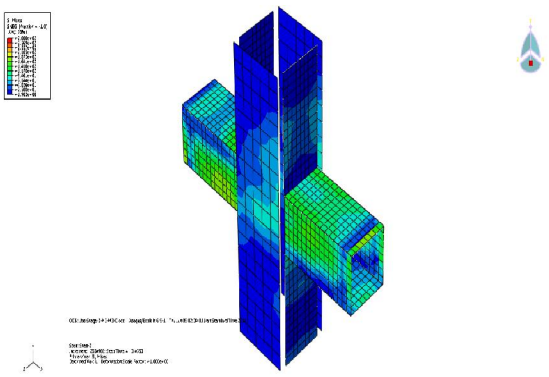


(b) C3 specimen (made of glass)

Figure 16- Plastic strain created in C1 and C2 specimens in final sub step of loading



(a) C4 specimen (made of carbon)



(b) C5 specimen (made of glass)

Figure 17- The stresses created in FRP sheets in C4 and C5 specimens along beam axle in final stage of loading (MPa)

As it is shown, by changing the material of sheets and wrapping joint, bearing capacity and ultimate displacement of specimens are improved. Also, in strengthening by CFRP sheets more stiffness and bearing are observed in comparison with GFRP.

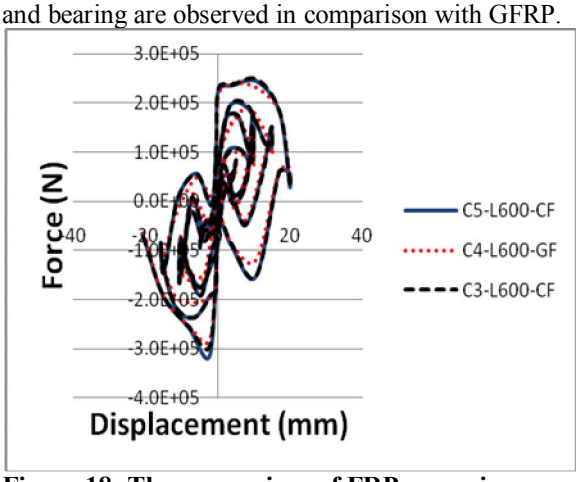


Figure 18- The comparison of FRP wrapping C_5 and C_4 ,effect and material of sheet in C_3 specimens

Strengthening concrete joints according to this reinforcement model increase 5 to 17% bearing capacity of joint. Also, the maximum increase in ultimate strength in this model is 315.068 KN. Also, as it is shown in figure 19, in CFRP and GFRP-strengthened reinforced concrete, in the specimens with CFRP, bearing capacity trend is consistent with increasing length. The following charts show the behavior of these reinforcement models to each other.

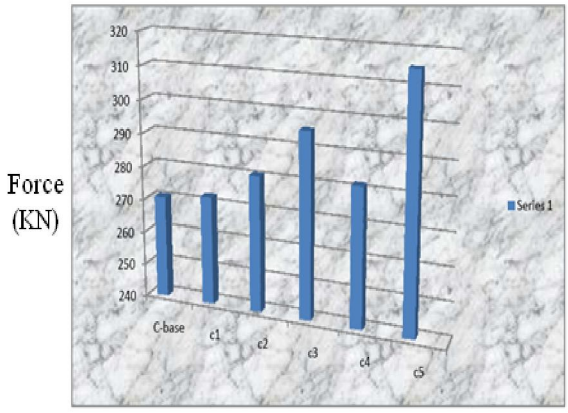


Figure 19- Comparing specimen in CFRP and GFRP-strengthened intermediate joint and FRP wrapping

4. Conclusion

The results of FRP-strengthened inner joints analysis

Regarding the results of intermediate joints, we can refer to the improvement of bearing capacity to 9% (in C3 specimen) and to 17% in external frame (in C5 specimen), also ultimate displacement to 33.56% (in C5 specimen) is increased. Regarding the material of reinforcement, in CFRP-strengthened specimens, bearing capacity and ultimate displacement increase were considerable in comparison with GFRP-strengthened specimens.

- By strengthening in basis specimen, increasing trend of stiffness, bearing capacity and ultimate displacement are increased.
- The results of this research show that strengthening by fiber composites (FRP)can increase some loads such as cracking, yield and ultimate and it is effective in increasing energy loss and opening hysteresis loops.

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A Numerical Investigation on the Effect of Angle and Initiation Point of Slope on the Base Flexural Moment in Seawalls under Random Waves

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Abstract: Seawalls are one of the most important types of sheltering structures which are constructed along the coast line. The main exerted force on these structures is the random sea wave induced load during the storm conditions. In such conditions, free surface of the water has a time dependent irregular pattern which can be described by either a time series or an energy spectrum. The wave induced pressure on a seawall is random in nature and consequently, the internal forces produced in the body of the structure have a random temporal change. The internal forces can be minimized through changing the slope of the seawall in an either local or global sense. In order to study the effect of slope's characteristics on the wave induced internal forces, a number of seawalls with different slope angles on their upper part have been modeled and analyzed subjected to sea waves, using the SACS software package. In the considered models, the wall is vertical between the base and the initiation point of the slope at the wall's upper part. Different values have been assigned to the slope of the seawall with the increments of 5˚ ranging from 0˚ to 45˚ with respect to the vertical axis. Different positions have also been considered for the initiation point of the slope with the increments of 5 cm. The first position is at the base and the last one is at the surface of the wave. In order to increase the accuracy of results, the structure's weight and the hydrostatic pressure have been considered during the analysis. The results show that when the initiation point of the slope is at the distance of half of the significant wave height from the water surface and the angle of the slope is 35˚, the base flexural moment becomes minimized and increase of the slope beyond this value will be no longer effective in minimizing the moment.
[Vafaeipour Sorkhabi R, Abasi A, Giyasi Tabrizi O. **A Numerical Investigation on the Effect of Angle and Initiation Point of Slope on the Base Flexural Moment in Seawalls under Random Waves**. *Life Sci J* 2012;9(4):5436-5441] (ISSN:1097-8135). http://www.lifesciencesite.com. 804

Keywords: Seawall, Random waves, Analysis of the wave induced dynamic response, Slope of the wall, SACS software package

1. 1. Introduction

Seawalls design and make to coastal protection against waves and to prevent entering water to coasts and in order to proper use of coastal lands. In order to optimize design in coastal engineering must be have appropriate information about exerted loads and coastal structural behavior against these loads. The important exerted loads on the seawalls are sea waves that certainly would be the most severe under storm conditions. The main hydrodynamic parameters include wave height, period and length. Due to random behavior of the wave, cannot be defined precisely the coastal structural behavior just rely on the theory. Therefore, in these cases using from authentic software and laboratory studies will be important. Due to wall base moment in seawall design is one of the most influential factors so set it when radiate random waves will be contributed to the design (Goda, 2000). Implement vertical walls are easier than steep walls and takes up less area of costal lands. Length of the wall is less so its weight is less. On the other hand due to vertical position of wall, its weight will be on base, so the weight flexural moment will be zero relation to the base. Also because of high reflection it does not exist on the wave. During collision wave and its reflection, wave force and follow base flexural moment increases. And this is one of the negative sides of these walls against the mentioned advantages. In steep walls because of wave energy dissipation during the collision, exerted force of the wave on structure is reduced significantly. In such case, base flexural moment caused by wall weight, water weight on the wall and wave induced force. On this basis, can be examined dual steep wall. In this case the wall will be vertical from base to starting point of slope and from that point to top of the wall is considered steep. Because of bulk of the wave induced forces on structures occurs near water surface, using these walls cause reduce base flexural moment result of wave induced , structure weight and water weight. It seems walls with dual slope had vertical and steep walls advantages together. In this context, determine starting point of slope on the wall will be important

in order to achieve minimum flexural moment. Due to waves random behavior would require a lot of trial and error to reach slope starting point and slope angle. Therefore, use reliable software in this field such as SACS software will be useful.

1.1 A Review of Experienced Researches

Many seawalls across the world due to lack of sufficient precision in design have caused great damage. Many of these faults occur because of structural collapse, crack in weak areas and total slide (Minkin, 1963). Hydrodynamic pressure distribution is high in water level and decreases in depth. However, hydrostatic pressure resulting from contact with the wall in rest condition is zero at water level but increases linearly in water depth. Sum of these two pressures is total pressure exerted on the wall. Due to maximum value of the hydrodynamic pressure occurs at the surface, also, because of arm length to the base approximate equality with water depth, flexural moment resulting from hydrodynamic pressure would be considerable (SPM, 1984). The wave's hydrodynamic pressure is a function of reflection coefficient. Reflection usually occurs in walls with low slope and nearly vertical. Reflection coefficient will be close to one and in this case the waves are non-breaking. But in walls with high slope, Cr is near zero and wave is kind of breaking mode also, in intermediate state, the wave will break (SPM, 1984; Neelamani et al., 1999).

$$\left[C_r = \frac{H_r}{H_i} \right]$$

Where:

H_r: is returning wave height in front of the structure.

The first studies were done to design seawall by Sainflou in 1928. He presented simple wave theory for calculation of wave's hydrodynamic performance on smooth vertical walls. The studies were completed with laboratory studies by Rundgren in 1958. Equations 2 and 3 offer Sainflou equations for calculation of non-breaking waves on vertical walls (Neelamani et al., 1999; Cheghini, 1998).

$$p_1 = \frac{1 + C_r}{2} \cdot \frac{\rho g H_i}{\mathrm{Cosh}\left(\frac{2\pi\pi}{L}\right)}$$

$$M = M_s + M_{wave} = \frac{1}{6}\rho g h^3 + M_{wave}$$

In above equations ρ is water density, h the water depth in front of a wall, g gravity acceleration, L wavelength and M_s moment result of water hydrostatic force, M_{wave} moment result of radiation, p_1 excess pressure during collision wave with its peak point and M total base flexural moment. To obtain M_{wave} can be use the diagrams provided by Rundgren. MiniKiń theory has been represented in 1963 based on empirical observations about large walls for breaking waves (Minkin, 1963). Goda represent the basic theory of wave's effect on seawall in 1974 .The theory today widely used in design of seawall. Shuto presented two-dimensional wave theory to calculate two-dimensional waves induced force in 1972, using Lagrange theory. This theory can be offer base moment either in breaking or non-breaking conditions (Neelamani et al., 1999). Interaction numerical studies between wall and waves have done by Ahrens in 1993 also, by Vander Meer in 1955 and Schutrumpf and et.al in 1994 to investigate waves exerted force (SPM, 1984; Cheghini, 1998). Based on the theory can be said many studies don't on the steep walls. Two-dimensional wave theory is expressed based on equations 4 to 7 about flat steep walls in position two-dimensional regular waves (Figure 1). Neelamani and Sandhya saw large errors between experimental and theoretical results by laboratory studies on steep walls in 2005.

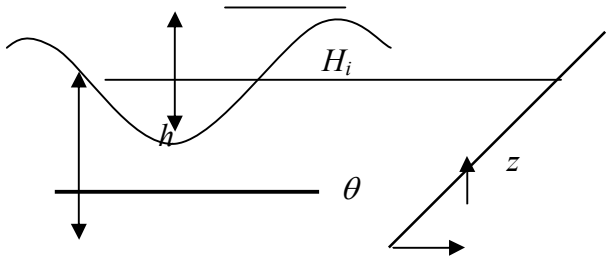

Figure 1: Wave impact on Steep walls

$$P(x,z,t) = \frac{1}{2}\rho g H_i \frac{\cosh(kz)}{\cosh(kh)}\cos(kx - \omega t) + \frac{1}{2}\rho g H_r \frac{\cosh(kz)}{\cosh(kh)}\cos(kx + \omega t + \gamma)$$

$$P(x,z,t) = \frac{1}{2}\rho g H_i \frac{\cosh(kz)}{\cosh(kh)}\sqrt{1 + C_r^2 + 2C_r\cos(2kx + \gamma)}\cos(\omega o - \alpha)$$

$$\alpha = \mathrm{Arctan}\ \frac{\sin(kx) - C_r\sin(kx + \gamma)}{\cos(kx) + C_r\cos(kx + \gamma)}$$

$$P_{max}(x,z) = \frac{1}{2}\rho g H_i \frac{\cosh(kz)}{\cosh(kh)}\sqrt{1 + C_r^2 + 2C_r\cos(2kx + \gamma)}$$

In above relations (x,z) is steep wall local coordinates in horizon and vertical sides, $k = \frac{2\pi}{L}$ wave number, wave length, $\omega = \frac{2\pi}{T}$ wave angle frequency and T is wave period. P(x,z,t) is Pressure distribution on seawall at any time and p_{max} (x , z) is maximum pressure on wall and γ is wave phase due to wave reflection. Muni Reddy used submerged breakwaters in order to reduce the impact of waves on seawall in

front wall in 2005 and observed reduce its impact based on the height of the submerged breakwater relation to wall height (Muni Reddy and Neelamani, 2005). Jeng used porous submerged breakwaters in front of the wall like as Muni Reddy in 2005(Jeng et al., 2005). Zanuttigh studied impact a variety of materials used on wall to reduce wave effects in 2005 (Zanuttigh and Vander Meer, 2008).

Pullen et al., 2009, Studied using precision measuring instruments, amount bending on Walling ford seawall in Edinburgh. In 2010 Cuomo done extensive experimental studies on a gentle slope wall encountering with random waves (Cuomo et al., 2010a,b) and in 2010 Ahand et al., investigated effect of random waves on curved walls numerically. Despite were done extensive researches on seawall about substantial impact of steep wall particularly double steep walls according to present authors information did not research to determine wave random induced force using updated software, especially SACS software.

1.2 Waves on the seawall

In general, waves were classified into waves regular and random. Random waves can be defined by combining infinite regular waves. During the storm condition, sea waves are kind of random waves and the water level is irregular. Using spectral analysis on recorded signals can be studied random waves. In this regard, by spectral density can be expressed a comprehensive explanation of the radiated waves during different sea conditions (Design regulation of Marine Structures, 2006). Based on recorded data, different spectrums such as Bretschnider spectrum in 1959, P-M spectrum in 1964 , TMA spectrum in 1985 and JONSWAP spectrum in 1974 have been defined (Sorensen, 1993; SACS, 2005; Cheghini, 1998). Sorensen has been introduced JONSWAP spectrum as one of the best spectrum to design seawalls (Sorensen, 1993; Ichikawa et al., 2010). In this study used JONSWAP spectrum.

1.3 JONSWAP spectrum

Obtained results from studies in the North Sea, allowing a proper estimation of limited one-dimensional wave spectrum. Figure 2 shows the spectrum. In this figure the horizontal axis, show wave frequency (f) and vertical axis show wave spectral density changes S(f) that are expressed by equations 8 to 11.

$$S(f) = \frac{\alpha g^2}{(2\pi)^4 f^5} e^{-1.25\left(f_p/f\right)^4} \gamma^a$$

$$a = e^{-\left[(f-f_p)^2/\left(2W^2 f_p^2\right)\right]}$$

$$\alpha = 0.076\left(\frac{gF}{U^2}\right)^{-0.22}$$

$$f_p = \frac{3.5g}{U}\left(\frac{gF}{U^2}\right)^{-0.33}$$

In this spectrum γ coefficient is between 1/6 to 6 but number 3/3 is recommended. γ coefficient is density ratio in the maximum frequency for JONSWAP spectrum against P-M spectrum. f_p is frequency of spectral peak ,F wave length and U is wind speed in 10 m level. Per $f \leq f_p$, W=0.07 and per $f > f_p$, W=0.09 are considered. Figure 2 is obtained based on wave length 30 km and wind speed 40 knots (Design regulation of Marine Structures, 2006).

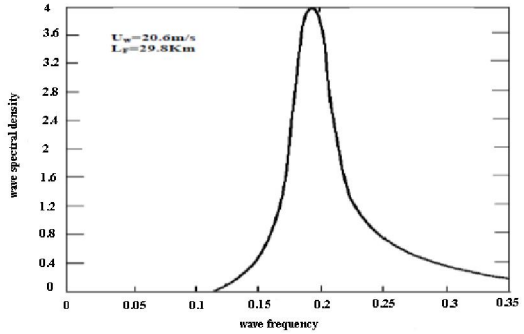

Figure 2: JONSWAP wave spectrum [16]

2. Methods

In this study, model of a steel seawall with dimensions 1 m × 1/5 m and thickness 1 cm has been considered which is free in floor and sides. The wall can be steep in different heights and slope starting point to total wall height considered variety. The slopes can be placed under different angle to vertical axis. A main reason of considering a unit for length is great of the seawall to their section dimension. These structures are usually built along the coast. Thus, the behavior of a length unit can be representing entire wall behavior. The model is placing under radiation random waves for definite times. Time changes in the water surface profile, shear force and wall base moment are determined. Maximum values moments in each case are collected and compared to each other. In order to obtain the interaction between the wall and the waves used SACS software.

2.1 SACS software

SACS software is one of the strongest and most widely used software to design and analyze of maritime structures under various loading conditions. Figure 3 show subtypes of models generated and analysis by software under different conditions. In present study, seawall is under random wave loading. Therefore, analyze the wall will be kind of dynamic response analysis. The method dynamic response analysis is shown in Figure 4 (**Hooshyar**, 2009).

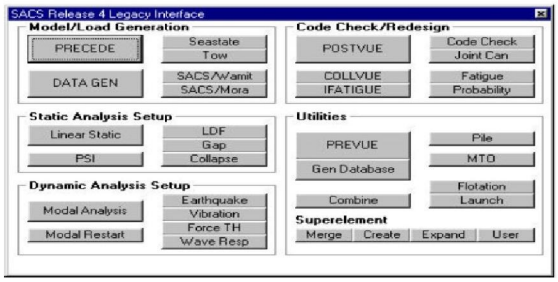

Figure 3: Entire structure of SACS software

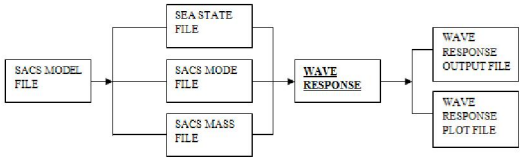

Figure 4: The method dynamic response analysis in SACS software [18].

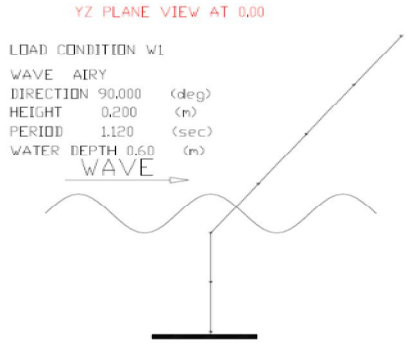

Figure 5: Seawall model in software

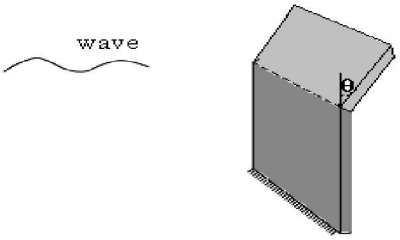

Figure 6: Three-dimensional view of the wall

2.2 Model used in software

Wall geometry model there is in SACINP subset. In this part in addition to introduce structural geometry, initial loading such as structure weight, static condition of the sea and the regular waves are introduced. This information will be use in dynamic response analysis. In figure (5) the model width section and in figure (6) wall three-dimension view is shown. In order to analysis of wave induced dynamic response first done linear static analysis then extract mode .To define irregular waves in software represented parameters of exerted waves due to environmental conditions. According to the model used in the present study the wave height 20 cm, water height 60 cm and JONSWAP wave spectrum ,γ parameter in 3/3 spectrum ,time of induced wave 300 seconds, parameter C in 0/142 spectrum and time pitch 0/02 seconds are applied. The wave period is usually 1 to 10 seconds at the practical works and period 2/5 seconds is suitable for condition of Iran beaches. Due to the similarity of Froude number and consider the scale of 1 to 5, the wave period 1/12 second is applied. Main reason of considering wave length 300 seconds and a time pitch of 0/02 seconds is appropriate overlap between JONSWAP spectrum and produced spectrum by the software.

2.3 Analysis done

To get the best steep slope and slope starting point in order to achieve a minimum flexural moment, seawall with dual slope is expressed in Figure 7.

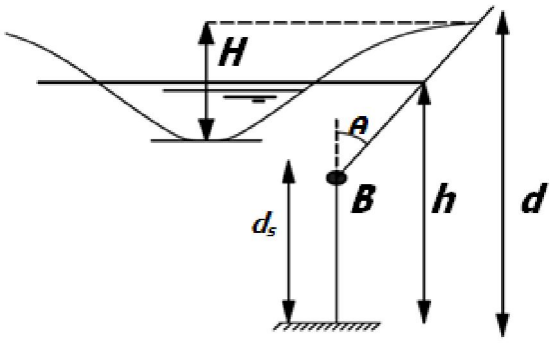

Figure 7: Manner placement compound steep wall against wave

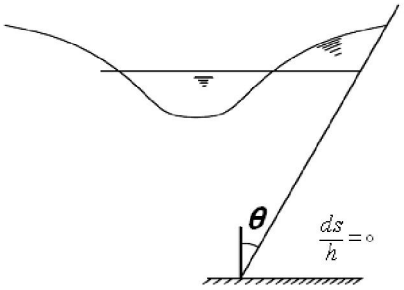

Figure 8: Full steep wall:

In this figure d_s is vertical height of the wall, d total wall height, h water height and θ is slope of wall. In vertical wall, θ=0 and in full steep wall d_s = 0. Range d_s from zero to 80 cm by changing 5 cm and placement angles values of wall steep part is considered between zeros to 45 degrees with a 5 degree change. For each case, static and dynamic and extract mode analysis done separately. Time history diagram of water surface, flexural moment and shear force, respectively have been achieved in figures 9,

10 and 11 during 300 seconds with pitch 0/02 sec. By comparing time history chart of the wall surface and the base flexural moment changes can be seen occurrence of the maximum moment does not compliance with peak water level linearity. Water level range and flexural moment are obtained in Figures 12 and 13, respectively. It is observed that the maximum frequency range of 1 Hz and a maximum frequency range of the flexural moment is 3/6 Hz. Due to obtained results of wall extract mode analysis, its fundamental frequency in the first mode was 3/61 Hz can be considered the dominant frequency in response of wall moment is the first wall mode frequency.

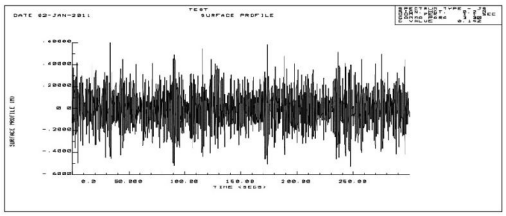

Figure 9: Water surface time history Graph

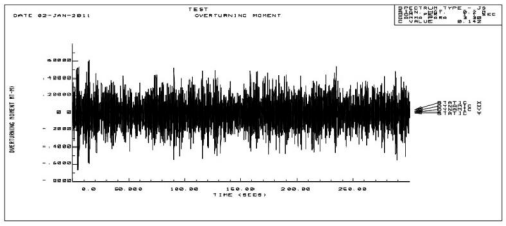

Figure 10: Wall flexural moment time history graph

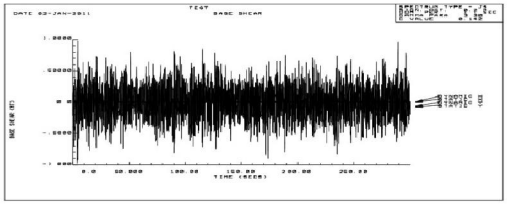

Figure 11: base shear force Time History Graph

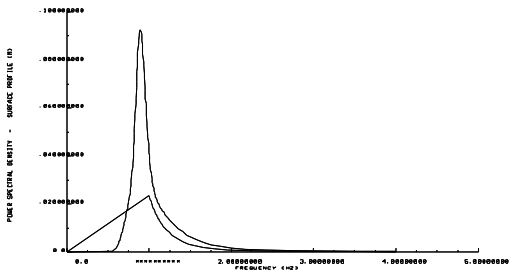

Figure 12: Water surface range

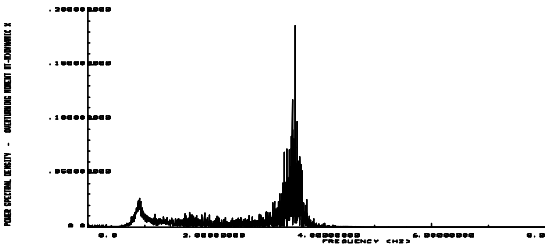

Figure 13: Base flexural moment range

3. Result and Discussion

With respect to the above issues in order to determine the start point and the most optimal slope from floor to 80 cm height in each 5 cm and different slope with angle pitches 15 degrees analyzed between zero and 45 degrees. In each time series maximum values of flexural moment are obtained during 300 second random wave radiation. Figure 14 shows results of the analysis, in this figure flexural moment at vertical axis is dimensionless ($M_r=M/(pgd^3)$) per unit length of wall also, slope starting point is dimensionless($d_{rs}=d_s/h$) .As can be seen at three angles the slope was studied on the wall with different starting point per $d_{rs}=0/83$ had minimum moment. This number offer proper slope starting point at 10 cm below water surface. Due to water height is 60 cm and effective wave height is 20 cm, in present model obtained result show if slope starting point equals half effective height at water surface , induced flexural moment in wall base had least values. In figure 15 slope angles per $d_{rs}=0/83$ has been drawn ranging from zero limit to 45 degree with change 5 degree. Can be seen after angle 35 degree the moment remains constant. So in the model, slope starting point equal to half of wave height is lower than free surface of water below slope 35 degree to vertical slope. The final shape of the wall is plotted in Figure 16 in order to accurate represent.

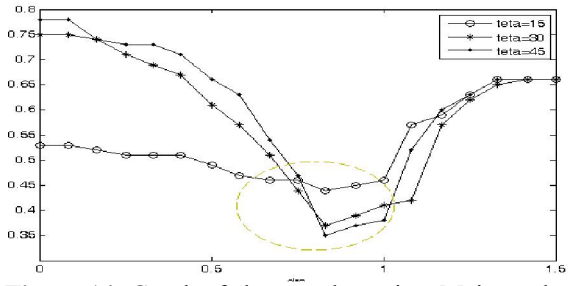

Figure 14: Graph of changes d_{rs} against M_r in angles 15, 30, 45 degrees.

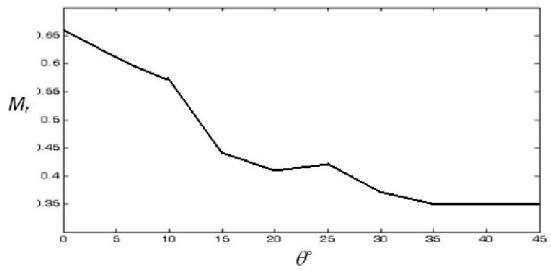

Figure 15: Graph of angle changes against M_r in angles zero to 45 degrees with changes 5 degree per d_{rs}=0/83

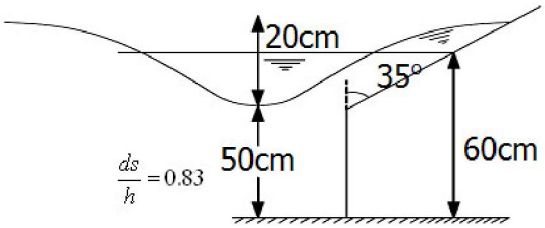

Figure 16: Manner placement wall against wave

4. Conclusions and suggestions

Based on the analysis done in this study, the main results are summarized as follows:

1 - Seawall with double slope encountering with sea random waves have better performance rather than walls vertical and steep walls in order to achieve minimal base flexural moment.

2 - The best slope starting point in seawall of the present study model has been conducted in half of the wave height which is lower than the water level.

3 –Flexural moment per angle 35 degrees on the slope is least and increase angle more than this value does not effect on reduce moment (Vafaiepour, et al., 2010; Ahand et al., 2010).

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Prevalence Study of Hepatitis B virus (HBV) Infection by Serological techniques in Jeddah, Saudi Arabia

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Abstract: Chronic liver disease is an important health challenge in the world, where hepatitis B virus (HBV) infections are the main causes of liver insufficiency. HBV infection is a serious global health problem, with two billion people infected worldwide, and 350 million suffering from chronic HBV infection. The objective of this study was prevalence of Hepatitis B virus on Jeddah populations, Saudi Arabia. (HBV) was screened in serum and plasma by using Elisa test , samples were collected and stratified according to nationality into Saudi and non Saudi and according to gender into male and female and also according to age. Prevalence was calculated separately for each group and for studied population as a whole. **Results** showed that HBsAg were found in 6.11 % seropositive of sample in study populations , the prevalence of HBs Ag was higher in males than females it is 8 % among males and 5.61 % among females with significant difference ($p<0.05$). Also HBs Ag were found in 6.53 % of Saudi population and 1.79 % of non Saudi patient with no statistically significant difference ($p>0.05$).According to age results all positive samples were found in adult age while no positive sample at age under 15 years with no significant difference ($p>0.05$). Finally in this study we tried to draw attention through the study to create future strategies to deal with this virus and limit its spread in Saudi society. This study provides valuable information that can be used to examine the incidence of infection in the community and help focus the administration of a future HBV vaccine to appropriate target populations.

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Key words: HBV; virus; seroprevalence; ELISA; HBsAg

1. Introduction

Hepatitis" means inflammation of the liver. The liver is a vital organ that processes nutrients, filters the blood, and fights infections. When the liver is inflamed or damaged, its function can be affected. Heavy alcohol use, toxins, some medications, and certain medical conditions can cause hepatitis. Viral hepatitis is a major global health problem. There are five known viruses that primarily infect the liver and cause hepatitis: hepatitis A; B; C; D and E. Hepatitis B, C, D virus (HBV, HCV, HDV) infections can lead to chronic liver disease with its attendant long term sequelae including cirrhosis and hepatocellular carcinoma (HCC). Viral hepatitis A (HAV), hepatitis B and hepatitis C virus (HCV) are the three most commonly identified worldwide.

This disease represents a major public health problem in Saudi Arabia. According to the Saudi Ministry of Health (MOH) data, viral hepatitis ranked the second most common reportable viral disease after chickenpox in 2007, with almost 9000 new cases diagnosed in that year (52% HBV , 32% HCV , and 16% HAV) **(MOH; 2009) .** In Saudi Arabia, HBV and HCV are major causes of disease requiring liver transplantation and of hepatocellular carcinoma, resulting in the need for considerable healthcare resources **(Al-Sebayel *et al.*, 2007).** The epidemiology of viral hepatitis in Saudi Arabia has undergone major changes, concurrent with major socioeconomic developments over the last two to three decades. Since the 1980s, Saudi Arabia has been known as a high HBV endemic area **(Andre, 2000).**

The prevalence of HBV infection varies widely, with rates ranging from 0.1% to 20% in different parts of the world **(Lavanchy, 2004).** "High" prevalence (hepatitis B surface antigen [HBsAg] positivity rates > 8%) regions where the viral infection is highly endemic include the Far East, parts of the Middle East, sub-Saharan Africa, and the Amazon basin. In these regions, serologic evidence of prior HBV infection (anti-hepatitis B core antigen [anti-HBc] or anti-HBs positivity) is present in the vast majority of individuals **(Berenguer and Wright, 2002).**

Hepatitis B is virus (HBV) a public health problem worldwide. The World Health Organization (WHO) estimates that approximately 350 million people are infected chronically with hepatitis B virus (HBV), and that the prevalence of the certain state is more than 20% in certain highly endemic area of Africa and Asia **(EPI-NEWS, No. 25, 2002).** Sequelae of HBV infection are serious. Up to 15% of

carriers develop eventually primary hepatocellular carcinoma; the younger a patient is when they acquire chronic infection, the higher the risk of primary hepatocellular carcinoma. Premature mortality from chronic liver disease occurs in 15–25% **(SOM 208 Microbiology Syllabus Viral Hepatitis, 2006).**

Detection of serological markers is the mainstay of diagnosis of HBV infection and the most reliable marker of HBV carriage is HBV surface antigen (HBsAg) in serum. HBV e antigen (HBeAg) is generally used as secondary marker to indicate high levels of virus in the blood. The minority of chronic HBV carriers in whom HBeAg can be detected have a particularly high risk of progressive liver disease and end stage liver failure **(Fattovich, *et al.*, 1997).** The monitoring of hepatitis B virus DNA in serum is as important as serological markers in predicting the clinical outcome of infection. More recently molecular diagnostic methods have been used to quantify the levels of HBV DNA in serum as a marker of viral replicate activity **(Baker et al., 1991).**

The aim of this study is detection the prevalence of HBV infection by Serological techniques in Jeddah province "Saudi Arabia" and Statistical analysis of results and assessment of the health hazard, and provides valuable information that can be used to examine the incidence of infection in the community and help focus the administration.

2. Materials and Methods

Serum samples collection

Blood samples were collected for 638 patients in different ages, they were selected randomly from AL-Thager general hospital Jeddah and from Jeddah regional laboratory, between November 2011 to April 2012, and all samples were collected from OPD at Plain tube or EDTA tube. Then separated the sample into serum or plasma; samples were transported to molecular virology laboratory in King Abdul AL-Aziz University. All serum samples were stored at -20^{O}C until use.

Serological testing

All samples were screening by Monolisa HBs Ag ULTRA using (ELISA) Technique Cat No.72346 (BIO-RAD). This kits contents of 1 plate – 96 tests**.**

Principle of assay

Monolisa HBs Ag ULTRA assay is a one step enzyme immunoassay based on the principle of the " sandwich " type using monoclonal antibodies and polyclonal antibodies selected for their ability to bind themselves to the various subtype of HBs- Ag now recognized by the WHO and the most part of variant HBV strains. The Monolisa HBs Ag ULTRA solid phase is coated with monoclonal antibodies. The Monolisa HBs Ag ULTRA conjugates are based upon the use of monoclonal antibodies from mouse and polyclonal antibodies from goat against the HBs Ag These antibodies are bound to the peroxides'

Materials for Enzyme Linked Immunosorbent Assay (ELISA):

Monolisa HBsAg ULTRA assay is a one step enzyme immunoassay technique of the "sandwich" type for the detection of the surface antigen of the Hepatitis B virus (HBsAg) in the human serum or plasma.

Preparation of the reagents:

NOTE: before use allow reagents to reach room temperature (18-30 ^{o}C).

Reagents to reconstitute:

- **Concentrated washing solution (20x): Reagent 2 (R2):**

Diluted 1:20 in distilled water to obtain the ready –for-use washing solution.

Prepare 800 ml for one plate of 12 strips.

- **Conjugate working solution (R6 + R7):**

Gently tap the vial of the lyophilized conjugate (R7) on the work- bench to remove any substance from the rubber cap. Carefully remove the cap and pour the content of a conjugate diluent vial (6) into the lyophilized conjugate vial (R7) .put the cap on and let stand for 10 minutes while gently shaking and inverting from time to time to ease dissolution. Enzyme development solution: reagent 8 (R8) + Reagent 9 (R9) Dilute 1:11 the chromogen (R9) in the substrate buffer (R8) (ex: 1ml reagent R9 + 10 ml reagent R8).Stability is for 6 hours in the dark once prepared.

Interpretation of the result

Samples with ratio values lower than 1 are considered to be negative by the Monolisa HBs Ag ULTRA. Results just below the cut-off value (sample ratio between 0.9 and 1) should however, be interpreted with caution. It is advisable to retest in duplicate the corresponding samples when the systems and laboratory procedures permit. Samples with ratio values equal to or greater than 1 are considered to be initially positive by the Monolisa HBs Ag ULTRA. They should be retested in duplicate before final interpretation.

Statistical analysis

The percentages of individuals with positive, negative, and equivocal results were determined for studied population as a whole. chi square test was used for the analysis and comparison of sero-statuses among age groups, male and female and each nationality. Ninety-five-percent confidence intervals were calculated where appropriate, and *P* values of < 0.05 were considered statistically significant.

3. Results

Blood samples were collected for 638 OPD in different ages, they were selected randomly from AL-Thager general hospital Jeddah and from Jeddah

regional laboratory , between November 2011 to April 2012, all samples were transported to molecular virology laboratory in king Abdul-Aziz University and this sample were tested using enzyme linked immunosorbent assay (ELISA) and calculated separately for seroprevalence, gender, nationality, age and studied population as a whole using chi square test.

Results showed that HBsAg were found in 6.11 % seropositive of sample in study populations , the prevalence of HBs Ag was higher in males than females it is 8 % among males and 5.61 % among females with significant difference ($p<0.05$). Also HBs Ag were found in 6.53 % of Saudi population and 1.79 % of non Saudi patient with no statistically significant difference ($p>0.05$).According to age results all positive samples were found in adult age while no positive sample at age under 15 years with no significant difference ($p>0.05$) .

Table1. Distribution of socidemgrafic (Nationality; gender and age) characteristics

Variable		Cases no (N=638)	
		Freq.	%
Nationality	Saudi	582	91.20
	Non-saudi	56	8.80
Gender	Male	139	21.90
	Female	499	78.21
Age	New born	19	3.00
	Adult	619	97.00
Result	ve +	39	6.11
	ve -	599	93.9

Demographic characteristics of studied population

Table2. Show *P*-value results within Nationality; gender and age.

Variable		**Results**		***P*-value**
		ve +	**ve -**	
Nationality	Saudi	38	544	0.32
	Non-saudi	1	55	
Gender	Male	11	128	0.02
	Female	28	471	
Age	New born	0	19	0.34
	Adult	39	580	

p-value < 0.05, 0.01 and > 0.05, significicant, highiely significantand Non significant respectively

. Seroprevalence study of HBV among studied population in relation to demographic variables.

Prevalence of Hepatitis B Virus according Age:

The overall prevalence of HBV among adult population was 6.11% from the total of studied population while there is no positive sample at age from new born to 15 years. There was no significant difference between age ($p>0.05$).

Table 3. Prevalence of Hepatitis B Virus according Age

Total Samples	**Age**	Sample type	Elisa - Result	Ratio
638	Adult	+ ve	39	6.11 %
	Adult	- ve	580	90.91 %
	N.B- 15 Y	- ve	19	2.98 %

Prevalence of HBV by Samples Type:

The studied populations according to seroprevalence stratified into two groups (positive samples & negative samples). The detection of HBsAg was tested using enzyme linked immunosorbent assay and calculated separately for each group. The results for HBs Ag were found in 6.11 % seropositive of populations while 93.9% seronegative.These was shown at Table 4.3. and Figure 4.1.

Table 4. Prevalence of Hepatitis B Virus

Total Samples	**Samples type**	Elisa - Result	Ratio
638	+ve	39	6.11 %
	-ve	599	93.9 %

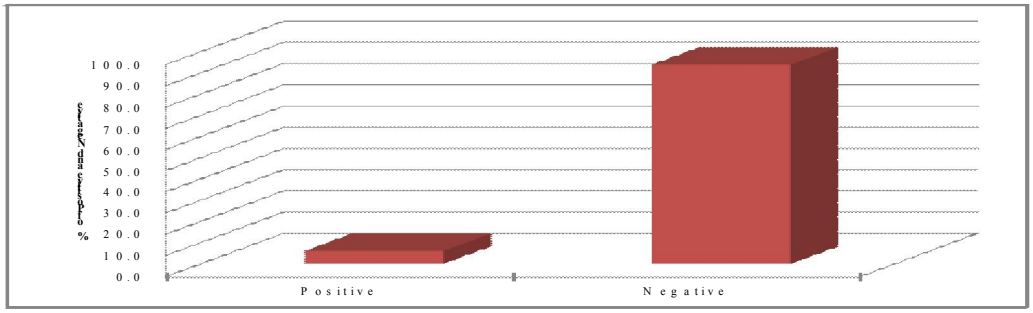

Figure 1. Prevalence of Hepatitis B Virus

Prevalence of Hepatitis B Virus by Gender:

A total of 638 OPD samples were enrolled in the study (139 male and 499 female). The prevalence of HBs Ag was higher in males than females it is 8 % among males and 5.61 % among females with significant difference ($p<0.05$).

Table 5. Prevalence of Hepatitis B Virus by Gender

Total Samples	**Gender**	Sample type	Elisa - Result	Ratio
139	Male	+ ve	11	8 %
	Male	- ve	128	92 %
499	Female	+ ve	28	5.61 %
	Female	- ve	471	94.39 %

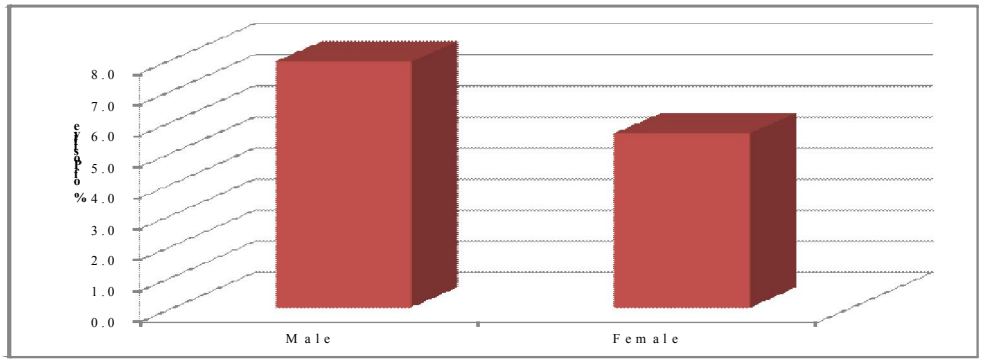

Figure 2. Prevalence of HBV by Gender

Prevalence of Hepatitis B Virus by Nationality:

According to nationalities HBs Ag were found in 6.53 % of Saudi population in studied samples and 1.79 % of non Saudi patients with no statistically significant difference ($p>0.05$).

Table 6. Prevalence of Hepatitis B Virus according to Nationality

Total Samples	**Nationality**	Samples type	Elisa - Result	Ratio
582	Saudi	+ve	38	6.53 %
	Saudi	- ve	544	93.47 %
56	Non-Saudi	+ve	1	1.79 %
	Non-Saudi	- ve	55	98.2 %

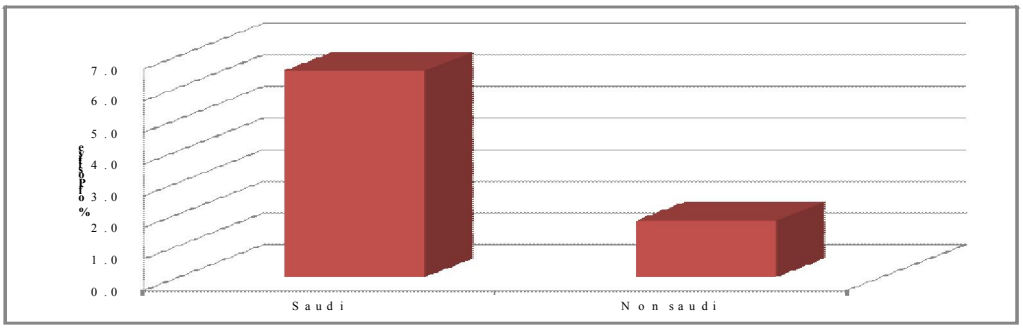

Figure 3. Prevalence of HBV by Nationality

4. Discussion

The human hepatitis B virus (HBV) is a small enveloped DNA virus causing acute and chronic hepatitis. Although a safe and effective vaccine has been available for the last two decades, HBV infection still represents a major global health burden, with about 350 million people chronically infected worldwide and more than 1 million deaths per year due to HBV-associated liver pathologies (Block, *et al.,* 2007). Many epidemiological and molecular studies have shown that chronic HBV infection represents the main risk factor for hepatocellular carcinoma development (Lok, 2004; Shepard, *et al.,* 2006; Pollicino, *et al.,* 2011). The rate for chronicity is approximately 5% in adult infections, but it reaches 90% in neonatal infections. HBV transmission occurs vertically and horizontally via exchange of body fluids. In serum, up to 1012 HBV genome equivalents per ml serum can be found. Although HBV does not induce direct cytopathic affects under normal infection conditions (Thimme, *et al.,*2003 and Wieland, *et al.,* 2004), liver damage (fibrosis, cirrhosis, and eventually hepatocellular carcinoma) is believed to be induced by the ongoing immune reaction and a consistent inflammation of the liver (Chisari, *et al.,* 2007 and McMahon, 2009).

The prevalence of chronic HBV infection varies geographically, from high (>8%), intermediate (2-7%) to low (<2%) prevalence (Margolis *et al.,* 1991). In the Middle East, HBV prevalence has altered from high to intermediate or low prevalence, but HBV infection is a problem of public health, and a major cause of mortality and morbidity particularly in developing countries. Most countries in the Middle East region are still in intermediate to high endemicity for HBV infection. Insufficient coverage of HBV vaccination, blood-contaminated equipment sharing between injection drug users, unsafe blood transfusion, and inadequate health precautions are major risk factors of HBV infection in this region (Ander, 2000).

In our study, serology was the method of choice as it permits a direct evaluation of the prevalence of HBV infections. In this study all blood samples were collected for 638 randomly patients in different ages, nationalities, sexes they were screened by Elisa test and molecular techniques (PCR) for detection of HBV in studied population in Jeddah province that located in west of Saudi Arabia . Most samples were found for females patients (n=499, 78.2%) and for males were found (n=139, 21.9%). In our study the seroprevalence of Hepatitis B Virus was 6.11 % in studied population's samples at age over 15 years. The prevalence rates were suggestive of history of past exposure to high risk procedure or behavior. The results of our study are generally consistent with the international reports indicate a prevalence ranging from 5.88 % in Bahrain and Saudi Arabia (**Toosi** *et al.,* 2008).

The average prevalence rate of HBsAg in the Saudi adult population is approximately 8% and 60% have evidence of past exposure to HBV (Faleh, 1988 and Shobokshi *et al.,* 1999). The different regions of Saudi Arabia showed a significantly variable prevalence of HBsAg . The eastern province had a prevalence of about 9% compared to the southwestern province where the prevalence was 25% in Jizan. Another studies indicate to form healthy male Saudi voluntary blood donors in Tabuk region 3.0% were positive for HBsAg while in the eastern region 6.7% and in the southwestern region 5.4%(Fatahalla,et al.,2000 ;Ayoola, *et al.,* 2003). Also the prevalence of HBsAg form western countries (0.1 - 0.5%) (Sobeslavsky, 1980; Papaevangelou, 1994). However several survey of voluntary blood donors have shown marked regional variation in the prevalence of HBV in KSA (Arya *et al.,* 1985; El- Hazmi, 1989). The Jizan region of KSA is a focus of hyper-endemic HBV infection and its sequelae of chronic liver diseases and hepatocellular carcinoma (Ashraf *et al.,* 1986 and Tandon *et al.,* 1995). A survey carried out in 1985 demonstrated an overall HBV exposure rate

of 46.5% and HBsAg prevalence of 12.7% among 724 Saudi adults residing in the region (Arya *et al.,* 1985). In 1986, a comparative study of different regions of KSA, reported a rate of HBsAg to be 32.2% among 237 blood donors in Jizan, compared to a rate of 4.7% in a similar population in Riyadh in the Central region of KSA (El- Hazmi, 1989).

The present study found the prevalence of HBs Ag was higher in males than females it is 8 % among males and 5.61 % among females with significant difference ($p<0.05$), Also HBs Ag were found in 6.53 % of Saudi population and 1.79 % of non Saudi patient with no statistically significant difference ($p>0.05$) this result are consistent with the result of other reports Memish *et al.,*(2010) reported that HBV incidence was significantly higher in males than females , Saudis than non- Saudis and in central and western region than the eastern region .

In our result according to age results all positive samples were found in adult age while no positive sample at age under 15 years with no significant difference ($p>0.05$) this results consistent with other reported that the incidence of HBV seropositivity was almost 30-fold higher in those who were aged >15 years compared to those who were <15 years (annual average incidence of 169.8 vs. 5.6 per 100 000; $p < 0.001$) (Memish *et al.,* 2010).

Between 2000 and 2007 the incidence of viral hepatitis seropositivity for all three virus types (HAV, HBV, and HCV) showed 20—30% declining trends. Similarly, a comprehensive review of prevalence studies of viral hepatitis conducted in Saudi Arabia in the 1980s and 1990s showed a more than 50% decline in all viral hepatitis types (Al-Faleh, 2003). The age group that included children <15 years was that which showed the greatest HBV incidence decline and this results consistent with our results and it is probably due to the universal infant/child immunization program started in 1990 in Saudi Arabia(Al-Faleh, *et al.,* 1999). Despite the declines in incidence, the current report confirms that seropositive viral hepatitis especially that caused by HBV and HCV, remains a major public health problem in Saudi Arabia, and was probably underestimated by the national surveillance system.

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11/2/2012

Evaluation of Locational Marginal Prices in Electricity Market

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Abstract: In electric power systems the constrained transmission leads to locally pricing for energy. This locally pricing is so called locational marginal prices (LMP) or nodal pricing. Locational marginal prices (LMP) are important pricing signals for the participants of competitive electricity markets, as the effects of transmission losses and binding constraints are embedded in LMPs. studying LMPs in electricity market is an important issue for independent system operator (ISO). ISO always analysis the system form different views for improving system nodal pricing. In this paper, LMPs are evaluated from different views and effects some factors on LMPs are tested.
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Keywords: Locational Marginal Prices, Independent System Operator, Electricity Markets.

1. Introduction

Electricity industry restructuring during the last two decades has made drastic changes to the traditional electricity structure and will continue for next several decades. In the past, electric power industry has been either a government-controlled or a government-regulated industry (i.e. single owner), which existed as a monopoly where overall authority in generation, transmission and distribution of power is within its domain of operation. Everyone including household, businesses, and industries were required to purchase their electricity needs from the local monopolistic power company. This was not only a legal requirement, but also the only source they had to rely on to fulfill their day to day requirements. The restructuring has led the traditional electricity industry to become a competitive electricity market. The main driving forces for these reforms are due to economic inefficiencies and consumer dissatisfaction associated with the single owned electricity industry. Since electricity is an essential source of energy for everyone and due to its unique characteristics such as un-storability and lack of flexibility in controlling the power flow in transmission lines, the whole process of restructuring was a challenging and a complex task. While rules concerning horizontal market structure form the basis of antitrust policies in most countries, it is widely recognized that horizontal structure comprises only one piece of the competition puzzle. Vertical integration and other vertical arrangements between wholesalers and retailers will also impact the incentives of firms. In addition, regulators and many economists have focused on the effects that market rules, such as auction design, may have on equilibrium prices. This paper empirically examines the relative importance of horizontal market structure and vertical arrangements in determining prices in imperfectly competitive markets [1-4].

Over the past two decades, however, countries have begun to split up these monopolies in favor of the competitive market in order to introduce commercial incentives in generation, transmission and distribution. The main goals under competitive market design are system reliability, market efficiency, congestion management, market power mitigation and operational & investment incentives for all the participants. This is done by creating the competition between participants in the electricity market with open access [5-7].

Optimal nodal pricing is one of the effective pricing schemes for providing a higher profit to both the utility and the customers. Nodal prices contain valuable information useful for participants, operation and, hence the scheme is to accurately determine them, continue to be an active area of research [8-13].

This paper deals with LMP analysis from different views. Effect of several parameters on LMPs are tested and analyzed.

2. Illustrative Test System

A typical power system as shown in Figure 1 is considered as test system. The system data and also market data can be found in [14].

3. Analyzing LMPs

In this section, effects of different parameters on LMPs are investigated. Network visualization from view of LMP is depicted in Figure 2. The red areas have high LMPs and blue areas have low LMPs. The bar in right section of figure shows the LMPs of network by using color. It is clearly seen that the LMPs in bus 2 and bus 3 are low, while the LMPs in bus 1, 4 and 5 are high. This is because of

placing high generations in buses 1 and 3 and high loads in buses 1, 4 and 5.

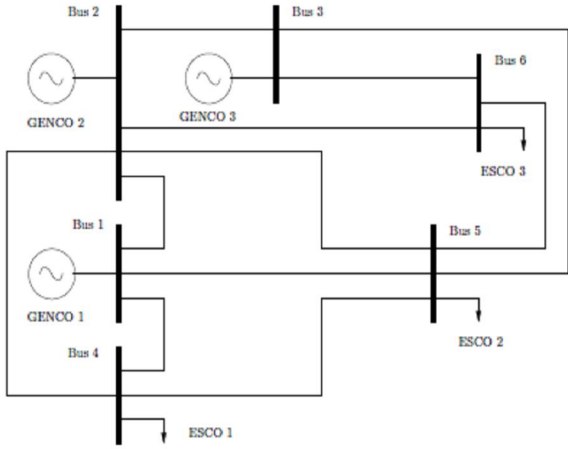

Figure 1. IEEE 6 bus test system

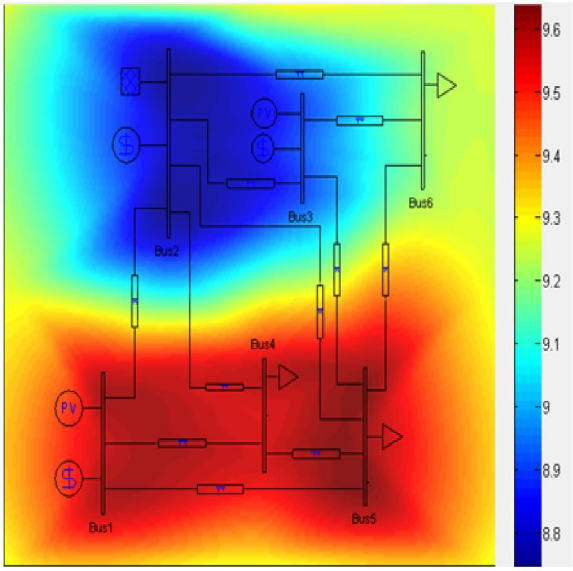

Figure 2. LMPs of network depicted in Figure 1

3.1. Effect of congestion on LMPs

The LMPs are closely related to capacity of lines and congestion in transmission lines. In this regard, it is very useful to show effect of congestion on LMPs. for this purpose, the capacities of following lines are increased to double:

- Line between bus 3 and bus 5
- Line between bus 1 and bus 2

The simulation results for this case are depicted in Figure 3. The figure shows that increasing capacity of lines affects on LMPs and nodal prices are reduced.

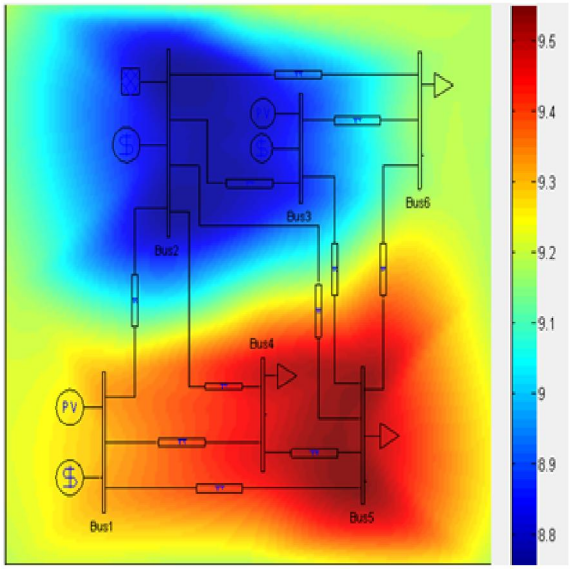

Figure 3. LMPs of network after increasing lines capacity

3.2. Effect of reactive power on LMPs

Locally feeding of reactive demands can affect on LMPs, because the power transfer in lines is reduced. In order to evaluated the effect of locally reactive sources on LMPs, it is assumed that reactive demand of bus 5 is supplied via a locally source placed at bus 5. Figure 4 shows the LMPs of system in this case. It is seen that the LMP in bus 5 in reduced in comparison with previous cases.

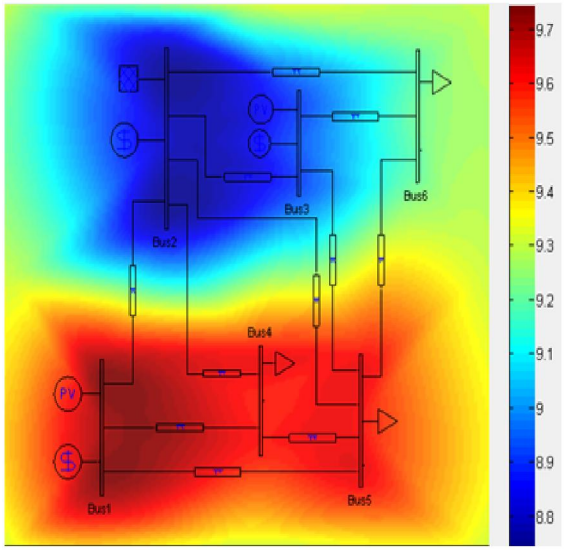

Figure 4. LMPs of network after installing reactive source at bus 5

3.3. Effect of DG on LMPs

Distributed generation (DG) can affect on LMPs, because the power transfer in lines is reduced. In order to evaluate the effect of DG on LMPs, it is

assumed that a 10MW DG is installed at bus 5. Figure 5 shows the LMPs of system in this case. The effect of DG on LMPs can be visibly seen. The voltage profile of network in this case is also depicted in Figure 6. DG can control the voltage in a predefined limit.

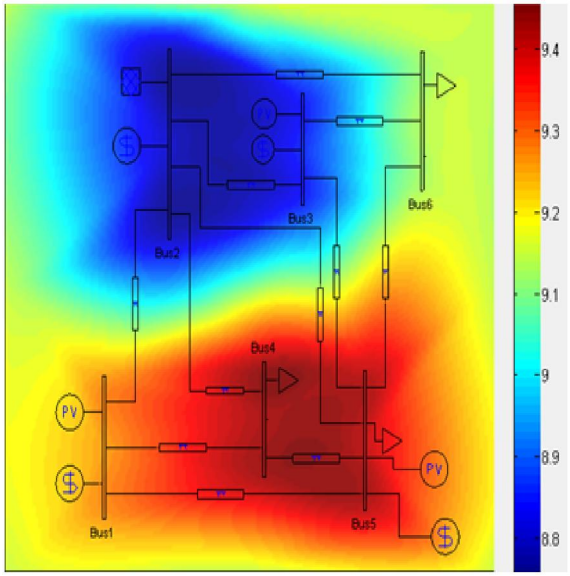

Figure 5. LMPs of network after installing a 10 MW DG in bus 5

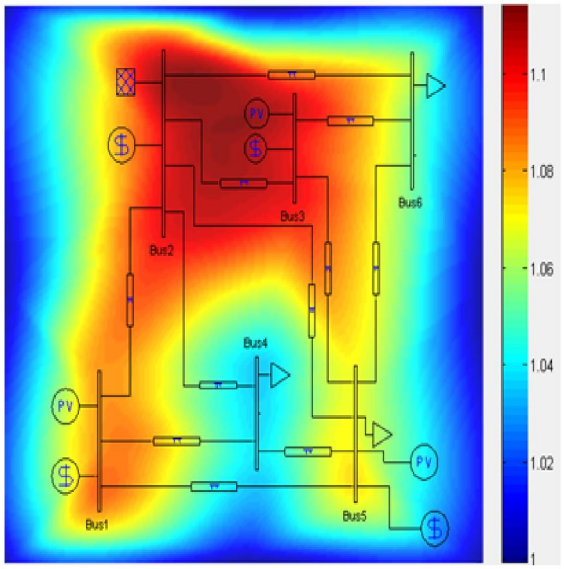

Figure 5. Voltage profile of network after installing a 10 MW DG in bus 5

4. Conclusion

In this paper LPMs were successfully investigated and analyzed. Effects of some general factors such congestion, reactive demands and distributed generation on LMPs were tested and showed. a visualization method was used to show LMPs.

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Numerical Solution of Volterra and Fredholm Integral Equations of the Second Kind by Using Variational Iteration Method

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Abstract: In the present article, we apply variational iteration method to obtain the numerical solution of Volterra and Fredholm integral equations of the second kind. The method constructs a convergent sequence of functions, which approximates the exact solution with little iteration. Application of this method in finding the approximate solution of some examples confirms its validity. We use the symbolic algebra program, Maple, 15, to prove our results.

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Keywords: Variational iteration method, Volterra and Fredholm integral equations of the second kind.

Mathematics Subject Classification: 45B05, 45Bxx, 65R10.

1. Introduction

Since the integral equations, [2,9,10], appear frequently in modelling of physical phenomena, they have a major role in the fields of science and engineering, and considerable amount of research work has been done in studying them.

The variational iteration method, [1, 3, 4, 6, 11, 12], is one of the useful techniques in solving linear and non- linear problems. In the present study, we aim to employ the variational iteration method (VIM) to obtain the approximate solutions of integral equations. This method gives the exact solution rapidly convergent successive approximations if such a solution exists [7,8].

2. Variational iteration method

Consider the following nonlinear differential equation

$$Ly(x)+Ny(x)=g(x), \qquad (2.1)$$

where L is a linear operator, N is a nonlinear operator and g(x) is a known analytical function. According to the (VIM),a correction functional can be constructed as:

$$y_{n+1}(x)=y_n(x)+\int_0^x \lambda(\zeta)[Ly_n(\zeta)+N\hat{y}_n(\zeta)-g(\zeta)]d\zeta \qquad (2.2)$$

where λ is a general multiplier and the term $\hat{y}_n$ is considered as a restricted variational i.e. $\delta\hat{y}_n = 0$. Making the above correction function stationary we obtain:

$$\delta y_{n+1}(x)=\delta y_n(x)+\delta\int_0^x \lambda(\zeta)[Ly_n(\zeta)+N\hat{y}_n(\zeta)-g(\zeta)]d\zeta \qquad (2.3)$$

In order to identify the Lagrange multiplier, from equation (2.3) we have:-

$$\delta y_{n+1}(x)=\delta y_n(x)+\delta\int_0^x \lambda(\zeta)[Ly_n(\zeta)-g(\zeta)]d\zeta, \qquad (2.4)$$

where y_0 is an initial approximation which possible unknown the successive approximations $y_n(x)$ of the solution $y(x)$ can be readily obtained.

3. Solution of Volterra and Fredholm integral equation of the second kind

Consider the Volterra and Fredholm integral equations of the second kind in the form:

$$y(x)=f(x)+\int_a^x k(x,t)y(t)dt, \qquad (3.1)$$

and

$$y(x)=f(x)+\int_a^b k(x,t)y(t)dt, \qquad (3.2)$$

where $y(x)$ is unknown function, $f(x)$ and $k(x,t)$ are given functions in $a \le x,t \le b$. For Volterra integral equation we take the partial derivatives with respect to x we have:

$$y'(x)=f'(x)+\frac{d}{dx}\int_a^x k(x,t)y(t)dt, \qquad (3.3)$$

and for Fredholm integral equation of the second kind, by differentiate both side of that equation by parts we get:

$$y'(x)=f'(x)+\frac{d}{dx}\int_a^b k(x,t)y(t)dt, \qquad (3.4)$$

Consider;

$$\frac{d}{dx}\int_a^x k(x,t)y(t)dt \text{ and } \int_a^b k'(x,t)y(t)dt,$$

as a restricted variational , we use (VIM)in direction x .

Then we have the following iteration sequence

$$y_{n+1}(x)=y_n(x)+\int_0^x \lambda(\zeta)\left[y_n'(\zeta)-f(\zeta)-\frac{d}{d(\zeta)}\int_0^\zeta k(\zeta,t)y_n(t)dt\right]d\zeta. \quad (3.5)$$

Taking with respect to the independent variable $y_n(x)$ and noticing that $\delta y_n(0)=0$, we get:

$$\delta y_{n+1}(x)=\delta y_n(x)+\lambda\delta y_n(x)-\int_0^x \lambda'\delta y_n(\zeta)d\zeta=0. \quad (3.6)$$

Then we apply the following stationary conditions:

$$1+\lambda(\zeta)\big|_{\zeta=x}=0 \;;\lambda'(\zeta)\big|_{\zeta=x}=0$$

The general Lagrange multiplier can be readily identified:

$$\lambda=-1 \quad (3.7)$$

Then we obtain the following iteration formula:

In case of Volterra integral equations (3.1),

$$y_{n+1}(x)=y_n(x)-\int_0^x\left[y_n'(\zeta)-f(\zeta)-\frac{d}{d(\zeta)}\int_0^\zeta k(\zeta,t)y_n(t)dt\right]d\zeta \quad (3.8)$$

and

$$y_{n+1}(x)=y_n(x)-\int_0^x\left[y_n'(\zeta)-f(\zeta)-\int_0^b\frac{\partial}{\partial\zeta}k(\zeta,t)y_n(t)dt\right]d\zeta. \quad (3.9)$$

in case of Fredholm integral equation (3.2).

Starting with initial approximation y_0 in (3.8) and (3.9), the successive approximations y_n will be easy obtained

4. Numerical examples

In this section, we applied the method in some examples to show the efficiently of the approach.

Example 1.

Consider the following linear Fredholm integral equation

$$y(x)=\sin(x)-\frac{x}{4}+\int_0^{\frac{\pi}{2}} x\,t\,y(t)dt, \quad (3.10)$$

with exact solution

$$y(x)=\sin(x). \quad (3.11)$$

In the view of (VIM), we construct a correction functional in the following form

$$y_{n+1}(x)=y_n(x)-\int_0^x\left[y_n'(\zeta)-\cos(\zeta)+\frac{1}{4}-\frac{1}{4}\int_0^{\frac{\pi}{2}} t\,y_n(t)dt\right]d\zeta. \quad (3.12)$$

Starting with the initial approximation $y_0(x)=\sin(x)-\frac{x}{4}$ in equation (3.12), successive approximations $y_i(x)$ will be achieved. The absolute error between the exact solution and the 4th order of approximate solution is shown in table 1

Table 1:

x	Approximate solution	Exact solution	Absolute solution
0	0	0	0
$\frac{\pi}{16}$	0.1945561472	0.195090322	5.3417485E-4
$\frac{\pi}{8}$	0.3816150827	0.382683432	1.0683493E-3
$\frac{3\pi}{16}$	0.5539677085	0.555570233	1.0602533E-3
$\frac{\pi}{4}$	0.7049700818	0.7071067812	1.0602533E-3
$\frac{5\pi}{16}$	0.828798738	0.8314696123	2.7670874E-3
$\frac{3\pi}{8}$	0.92067448	0.9238795325	3.2050525E-3
$\frac{7\pi}{16}$	0.9770460564	0.980785258	3.739224E-3
$\frac{\pi}{2}$	0.9957266	1	4.2734E-3

Example2.

Consider the following linear Volterra integral equation[5] :

$$y(x)=1-\int_0^x (x-t)y(t)dt, \quad (3.13)$$

with exact solution:

$$y(x)=\cos(x) \quad (3.14)$$

In the view of (VIM), we construct a correction functional in the following form

$$y_{n+1}(x)=y_n(x)-\int_0^x\left[y_n'(\zeta)+\frac{d}{d\zeta}\int_0^\zeta(\zeta-t)y_n(t)dt\right]d\zeta. \quad (3.15)$$

Starting with the initial approximation $y_0(x)=1$ in equation (3.15), successive approximations $y_i(x)$ will be achieved. The

absolute error between the exact solution and the third order of approximate solution is shown in Table2:

x	Approximate solution	Exact solution	Absolute error
0	1	1	0
$\frac{\pi}{8}$	0.923879	0.9238795	5.32511E-7
$\frac{\pi}{4}$	0.7071032	0.7071067812	3.5811865E-6
$\frac{3\pi}{8}$	0.3825928	0.382683432	9.063236E-5
$\frac{\pi}{2}$	-8.94522998E-4	0	-8.94522998E-4

Example 3.

Consider the following nonlinear Fredholm integral equation :

$$y(x)=\frac{11}{12}x^2+\frac{1}{2}\int_0^1 x^2 t y^2(t)dt, \qquad (3.16)$$

with exact solution

$$y(x)=x^2 \qquad (3.17)$$

In the view of (VIM), we construct a correction functional in the following form

$$y_{n+1}(x)=y_n(x)-\int_0^x \left[y_n'(\zeta)-\frac{11}{6}\zeta-\frac{1}{2}\int_0^{\frac{\pi}{2}} 2\zeta t y^2{}_n(t)dt \right] d\zeta . \quad (3.18)$$

Starting with the initial approximation $y_0(x)=\frac{11}{12}x^2$ in equation (3.18), successive approximations $y_i(x)$ will be achieved. The absolute error between the exact solution and

The third order of approximate solution is shown in table 3

Table 3:

x	Approximate solution	Exact solution	Absolute error
0	0	0	0
0.2	0.03999868	0.04	1.32E-6
0.4	0.15999472	0.16	5.28E-6
0.6	0.35998812	0.36	1.188E-5
0.8	0.63997888	0.64	2.112E-5
1	0.999967	1	3.3E-5

Example 4.

Consider the following nonlinear Fredholm integral equation

$$y(x)=\frac{15}{32}x+\frac{1}{2}\int_0^1 x t y^2(t)dt, \qquad (3.19)$$

with exact solution

$$y(x)=\frac{x}{2}. \qquad (3.20)$$

In the view of (VIM), we construct a correction functional in the following form

$$y_{n+1}(x)=y_n(x)-\int_0^x \left[y_n'(\zeta)-\frac{15}{32}\zeta-\frac{1}{2}\int_0^1 t y_n^2(t)dt \right] d\zeta . (3.21)$$

Starting with the initial approximation $y_0(x)=\frac{15}{32}x$ in equation (3.21), successive approximations $y_i(x)$ will be achieved. The absolute error between the exact solution and the 4th order of approximate solution is shown in table 4.

Table 4.

X	Approximate solution	Exact solution	Absolute error
0	0	0	0
0.2	0.0999985	0.1	1.5E-6
0.4	0.1999970477	0.2	2.9523E-6
0.6	0.29999557152	0.3	4.4285E-6
0.8	0.399994095	0.4	5.905E-6
1	0.4999926192	0.5	7.3808E-6

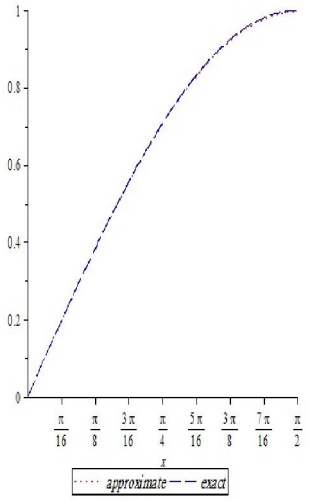

Figure 1: The plots of approximate solution of 4th order and exact solution for Example 1

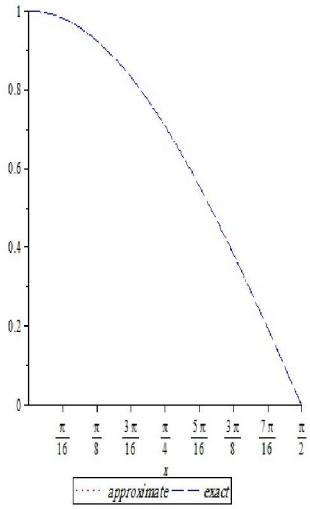

Figure 2: The plots of approximate solution of third order and exact solution for Example 2

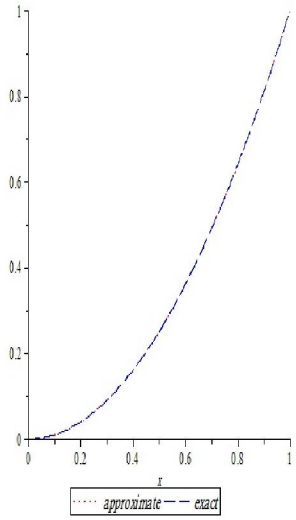

Figure 3: The plots of approximate solution of 5th order and exact solution for Example 3

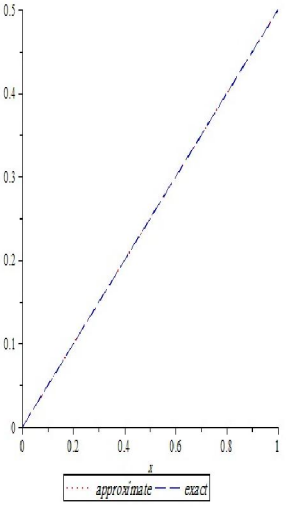

Figure 4: The plots of approximate solution of 3th order and exact solution for Example 4

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Elemental Analysis of Hematite by Instrumental Neutron Activation Analysis

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Abstract: Instrumental neutron activation analysis (INAA) have been used to achieve accurate knowledge about the elemental analysis of hematite. The samples were prepared for irradiation by thermal neutrons using the irradiation facilities of the TRIGA Mainz research reactor. The gamma-ray spectra were obtained by using a hyper pure germanium detector. The value of iron concentration in our hematite samples of 57.7 % is in fair agreement with the results reported by other workers. From the economical point of view the hematite field is suitable for iron production due to its high iron content. Altogether, 32 elements were detected both qualitatively and quantitatively. In addition X-ray fluorescence XRF is used to detect other elements such as F, P, Si, W, Cu, Mo, Ni, Pb, Sr not determined by INAA. In brief, the presence of any elements in higher or lower levels is contingent on the occurrence of its bearing minerals, nature of parent sediments and depositional environments of these sediments.
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Keywords: Elemental Analysis, Hematite, Neutron Activation Analysis, TrRIGA Mainz

1. Introduction

A number of techniques such as calorimetric, atomic absorption and emission spectroscopy, X-ray fluorescence and mass spectrometry have been used by geologists for multi-elemental and trace analysis of mineral, meteorites, lunar rocks and other earth related materials. For any analytical method there are several desirable characteristics, above all, sensitivity, accuracy, cheapness, speed contamination by reagent blanks and possibilities of automation, which need to be considered. Relative merits of the above listed methods to some extent do suffer from one drawback or the other. Compared to these, instrumental neutron activation analysis (INAA) using HPGe γ-spectrometry offers a combination of high sensitivity, good accuracy and absence of contamination and extremely well-suited for large number of elements. Here we report on the determination of major, minor and trace elements in hematite by non-destructive activation analysis involving neutron irradiation of the samples and standard reference materials followed by γ-spectrometry. Iron is the most abundant element in the core of the earth and one of the most abundant in the earth's crust. Regarding its biological activity, iron is also the most versatile of all elements (Merian, 1991 ; Raoof et al., 1990; Erdlmann, & Retri ., 1986). In the present work instrumental neutron activation analysis was used to achieve accurate knowledge about the elemental analysis and iron content in hematite deposits.

2. Experimental procedure

Samples preparation and irradiation:

Five hematite samples have been collected for investigation. The samples were crushed to small pieces using a mechanical crusher. The crushed samples are dried at 105 ^{0}C to constant weight. The dried samples were grounded to form fine powder. Then, the powdered samples were sieved using a standard set of sieves of having diameters in the range of less than 125 μm and greater than 63 μm. Every powdered sample was shacked using an electric shaker. For X-ray fluorescence 8 g from the powdered sample and 1.6 g from wax material are pressed under 300 N/cm^2 to give a disc with 4-cm diameter. These discs are then measured by XRF.

For neutron activation analysis, polyethylene capsules filled with 100 mg of powder samples are irradiated together with the standard reference materials by thermal neutrons using irradiation facilities at the TRIGA Mainz research reactor. Three different cycles of irradiation are applied (KCh-Report, TRIGA Mainz, 1989). Two short activations followed by one gamma measurement (Kz1 and Kz2) and one long time activations followed by three gamma measurements (Lz1, Lz2 and Lz3). Tables 1 and 2 summarizes the irradiation cycles, measuring conditions and the nuclear data for the elements determined (El Abd, 2008; "El-Taher ., 2010 a-c).

Instrumentation:

All γ-measurements were performed with a HPGe (efficiency 29%, resolution 1.7 keV at 1332 keV ^{60}Co and 0.686 keV at 122 keV ^{57}Co) with standard amplifier and ADC-converter. The detector is shielded in a chamber of 2 layers of lead (10 cm

thick), copper (0.3 mm thick) and finally cadmium (1mm thick) with dimensions 30x30x30 cm to prevent back scattering of gamma-rays. The measurements were performed and spectra analysed with the Intergamma software. The element contents were determined relative to certified reference materials (WSE, PMS) produced by the Open University Milton Keynes, U.K as geostandards. They were irradiated and measured under the same conditions. The electronic dead time in all measurements was less than 10 % and was corrected by Intergamma Software.

Table (1): Irradiation cycles of the elements determined.

Activation cycle	Thermal neutron flux ($cm^{-2} s^{-1}$)	Irradiation time	Decay time	Measuring time	Elements Determined
Kz1	$1.7x10^{12}$	1 min	5 min	4 min	Mg, Al, Ca, Ti, V
Kz2	$1.7x10^{12}$	5 min	1 h	15 min	Na,K,Mn, Ba, Eu
Lz1	$0.7x10^{12}$	6 h	2 d	1 h	Na, K,Ga, As, La, Sm, U
Lz2	$0.7x10^{12}$	6 h	14 d	8 h	Sc,Cr,Fe,Co,Zn,Rb,Zr,Sn,Ba, Ce,Nd, Eu, Yb, Lu, Hf,Ta,Th
Lz3	$0.7x10^{12}$	6 h	28 d	8 h	Sc, Cr, Fe, Co, Zn, Nb, Sn,Ba Cs, Ce, Eu, Yb, Lu, Hf, Ta, Th

Table (2): The nuclear data for the detected elements (Erdtmann, 1976 & Kinsey,1996).

Element	Activation product	Energy keV	$T_{1/2}$	Kz1	Kz2	Lz1	Lz2	Lz3	Detection Limits (µg/g)
Al	^{28}Al	1179	2.2m	*					35
As	^{76}As	559	26.3h		*	*			0.3
Ba	^{131}Ba	496	11.8d				*	*	16.4
Ca	^{49}Ca	3984	8.7m	*					10
Ce	^{141}Ce	145	32.5d				*	*	0.3
Co	^{60}Co	1332	5.3y				*	*	0.2
Cr	^{51}Cr	320	27.7d				*	*	0.5
Cs	^{134}Cs	604	2y					*	0.07
Eu	^{152}Eu	1408	13.3y				*	*	0.09
Fe	^{59}Fe	1099	44.5d				*	*	75
Ga	^{72}Ga	834	14.1h			*			0.6
Hf	^{181}Hf	428	42.4d				*	*	0.06
K	^{42}K	1524	12.4h		*	*			90
La	^{140}La	1596	40.3h			*			0.4
Lu	^{177}Lu	208.4	161d				*	*	0.01
Mg	^{27}Mg	1014	9.5m	*	*				1.7
Mn	^{56}Mn	846	2.6h		*				0.01
Na	^{24}Na	1369	15h		*	*			1.2
Nb	^{95}Nb	765	35d					*	2.2
Nd	^{147}Nd	531	11d				*	*	3.8
Rb	^{86}Rb	1077	18.7				*	*	2.6
Sc	^{46}Sc	889	38.8d				*	*	0.007
Sm	^{153}Sm	103	46.3h		*	*			0.03
Sn	^{117}Sn	158	13.6d				*	*	9.6
Ta	^{182}Ta	1221	115d				*	*	0.11
Th	^{233}Pa	312	27d				*	*	0.2

Ti	^{51}Ti	320	5.8m	*					0.4
U	^{239}NP	106	2.4d			*			0.3
V	^{52}V	1434	3.4m	*					0.003
Yb	^{169}Yb	198	32d				*	*	0.05
Zn	^{65}Zen	115	244d				*	*	3.2
Zr	^{95}Zr	756	64d				*		19

3. Results and Discussion

The elemental constituents of the samples under investigation in the present work were determined by means of the activities induced by (n,γ) reactions. The gamma rays emitted were identified according to the energies of the well resolved gamma ray lines taking into consideration that some of the product isotopes could exhibit more than one gamma-ray line. Thirty-two elements were identified in hematite samples. The average concentration values are expressed in units of ppm for all elements except for Al, Na, K, Mn, Mg, Ca, Fe and Ti in units of g/kg.

The statistical counting errors are,
< 2 % for Na, Mn, Sc, Co, Zr, Hf, Al, Sm,
2-5 % for V, Eu, La, Cr, Fe, Sn, Ce, Yb, Lu, Th,
5-10 % for Ta, Cs, Zn, As, K,
10-20 % for Mg, Ti, Ca, Ga, Rb, Nb,
20-30 % for Ba, U.

From the results we can conclude that the elemental contents of hematite samples were,
< 10 ppm for Lu, Ta, Th, U, Yb, Cs,
10-50 ppm for As, Ce, Co, Eu, Ga, Hf, Nb, Rb, Sc, Sm,
50-100 ppm for La, Zn, Zr,
>100 ppm for Ba, Cr, V,
> 1 % for Al, Ca, Fe, K, Mg, Mn, Na, Ti.

Table (3) shows the elemental analysis of hematite samples determined by both INAA and XRF techniques. There are also some elements which can only determined by XRF such as F, P, Si, Cu, Mo, Ni, Pb, Sr and W. The average contents of these elements are 1.8, 0.5, 21.5, 53, 5, 46, 31, 255 and 36 ppm, respectively except for the contents of the elements F, P, S and Si in units of g/kg.

X-Ray Fluorescence (XRF) analysis of hematite

Though XRF is one of the most important techniques for the analysis of metals and trace elements, it is also independent of the chemical form of the element as INAA. X-rays emitted from an ionized atom have energies characteristic of the element involved; and the intensity of an X-ray is proportional to the concentration of an element and the strength of the ionizing source. Thus, X-ray fluorescence XRF analysis is based on the generation of characteristic X-rays from a sample irradiated by an energetic beam and hence, capable of measuring the concentrations of different elements in the sample (Eberhardt, 1989).

Determination of iron concentration in hematite

The constituents of the iron were determined by means of activities induced by (n,γ) reactions. The ^{59}Fe ($t_{1/2}$ = 45d) γ-peak at 1099 keV was used for the Fe determination. Quantitative analysis was carried out for each Fe isotope by comparing the activities from the favourable peak in the gamma spectra of the samples with those of the standard reference materials. In this analysis we used the ^{59}Fe peak, since this peak has less interferences than lower-energy peaks due to the Compton effect. Table (4) lists the concentration values with their accuracy for iron in the five samples obtained by both, NAA and XRF techniques. The value of iron concentration in hematite samples of 57.7 % is in fair agreement with the results reported by (Sroor et al., 2001).

Rare Earth Elements

Rare earth elements are becoming more and more technologically significant due to their widespread utility as fine chemicals in modern industry. The main areas of application of the REE are in solid state lasers and superconducting materials. Activation analysis plays a preponderant part in REE determination. The accuracy and the limit of detection of the REE data using INAA depends strongly on the type of material analysed. Polyethylene capsules filled with 100 mg of hematite and standard reference materials were irradiated for 6 hours in the rotary specimen rack of the Mainz TRIGA research reactor by a thermal neutron flux of $7x10^{11}$ n/cm^2.s. After the irradiation, two measurements were performed for each sample. The elements La and Sm were measured 2 days after the end of irradiation. A second measurement after 14 days cooling time allowed the determination of the elements Ce, Nd, Eu, Yb and Lu. Table 3 shows the concentration values of REE in hematite samples. The results obtained indicate the viability of using the INAA for the determination of the elements La, Ce, Nd, Sm, Eu, Yb and Lu (El-Taher et al, 2003; El-Taher, 2007 and El-Taher , 2010 d).

Determination of uranium and thorium content

Instrumental neutron activation analysis techniques have been used to determine the elemental concentrations of uranium and hematite samples. They also allow to overcome many of the limitations encountered in other methods. For INAA, the samples were irradiated for 6 hours in the rotary specimen rack of the TRIGA Mainz research reactor. After two days of cooling time the samples were counted for 1 hour for ^{238}U. For the thorium case, the samples were counted 8 hours after 14 and 28 days cooling time. The activation converts ^{238}U and ^{232}Th into ^{239}Np and ^{233}Pa, respectively (El-Taher et al., 2004 and El-Taher , 2010 e). The average concentration values for uranium and thorium presented in our study are listed in Table 3.

Table (3): The average values of the elements determined in hematite in by INAA and XRF.

Element and Units	Activation product	Energy keV	$T_{1/2}$	INAA	XRF
Al %	^{28}Al	1179	2.24m	12.1	8.8
Ca %	^{49}Ca	3084	8.72m	6.7	6.1
Fe %	^{59}Fe	1099	44.5d	58.1	54.4
K %	^{42}K	1524	12.4h	1	0.9
Mg %	^{27}Mg	1014	9.46m	4	1.1
Mn %	^{56}Mn	847	2.58h	3.3	0.3
Na %	^{24}Na	1369	14.5h	0.8	0.2
Ti %	^{51}Ti	320	5.8m	1.3	1.1
As ppm	^{76}As	559	26.3h	16	13
Ba ppm	^{131}Ba	496	11.5d	440	348
Ce ppm	^{141}Ce	145	32.5d	43	+
Co ppm	^{60}Co	1332	5.3y	47	47
Cr ppm	^{51}Cr	320	27.7d	173	201
Cs ppm	^{134}Cs	604	2y	0.4	+
Eu ppm	^{152}Eu	1408	13.3y	17	+
Ga ppm	^{72}Ga	834	14.1h	14	+
Hf ppm	^{181}Hf	482	42.4d	15	+
La ppm	^{140}La	1596	40.3h	52	+
Lu ppm	^{177}Lu	208	161d	1	+
Nb ppm	^{95}Nb	765	35d	24	+
Nd ppm	^{147}Nd	531	11d	62	+
Rb ppm	^{86}Rb	1077	18.7d	26	+
Sc ppm	^{46}Sc	889	38.8d	15	+
Sm ppm	^{153}Sm	103	46.2h	13	+
Sn ppm	^{117}Sn	159	13.6d	12	2
Ta ppm	^{182}Ta	1221	115d	2	+
Th [a] ppm	^{233}Pa	312	27d	8	+
U [a] ppm	^{239}Np	106	2.35d	3	+
V ppm	^{52}V	1434	3.4m	**314**	**313**
Yb ppm	^{169}Yb	198	32d	**7**	+
Zn ppm	^{65}Zn	115	244d	**97**	**67**
Zr ppm	^{95}Zr	756	64d	**220**	+

Table (4): Concentration of iron Hematite by INAA and XRF

Sample number	INAA* * 2 weeks decay time	Error %	INAA** ** 4 weeks decay time	Error %	XRF
1	58.1	2.3	57.4	2.5	54.4
2	57.7	2.3	57.2	2.5	54.2
3	57.5	2.5	56.8	2.5	53.9
4	57.3	2.5	56.3	2.5	53.4
5	57.7	2.5	56.5	2.5	53.6
Average %	57.7		56.8		53.9

Conclusion

In conclusion, the applied technique (INAA) is quite successful in obtaining an accurate concentration of elemental constituents of hematite samples. Also, it can be concluded that, from the economical point of view the hematite field is suitable for iron production due to its high iron content. It is hoped that the data presented here will be useful to those dealing with geochemistry of hematite and related fields.

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Preventive effects of Turmeric (*Curcuma longa* Linn.) Powder on hepatic steatosis in the rats fed with high fat diet

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Abstract: The aim of the present study was to evaluate the preventive effects of Turmeric (Curcuma Longa Linn.) powder on rat high fat diet-induced hepatic steatosis. For this purpose, male Wistar rats were treated in 4 experimental groups including: 1-healthy control group given standard diet, 2- high fat diet group for induction of hepatic steatosis, 3- high fat diet plus Clofibrate (320 mg/kg) as positive control, and 4- high fat diet plus Turmeric powder (5%) for protection of liver steatosis, at a period of 6 weeks. At the end of experiment, the groups were compared considering serum lipid profile, serum biomarkers of liver tissue injury and liver histopathological changes. The lipid peroxidation product and the activities of antioxidant enzymes were measured as indicators of antioxidation in liver tissue. After 6 weeks, high fat diet caused deleterious metabolic effects, including hypertriglyceridemia, hypercholesterolemia and liver dysfunction. Rats fed high fat diet alone showed increased activities of hepatocellular enzymes in plasma, significant decline in antioxidants, and elevated lipid peroxidation indices in liver. Turmeric treatment significantly reduced elevated markers of liver tissue injury and lipid peroxidation product (MDA), and brought back the liver antioxidants and the over accumulation lipids in serum towards normal. Histopathology of the liver confirmed the changes induced by high fat diet and the hepatoprotective effect of Turmeric powder. The results obtained showed turmeric powder exerts protective effects against hepatic steatosis in rats fed with high fat diet possibly through its antioxidant actions.

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***Key words*:** High fat fed diet, Turmeric (*Curcuma longa* Linn.), Hepatic steatosis.

Abbreviations: MDA, Malondialdehyde; SOD, Superoxide dismutase; CAT, Catalase; GPX, Glutathione peroxidase; GR, Glutathione reductase; Alb, Albumin; TP, Total protein; AST, Aspartate aminotransaminase; ALT, Alanine aminotransaminase; LDH, Lactate dehydrogenase; GSSG, Oxide glutathione; GSH, Reduced glutathione; TB, Total bilirubin.

1. Introduction

Nonalcoholic fatty liver disease (NAFLD) is one of the most common causes of chronic liver injury in many countries around the world. It has a broad pathologic spectrum which ranges from simple fatty infiltration of the liver or steatosis, to nonalcoholic steatohepatitis (NASH), fibrosis, cirrhosis and to liver failure (Assy et al., 2000). Nonalcoholic fatty liver disease (NAFLD) is now recognized as the most common type of liver disease and might lead to important public health problems (Clark et al., 2002).

Triglycerides and cholesterol are of important biological lipids of body that excess get them through the diet is resulted in hypertriglyceridemia (Hokanson, 2002; Kametani et al., 2002) and hypercholestrolemia (Walldius et al., 2004). NAFLD is diagnosed by accumulation of triglycerides in the hepatocytes in consequence of the esterification of free fatty acids and glycerol. Increase in free fatty acids in the liver is driven from three separate sources includes lipolysis (hydrolysis of glycerol and fatty acid from triglycerides) in adipose tissue, high fat diet and de novo lipogenesis (Postic and Girard, 2008). In contrast, fatty acids may use through β-oxidation, de novo esterification to triglycerides and store as fat droplets or excretion in the form of VLDL. Thus, accumulation of fat in the liver can occurs in results of increase the synthesis of fat, reduce in fat excretion or reduce in them oxidation. Donnelly et al. (2005), showed that 60% of liver triglyceride content is driven from influx of fatty acids from adipose tissue, 26% from de novo lipogenesis, and 15% from the diet. Nonalcoholic fatty liver is associated with some histopathologic changes, which is different from steatosis to cirrhosis (Dixon et al., 2001; Angulo and Lindor, 2002; Clark et al., 2002; Farrell, 2003). It was formerly believed that steatosis is a simple phenomenon and has no complications. However, nowadays it is known that fatty liver is vulnerable to factors such as oxidative stress and can lead to Steatohepatitis, which is

associated with necrosis, inflammation, fibrosis and cirrhosis (James and Day, 1999; Orrenius et al., 2007). In the pathogenesis of nonalcoholic steatohepatitis is assumed that the accumulation of triglycerides in the liver or steatosis will yield to increases the susceptibility of liver to the damages caused by inflammatory cytokines and lymphokines, mitochondrial dysfunction and oxidative stress (Day, 2006; Day and James, 1998). Barbuio et al. (2007), showed that oxidative stress is effective in alteration of steatosis to steatohepatitis. However, although liver steatosis may lead to complete hepatic failure, but appropriate and ideal treatment is not established (Angulo and Lindor, 2002). Biological materials with plant origin forms modern branch pharmacotherapy of disease. Although various pharmacologic agents exist to treat various diseases, but most patients cannot tolerate the side effects of chemical drugs from one hand and plants have very few side effects on patients from other hands. Obviously, it is necessary that several studies must be done on the new drugs in several stages before their entrance to the field of medicine. Turmeric, the powdered rhizome of the plant Curcuma longa L. has been extensively used as colouring agent, a spice and in the treatment of infammatory conditions and other diseases (Govindrajan, 1980; Ammon and Wahl, 1991). Curcumin (diferuloylmethane), the major pigment and phenolic compound in turmeric has also been shown to possess both anti-infammatory (Srimal and Dhawan, 1973) and anti-oxidant properties (Sharma, 1976; Sreejayan and Rao, 1994). Dietary administration of turmeric or curcumin or ethanolic turmeric extract (ETE) has been shown to inhibit tumor induction by diverse carcinogens in various organs of mice (Nagabhushan and Bhide, 1987; Azuine and Bhide, 1992; Huang et al., 1994; Deshpande et al., 1997) and rats (Rao et al., 1995). Curcumin has been shown to reduce the hyperlipidaemia (Babu and Srinivasan, 1997), delay the development of cataract (Suryanarayana et al, 2005), ameliorate renal lesions (Babu and Srinivasan, 1998) and reduce cross-linking of collagen (Sajithlal et al., 1998) in a streptozotocin-treated diabetic animal model. Curcumin has also been shown to lower blood glucose levels in type 2 diabetic KK-Ay mice (Nishiyama et al., 2005) and streptozotocin-treated rats (Mahesh et al., 2005). Turmeric/alcoholic extract of turmeric/curcumin have not shown any toxic effects (even at high doses) in the acute and/or subchronic toxicity studies in rats, dogs, guinea pigs and monkeys (Wahlstrom and Blennow, 1978; Bhavani shankar et al., 1980; Sambaiah et al., 1982).

However, among the various protective mechanisms, the antioxidant activity of turmeric is considered responsible for its pharmacological effects. By consideration of antioxidant and hypolipidemic activity of turmeric, this matter it will probably be able to protect the liver from steatosis.

To our knowledge, no other biochemical investigations have so far been carried out concerning the effect of turmeric powder on the liver steatosis in high fat diet fed-rats are available in the literature. On the other hand, animal models of liver steatosis and dyslipidemia are valuable for studying the pathogenesis and treatment of steatohepatitis as well as its relationship to metabolic syndrome. Therefore, present study examined the hypothesis that turmeric supplementation prevents liver steatosis in a high fat diet model. The results of this study demonstrate that turmeric supplementation prevents liver steatosis and decreases oxidative stress in hepatocytes exposed to high levels of lipid.

2. Materials and methods

This study carried out during 2012 in the research center of Islamic Azad University. All procedures were conducted under supervision of Animal Rights Monitoring Committee of Islamic Azad University Research Center.

2.1. Animals

Forty male Wistar rats, weighted 180±20 gr and aged 10 weeks old were obtained from the animal breeding center of Islamic Azad University. The rats were divided into 4 equal groups of 10 animals including: 1- normal control, 2- normal rats fed high-fat diets, 3- normal rats fed high-fat diets plus Clofubrate (320 mg kg^{-1}/day) and 4- rats which are fed high-fat diets plus turmeric powder (5% turmeric diet). Management and husbandry conditions were identical in all groups with 12/12 h light/dark cycle at 21 ± 2°C. Food and water were provided ad libitum.

2.2. Experimental plan

In rats were fed with high-fat diets used of high-fat emulsion, which its formula is mentioned in table 1, to induce hepatic steatosis based on Zou et al., (2006) method. All treatment groups received high-fat emulsion at the dose of 10 ml kg-1 daily at morning 8 o'clock for 6 weeks. Simultaneously, control group received normal saline in same dosage. In groups 4 beside of high-fat emulsion, turmeric powder weighed and added to the preweighed standard laboratory diet and thoroughly mixed up to 5% concentration. Group 3 beside of high-fat emulsion received Clofubrate at the dose of 320 mg kg^{-1}/day through gavage as suspension in the 2 ml kg^{-1} methylcellulose 0.5% (Sheng, et al 2006). Control group received 2 ml kg^{-1} methylcellulose 5%.

2.3. Biochemical factors evaluation

At the end of the experiment, blood samples were collected from the retro-orbital plexus and the sera prepared through centrifuging at 2500 ×g for 15

minutes at 30°C. After 12 hours fasting, blood glucose and serum biomarkers of liver function including ALT, AST (Reitman and Frankel, 1957), LDH (Martinek, 1972), albumin, TP (Lowry et al., 1951) and total bilirubin (Malloy and Evelyn, 1937) were measured using commercially available kits.

Table 1: Composition of high-fat emulsion gavaged to rats

Constituents	Amount
Corn oil	400 g
Sacarose	150 g
Milk powder	80 g
Cholesterol	100 g
Sodium deoxy colat	10 g
Tween 80	36.4 g
Propilen glikol	31.1 g
Multi vitamin	2.5 g
Salt	10 g
Minerals	1.5 g
Normal saline	300 ml

2.4. Measurement of antioxidant activity

All experimental rats were euthanized by cervical dislocation. The rat's Liver were removed immediately and washed in normal saline and homogenate 10% prepared in 1.15% w/v of potassium chloride. The homogenate was centrifuged in 7000 ×g for 10 minutes at 4°C and supernatant were used for measurement of Oxidative stress by determination of malondialdehyde (MDA) as well as antioxidant enzymes (AOE) such as superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GSH-PX) and glutathione reductase. MDA, SOD, CAT and GSH-PX, GR were measured by using commercially available kits according to the manufacturer's protocol (Nanjing Jiancheng Bioengineering Institute, Nanjing, China). Liver homogenate MDA levels were expressed as nmol MDA per mg protein and antioxidant activity was expressed as arbitrary units per mg protein.

Degree of lipid peroxidation in kidney tissue homogenates was determined in terms of thiobarbituric acid reactive substances (TBARSs) formation by following the protocol of Esterbauer and Cheesman (Esterbauer and Cheesman, 1990). SOD activity was measured by Nishikimi method (Nishikimi et al., 1972) and was modified by Kakkar method (Kakkar et al., 1984). Each unit of SOD activity was determined as required enzyme concentration for prohibition of creation color at 1 minute, under study conditions. CAT activity was measured by Claiborne method (Claiborne, 1985) and was based on hydrogen peroxide breakdown. GPX activity was measured by Rotruck method (Rotruck et al., 1973) and was expressed as micromole of GSSG /minute/milligram of protein, based on blew reaction:

$2H_2O+GSSG \longrightarrow H_2O_2+2GSH$

GR activity was measured by Mohandas method (Mohandas et al., 1984), based on blew reaction:

$NADPH+H^+ +GSSG \longrightarrow NADP^+ +2GSH$

2.5. Microscopic studies

A small piece of hepatic tissue from the anterior portion of the left lateral lobe was removed for histological analysis. The sample was fixed by immersing it in 10% neutral-buffered formalin. The sample was then embedded in paraffin, sliced into 5 µm sections, and stained with hematoxylin-eosin for blinded histological assessment (Lee and Luna, 1968). Hepatocytes were assayed from fatty changes aspect like a mentioned method by Wang et al 2009 and steatosis were degreed from 0 to 4 (0: without steatosis, 1: <25% steatosis, 2: approximately 26-50% steatosis, 3: approximately 51-75% steatosis, 4: >76% steatosis). The stained 5 µm sections were graded as follows: 0, absent; I, minimal; II, mild; III, modest; IV, severe. The histological changes were evaluated in nonconsecutive, randomly chosen ×200 histological fields using light microscope, NIKON ECLIPSE E200 (Shen et al., 2009).

2.6. Statistical analysis

The Statistical Package for Social Sciences (SPSS Inc., Chicago, IL, USA), version 13.0, was used for statistical analysis. All data are presented as mean ± SEM. Before statistical analysis, all variables were checked for normality and homogeneity of variance by using the Kolmogorov-Smirnoff and Levene tests, respectively. The data obtained were tested by ANOVA followed by Tukey's post-hoc multiple comparison test. $P<0.05$ was considered statistically significant.

3. Results

3.1. Effect of Turmeric powder on the biochemical parameters of liver damage caused by feeding high-fat diet

In group 2, ALT, AST, ALP and TB increased and TP and Alb decreased significantly ($p<0.01$) in compared with control group. In group 3, high levels of ALT, AST, ALP and TB significantly decreased ($p<0.01$) to normal levels and levels of TP and Alb increased to their normal boundaries. In group 4, levels of ALT, AST, ALP and TB significantly decreased ($p<0.05$) and levels of TP and Alb significantly increased ($p<0.05$) but not reached to normal levels (Table 2).

Table 2: Effect of Turmeric powder on serum biochemical parameters in hepatic steatosis consequence of high-fat diet

Groups	Biochemical parameters					
	ALT U/L	AST U/L	ALP IU/L	TB Mg/dl	Alb g/dl	TP g/dl
Control	49.51±2.31 [bd]	64.72±1.55 [bd]	187.72±9.03 [bd]	0.83±0.04 [bd]	4.42±0.44 [bd]	7.95±0.54 [bd]
High-fat diet	66.75±3.21 [acd]	89.35±2.74 [acd]	275.56±11.25 [acd]	1.31±0.08 [acd]	3.16±0.25 [acd]	5.21±0.21 [acd]
High-fat diet+ Clofubrate	50.69±2.15 [b]	64.20±1.27 [b]	199.87±7.63 [b]	0.89±0.06 [b]	4.35±0.38 [b]	7.05±0.44 [b]
High-fat diet+Turmeric 5%	58.26±2.74 [ab]	74.15±2.42 [ab]	227.43±5.82 [ab]	1.08±0.07 [ab]	3.77±0.20 [ab]	5.88±0.39 [ab]
ANOVA	P=0.000	P=0.000	P=0.000	P=0.000	P=0.000	P=0.000

Values are presented as mean ± SEM for 10 rats in each group.
a, significant difference with group 1; b, significant difference with group 2; c, significant difference with group 3; d, significant difference with group 4 ($p<0.05$).

3.2. Histopathological findings

In microscopic studies no abnormalities was found in the livers of control group rats (fig 1-A). But in group 2 rats' which fed with high-fat diet for 6 weeks, sever steatosis was found as micro and macrovesicular fatty changes accompanied hepatitis (fig 1-B). Clofubrate prevented from steatosis in group 3 rats (fig 1-C). In groups 4, Turmeric powder prevented from fatty changes in hepatocytes obviously (fig 1-D).

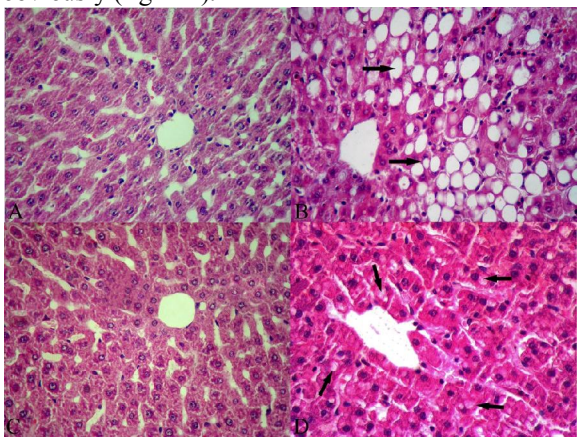

Fig 1: A, control group. **B**, high-fat diet group. **C**, high-fat diet+Clofubrate. **D**, high-fat diet+Turmeric 5%. Arrows show micro and macrovesicular lipid droplets. H&E 40×

Effect of Turmeric powder on the pathologic grading of hepatic steatosis in rats fed high-fat diet is listed in Table 3.

Table 3: Effect of Turmeric on the hepatic steatosis in rats fed high-fat diet

Groups	Hepatic steatosis grading					P
	0	1	2	3	4	
Control	10	0	0	0	0	
High-fat diet	0	0	1	2	7	a
High-fat diet+ Clofubrate	5	3	2	0	0	c
High-fat diet+Turmeric 5%	1	3	5	1	0	bd

Each group contains 10 rats. a: $p<0.01$; b: $p<0.05$ in compared with control group. c: $p<0.01$; d, $p<0.05$ in compared with high-fat fed diet group.

3.3. Effect of Turmeric powder on metabolism of fat due to high-fat diet

Clofubrate in groups 3 significantly ($p<0.001$) decreased, markedly increased serum levels of TG, total cholesterol, LDL and VLDL compared with group 2 and significantly ($p<0.01$) increased slightly decreased serum levels of HDL than group 2. In group 4, Turmeric powder significantly ($p<0.01$) decreased serum levels of total cholesterol, LDL and VLDL compared with group 2 and significantly ($p<0.05$) increased serum levels of HDL than group 2 (table 4).

Table 4: Effect of Cr Turmeric powder ocin on lipid levels in rats fed high-fat diet

Groups	TG mg/l	Total cholesterol mg/l	LDL mg/l	VLDL mg/l	HDL mg/l
Control	88.68±4.21	83.65±3.58	13.69±0.83	19.45±1.16	50.51±3.26
High-fat diet	233.61±6.90	218.14±7.81	122.72±4.75	49.52±2.21	45.90±2.34
High-fat diet+ Clofubrate	95.87±3.42 [c]	110.28±4.29 [c]	25.54±1.09 [c]	31.32±1.15 [c]	53.42±4.38 [b]
High-fat diet+Turmeric 5%	173.62±5.31 [b]	134.15±4.56 [b]	49.62±3.71 [b]	33.07±2.50 [b]	51.46±3.41 [a]
ANOVA	P=0.000	P=0.000	P=0.000	P=0.000	P=0.000

Values are presented as mean ± SEM for 10 rats in each group.
a: $p<0.05$; b: $p<0.01$; c: $p<0.001$ in compared with high-fat fed diet group.

Effect of Turmeric powder on anti-oxidative activity of liver in damage induced by high fat diet

In group 2, Hepatic levels of antioxidant enzymes superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase compared with group 1 (normal control), significantly ($p<0.01$) reduced and the levels of malondialdehyde significantly ($p<0.01$) increased. Clofubrate in groups 3 significantly ($p<0.01$) increased, markedly decreased levels of SOD, CAT, GPX and GR compared with group 2 and significantly ($p<0.01$) decreased slightly increased levels of malondialdehyde than group 2. Data are showed in table 5.

Table 5: Effect of Turmeric powder on anti-oxidative activity of rat livers in steatosis induced by high fat diet

Groups	Biochemical parameters				
	MDA nmol/g protein	SOD U/mg protein	CAT U/mg protein	GPX U/mg protein	GR U/mg protein
Control	3.54±0.16 [bd]	13.64±0.54 [bd]	64.66±2.13 [bd]	22.84±1.65 [bd]	123.37±5.65 [bd]
High-fat diet	5.18±0.21 [acd]	9.13±0.32 [acd]	41.74±1.15 [acd]	17.49±0.83 [acd]	88.85±3.52 [acd]
High-fat diet+ Clofubrate	3.59±0.18 [b]	12.53±0.52 [b]	60.84±1.74 [b]	21.95±1.54 [b]	116.13±3.42 [b]
High-fat diet+Turmeric 5%	4.86±0.28 [ab]	10.74±0.47 [ab]	52.14±1.85 [ab]	19.12±1.14 [ab]	106.57±3.12 [ab]
ANOVA	P=0.000	P=0.000	P=0.000	P=0.000	P=0.000

Values are presented as mean ± SEM for 10 rats in each group.
a, significant difference with group 1; b, significant difference with group 2; c, significant difference with group 3; d, significant difference with group 4 ($p<0.05$).

Discussion

The increased activities of marker enzymes, AST, ALT and ALP are suggestive of liver injury (Chidambarama and Venkatraman, 2010). Because these serum liver biomarkers disorders have been documented in hepatic steatosis (Angulo, 2002, Wang et al., 2009; Chidambarama and Venkatraman, 2010), their levels were studied. Increased plasma activities of AST, ALT and ALP were found in high fat diet fed rats, indicating damage to liver cells. These results were consistent with the findings reported by Chidambarama et al. (2010).Treatment with turmeric powder notably prevented the elevation of these enzymes to an extent that was comparable to the Clofibrate.

The biochemical findings were matched with histopathological verification. Rats fed with high-fat emulsion for 6 weeks developed a higher degree of steatosis. Howevere, histopathological assessment of liver tissues from high fat emulsion induced rat hepatic steatosis, displayed the antihepatosteatosis effects of turmeric powder. Administration of turmeric powder resulted in prevention of hepatic fatty deposition in hepatocytes. Histopathological changes in agreement with biochemical findings were concordant with those of previously reported (Wang et al., 2009).

Our results show that high fat diet caused significant decreases in SOD, CAT, GPx and GR activities. The derangement in enzymatic antioxidant potential indicates that high fat diet fed rats is unable to cope up with excess free-radical formation which leads to tissue damage. A body of evidence indicates that accumulation of fat in the liver increases the susceptibility to other insults such as oxidative stress that results in the progression of steatosis to steatohepatitis, fibrosis and cirrhosis (Koteish and Diehl, 2002).

Considering the recently recognized association between oxidative stress and inflammation (Chidambarama and Venkatraman, 2010), the present experiment confirms that high fat diet could result in oxidative liver injury. Induction of oxidative stress is evident from the increased peroxidation marker (MDA) and inadequate antioxidant enzymes status in liver of rats fed high fat diet. We estimated antioxidant activities of turmeric by determination of hepatic MDA content and antioxidant enzymes activity. High fat diet fed caused an increase in liver MDA content but a decrease in liver antioxidant enzymes activity compared with normal control group. Turmeric powder supplementation significantly improved the antioxidant defense mechanisms in high fat diet fed rats.

These results suggest that the imbalance between oxidative stress generation and antioxidants formation could occur after high fat diet fed, and turmeric could prevent this pathological process, indicating its therapeutic and preventive effect on hepatosteatosis induced by high fat ingestion. Antioxidant activity of turmeric is concordant with those of other investigators (Sharma, 1976; Sreejayan and Rao, 1994). The results of biochemical tests together with histological observations suggest that turmeric treatment lowers steatosis and prevents peroxidative damage and the effects are comparable with that of Clofibrate.

To analyze the possible role of turmeric in lipid metabolism which is the key factor in fatty liver formation, serum TG, TC, VLDL-C, HDL-C and LDL-C were investigated. After 6 weeks of treatment, the serum levels of TG, TC, VLDL-C, and LDL-C was markedly increased in the high fat diet fed group compared to those in the control group. This finding was parallel to the previous study (Zou et al., 2006). Treatment of high fat diet fed rats with turmeric showed considerable restoration of lipid levels to that of control. The increased serum levels of TG, TC, VLDL-C and LDL-C were significantly suppressed, whereas the decreased serum HDL-C level was obviously elevated by turmeric treatment in high fat diet fed rat.

Results of the histological changes in high fat diet rats, widespread deposition of lipid droplets inside the parenchymal cells, are consistent with the result of the biochemical analysis. This result suggests that turmeric powder can prevent hepatosteatosis via downregulation of accumulation

of lipid in serum and liver. Liver plays a key role in lipid metabolism. Hepatic steatosis refers to the excessive accumulation of lipids within hepatocytes due to imbalance between lipid formation and lipid degradation (Burt et al., 1998). Hypercholesterolaemia, hypertriglyceridaemia, low level of HDL-C and high level of LDL-C are the most common impairments in lipid homeostasis in patients with steatosis (Angulo and Lindor, 2002). Previous study has showed turmeric has hypolipidemic effects (Babu and Srinivasan, 1997). In this study, turmeric powder significantly improved both the biochemical and histological evidence of hepatic lipid accumulation. These results indicate that turmeric attenuates the disorder of lipid metabolism in liver resulted from high fat diet fed.

This study reveals that turmeric, as a glycosylated carotenoid contained in the stigmas of *Crocus sativus* Linne and in the fruits of *Gardenia jasminoides* Ellis, prevents high fat fed induced accumulation of lipid in rat liver. The preventive effect of turmeric powder is mediated through downregulation the levels of TG, TC, VLDL-C and LDL-C and elevation HDL-C synthesis. These changes are associated with decreasing in serum biomarkers of hepatic injury as well as attenuation of oxidative stress formation by turmeric treatment. These results demonstrate that turmeric powder has preventive effects against high fat diet induced rat fatty liver. It is noteworthy that this experiment has been performed on animal, so further studies are needed to examine whether similar findings would be obtained in humans.

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Identification of the Etiological Agents of Onychomycosis in Tehran (2011-2012)

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Abstract: Onychomycosis is one of the most common causes of dystrophycation of nails and comprises 30-50 % of nail diseases and is created by yeasts dermatophytes and saprophytic molds. Aim of this study was investigation of frequency of fungal agents in dystrophic nails of referring persons to mycology laboratory of Razi hospital in Tehran. This was a cross sectional study that was performed on 700 patients with dystrophic nails who were introduced to the laboratory. Sampling was carried out by non-probability and in access. Specimens were investigated by direct microscopic observation, culturing and if necessary complementary examinations. Relationship between variations deliberated by chi- square and fisher exact tests. Out of 700 introduced individuals with dystrophic nails 183 persons were contracted to onychomycosis, 104(56.8%) female and 79 (43.1%) males and more of them (31.1%) in the range of 50-59 of age wise. most of contracted persons were house holding women with distal subungual onychomycosis form (60.4 %).Yeasts with 110 cases (55.8%) and among them candida Albicans (42.7 %) were the most common etiologic agents of onychomycosis that were more often isolated from finger nails. Dermatophytes with 53 cases (26.9%) were more often isolated from toe nails and tiichophyton interdigital with (39.6 %) was the most common of them. 34 cases (17.3%) of saprophytic moulds and more often from toe nails were isolated and most common of them was aspergillus flavus. yeasts are most common causes of onychomycosis and more affection of house holding women to them probably is because of more contact of them to water and detergent that prepare background for affection to it.
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Keyword: Onychomycosis, dermatophyte, yeast, saprophyte, Tehran.

1. Introduction

Onychomycosis is the fungal infection of the nail, which is caused by various species of the dermatophytes, yeasts and molds. Onychomycosis represents up to 50% of all nail disorders and 30% of all superficial skin fungal infections diagnosed (Gupta et al., 2000). Clinically, onychomycosis is classified into various types: distal subungual onychomycosis (DSO), Lateral subungual onychomycosis (LSO), Superficial white onychomycosis (SWO), proximal subungual onychomycosis (PSO), Total dystrophic onychomycosis (TDO) and paronychia (Scher, 1996; Midgley and Moore, 1996). In onychomycosis, some factors such as diabetes, aging atopy, immunodefiency virus, immunosuppressive therapy, psoriasis, trauma, tinea pedis, hyperhydrosis and genetic considered as a predisposing factors and should be paid more attention. dermatoses such as psoriasis , lichen plan and melanoma can also cause nail alterations similar to onychomycosis , therefore diagnosis of fungal nail infections is critical (Walshe and English, 1966; Zaias et al., 1996). According to increase of prevalence of onychomycosis during the last decades as well as the role of various types of climate, socio-economical and occupational situations, regional investigations for determining causative fungal agents and its prevalence is necessary.

2. Material and Methods

During a period of one year (2011- 2012), 700 patients with dystrophic nails were examined that 183 cases were affected by onychomycosis. 56.8% of Patients were female. Appropriate specimens were collected, by scrapping of the nails. The direct mount from specimens was made by 20% potassium hydroxide and the remaining samples were cultured on sabouraud's dextrose agar and sabouraud's containing chloramphenicol and cycloheximid. All plates were incubated in 30C. For four weeks and examined at daily intervals for developing colonies. The fungi were identified by routine laboratory methods, in particular, the slide culture techniques, microscopic and macroscopic characteristics, germ tube test as well as chlamydospore formation.

3. Results

From suspected 700 cases of onychomycosis, 183 cases were positive based on laboratory findings. 104 (56.8%) were female and 79(43.1%) were males and more of them (31.1%) in the range of 50-59 years-old (table 1). Most of affected individuals were housewives with distal sulungual onychomycosis form (60.4 %) (table 2).

Yeasts with 110 (55.8%) cases and among them candida Albicans (42.7 %) were the most frequent etiologic agents of onychomycosis (table 3). Furthermore the yeasts are the dominant cause of onychomycosis in finger nails. Dermatophytes was accounted for 26.9% of fungal toe nails infections and trichophyton interdigital was responsible for most cases (39.6%) of dermatophyte induced onychomycosis. 34 cases (17.3%) of saprophytic molds were more often isolated toe nails (table 4). The most common species of them was aspergillus flavus (table 5).

Table 1: Distribution of age groups according the causative agents of onychomycosis and gender of patients

Age (Years)	Female		Male		Total		Dermatophyte		yeast		saprophyte		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
0-9	2	1/9	3	3/8	5	2/7	1	1/9	3	2/8	1	2/9	5	2/5
10-19	5	4/8	1	1/3	6	3/3	1	1/9	3	2/8	2	5/9	6	3/04
20-29	9	8/7	6	7/6	15	8/2	4	7/5	9	8/2	4	11/8	17	8/6
30-39	13	12/5	12	15/2	25	13/7	6	11/3	15	13/6	4	11/8	25	12/7
40-49	17	16/3	17	21/5	34	18/6	16	30/3	15	13/6	4	11/8	35	17/8
50-59	37	35/6	20	25/3	57	31/1	19	35/8	30	27/2	10	29/4	59	29/9
60-69	14	13/5	12	15/2	26	14/2	6	11/3	22	20	3	8/8	31	15/7
70>	7	6/7	8	10/1	15	8/2	0	0	13	11/8	6	17/6	19	9/6
TOTAL	104	100	79	100	183	100	53	100	110	100	34	100	197	100

Table 2: Clinical types, causative agents and sites of involvement

Clinical type	Dermatophyte		Saprophyte		Yeast		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Distal subungual onychomycosis	42	79/2	22	64/7	55	50	119	60/4	42	42	69	81/2	8	66/6	119	60/4
Superficial onychomycosis	7	13/2	1	2/9	0	0	8	4/1	0	0	8	9/4	0	0	8	4/1
Proximal sulungual onychomycosis	0	0	7	20/6	3	2/7	10	5/1	7	7	3	3/5	0	0	10	5/1
Total dystrophy onychomycosis	3	5/7	3	8/8	3	2/7	9	4/6	4	4	3	3/5	2	16/7	9	4/6
Lateral subungual onychomycosis	1	1/9	1	2/9	13	11/8	15	7/6	14	14	1	1/2	0	0	15	7/6
Paranychia	0	0	0	0	36	32/7	36	18/3	33	33	1	1/2	2	16/7	36	18/3
TOTAL	53	100	34	100	110	100	197	100	100	100	85	100	12	100	197	100

P Value< 0/001 (chi- square test)

Table 3: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Species of dermatophyte	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
T. Interdigital	18	47/4	3	20	21	39/6	1	25	19	40/4	1	50	21	39/6
T. Mentagrophytis	6	15/8	2	13/3	8	15/1	0	0	8	17	0	0	8	15/1
T. Rubrum	14	36/8	6	40	20	37/7	1	25	18	38/3	1	50	20	37/7
T.Verucosome	0	0	4	26/7	4	7/5	2	50	2	4/3	0	0	4	7/5
TOTAL	38	100	15	100	53	100	4	100	47	100	2	100	53	100
P Value= 0/007 (chi- square test)							P Value= 0/187 (Fisher exact test)							

Table 4: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Species of saprophyte	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Aspergillus Flavous	3	17/6	9	52/9	12	35/3	5	41/7	7	35	0	0	12	35/3
Aspergillus Fumigatus	3	17/6	1	5/9	4	11/8	1	8/3	3	15	0	0	4	11/8
Aspergillus Niger	2	11/8	1	5/9	3	8/8	1	8/3	2	10	0	0	3	8/8
Penicilium	4	23/5	3	17/6	7	20/6	3	25	2	10	2	100	7	20/6
Acromonium	4	23/5	2	11/8	6	17/6	2	16/7	4	20	0	0	6	17/6
Fusarium	1	5/9	0	0	1	2/9	0	0	1	5	0	0	1	2/9
Exophiala dermatitidis	0	0	1	5/9	1	2/9	0	0	1	5	0	0	1	2/9
Total	17	100	17	100	34	100	12	100	20	100	2	100	34	100
P Value= 0/301 (Fisher exact test)							P Value = 0/805 (Fisher exact test)							

Table 5: Distribution of the causative agents of onychomycosis according to site of involvement and gender of patients

Yeasts	Male		Female		Total		Finger nail		Toe nail		Finger and toe nail		Total	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Candida Albicans	11	35/5	36	45/6	47	42/7	38	47/5	5	31/2	4	28/6	47	42/7
C.parapcilusis	7	22/6	16	20/3	23	20/9	15	18/8	5	31/2	3	21/4	23	20/9
C.Tropicalis	3	9/7	13	16/5	16	14/5	13	16/2	1	6/2	2	14/3	16	14/5
C. Kerosei	6	19/4	8	10/1	14	12/7	8	10	3	18/8	3	21/4	14	12/7
C.Glaberata	1	3/2	3	3/8	4	3/6	2	2/5	0	0	2	14/3	4	3/6
C.Gillermondi	1	3/2	2	2/5	3	2/7	2	2/5	1	6/2	0	0	3	2/7
C.lositani	0	0	1	1/3	1	0/9	1	1/2	0	0	0	0	1	0/9
C.Famata	1	3/2	0	0	1	0/9	0	0	1	6/2	0	0	1	0/9
Rodotrolla	1	3/2	0	0	1	0/9	1	1/2	0	0	0	0	1	0/9
Total	31	100	79	100	110	100	80	100	16	100	14	100	110	100
P Value= 0/380 (Fisher exact test)							P Value= 0/300 (Fisher exact test)							

4. Discussion

Onychomycosis is one of the most common nail diseases with worldwide occurrence, although it has worldwide occurrence, but its frequency is variable which depends on different climatic, professional and socio-economic conditions. For example, a comprehensive survey from North Malawi found no onychomycosis thought there was a 1.5 to 2.5 %prevalence of dermatophytosis (Ponninghaus et al., 1996), while the stimated prevalence of onychomycosis in United Kingdom is 1.3 to 4.7% (Roberts, 1992). The frequency of onychomycosis increases with age, This infection is very rare in young children, common in young adults and very frequent in elderly (Ponninghaus et al., 1996; Baran et al., 1999). In this study, the highest prevalence was seen in the age range of 50-59 years. In our study, 183 cases of the samples were positive in both culture and direct vision. The etiological fungal agents were 26.9% dermatophytes, 55.8% yeasts and 17.3 %saprophytic moulds; this is not in agreement with one of the observation from Tehran (Haneke, 1989) in which dermatophyte were pointed out as the dominant cause of onychomycosis. According to Alvarecz et al. (2004), onychomycosis has been more prevalent in women and in the current study also 56.8% of people with onychomycosis were females with distal subungual onychomycosis form.

Among isolated species, Trichophyton rubrum is reported as a causative agent 50-75 % cases in Western Europe, North America and Asia (Gill and Marks, 1999). In the 1970s, the most common agents of onychomycosis in Iran were T.schoenleinni and T.violaceum, respectively (Ardehali, 1973; Khosravi and Mansouri, 2000). However, dermatophyte prophile in Iran follows the world pattern since 1980 for onychomycosis. In the most part of the Iran, this species were replaced by T.mentagrophytes and T.rubrum (Moghaddami and Shidfar, 1989; Shokouhi, 1981). In this survey, the most isolated dermatophytes were T.Interdigital (39.6%) and T.rubrum (37.7%).

In this investigation, yeasts were the most frequent causative agent of onychomycosis, which mainly involved women's finger nails, Similar to other investigation (Cohen et al., 1992; Zaini, 1986). We found Candida Albicans as the predominant isolated yeast (42.7%).

Based on several studies, none-dermatophyte moulds are considered pathogenic in about 5%of cases, but significant were seen differences in various geographical regions (Clayton, 1992; Summerbell et al., 1989; Williams, 1993). In this investigation, the causes of 17.3% of positive cases were moulds which were isolated mainly from toenails (58.8%). We found Aspergillus flavous as the most common non dermatophyte moulds. This was in contrast to observation of khosravi et al. (2000), in which scopolariopsis bervicaulis was the dominant species. Considering our results, which revealed high frequency of onychomycosis in elders and women, study of high–risk groups to improve their sanitary and health is recommended. Regarding high prevalence of yeast as major causes of onychomycosis and its variation in different climatic condition, determining causative agents is so imperative in rapid diagnosis and appropriate treatment.

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12/2/2012

Dynamic Stability Improvement in Multi Machine Power System by Using AVR

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Abstract: Automatic voltage regulator (AVR) is a controller based on synchronous generator for controlling voltage in generators' terminals. AVR can generally change the system dynamic performance and the effect of AVR on dynamic stability has been seldom investigated. In this regard, effect of AVR on dynamic stability is investigated in this paper. IEEE 14 bus test system is considered as case study to show effectiveness of the proposed method.
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Keywords: Power System Dynamic Stability**,** Automatic Voltage Regulator, Synchronous Generators.

1. Introduction

Power system stability is an important issue in power systems and improving power system stability have been widely investigated and reviewed [1-20]. One the most important factors which affects on stability are AVRs. The generator excitation system consists of an exciter and an automatic voltage regulator (AVR) and is necessary to supply the generator with DC field current. The power rating of the exciter is usually in the range 0.2–0.8% of the generator's megawatt rating. In the case of a large generator this power is quite high, in the range of several megawatts. The voltage rating of the exciter will not normally exceed 1000 V as any higher voltage would require additional insulation of the field winding. Generally exciters can be classified as either rotating or static. Figure 1 shows some typical systems. In the rotating exciters of Figure 1-a–c, the excitation current is supplied either by a DC generator or by an AC generator with rectifiers. As DC generators usually have relatively low power ratings, they are cascaded to obtain the necessary output, Figure 1-a. Because of commutation problems with DC generators this type of exciter cannot be used for large generators which require large excitation currents. As the number of cascaded DC generators increases, the dynamic properties of the exciter deteriorate, resulting in an increase in the equivalent time constant. Nowadays DC generators have been almost entirely replaced by alternators, which are simpler and more reliable. This change to alternators has been possible because of advances in power electronics which allow cheap, high power rectifiers to be used in conjunction with the AC exciter. The exciter shown in Figure 1-b is a reluctance machine (inductor generator) operating at about 500–600 Hz so that the rectified current requires little smoothing. With this exciter both windings (AC and DC) are on the stator side. One disadvantage of this system is that slip rings are required to feed the rectified excitation current to the rotating field winding of the main generator. A further disadvantage is that the exciter itself tends to be quite large. This is a direct result of the way in which the sinusoidal flux changes, necessary to induce the alternating emf in the armature, are produced solely by the changes in reluctance due to the rotation of the salient rotor teeth. The exciter shown in Figure 1-c has neither commutator nor slip rings. The principal excitation source is an inside-out synchronous machine with the field winding on the stator and armature winding on the rotor. The induced current is rectified by diodes, which are also mounted on the rotor, and fed directly to the excitation winding of the main generator. One limitation of this type of exciter is that the current supplied to the main generator can only be controlled indirectly via field control of the exciter. This tends to introduce a time constant of about 0.5 to 1 s into the exciter control system. One solution to this problem is to use rotating thyristors, rather than diodes, and control the exciter output via the firing angle of the thyristors. Unfortunately, controlling the firing angle of a rotating thyristor is not easy and the reliability of such systems tends to be compromised by stray fields causing unscheduled thyristor firing. Some alternative exciter systems using static thyristor converters are shown in Figure 1-d–f. In these exciters the thyristor rectifiers are controlled directly by a voltage regulator. The main difference between the systems is in the type of supply used. Figure 1-d shows an exciter supplied by an additional auxiliary service transformer. Figure 1-e shows an alternative, and simpler, solution in which the exciter is fed from the generator output via a transformer. However, should a short circuit occur, particularly one close to

the generator terminals, the decrease in the generator terminal voltage will result in a possible loss of excitation. With careful design the exciter can operate when the short circuit is further away from the generator terminals, for example at the high-voltage terminals of the step-up transformer. More flexibility can be obtained by modifying the supply to the rectifier as shown in the exciter design of Figure 1-f. In this system the generator does not lose excitation because its supply voltage is augmented, or compounded, by a component derived from the generator load current. The main disadvantage of all static exciters is the necessity of using slip rings to feed current to the rotor of the main generator. This is offset to a large extent by the rapid speed with which they can react to control signals. As the cost of high-power rectifiers decreases, and reliability increases, static exciters are becoming the main source of excitation for high-power generators [21].

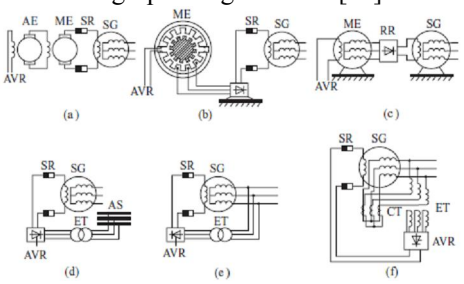

Figure 1: Typical exciter systems: (a) cascaded DC generators; (b) reluctance machine with rectifier; (c) inside-out synchronous generator with rotating rectifier; (d) controlled rectifier fed from the auxiliary supply; (e) controlled rectifier fed from the generator terminals; (f) controlled rectifier fed by the generator's voltage and current [21]

2. Automatic Voltage Regulators

The AVR regulates the generator terminal voltage by controlling the amount of current supplied to the generator field winding by the exciter. The general block diagram of the AVR subsystem is shown in Figure 2. The measuring element senses the current, power, terminal voltage and frequency of the generator. The measured generator terminal voltage Vg is compensated for the load current Ig and compared with the desired reference voltage Vref to produce the voltage error ΔV. This error is then amplified and used to alter the exciter output, and consequently the generator field current, so that the voltage error is eliminated. This represents a typical closed-loop control system. The regulation process is stabilized using a negative feedback loop taken directly from either the amplifier or the exciter. The AVR subsystem also includes a number of limiters whose function is to protect the AVR, exciter and generator from excessive voltages and currents. They do this by maintaining the AVR signals between preset limits. Thus the amplifier is protected against excessively high input signals, the exciter and the generator against too high a field current, and the generator against too high armature current and too high power angle. The last three limiters have built-in time delays to reflect the thermal time constant associated with the temperature rise in the winding. A power system stabilizer (PSS) is sometimes added to the AVR subsystem to help damp power swings in the system. PSS is typically a differentiating element with phase shifting corrective elements. Its input signals may be proportional to rotor speed, generator output frequency or the electrical real power output of the generator. The AVR parameters have to be chosen in such a way that an appropriate quality of voltage regulation is maintained. For small disturbances, that quality can be assessed by observing the dynamic voltage response of a generator to a step change in the reference value [21].

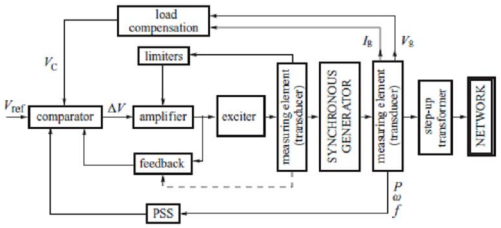

Figure 2: Block diagram of the excitation and AVR system [21]

3. System under Study

In this paper IEEE 14 bus test system is considered to evaluate the proposed method. The system data are completely given in IEEE standards. The excitation and AVR system parameters are changed to show effect of them on stability. Figure 3 shows the test system and its data are given in [22].

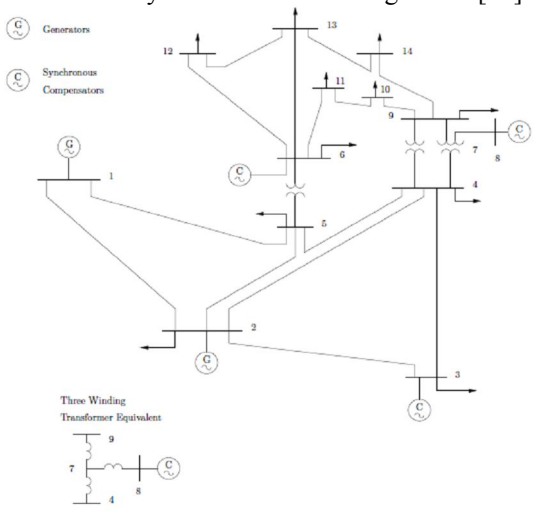

Figure 3: IEEE 14 bus test system [22]

3.1. AVR model

The AVR model is depicted in Figure 4 and described by the following equations and its parameters are defined in Table 1 [22].

$$
\begin{aligned}
\dot{v}_m &= (V - v_m)/T_r \\
\dot{v}_{r1} &= (K_a(v_{\text{ref}} - v_m - v_{r2} - \frac{K_f}{T_f}v_f) - vr1)/T \\
v_r &= \begin{cases} v_{r1} & \text{if } v_{r\min} \le v_{r1} \le v_{r\max}, \\ v_{r\max} & \text{if } v_{r1} > v_{r\max}, \\ v_{r\min} & \text{if } v_{r1} < v_{r\min}. \end{cases} \qquad (1) \\
\dot{v}_{r2} &= -(\frac{K_f}{T_f}v_f + v_{r2})/T_f \\
\dot{v}_f &= -(v_f(1 + S_e(v_f)) - v_r)/T_e
\end{aligned}
$$

Table 1: Exciter system data

Variable	Description
$V_{r\max}$	Maximum regulator voltage
$V_{r\min}$	Minimum regulator voltage
K_a	Amplifier gain
T_a	Amplifier time constant
K_f	Stabilizer gain
T_f	Stabilizer time constant
T_e	Field circuit time constant
T_r	Measurement time constant
A_e	1st ceiling coefficient
B_e	2nd ceiling coefficient

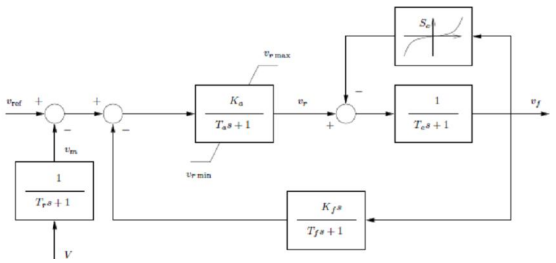

Figure 4: excitation model [22]

4. Simulation results

The following cases are considered for simulation, where the case 1 is the nominal condition.

Table 2: excitation system parameters for several conditions

	Ka	Ta
Case 1	40	0.02
Case 2	20	0.02
Case 3	100	0.04

The simulation results for the proposed system are depicted in Figures 5-14. The simulation results show the effect of AVR parameters on stability of power system. It is clearly seen that the system stability is a function of AVR parameters. The system oscillation depends to AVR tuning and with changing AVR parameters the oscillations are changed. The effect of AVR parameters on stability denotes the importance of AVR sitting in power systems. An optimal and good tuned AVR can improve power system stability, while a non-tuned AVR can greatly affect on stability and would lead to instability.

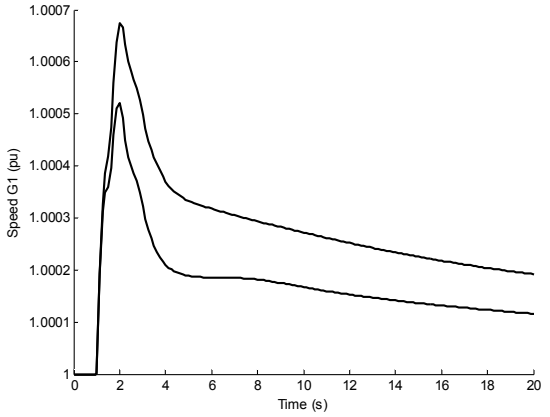

Figure 5: Speed G_1 (solid: case 1; dashed: case 2)

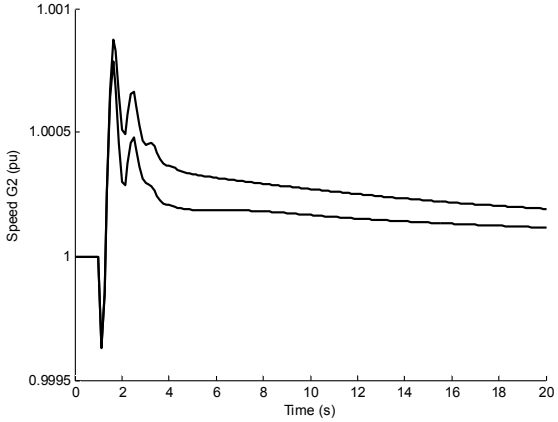

Figure 6: Speed G_2 (solid: case 1; dashed: case 2)

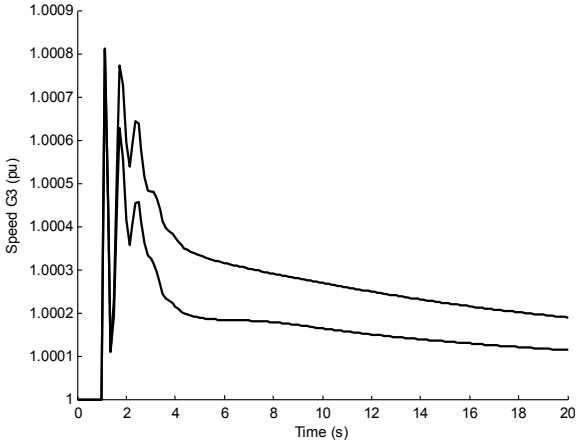

Figure 7: Speed G_3 (solid: case 1; dashed: case 2)

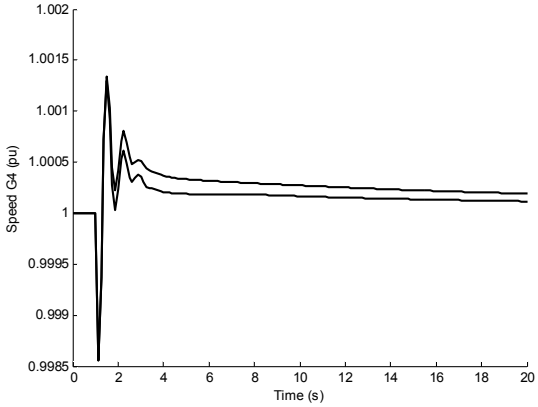

Figure 8: Speed G_4 (solid: case 1; dashed: case 2)

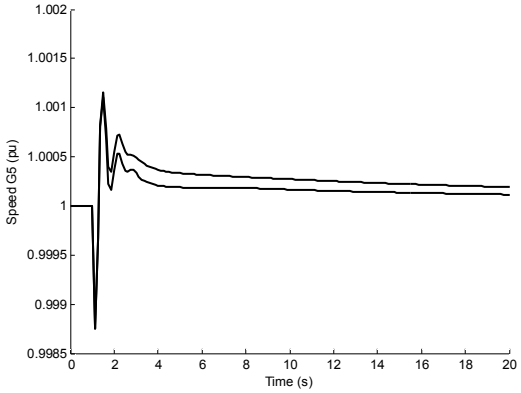

Figure 9: Speed G_5 (solid: case 1; dashed: case 2)

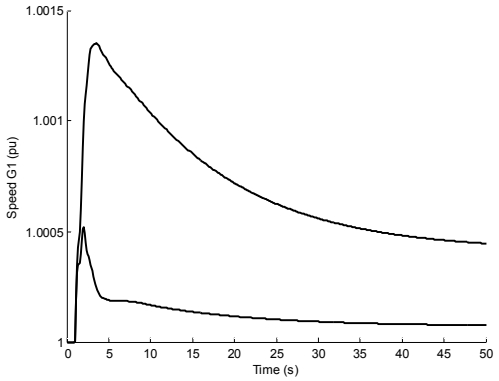

Figure 10: Speed G_1 (solid: case 1; dashed: case 3)

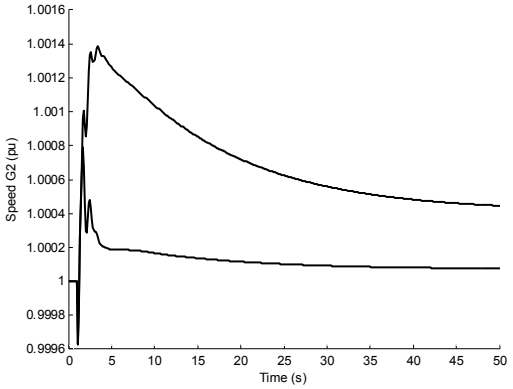

Figure 11: Speed G_2 (solid: case 1; dashed: case 3)

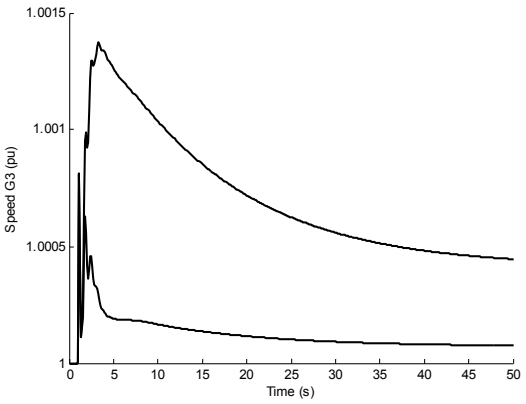

Figure 12: Speed G_3 (solid: case 1; dashed: case 3)

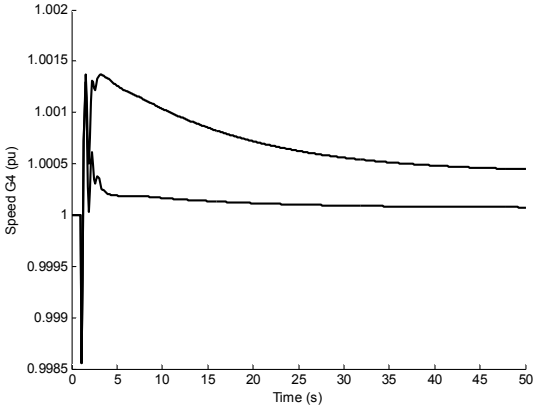

Figure 13: Speed G_4 (solid: case 1; dashed: case 3)

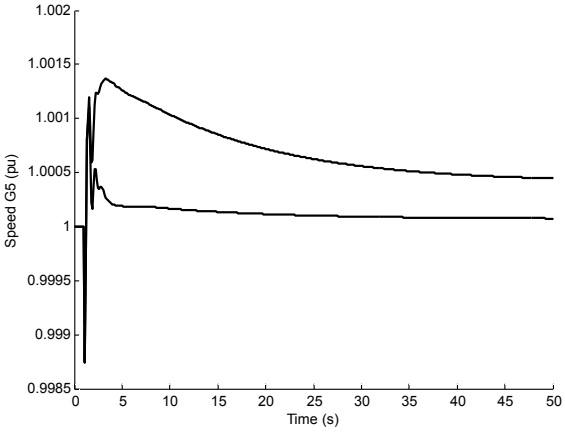

Figure 14: Speed G_4 (solid: case 1; dashed: case 3)

5. Conclusion

Effect of AVR and excitation system on stability and oscillations was investigated in this paper. A typical power system equipped with AVR on all generators was chosen as case study and effect of AVR parameters was investigated on test system. The simulation results showed the great effect of AVR parameters on power system stability. The power system stability is associated with AVR good sitting and non-tuned AVR may lead to instability.

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A new optimization method for PSS design in New-England Power system

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Abstract: Power system stabilizer (PSS) design in large scale power systems is a critical issue and has always been investigated by researchers. In this paper a new strong optimization method named memetic algorithms is used to design PSS in a large scale power system. New-England power system is considered as case study to show effectiveness of the proposed method.

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Keywords: Memetic Algorithms, Power System Stabilizer, Low Frequency Oscillations.

1. Introduction

With recent increase in electric power demand, power systems are becoming large in scale. Furthermore, wide area power interchanges lead to large and complex power system. Under such conditions, poor damping low frequency oscillations (LFO), between 0.3 to 0.5 Hz, might occur to influence the whole system.

One of several methods to stabilize power system oscillation is to use a single input PSS that is equipped with generator excitation system. In real world practical applications, the PSS has been a very effective device for improving generator's oscillation. However, the conventional single input PSS has a weak point in that it cannot be applied to the above mentioned wide range of swing frequency, that is the so called 'inter-area mode'. The reason is that the conventional PSS is designed using one generator connected to infinite bus system in general and it is tuned for the local mode which frequency is around 1.0-2.0Hz. Moreover, when designing the PSS, only one operating condition is considered. The inter-area mode is a complex phenomenon which arises from all of generator dynamics. Therefore, conventional PSS must be improved to be more a robust controller. In order to improve the performance of CPSSs, numerous techniques have been proposed for designing them, such as intelligent optimization methods [1-4] and Fuzzy logic method [5-9]. Also many other different techniques such as robust control methods have been reported in [10-14].

In this paper a new optimization method is used to design PSS at a large scale power system with 10 generators. The results show the ability of the proposed optimization method in finding optimal solution.

2. System under study

A large scale power system with ten generators and 39 buses is considered as case study. Figure 1 shows the proposed test system which is known as New-England power system. Generator 1 is equivalent of a large number of generators and is not installed with PSS; the other generators are equipped with PSS. The system data are given in [15].

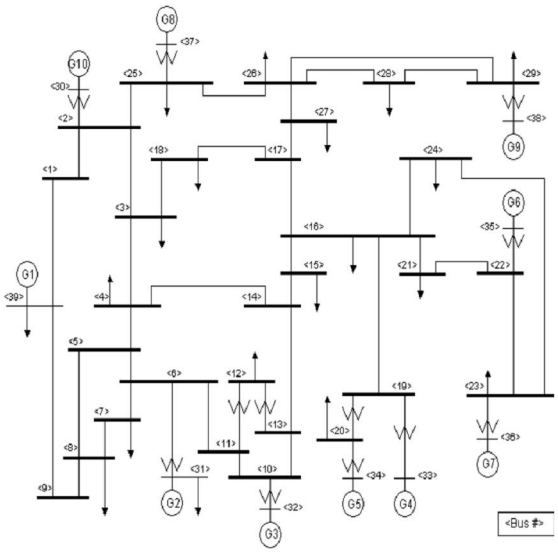

Figure 1: 10-machine 39-bus power system

3. Dynamic model of the system

A non-linear dynamic model of the system is derived by disregarding the resistances and the transients of generator, transformers and transmission lines [15]. The nonlinear dynamic model of the system is given as (1).

$$\begin{cases} \dot{\omega} = \dfrac{\left(P_m - P_e - D\Delta\omega\right)}{M} \\ \dot{\delta} = \omega_0\left(\omega - 1\right) \\ \dot{E}'_q = \dfrac{\left(-E_q + E_{fd}\right)}{T'_{do}} \\ \dot{E}_{fd} = \dfrac{-E_{fd} + K_a\left(V_{ref} - V_t\right)}{T_a} \end{cases} \quad (1)$$

3.1. Analysis

The Eigen values of the system are obtained and listed in Table 1. It is clearly seen that the system has one pole at zero and therefore the system is unstable and needs to Power System Stabilizer (PSS) for stability.

Table 1: The Eigen values of power system

-8358.4+39301i
-8358.4-39301i
-4945.2+70702i
-4945.2-70702i
-5017.8+70208i
-5017.8-70208i
-5320.2+67975i
-5320.2-67975i
-6393.3+59586i
-6393.3-59586i
-5642.1+65561i
-5642.1-65561i
-5786.1+64437i
-5786.1-64437i
-6147.2+61294i
-6147.2-61294i
-6018.8+62463i
-6018.8-62463i
-0.01398+6.0244i
-0.01398-6.0244i
-0.01702+5.085i
-0.01702-5.085i
-0.01813+4.2203i
-0.01813-4.2203i
-0.0178+3.9941i
-0.0178-3.9941i
-0.01431+3.5683i
-0.01431-3.5683i
-0.01512+3.1525i
-0.01512-3.1525i
-0.01509+2.5403i
-0.01509-2.5403i
-0.01473+1.695i
-0.01473-1.695i
-0.00596+0.69955i
-0.00596-0.69955i
-0.02614
0
-0.97421
-0.99417
-0.99579
-0.99651
-0.99735
-0.99794
-1.0003
-0.99911
-0.99994
-0.1,-0.1,-0.1, -0.1,-0.1,-0.1, -0.1,-0.1,-0.1
-10,-10,-10, -10,-10,-10, -10,-10,-10
-20,-20,-20, -20,-20,-20, -20,-20,-20

4. Power system stabilizer

A Power System Stabilizer (PSS) is provided to improve the damping of power system oscillations. Power system stabilizer provides an electrical damping torque (ΔT_m) in phase with the speed deviation ($\Delta\omega$) in order to improve damping of power system oscillations [16].

4.1. Conventional power system stabilizer

The Conventional Power System Stabilizer (CPSS) block can be used to add damping to the rotor oscillations of the synchronous machine by controlling its excitation. The disturbances occurring in a power system induce electromechanical oscillations of the electrical generators. These oscillations, also called power swings, must be effectively damped to maintain the system stability. The output signal of the PSS is used as an additional input (v_{stab}) to the Excitation System. The PSS input signal can be either the machine speed deviation, $\Delta\omega$, or its acceleration power. The CPSS is modeled as shown by Figure 2 [16].

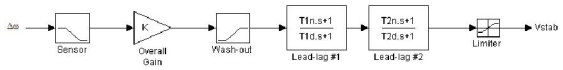

Figure 2: Conventional Power System Stabilizer

This model consists of a low-pass filter, a general gain, a washout high-pass filter, a phase-compensation system, and an output limiter. The general gain K determines the amount of damping produced by the stabilizer. The washout high-pass filter eliminates low frequencies that are present in the $\Delta\omega$ signal and allows the PSS to respond only to speed changes. The phase-compensation system is represented by a cascade of two first-order lead-lag transfer functions used to compensate the phase lag between the excitation voltage and the electrical torque of the synchronous machine [16].

5. Memetic algorithms

Evolutionary algorithms (EA) propagate effective neuron structures by varying the sample distribution in the solution space, depending upon the evaluation of the objective (fitness) function. This selection biases the search towards regions of the solution space where near optimal solutions have been discovered. Local refinements to these near optimal solutions could significantly accelerate arriving at an optimal solution. However, EA's are not suited to focusing local refinements in large combinatorial tasks. Genetic Evolution may be

augmented to facilitate local (neighborhood) search via cultural evolution [17]. Analogous to genetic propagation, cultural transmission (i.e., bird song) is the evolutionary flow of information. However, there are significant differences between cultural and genetic evolution. In cultural evolution, improvements are seldom a result of copying errors or the exchange of co-adapted units of information. Clear-cut combination of exact ideas does not generally lead to innovation. An idea is rather blended with other similar ideas based upon perception and understanding. This blending process is the driving force towards innovation. Genetic evolution does not incorporate an innovative component, as experimentation (reproduction) with new information is governed by biased selection. A gene is not changed based on the quality of other similar genes. The individuals in cultural evolution are conscious entities that use one another's ideas in the search process, subject to cooperation and competition. Genetic evolution has no concern for individual genes, but focuses on improving the population by propagating effective gene combinations.

Memetic algorithms (MA) are evolutionary algorithms that use cultural evolution for local search (LS). The local search is applied to solutions in each generation of the EA, creating a process of lifetime learning. The EA searches globally for regions containing significant optima, while the LS search these regions for the local optimum. The EA is thus responsible for exploration, whilst the LS govern exploitation. A balance between exploration and exploitation ensures that the minimum number of evaluations is employed in finding the global optimum. This balance is dependent on the synergy between lifetime learning and evolution. LS aid the evolutionary process by smoothing the fitness landscape. LS exploit the local fitness landscape, which absolves the EA from devoting resources to searching in areas of local complexity on the fitness surface. This smoothing essentially involves discretion of the fitness landscape. Consider the optimization of the fitness landscape in Figure 3.

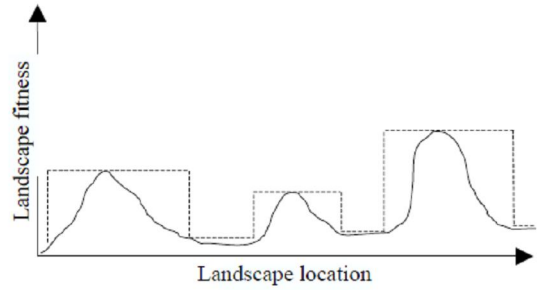

Figure 3: Smoothing of the fitness landscape by local search

Assume that any EA solution, located on one of the slopes on the three peaks, is able to locate the local maximum through LS. The EA's task is simplified considerably, in that it only needs to locate three regions of the search space. The dashed lines in Figure 3 indicate these three discrete regions. With the added local search capability, the complexity of the EA's solution space is reduced significantly. The plasticity afforded by lifetime learning makes it easier for the EA to climb to peaks in the fitness landscape [17].

Therefore, the EA of a memetic algorithm should not generate multiple solutions in the neighbourhood of a single optimum, but should maintain a diverse (wider) search in the solution space. Thereby, the EA aids the LS by bordering regions (sub-spaces) of the fitness landscape that contain significant optima. Such regions become prime candidates for exploitation by local search algorithms. A synergetic effect, which accelerates evolution, thus exists in an evolving population of individuals, where the individuals are also exposed to learning during their lifetime. A key element to maintaining such synergy is a diversification mechanism in the EA. Genetic diversity is required to continue a global search. Global reliability, which promises convergence to the global optimum, is required to ensure that every region of the solution space is effectively explored [17].

6. Design methodology

In this section the proposed PSSs are tuned based on the MA. In this study the performance index is considered as (2). In fact, the performance index is the Integral of the Time multiplied Absolute value of the Error (*ITAE*).

$$\mathrm{ITAE} = \int_0^t \sum_{i=1}^{n} t\left|\Delta\omega_i\right| dt \qquad (2)$$

To compute the optimum parameter values, different three phase short circuits are assumed and the performance index is minimized using MA. It should be noted that MA algorithm is run several times and then optimal set of PSS parameters is selected. The optimum values of the parameters are listed in the Table 2. T_{1d} and T_{2d} are fixed on 0.01.

Table 2: PSS parameters using GA

	K	T_{1n}	T_{2n}
G_2	7.77	0.034	0.122
G_3	142.9	0.037	0.054
G_4	166.8	0.041	0.041
G_5	155.1	0.023	0.058
G_6	136.1	0.01	0.030
G_7	175.5	0.01	0.051
G_8	179.9	0.02	0.011
G_9	176.3	0.02	0.019
G_{10}	123.9	0.011	0.13

7. Simulation results

The simulation results are depicted in Figures 4-13. The figures show speed of all ten generators following a 5 cycle three phase short circuit in bus 14. Each figure contains two plots which as system with PSS (solid line) and system without PSS (dashed line). It is clear to see that the system without PSS is unstable and in this system the oscillations are cannot be damped out. But, the system with PSS is stable and oscillations are damped out by using PSS.

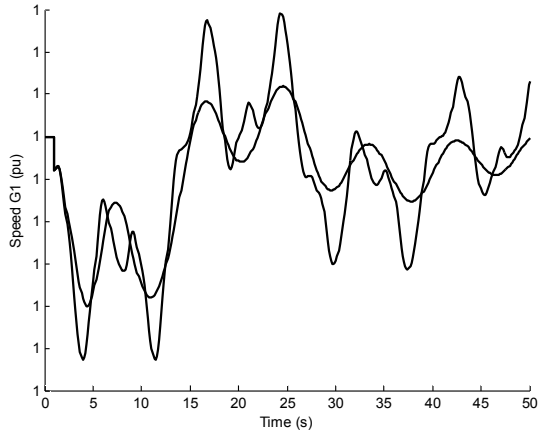

Figure 4: speed G_1 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

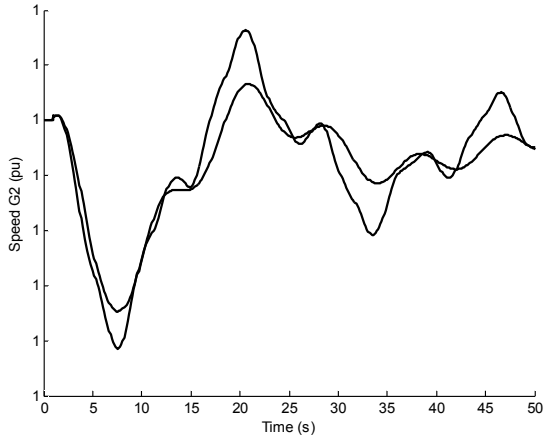

Figure 5: speed G_2 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

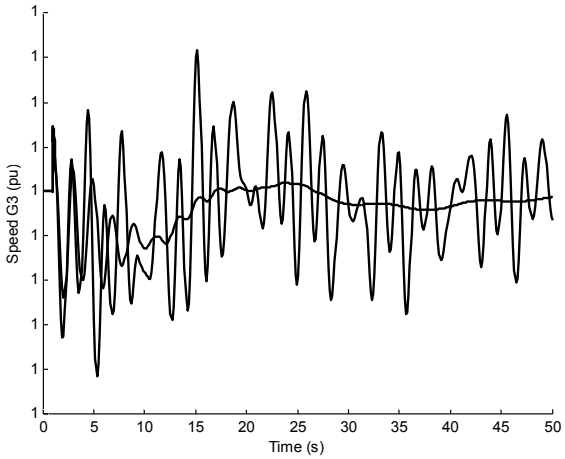

Figure 6: speed G_3 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

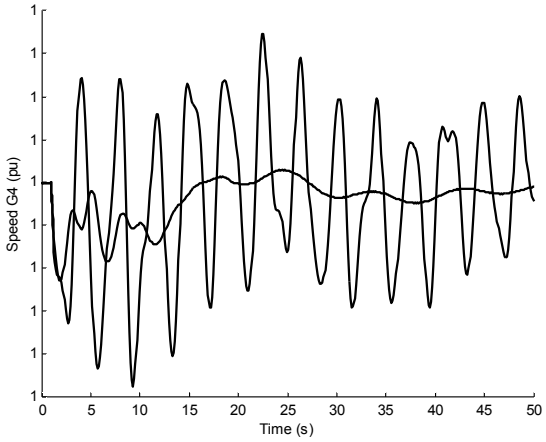

Figure 7: speed G_4 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

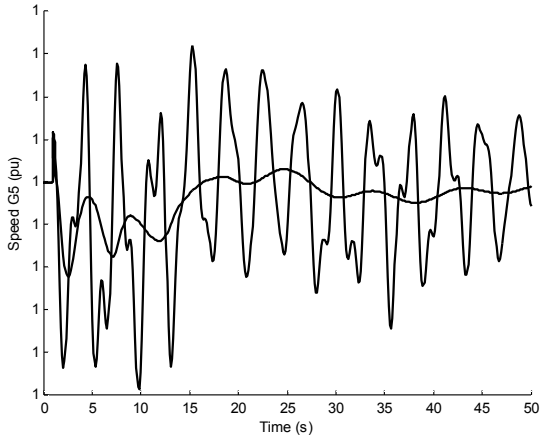

Figure 8: speed G_5 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

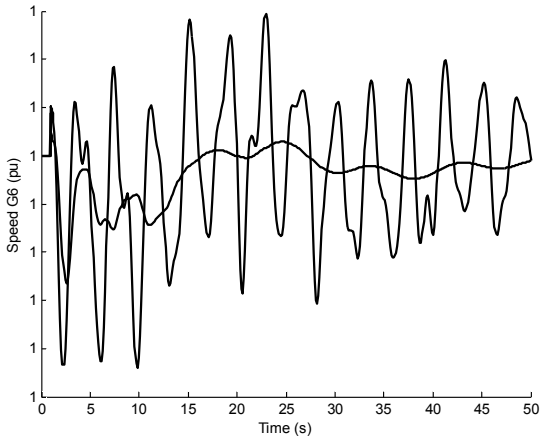

Figure 9: speed G_6 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

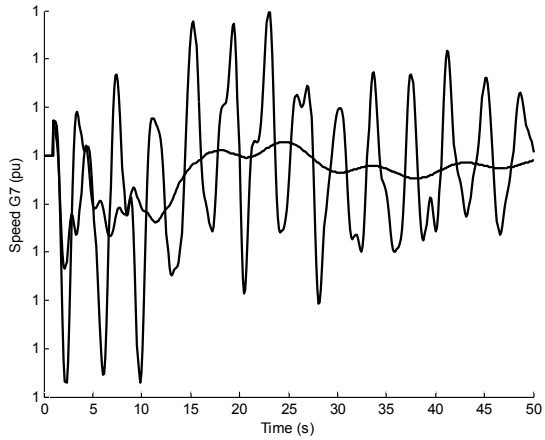

Figure 10: speed G_7 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

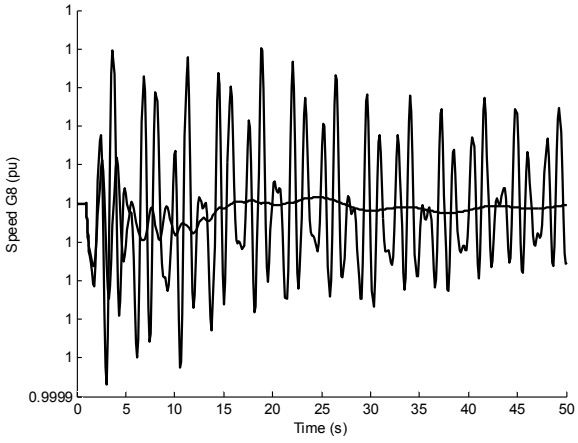

Figure 11: speed G_8 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

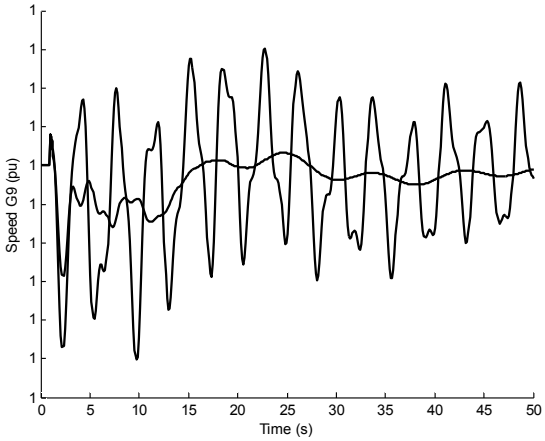

Figure 12: speed G_9 following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

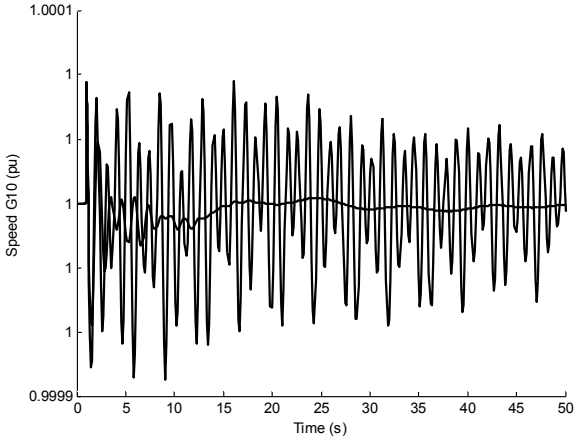

Figure 13: speed G_{10} following three phase short circuit in bus 1 (Solid: with PSS; dashed: without PSS)

8. Conclusions

Tuning a large number of PSSs was successfully carried out in this paper. A large scale power system installed with nine PSSs was considered as case study. The proposed PSSs were successfully tuned at the same time by using memetic algorithms. It was showed that the system with proposed PSSs is stable and robust under large signal disturbances such as three phase fault. The effectiveness of the designed PSSs was tested by nonlinear simulations.

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The Effect of the Quality of Information Disclosure on Profit Information content and the Book Value of the Equity of Firms listed on Tehran Stock Exchange

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Abstract: This paper studies the effect of the quality of information disclosure on profit information content and the book value of the equity of 256 firms listed on Tehran Stock Exchange (TSE) during 2002-2009. To this aim, and to determine if there is any linear correlation between the research variables, various tests such as Pearson's and Spearman's correlation tests as well as Fisher, Limer, Hausman, Durbin-Watson, Wald, and Vaung's statistics methods were used. The results showed that: 1) the incremental and relative information content of the book value is little; 2) the profit information content is significantly higher than that of the book value; and 3) the quality of information disclosure in the studied firms did not have a significant impact on the information content of earnings and the book value of equity.

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Introduction

Investment is one of the important factors of development in the current century. In this respect, stock exchange serves as the most significant tool that can mobilize investments, directing them towards the industry. The stock exchange in industrial countries is important to the extent that it acts as one of their most significant indicators of economic growth. Iran's economic structure and its respective characteristics have given rise to a condition that necessitates the growth and development of the stock exchange. When making decisions concerning investments in the stock exchange, the first and the foremost factor considered by the investor is the "price"; and studying the trend of changes in the stock prices is the most common starting point when buying stocks. Therefore, having knowledge of the factors affecting the stock prices is of great importance and since stock prices are influenced by several factors and every one of such factors leads to an increase or decrease in the prices of the stocks in some way, studying and analyzing each of those factors is a necessary task. The annual budget of the firm and its production prospects, sales, earnings per share, and budget control in mid-term reports as well as the level of realization of anticipations significantly influence the changes in the stock prices. Among the mentioned factors, one may seek into the anticipation of earnings per share may be the most important element affecting the stock prices.

Profit is one of the most premier indicators for assessing the activities of an economic unit. The importance of accounting profit arises from the expansion of quantitative managerial techniques and the necessity of addressing the needs of the users of financial statements, and by passing the limited view provided by assessing the results of past activities, it has empowered accounting in helping the decision-makers. The efficient market theory has been on the scene since 1965. Based on this theory, all the available information pertaining to the stock is manifested in the price of the stock and even the investors within the organization who have access to first hand information could not gain abnormal returns. In such market, the complete disclosure of information, particularly accounting information, carries information content.

Studying the content of information is to observe the role that accounting information could take in explaining the behavior of returns on securities. The well-know research conducted by Baul and Brown (1968) provided the first impetus as they noticed in their research the direct relationship between the unexpected changes in the profits and the stock residual return.

1- Theoretical Background

Disclosure, in its broadest sense, means presentation of information. Accountants use this term in a more limited way, meaning disclosure of financial information about a firm provided in the financial reports (usually in the form of annual

reports). In some cases, the term is used more narrowly, denoting providing information that is not incorporated in financial statements. The terms "quality" of disclosure of accounting information and "transparency" of a disclosure system are commonly and interchangeably used and it is difficult to reach a consensus on a precise definition of "transparency" and "quality". So far, various constructs such as adequacy, comprehensiveness, informativeness, and timeliness have been used as representatives of disclosure quality. Sinqavi and Dessay believe that quality refers to attributes of completeness, accuracy, and reliability. Balbal et al. and Kowsari interpret transparency as a combination of timeliness and conservatism. Timeliness refers to the extent the current economic events are incorporated in the current financial statements and conservatism implies the higher immediacy of reflection of adverse economic news over the promising news in financial reports. Bareth and Shipper claim that the transparency of financial reporting is the extent to which the financial reports reveal the underlying economics of an economic unit (business) in a manner comprehensible by the users of those reports. From accounting perspective, the underlying economics of a economic business unit include its resources (assets), claims on those resources (liabilities and equities), changes in the resources, claims and (on) cash flows (which are reflected respectively in the financial statement, income statement, and cash flow statement), risks, and the way the risks are handled. Panal and Shipper also assess financial statements as quality statements if they meet the three criteria of transparency, full disclosure, and comparability. Transparent financial statements are those that illustrate the basic events, transactions, judgments, and estimates of the financial statements and their applications. Transparency allows the users to observe and understand the results and applications of the decisions, judgments, and estimates of the financial statements preparers. Full disclosure implies the provision of all the information required for decision-making and, accordingly, ensures that the investors are not misled. Finally, comparability means that similar transactions and events are accounted for and reported identically. Experimental research does not set a clear distinction between the quantity and quality of disclosure. It is generally assumed that the quantity of the disclosed information serves as an indicator in determining its quality. As a result, disclosure quantity measures are used to evaluate the quantity of disclosure. Nonetheless, the assumption remains uncertain and disputes on obtaining a more effective scale for measuring the quality of disclosure persist. In this respect, Jang makes a distinction between the quality and quantity of disclosure and holds that the quality refers to the exactness and accuracy of the disclosure and is calculated through the increase in consensus of the investors and the accuracy of their expectations concerning the disclosure. He uses the anticipation of analysis as a representation of the investors' expectation. Betty et al (2004) also suggest that the quality of disclosure depends not only on the quantity of disclosure, but also on how it extends to other issues. (With this respect, primary (major) and secondary (minor) topics (threads) of Jenkins Report are used). They claim that a high quality disclosure of information is widespread and balanced among the primary and secondary threads of the framework in question. Together with these two aspects, three other attributes are also used for assessing the disclosure of information: time aspect (concerning past versus future information), financial aspect (financial versus non-financial information), and the type of the measurement aspect (qualitative versus quantitative information). Nevertheless, the majority of researchers assume that the quality and quantity of disclosure are directly correlated. Taking into account the importance of disclosure quality and the responsibility of firms' managers concerning information (informing), TSE decided to provide the market with the score and rank of all the firms listed on TSE based on their "quality of disclosure and providing proper information", so that the firms have knowledge of their stance and strive to improve their position. During the recent years, the firms have constantly been ranked based on information and quality of disclosure and the list of the top 20 firms has been provided to the market. "It is noteworthy that the information score of the publishers is calculated based on the time when the information about the anticipation of the earnings per share is provided, 6- and 9-month financial statement, the unaudited declaration of three auditors on the anticipation of each primary share and the 6-month statement, the auditor's declaration on the mid-term 6-month financial statements, the unaudited financial statements at the end of the year and the discrepancies between the anticipated and actual audited performance. In addition, negative scores were given if the audited financial statements at the end of the year were not provided in a timely manner and paying the shareholders earnings was delayed." The "disclosure quality and proper informativeness scores" of all the firms listed on TSE are available for 2003 and after at TSE's website.

First, the researchers tried to examine the contradictory anticipations concerning the efficient market theory and the dominant literature in accounting (for example, whether or not the change

in accounting method could systematically mislead the stock exchange was examined). Eventually, the researchers strived to conduct a test (different from what was then common). Nonetheless, in the pioneering article by Ball and Brown (1968), which made the positive accounting research known, they did not take on to perform such test. Based on the evidence available in the financial sciences, they based their hypothesis on the notion that the efficient market theory is descriptive or explanatory. Taking into account the efficient market theory, they then tried to conduct a research to see if the net earnings could, from an experimental perspective, be related to the price of the stock, and in case of such relation, whether or not the net earnings could potentially provide valuable information. By observing a direct relation between the net earnings and the stock prices, Ball and Brown decided to conduct a research to find out if the net earnings merely reflect the elements within the stock prices or if the declaration of the net earnings could provide the stock exchange with some information (i.e. if the declarations on the net earnings carry information or not.)

The article by Ball and Brown prompted an extensive (experimental) literature on observing the relationship between the net earnings and the stock prices and if the net earnings include information content or not; the literature is still growing. From this perspective, it is a positive action in that the researchers try to find out the reason why the net earnings and the stock prices are directly related and why the net earnings could convey some information to the stock exchange.

2- Problem Statement

Market participants always seek to obtain quality financial information, since such information reduces the information asymmetry between the firms' managers and its external investors.

The main objective of disclosure is to inform the analysts and investors of the amount and schedule of the future cash flows. Such disclosure will help the analysts and investors in anticipating the future earnings. Therefore, transparency and disclosure provide the shareholders with valuable awareness. Based on the conducted research, a proper disclosure could improve the accuracy of estimates concerning the earnings of the future years. That is, compared to firms with lower levels of disclosure, firms enjoying higher levels of disclosure experience a more strong relation between the current stock returns and the future earnings (Jasper and Planburg, 2008).

The scores of disclosure quality are calculated based on the information provision of firms with respect to reliability and timeliness of the information. The timeliness criterion is measured based on the time the information (anticipation of earnings per share, unaudited mid-term financial statements, portfolio statement, auditor's declaration on anticipation of earnings per primary share and 6-month earnings as well as mid-term 6-month financial statements, audited and unaudited financial statements at the end of the fiscal period and the earnings distribution schedule) is submitted by the firm in specified times in the information disclosure instruction while taking into account the delay in submission of the information. The amount of fluctuations and changes in the submitted anticipations as well as the discrepancies between the anticipated and actual audited performance have taken as the criterion of reliability.

3-Conducted Studies

3-1-Studies on the Quality of Disclosure

Mohammad Hossein Setayesh, Mostafa Kazemnejad, and Mehdi Zolfaghari (2011)

These researchers investigated the influence of disclosure quality on the liquidity and the cost of capital of the current and future common stock of the firms listed on TSE. With this respect, the effect of the firms' size was controlled. The findings resulted from studying 105 firms during 2004-2008 indicate that there is a positive and significant relationship between the size of firms and their current and future liquidity. However, no significant relation exists between disclosure quality and the current and future liquidity of the firms. Moreover, there is a negative and significant connection between disclosure quality and the cost of capital of the firms' current and future common stocks.

Dastgir and Bazzaz-zadeh

Dastgir and Bazzaz-zadeh (2003) studied the effect of (mandatory) increase in disclosure on the cost of the common stocks of the firms listed on TSE. The amount of disclosure of the studied firms was calculated through comparing the annual financial statements for the year ending in 2000 with the items specified in the accounting instructions if force from March 21, 1999 ("Trade Law and Direct Taxes Law"). The results of studying 40 manufacturing firms indicate that an increase in the amount of disclosure will decrease the cost of the common stocks. In other words, investors prefer investing in firms with higher levels of disclosure (lower risk).

Diamond and Verchia

These two researchers studied the link between the disclosure of liquidity and the cost of capital of American firms. Their findings show that the disclosure of general information to reduce information asymmetry could decline firms' cost of capital through attracting the growing demand of major investors for increase in liquidity of stocks.

Botosan

Botosan investigated the relationship between the amount of disclosure and the cost of capital of American firms. The results show that in firms where the analysts show low levels of follow-ups, an increase in disclosure will result in decrease in the cost of capital, whereas in firms where the analysts represent high levels of follow-ups, no evidence of a relationship between the amount of disclosure and the cost of capital will be found.

Sengupten

Sengupten analyzed the effect of disclosure quality on the cost of debts of American firms. The findings show that the firms with high quality disclosure experience lower cost of debt. Additionally, in situations where market uncertainty about the firm is high, the relative importance of disclosure is higher.

3-2-Studies on Information Content

Dr. Hamid Khaleghi Moghaddam and Mohammad Azad

In a study conducted on the information content of the earnings prediction of firms, Dr. Hamid Khaleghi Moghaddam and Mohammad Azad used Pearson's correlation method. They proposed two hypotheses in their research:

1. There is no significant relationship between the firms' predicted earnings and the return on equity.
2. There is no significant relationship between the firms' predicted earnings and the actual earnings.

1. The results of testing the cumulative average abnormal return rate show that there is a significant connection between the predicted earnings and the return on equity.
2. The results of repeated measures analysis of the weekly average of abnormal return rate illustrate that there is a significant link among the abnormal return averages.

Based on the above results, it can be said that the first hypothesis of the research, claiming the absent of a significant relationship between the declaration of the predicted earnings and the stock returns, is rejected.

3. The results of Pearson's correlation test confirms the present of a strong and solid relation between the predicted and actual earnings. A positive correlation with a value approaching 1 is indicative of presence of a direct and incomplete relation.

Generally, the earnings predicted by firms carry information content and efficiency, thus highlighting the importance of predicting the accounting profit due to its role in and effect on decision-making by the users, particularly the investors.

Hamid Haghighat and Ehsan Rayegan

Hamid Haghighat and Ehsan Rayegan studied the role of earnings smoothing on the information content with respect to the prediction of future profits. In their research, they investigated managerial motives in smoothing the profits in the population of firms listed on TSE. In this study, profit smoothing was calculated using the negative correlation between the changes in optional accrual items and the changes in optional predetermined profits of 70 chosen firms during 1997-2001. Then, using the model proposed by Collins et al and extended by Tucker and Zarvoin, the link between the profits and current and future returns was analyzed through incorporating the profit smoothing index in the model for the years 2003-2010. The results of this research show that the current stock prices of the firms that use smoothing more than others include less information on the profits and future cash flows. Therefore, smoothing is conducted mainly to distort the information rather than to convey the confidential managerial information. In their research, they investigated the relationship between the corporate governance's features (ownership concentration, institutional ownership, managing director's influence, duality of managerial duties, the size of the board, the independence of the board, dependency on debts, and the duration in which the managing director is in charge of the board) and the information content of profits when there is a profit management task in the firms listed on TSE during 2001-2007. In order to test the hypotheses, multivariate regression model and combinatorial generalized least square were used. The research findings show that the relationship between the institutional ownership of the board and the information content of the profits in the firms with higher levels of profit management motives is stronger than that in the firms with lower profit management stimulus. Moreover, according to shareholders, other corporate governance's features (ownership concentration, managing director's influence, duality of managerial duties, the size of the board, dependency on debts, and the duration in which the managing director is in charge of the board) have no effect on the improvement of profit's information content, either at the presence of high levels of profit management motives or when there is low levels of profit management drives. Therefore, in order to support the minority shareholders, increase profit reliability, and to help to the development and growth of the stock exchange, it is necessary for the Supreme Council of Stock Exchange and Securities to take into account the ratification of the steering instruction of the firms listed on the stock exchange while considering the results of the research conducted on the corporate governance.

Bernard

Bernard is one of the first individuals who measured the information content of accounting data.

The researcher compared the explanatory power of two models: the first model examined the link between the book value of the stocks and stock earnings and the second model tested the relation between the stock dividends and stock prices. The results of Bernard's study showed that of three accounting variables, namely stock earnings, stock dividends, and book value, stock dividends enjoyed the most level of information content.

Bergestaller and Dichow

After Bergestaller and Dichow (1997) presented their assessment model, they found that the information content of stock dividends (as opposed to the stock's book value), varies with return on investment, and the book value of the stock is more significant in explaining the stock prices when compared to stock dividends. Bergestaller and Dichow found that, in comparison with earnings, the book value is more significant in explaining the stock market value.

Lendseman and Hend

By investigating the information content of dividends, Lendseman and Hend examined the different estimates provided by Olsen. They found that stock dividends incorporate information content.

Lou and Zarowin

Based on the findings of Lou and Zarowin (about the information content of accounting data), if the analysis is extended to 1996, the book value will decrease in line with the stock market value. They introduced the reason for this to be the change in business environment. Such change has resulted in formation of creative activities mainly in the form of intangible assets.

Michell et al

Michell et al studied the relation between the changes in the dividends and the quality of profits. For this purpose, they examined the market's reaction to the quality of the past published information through analyzing the stock prices and revising the analysts' prediction around the changes in dividends. Finally, the research hypotheses were verified after experimental testing. That is, the market reacts less intensely to the announcement of changes in the cash profit of firms with high quality profits. Moreover, the volume of the revised predictions of financial analysts was very little for the firms with high quality profits.

3-3-Studies on the Book Value

Omid Poorheidari, Gholamreza Amirpoor, Mohsen Safajoo

They studied the connection between profits and the book value of stocks, and the stock market value of firms listed on TSE.

They proposed four hypotheses in their research:

1. There is a significant relationship between earnings per share and the price of each share.
2. There is a significant relationship between the book value of each share and the price of each share.
3. There is a relationship between variation in coefficient of determination of earnings per share and variation in the size of the firms.
4. There is a relationship between variation in coefficient of determination of the book value of each share and variation in the size of the firms.

They used 64 firms as their research sample and studied them for the period of 1996-2004. In order to test the hypotheses, univariate regression analysis was used. According to the findings, the first hypothesis was verified. Based on this hypothesis, it can be said that the earnings per share is an important factor in determining the value of the firms in Iran. In other words, profit carries information content and plays a basic role in determining the value of firms.

The second hypothesis was also accepted. It can be concluded that the book value of each share is important in determining the value of firms and that in deciding the value of firms, the book value of each share is of less importance compared to earnings per share.

The third hypothesis is verified. That is, it can be said that there is a significant relationship between the size of the firm and the increase in the explanatory power of earnings per share concerning the price of each share during the considered period.

The fourth hypothesis is rejected, i.e. there is no relationship between the size of the firm and the coefficient of determination of each share. The results of the fourth hypothesis are not in line with the results of Western studies.

Dr. Mohammad Arab Mazar Yazdi and Mahmood Mostafazadeh

Dr. Mohammad Arab Mazar Yazdi and Mahmood Mostafazadeh studied the effect of profit management on the relevance of profit and book value in determining the value of the firm and compared the short-term and long-term optional accrual items. They proposed two hypotheses in their research:

1. Profit management decreases profit relevance and increases book value relevance.
2. Profit management, using long-term optional accrual items, has more influence on the profit and book value relevance compared to when the short-term optional accrual items are used.

In their research, they studied the firms listed on TSE during 2001-2006. The period for estimating Jones model coefficient was 2000-2006. In order to test the hypotheses, the classic regression model and

test of normality, homogeneity of variance, and test of independence were employed. To perform the test rejected and the alternative hypotheses were accepted. The results of the research indicate that profit management using long-term optional accrual items has more influence on the profit and book value relevance compared to when the short-term optional accrual items are used.

Saberamanian and Nekatachalam (1998)

Saberamanian and Nekatachalam (1998) indicate that the book value could play an indirect role in evaluating the stocks even within the framework of capitalization. Their study included a large sample covering 30 years from 1967 to 1996. They concluded that current and past profits contain identical information content (explanatory power) and that the combinatorial model of current and past profits outperforms the combinatorial model of current profits and book value in terms of explanatory power.

Collin, Maydo, and Weiss

Collin, Maydo, and Weiss (1997) investigated the connection between the profit and book value of stocks and the stock market value of firms during the last 40 years. Their results show that, generally, the stock market value of firms is reversely connected with profit and book value.

In the mentioned research, the information content of profits and book value over time was evaluated using the framework provided by Olsen. Olsen's model considers the price as a function of profit and book value. Their findings showed that (despite the claims of the professional society) information content resulted from the combinatorial model of profit and book value during the past years has not only decreased, but also has shown a small increase. Moreover, although the information content of profit has reduced, the information content of book value has increased. The results of the research by Collin et al indicate that such changes are due to the abundance in iterations, emergence of unexpected items, losses and changes in the size of medium-sized firms, and attraction of intangible resources.

Lou (1997) and Amir and Lou (1996)

Lou (1997) and Amir and Lou (1996) indicate that financial accounting information for evaluating the firms intensively invested in intangible assets (such as R&D, brand development, or IT) suffers some shortcomings.

A similar result is present in the research by Amir and Lou (1996). In their study, they concluded that the profit, book value, and cash flows were irrelevant in evaluating the firms that invested in communication industry.

4-Research Hypotheses

of normality, Kolmogorov-Smirnov test was used. Based on the findings, both hypotheses were Based on the explanations about the subject of the study, the hypotheses of this research include:

1. There is a significant relationship between the book value and stock returns.
2. There is a significant relationship between profit and stock returns.
3. The incremental content information of profit is more than the incremental information content of book value.
4. The relative content information of profit is more than the relative information content of book value.
5. The quality of disclosure increases the information content of profit.
6. The quality of disclosure increases the information content of book value.

5-Statistical Population

Statistical population includes all the items and individuals within a specific geographical scale (regional or global) who possess one or more identical attributes (Hafeznia, 2008, p. 199).

In this section, we study all the firms listed on TSE. The reason for such selection is the investors and financial analysts' attention to the stock market, availability of information and its transparency, as well as the higher reliability of information and its timeliness for the specific requirements of the stock market.

Given the scope of the research, our study includes the firms listed on TSE before March 21, 2002. During the mentioned period, a number of 457 firms were listed on TSE. For the purpose of homogeneity among the firms that were active during 2002 to 2009, the number of firms was modified based on the following specifications:

1. Investment companies and financial brokers, banks and insurance companies (13 companies)
2. Firms whose fiscal year did not end on March 20 (103 companies)
3. Elimination of noisy observations (below 1 per cent and above 99 per cent) and the firms whose data were unavailable (85 companies)

This said, the number of the study population amounts to 256 firms.

6-Hypothesis Testing Method

Once the data were gathered, the following model was used to test the first, second and third hypotheses:

$$R_{it} = a + \beta_1 E_{it} + \beta_2 BV_{it} + \varepsilon_{it} \qquad (3\text{-}1)$$

If β_1 is positive and significant, the first hypothesis is accepted.

If β_2 is positive and significant, the first hypothesis is accepted.

If $\beta_2 > \beta_1$, the third hypothesis is accepted.

R_{it} : stock return

E_{it} : dividend

BV_{it} : the book value of the stock

In order to test the fourth hypothesis, the following model along with Vaung's test (1989) were used:

$$R_{it} = a + \beta_1 E_{it} + \varepsilon_{it} \rightarrow adjR_E^2 \qquad (3\text{-}2)$$

$$R_{it} = a + \beta_2 BV_{it} + \varepsilon_{it} \rightarrow adjK_{BV}^2 \qquad (3\text{-}3)$$

If Vaung's statistic is significant, the fourth hypothesis is verified.

$$adj : R_E^2 > adj : K_{BV}^2$$

In order to test the fifth and sixth hypotheses of the research, the following models were used:

$$R_{it} = a + \beta_1 DQ_{it} + \beta_2 E_{it} + \beta_3 BV_{it} + \beta_4 DQ_{it} E_{it} + \beta_5 DQ_{it} BV_{it} + \varepsilon_{it} \qquad (3\text{-}4)$$

If β_4 is positive and significant, the fifth hypothesis is verified.

If β_5 is positive and significant, the sixth hypothesis is verified.

DQ_{it} : disclosure quality rank

Wald Test

Wald test was performed using Fisher's statistic. In the F-test, two regressions are required, known as restricted and unrestricted regressions. The unrestricted regression is a regression in which the coefficients are freely determined by the data, whereas in a restricted regression, the coefficients are bound by some specific limits.

In order to test the coefficients limits, the model is firstly estimated based on the restriction that all the slope coefficients are equal to zero and R_R^2 and *RRSS* are derived. Then, the model is estimated without the restriction. This time, R_{UR}^2 and *URSS* are derived. Afterwards, the sum of the squares of the residuals (or coefficients of determination) resulted from the two regressions are calculated and the test's statistic is generated. The F-test statistic for examining the hypotheses on the estimation coefficients are as follows:

$$F = \frac{RRSS - URSS}{URSS} \cdot \frac{T-K}{m} \quad F = \frac{(R^2{}_{UR} - R^2{}_R}{(1 - R_{2\,UR})/(T-K)} \qquad (5\text{-}1)$$

where *URSS* is the sum of the squares of the residuals resulted from the unrestricted regression, *RRSS* is the sum of the squares of the residuals obtained from the restricted regression, R_{UR}^2 is the coefficient of determination of the restricted regression, *m* is the number of restrictions, *T* is the number of observations, and *K* is the number of the parameters of the unrestricted coefficient.

Vaung's Non-nested Test

When we want to compare the efficiency of two non-nested models (models that are not sub-models of each other), such as the following models, Vaung's Z test is used:

$$zit = B0 + B_1 X_{it} + \varepsilon_{2it} \qquad (1\text{-}6)$$

$$Z_{it} = a0 + a_1 y_{it} + \varepsilon_{1it} \qquad (1\text{-}7)$$

In order to compare the explanatory power of two models, likelihood ratio test is used. The statistic concerning the likelihood ratio is adjusted as follows:

$$LR = Log\left(\frac{L(mv_y)}{L(MV_X)}\right) = Log(L(MV_Y)) - Log(L(MV_X))$$

$$= \frac{n}{2}(Log(\hat{\sigma}x^2) - Log(\hat{\sigma}Y^2)) + \sum_i^n = 1\left(\frac{1}{2}\frac{(eXi)^2}{\hat{\sigma}x^2} - \frac{1}{2}\frac{(eY_i)^2}{\hat{\sigma}^{Y2}}\right.$$

The variance of the LR statistic, ω^2, is calculated as follows:

$$\hat{\omega}2 = \frac{1}{n}\sum_i^n = 1\left(\frac{1}{2}Log(\hat{\sigma}_x^2) - \frac{1}{2}Log(\hat{\sigma}_y^2) + \frac{1}{2}\frac{(exi^2}{\hat{\sigma}x^2} - \frac{1}{2}\frac{(eYi)^2}{\hat{\sigma}Y^2}\right) - \left(\frac{1}{n}LR\right)^2 \qquad (1\text{-}9)$$

Where e_Y is equal to RSS_Y/n and e_X is equal to RSS_X/n. Voung's statistic is calculated as follows:

$$z = \frac{1}{\sqrt{n}}\frac{LR}{\hat{\omega}} \qquad (1\text{-}10)$$

However, the simpler method is to calculate LR_i as follows:

$$LR_i = \frac{1}{2}Log\left(\frac{Rssx}{RssY}\right) + \frac{n}{2}\left(\frac{(exi)^2}{Rssx} - \frac{(eYi)^2}{RssY}\right) \qquad (1\text{-}11)$$

Now, by fitting LR_i over a column of ones, the regression coefficients will be $\frac{1}{2}Log\left(\frac{RSS_x}{RSS_Y}\right)$, which shows the difference between the coefficients of determination of models (2) and (3). The standard deviation obtained from the regression will also provide some information about the significance of the difference among the models' coefficients of determination. By multiplying the T-statistic obtained from the regression by $((n-1)/n)^{1/2}$, Vaung's Z statistic is obtained (Aflatooni and Nikbakht, 2006).

7-Research Variables

7-1-Information Disclosure

Definition: Provision of information through methods or channels of identification or records of events in financial statements which are different from the identification of the financial reports. This is indeed the aspect of information disclosure which is highly considered.

7-2-Disclosure Index

Disclosure index is equal to the firm's disclosure score calculated by the Stock Exchange and Securities Organization. In this research, the annual scores of firms' disclosure quality, calculated for the firms listed on TSE during 2003-2009, are used as disclosure index. The disclosure quality scores of the firms listed on TSE are calculated for the 3-, 6-, 9-, and 12-month periods and published by the Stock Exchange and Securities Organization for the year 2003 onwards. These scores reflect the evaluation of the Stock market (organization) on the informativeness of corporate disclosure. The mentioned score is calculated based on the weighted average of timeliness and reliability of the disclosed information. The assessed information is in accordance with the information disclosure regulations of the Stock Market, including annual financial statements, mid-term 3-, 6-, and 9-month financial statements, and predictions of stock earnings over 3-, 6-, 9-, and 12-month periods. Delays in submitting the information to the Stock Market based on the determined deadlines and discrepancies between the realized profits and the predicted profits are used for measuring the timeliness and reliability of disclosure.

7-3- Information Content

Information would be of value to the investors when they witness a reaction of prices to the new information. When such an event occurs, it is idiomatically said that the declared information includes information content.

7-3- Profit

When discussing to provide a definition for the concept of accounting profit, the majority of accounts refer to two economic (real world) meanings of profit. These two economic meanings are: changes in the welfare and maximization of profit under the specific structural conditions of the market, demand for the products, and the cost of input items.

When commenting on profit, the Financial Accounting Standards Council implicitly refers to these two concepts: general profit is the change in the equity of a business unit during a specific period. According to Irving, profit is enjoying from such services during a specific period.

From an accounting perspective, profit is the positive difference between earnings and expenses of the business unit.

7-4- The Book Value of Each Share

The book value of each share includes the value of each share of the firm's shares as in the firm's books and based on its historical cost.

The book value of each share is calculated as follows:

BVPSIT= Total Equities/No. of Common Stocks

8- Research Findings

8-1- Descriptive Statistics of the Research

The descriptive statistics of the research which include the mean, median, minimum, maximum, and standard deviation of the data are calculated and presented in figure (4-1). The mentioned values provide only an outline of the data distribution.

The results show that the mean (median) of the stock returns, book value, net profit, and disclosure quality are 0.26 (0.07), 0.67 (0.51), 0.17 (0.16), and 3.70 (3.83), respectively. Moreover, the maximum (minimum) values are 4.78 (-0.80) for stock returns, 11.55 (-3.83) for book value, 2.09 (-1.29) for net profit, and 4.60 (0.00) for disclosure information. The standard deviation values for stock returns, book value, net profit, and disclosure quality are 0.72, 0.77, 0.24, and 0.65, respectively.

Figure (4-1): Descriptive Statistics

Variable	Mean	Median	Maximum	Minimum	Standard Deviation
RET	0.26	0.07	4.78	-0.80	0.72
BV	0.67	0.51	11.55	-3.83	0.77
E	0.17	0.16	2.09	-1.29	0.24
DQ	3.70	3.83	4.6	0.00	0.65

RET: returns obtained through the policy of purchase and maintaining the shares

BV: the book value of the stocks which is adjusted against the stock market value at the beginning of the period

E: net profit which is adjusted against the stock market value at the beginning of the period

DQ: disclosure quality score which is equal to the logarithm of the disclosure scores published by TSE, which is about the firms listed on TSE

9-2- Correlation Coefficient Test

In order to examine the presence and direction of correlation between the research variables, Pearson and Spearman correlation tests are used and the results are shown in figure (4-2).

Figure (4-2): Pearson's Correlation Coefficients (down the main diagonal) and Spearman's Correlation Coefficients (above the main diagonal)

Variable	***RET***	***BV***	***E***	***DQ***
RET	1	0.19** (0.00)	0.35** (0.00)	0.06* (0.04)
BV	0.33**	1	0.44**	0.04

	(0.00)		(0.00)	(0.21)
E	0.55** (0.00)	0.54** (0.00)	1	0.14** (0.00)
DQ	0.12** (0.00)	0.00 (0.87)	0.17** (0.00)	1

* & ** are significance at 5% and 1% confidence intervals, respectively.

The results of Pearson's correlation test show that there is a significant relationship between the stock returns and book value (0.33), net profit (0.55), and disclosure quality (0.12) at 1% confidence interval. The correlation between the book value and net profit (0.54) is also significant at 1% confidence interval. There is also a significant relationship between information disclosure quality of the sample firms and the net profit (0.17) at 1% interval.

The results of Spearman's correlation test show that there is a significant relationship between the stock returns and book value (0.33), net profit (0.55), and disclosure quality (0.12) at 1% confidence interval. The correlation between the book value and net profit (0.54) is also significant at 1% confidence interval. There is also a significant relationship between information disclosure quality of the sample firms and the net profit (0.17) at 1% interval.

The results of Spearman's correlation test show that there is a significant relationship between the stock returns and book value (0.19) and net profit (0.35) at 1% confidence interval, and between the stock returns and disclosure quality (0.06) at 5% confidence interval. The correlation between the book value and net profit (0.44) is also significant at 1% confidence interval. There is also a significant relationship between information disclosure quality of the sample firms and the net profit (0.14) at 1% interval.

9-3- Hypotheses Testing

In order to examine the first, second, and third hypotheses of the research, the estimation results of model (3-1) as well as Wald test were used, and in order to test the fourth hypothesis, the estimation results of the model (3-2) and (3-3) and Voung test were used. Finally, to test the fifth and sixth hypotheses, model (3-4) was estimated.

The Results of Estimating Model (3-1) and the Testing of Hypotheses 1-3

In order to test the first hypothesis of the research, model (3-1) is estimated with a combinatorial data approach. The significance of Limer statistic (19.35) at 1% confidence interval and the insignificance of Hausman statistic (0.21) show that the random effects method is used to estimate model (3-1).

The results of estimating model (3-1) using the mentioned method show that the intercept (0.10) and the book value (0.02) do not have a significant relationship with the stock returns. This indicates that the book value variable carries little information content. Nonetheless, the results show that there is a significant connection between the net profit (1.01) and stock returns at 1% confidence interval. This is indicative of the high levels of information content for profit variable and acceptance of the second hypothesis. The results of Wald test (102.82) also show that the net profit coefficient is significantly higher than the book value coefficient. This means that the incremental information content of the net profit is significantly higher than the incremental information content of the book value. Therefore, the third hypothesis is also accepted.

Figure (4-3): The Results of Estimation of Model (3-1)

$$RET_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \varepsilon_{it}$$

Variable/ Estimation Method	Coefficient	Student's t Statistic	Significance
Intercept	0.10	1.15	0.25
BV	0. 02	0.71	0.48
E	1.01**	12.23	0.00
Adjusted Coefficient of Determination	11.73%		
Fisher statistic (Significance)	99.5** (0.00)		
Limer statistic (Significance)	19.35** (0.00)		
Hausman statistic (Significance)	(0.90) 0.21		
Durbin-Watson statistic	1.84		
Wald Statistic (Significance)	102.82 (0.00)		

** 1% confidence interval

The significance of Fisher statistic (99.50) indicates the overall significance of the model. The value of Durbin-Watson statistic (1.48) also shows that the disturbing elements of model (3-1) are not serially auto-correlated. As a result, the presented statistics are not false and can be reliable.

Moreover, the adjusted coefficient of determination shows that the net profit and book value variables explain about the 12% of the changes in the stock returns variable. This shows that there is information other than that latent in the net profit and book value that affect the stock returns. Such factors may include economic shocks, industry news, etc.

9-4-2- The Results of Estimating Models (3-2) and (3-3) and the Testing of Hypothesis 4

In order to test the fourth hypothesis, models (3-2) and (3-3) are estimated based on combinatorial data approach. The significance of Limer statistic (18.45) at 1% confidence interval and the insignificance of Hausman statistic (0.00) show that the random effects method is used to estimate model (3-2). In addition, the significance of Limer statistic (19.56) at 1% confidence interval and the insignificance of Hausman statistic (0.06) show that the random effects method is also used to estimate model (3-3).

Figure (4-4): The Results of Estimation of Models (3-2) and (3-3)

Model	**Model (3-2)**			**Model (3-3)**		
Variable/ Estimation Method	**Coefficient**	**Student's t Statistic**	**Significance**	**Coefficient**	**Student's t Statistic**	**Significance**
***y*-intercept**	0.20*	2.38	0.02	0.11	1.36	0.17
BV	0.13**	5.37	0.00			
E				1.05**	13.92	0.00
Adjusted Coefficient of Determination	2.20%			12.04%		
Fisher statistic (Significance)	34.85**(0.00)			204.82**(0.00)		
Limer statistic (Significance)	18.45**(0.00)			19.56**(0.00)		
Hausman statistic (Significance)	(0.97) 0.00			(0.81) 0.06		
Durbin Watson statistic	1.86			1.84		
Waung statistics (Significance)			(0.00)-3.14**			

* & ** are significance at 5% and 1% confidence intervals, respectively.

The results of estimating model (3-2) using the mentioned method show that the intercept (0.20) at 5% confidence interval and the book value (0.13) at 1% confidence interval are significant. The significance of Fisher statistic (34.85) is indicative of the overall significance of the model and the adjusted coefficient of determination shows that the book value explains merely 2% of the changes in the stock returns. This is because the book value is calculated based on the historical information, but the stock returns are determined based on the current information. The value of Durbin-Watson statistic (1.86) also shows that the disturbing elements of model (3-2) are not serially auto-correlated. As a result, the presented statistics are not false and can be reliable.

The results of estimating model (3-3) show that the intercept (0.11) is not significant but the coefficient of net profit (1.05) is significant at 1% confidence interval. The significance of Fisher statistic (204.82) indicates the overall significance of the model; and the adjusted coefficient of determination shows that the book value explains about 12% of the changes in the stock returns. The value of Durbin-Watson statistic (1.84) also shows that the disturbing elements of model (3-3) are not serially auto-correlated. As a result, the presented statistics are not false and can be reliable.

The significance of Vaung statistic (-3.14) at 1% interval shows that the adjusted coefficient of determination of the net profit is significantly higher than the adjusted coefficient of determination of the book value. This means that the relative information content of the net profit is significantly higher than the relative information content of the book value. Therefore, the fourth hypothesis is also accepted.

9-4-3- The Results of Estimating Model (3-4) and the Testing of Hypotheses 5 and 6

In order to examine the effect of disclosure quality on the information content of the book value and net profit, model (3-4) is estimated based on combinatorial data approach.

The significance of Limer statistic (18.61) and the insignificance of Hausman statistic (0.28) show that the random effects method should be used to estimate model (3-4). The results of estimating model (3-4) using the mentioned method show that none of the coefficients of the model are significant. More importantly, DQ*BV (0.02) and DQ*E (0.14) are also insignificant. This indicates that the quality of information disclosure in the studies firms have had no significant effect on the information content of the book value and net profit of the firms. Therefore, the

fifth and sixth hypotheses of the research are rejected. This could be due to the improper disclosure of information by the firms.

Figure (4-5: The Results of Estimation of Model (3-4)

$$RET_{it} = \alpha_{it} + \beta_1 BV_{it} + \beta_2 E_{it} + \beta_3 DQ_{it} + \beta_4 DQ_{it} BV_{it} + \beta_5 DQ_{it} E_{it} + \varepsilon_{it}$$

Variable/ Estimation Method	Coefficient	Student's t Statistic	Significance
y-intercept	0.20	0.93	0.35
BV	-0.05	-0.37	0.71
E	0.54	1.21	0.23
DQ	-0.04	-0.98	0.33
*DQ*BV*	0.02	0.53	0.60
*DQ*E*	0.14	1.11	0.27
Adjusted Coefficient of Determination	12/73%		
Fisher statistic (Significance)	(0.00) 37.6**		
Limer statistic (Significance)	(0.00) 18.61**		
Hausman statistic (Significance)	(1.00) 0.28		
Durbin Watson statistic	1.8		

** 1% confidence interval

Nonetheless, the significance of Fisher statistic (37.60) at 1% confidence interval indicates the overall significance of the model and the value of Durbin-Watson statistic rejects the evidence of serially auto-correlated elements of disturbance of model (3-4). The adjusted coefficient of determination also shows that the independent variables explain about 13% of the changes in the stock returns. This indicates that despite taking into account the disclosure quality variable, the independent variables explain a small percentage of the changes in the dependent variable and there are other variables that could explain the majority of changes in the stock returns.

10- The general results are as follows:

1) The incremental and relative information content of book value is little.

2) Net profit includes significant incremental and relative information content and its information content is significantly higher than that of the book value.

3) The information disclosure quality of the studied firms does not have a significant effect on the information content of profits and book value.

11- Recommendations of the Research

Based on the results of this research, investors are suggested to consider the following in their analyses:

1) The incremental and relative information content of book value is little.

2) Net profit includes significant incremental and relative information content and its information content is significantly higher than that of the book value.

3) The information disclosure quality of the studied firms does not have a significant effect on the information content of profits and book value. This could be due to the improper disclosure of information by firms. Moreover, the adjusted coefficient of determination shows that the net profit and book value variables explain about the 12% of the changes in the stock returns variable. This shows that there is information other than that latent in the net profit and book value that affect the stock returns. Such factors may include economic shocks, industry news, etc.

12- Research Limitations

Difficulty of collecting the research data was the major difficulty of this study. Moreover, this research was conducted based on the data collected from various sources and software and data validity and accuracy is one of the limitations inherited in such data.

13- Recommendations for Future Studies

1- Taking into account the fact that in this research the information content of mandatory disclosure was studied, it is suggested that the future studies consider the information content of optional disclosure.

2- The present study is suggested to be conducted on other industries.

3- The relationship between disclosure of information and the capital cost of debts is recommended to be studied.

4- Other explanatory variables and other time spans may be considered.

5- A comparative study on the stock markets of other countries

6- Investigating the effect of information disclosure quality on the information content of the dividends and the book value of the firms listed on TSE is recommended.

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Voltage Control by using STATCOM

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Abstract: Static synchronous compensator (STATCOM) is one the parallel FACTS devices which is mainly used to control of voltage in power systems. STATCOM is usually installed in a bus which suffer voltage drop. The researches have shown that STATCOM can successfully control the system voltage by injecting a relevant signal to the proposed bus where the STATCOM is installed. In this paper the ability of STATCOM in voltage control is investigated at a multi machine power system. An optimization technique is used to tune the proposed STATCOM controllers. The results are compared with the system without STATCOM. Simulation results visibly show the ability of STATCOM in voltage support.

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Keywords: Static Synchronous Compensator, Voltage Support, Multi-machine Power System, Genetic Algorithm.

1. Introduction

It has long been recognized that the steady-state transmittable power can be increased and the voltage profile along the line also can be controlled by appropriate reactive shunt compensation. The purpose of this reactive compensation is to change the natural electrical characteristics of the transmission line to make it more compatible with the prevailing load demand. Thus, shunt connected, fixed or mechanically switched reactors are applied to minimize line overvoltage under light load conditions, and shunt connected, fixed or mechanically switched capacitors are applied to maintain voltage levels under heavy load condition [1].

The ultimate objective of applying reactive shunt compensation such as STATCOM in a transmission system is to increase the transmittable power. This may be required to improve the steady-state transmission characteristics as well as the stability of the system. Var compensation is thus used for voltage regulation at the midpoint (or some intermediate) to segment the transmission line and at the end of the (radial) line to prevent voltage instability, as well as for dynamic voltage control to increase transient stability and damp power oscillations.

The static synchronous compensator (STATCOM) is one of the most important FACTS devices and it is based on the principle that a voltage-source inverter generates a controllable AC voltage source behind a transformer-leakage reactance so that the voltage difference across the reactance produces active and reactive power exchange between the STATCOM and the transmission network. The STATCOM can be used for dynamic compensation of power systems to provide voltage support [2, 3]. Also it can be used for transient stability improvement by damping low frequency power system oscillations [4-7].

The objective of this paper is to investigate the ability of STATCOM for voltage support. Genetic algorithm (GA) method as a meta-heuristic optimization method is considered for tuning the parameters of STATCOM. A multi-machine power system installed with STATCOM is considered as case study. Simulation results show the validity of STATCOM in voltage support at bulk electric power systems.

2. Test system

A multi machine power system installed with STATCOM is considered as case study. The proposed test system is depicted in Figure 1. The system data can be found in [8]. In this paper, turbine-governor system is also modeled to eliminate steady state error of responses.

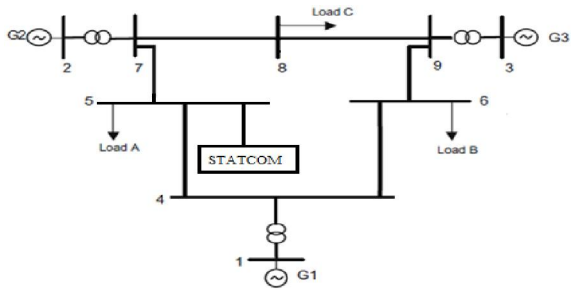

Figure 1. Multi-machine electric power system installed with STATCOM

2.1. Dynamic model of the system with STATCOM

The nonlinear dynamic model of the system installed with STATCOM is given as (1). The dynamic model of the system installed with STATCOM is completely presented in [1].

$$\begin{cases} \dot{\omega} = (P_m - P_e - D\omega)/M \\ \dot{\delta} = \omega_0(\omega - 1) \\ \dot{E}'_q = (-E_q + E_{fd})/T'_{do} \\ \dot{E}_{fd} = (-E_{fd} + K_a(V_{ref} - V_t))/T_a \\ \dot{V}_{dc} = (K_r(V_{ref} - V) - b_{STAT})/T_r \end{cases} \quad (1)$$

Where, δ: Rotor angle; ω: Rotor speed (pu); Pm: Mechanical input power; Pe: Electrical output power (pu); M: System inertia (Mj/MVA); E´q: Internal voltage behind x´d (pu); Efd: Equivalent excitation voltage (pu); T´do: Time constant of excitation circuit (s); Ka: Regulator gain; Ta: Regulator time constant (s); Vref: Reference voltage (pu); Vt: Terminal voltage (pu).

By controlling m_E, the output voltage of the shunt converter is controlled. By controlling δ_E, exchanging active power between the STATCOM and the power system is controlled.

2.2. STATCOM Controllers

In this paper two control strategies are considered for STATCOM:

DC-voltage regulator
Bus-voltage regulator

STATCOM has two internal controllers which are bus voltage controller and DC voltage regulator. A DC capacitor is installed behind the STATCOM; this capacitor is used to provide the reference voltage for PWM performance. In order to maintaining the voltage of this capacitor, a DC-voltage regulator is incorporated. DC-voltage is regulated by modulating the phase angle of the shunt converter voltage. This controller is commonly a PI type controller. A bus voltage controller is also incorporated based on STATCOM. The bus voltage controller regulates the voltage of bus where the STATCOM is installed.

The most important subject is to tuning the STATCOM controller parameters. The system stability and suitable performance is guaranteed by appropriate adjustment of these parameters. Many different methods have been reported for tuning STATCOM parameters so far. In this paper, an optimization method named is considered for tuning STATCOM parameters. In the next section an introduction about the proposed optimization method is presented.

3. Genetic Algorithms

Genetic Algorithms (GA) are global search techniques, based on the operations observed in natural selection and genetics. They operate on a population of current approximations-the individuals-initially drawn at random, from which improvement is sought. Individuals are encoded as strings (Chromosomes) constructed over some particular alphabet, e.g., the binary alphabet {0.1}, so that chromosomes values are uniquely mapped onto the decision variable domain. Once the decision variable domain representation of the current population is calculated, individual performance is assumed according to the objective function which characterizes the problem to be solved. It is also possible to use the variable parameters directly to represent the chromosomes in the GA solution. At the reproduction stage, a fitness value is derived from the raw individual performance measure given by the objective function and used to bias the selection process. Highly fit individuals will have increasing opportunities to pass on genetically important material to successive generations. In this way, the genetic algorithms search from many points in the search space at once and yet continually narrow the focus of the search to the areas of the observed best performance. The selected individuals are then modified through the application of genetic operators. In order to obtain the next generation Genetic operators manipulate the characters (genes) that constitute the chromosomes directly, following the assumption that certain genes code, on average, for fitter individuals than other genes. Genetic operators can be divided into three main categories: Reproduction, crossover and mutation [9].

4. STATCOM tuning based on GA

In this section the parameters of the STATCOM controllers are tuned by using GA. The optimum values of controllers which minimize different performance indices are accurately computed using GA. The performance index is considered as (2). In fact, the performance index is the Integral of the Time multiplied Absolute value of the Error (ITAE).

$$ITAE = \int_0^t t \sum_{i=1}^{3} |\Delta\omega_i| dt + \int_0^t t \sum_{i=1}^{9} |\Delta v_i| dt \quad (2)$$

Where, Δω shows the frequency deviations and Δv shows the voltage of buses. To compute the optimum parameter values, different faults are assumed in all buses and then the minimum solution

is chosen as final solution. The results are listed in Table 1.

Table 1. Optimal parameters of STATCOM

	gain	value
PI controller of voltage	Proportional gain	1.35
	Integrator gain	0.55
PI controller of DC link	Proportional gain	24.8
	Integrator gain	0.30

5. Simulation results

The proposed STATCOM is evaluated on the test system given in section 2. The disturbance is provided by a 10 cycles three phase short circuit in bus 7. This disturbance shows a large signal disturbance in power systems. The simulation results are presented in Figures 2-6. Where, solid line indicates the system installed with STATCOM and dashed line shows the system without STATCOM.

The STATCOM is installed in bus 5 and it is expected that voltage of bus 5 be controlled. In this regard, the voltage of bus 5 and bus 1 are depicted in Figures 2-3. It is clearly seen that the STATCOM can successfully control the voltage of bus 5. It is also seen that STATCOM has a positive effect on the voltage of rest buses. Where, the voltage profile in bus 1 is better than the system without STATCOM.

The STATCOM is installed to control of voltage, bus is has an effect on the system dynamic performance. Figures 4-6 show the speed of generators following disturbance. It is seen that the system with STATCOM is more stable than system without STATCOM. STATCOM affects the system damping and the oscillations are rapidly damped out with being of STATCOM.

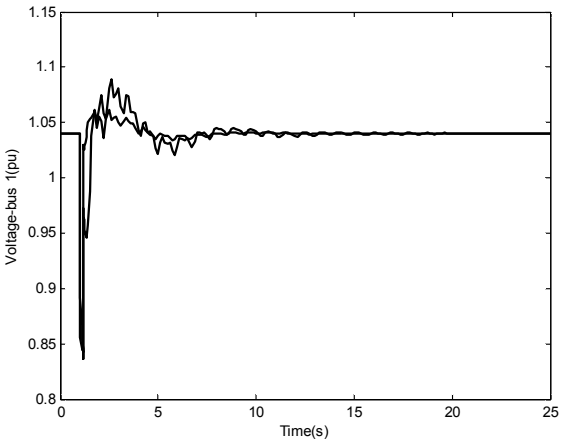

Figure 2. Voltage bus 1 following disturbance

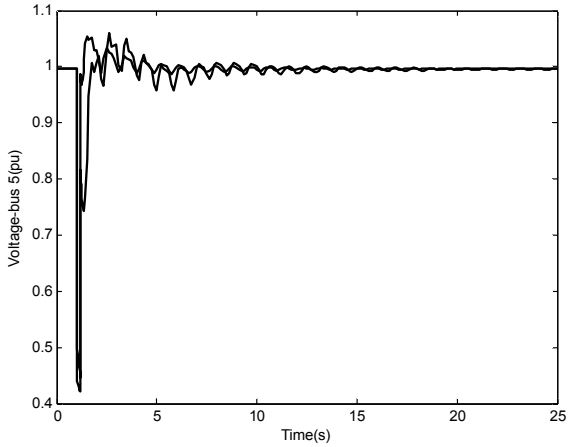

Figure 3. Voltage bus 5 following disturbance

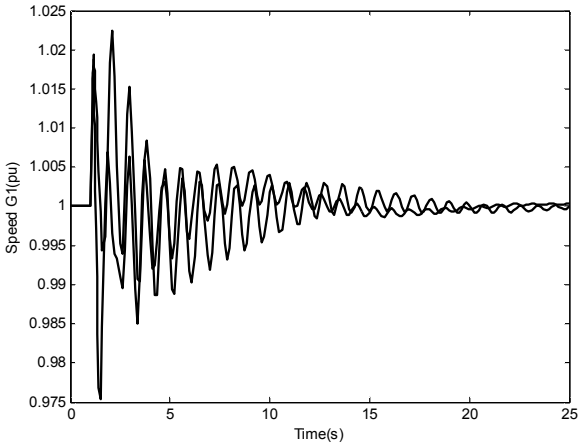

Figure 4. Speed G_1 following disturbance

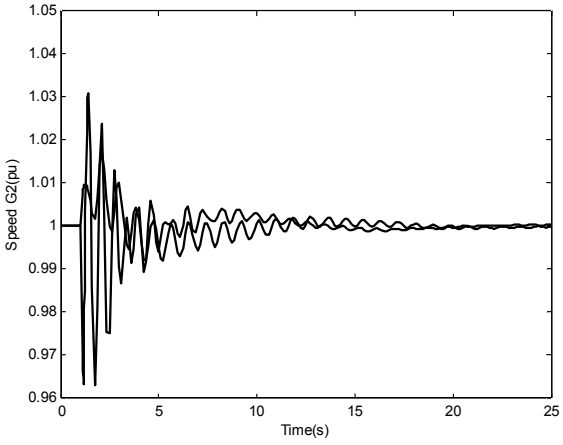

Figure 5. Speed G_2 following disturbance

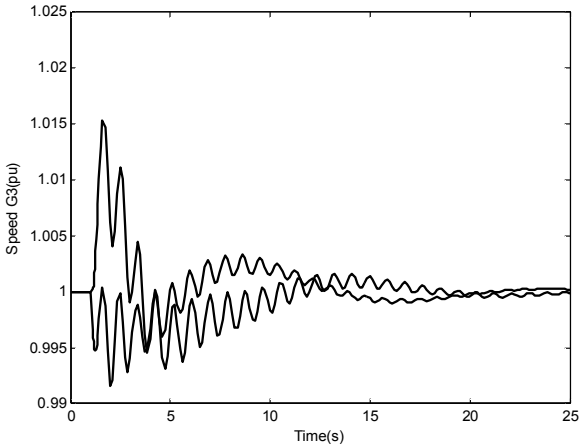

Figure 6. Speed G_3 following disturbance

6. Conclusions

The application of STATCOM in voltage support was investigated in this paper. A multi-machine electric power system installed with STATCOM was assumed to demonstrate the ability of STATCOM in voltage support. The parameters of the proposed STATCOM were tuned by using a Meta-heuristic optimization method. The proposed optimization procedure guaranteed the solution to reach a suitable and optimal response. Three phase short circuit was considered as disturbance, this is the worst case fault in power system which was assumed to evaluate the dynamic performance of system. Simulation results demonstrated that the designed STATCOM can guarantee the robust stability and robust performance under large signal disturbances.

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Employed nurse's awareness about nursing sighted tasks

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Abstract: Setting the nurse's sighted tasks and clarifying communicative lines and their purposes help effectively to establish appropriate working conditions. Approved nurse's sighted tasks are sensible and necessary for all nursing rankings and levels. Regarding this, a research for determining the nurses' awareness about nursing sighted tasks was conducted in internal and surgical wards in Tabriz selected hospitals. This survey was a descriptive study. 298 nurses were studied through a questionnaire that contained 40 questions in the form of self – reporting check list. 21 questions of 40 questions of the questionnaire were nursing sighted tasks; 19 ones were not. Reliability of the test was analyzed by SPSS14 statistical software during the study on 20 nurses. Inner correlation coefficient of questioner was 0.88. Most of the nurses were female (90.3%) and 69.5% married . 98.7% bachelor in nursing ,and 90.9% of the nurses had BSc in nursing, 60.7% were under the professional responsibility insurance, and worked as nurses, respectively . The averages of nurses' ages and working background in nursing profession were 5.9 ± 33.6 years and 73.13 ± 108.3 months, respectively. Most of the nurses had average awareness about nursing sighted tasks, and Just 7.4% and 11.4% had low and good awareness. 67.4% and 29.9% of the subjects had known the presence of nursing duties composition very necessary and necessary. Overall, 97.3% of them have known the presence of duties composition very necessary and essential, and so these ones tended to be aware of their duties composition. Just 24.2% of the nurses had stated that there exists nursing duties composition. These cases can indicate the low level in-service education periods and also low nurses academic educations in this field. There are often ambiguous points in nursing activities which are arisen from working interferences with the other medicine professions in hospitals. Nurses are expected to do some procedure which is not their sighted tasks or they have not been trained enough about. Nurses ' activities in the affairs out of their sighted tasks and have done by system pressure have frequently led to complain of the nurses, and so this issue faces the nurses with so many difficulties.
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Keywords: Nurses, sighted tasks, duties, composition, awareness.

1. Introduction

Nursing is a specialized profession, having multiple roles that each one of them have their own general and specialized duties (Iran Nursing System Organization, 2006) .The ultimate aim of nursing profession is to provide and promote the health of human beings and societies (Kazemian and Kazemian M, Farshidrad, 2006). Nurses are in front line of treating and care dealing with patients and their families and also play the primary and main role in keeping and promoting health, preventing the diseases, and also reliving the patient's pains (Kazemian and Kazemian M, Farshidrad, 2006). Accordingly, familiarity with the contents of laws, nursing instructions, and their changes can be considered as a good guide to nurses' activities towards doing the responsibilities professionally (Garrett et al., 1993). Nowadays, having an activity frame work and acting within its boundaries is the important things to decrease the nurse's lawful problems. In Iran and also Tabriz medical sciences university hospitals, no study has been conducted about nurses' awareness about sighted tasks with attention to the composition of approved duties of health and treatment ministry. Since this research can provide the researchers involved in this field with useful information, the researchers decided to investigate employed nurses' awareness of nursing approved **sighted tasks** in educational centers of Tabriz medical sciences university.

2. Material and Methods

This study is part of a descriptive_ analytical investigation, in which studies nurse's awareness about the nurse's sighted tasks in 2010-2011. The population of the study consisted of all the nurses employed in internal – surgical wards of educational hospitals of Tabrize medical sciences university. Eligibility criteria were as follows : having BSc degree or higher in nursing field, being employed in internal or surgical wards, having working experience of at least six months in internal and surgical wards, as well as being satisfied and willing to take part in the study. The samples involved all of the nurses employed in research population. There were totally 320 nurses, 312 ones were eager to participate in the study. Of course, 14 questionnaires weren't analyzed and removed from the study, and finally the data of 298 questionnaires were analyzed.

A researcher _ made questionnaire was used to determine the employed nurse's awareness about nursing approved sighted tasks. This questionnaire was a three part test, designed based on the approved nurse duties, suggested by the ministry of health, and medical training. It was contained 40 items, 21 questions related to nurse's sighted tasks, and 19 ones were among the cases the nurses did frequently, but they did not belong to their sighted tasks. There items as "Yes ", "No", and "I don't Know" were considered for each item. Choosing the correct answer as well as the two items of "No" and "I don't Know" were given the scores "1" AND "0", respectively.

The final score of this test varied from 0 to 40. Research population was Tabriz selected hospitals nurses. In this study, simple sampling was used as the sampling method. Having collected the data, they were analyzed using SPSS .14 statistical software.

Content validity was used for determine the scientific validity of questioner. By attention to research purposes, references, papers related to the research topic, scientific and valid journals and researches, as well as nursing approved sighted tasks presented by the ministry of health, treatment, and medical training were used to design the questioner. Questioner validity was determined by 20 scientific board members of Tabriz nursing and Midwifery College, Tabriz University, Azad and national universities of urumia, Tabriz, and Golestan as well as Tehran nursing system organization, and the supervisory recommend were taken into account. In order to decide the test reliability, Koodr – Richardson 21 was done and its internal correlation coefficient was determined as 0.88 after gathering the questionnaires.

In order to data collection, having received the certificate from the authorized referees to conduct the research and coordination with nursing services office of hospitals, all of subjects informed about the research and informed consent were obtained.

3. Results

The result of this research indicate the individual, social, and professional features of the nurses (table 1) that most of them were female and had BSc degree in nursing. The majorities of nurses have professional responsibility insurance and worked as official nurses. Besides, most nurses were employed in surgery ward.

Table 1: Individual, social, and professional characteristics of the nurses in selected hospitals of Tabriz medical sciences university.

Percent	number	group	variables
9.7	29	male	Gender
90.3	269	female	
30.2	90	notmarrid	Marital status
69.5	207	married	
0.3	1	widow	
98.7	294	BSC	Document
1.3	4	MSC	
60.7	181	yes	Insurance
39.3	117	no	
90.9	271	nurse	
9.1	27	head nurse	
45	134	internal	Place of work
46	137	surgical	
9	27	Medical & surgical	

Table 2: Distribution of the employed nurses in Tabriz educational hospitals based on the awareness of nursing about approved sighted tasks.

Good		Average		Weak		
Percent	Number	Percent	Number	Percent	Number	
11.4	34	81.2	242	7.4	22	Awareness of nurses about approved nurses tasks
22.0 ± 5.2						Mean and Standard Deviation (Score 0 to 40).

Table 2 showed that the nurses ' awareness in this test is average (Mean 22.0 ± 5.2 the minimum score "0" and maximum "40"). Most of the nurses had an average awareness of nursing approved tasks (81.2%) and just a low percentage of them (11.4%) had a good awareness in this regard.

The questions of duties have been brought in two tables. Table (3) consists of 21 items which is

indicate the nurses' knowledge and awareness about approved nurses' sighted tasks. Table (4) shows the subjects' answers to the questions that there are not nurses approved tasks but they do frequently in hospital.

Table (3): frequency and percentages of nurses answers to questions that are their sighted tasks

Nurse's answers to tasks are their approved tasks.					**Question Number**
Wrong Answer		**Right Answer**		**Question**	
Percent	**Frequency**	**Percent**	**Frequency**		
67.4	201	32.6	97	Supervision on medicine team activity	2
35.6	106	64.4	192	Satisfying the patient's spiritual needs.	4
39.6	118	60.4	180	Urinal catheterization	5
53.7	160	46.3	138	NGT inserting	7
66.4	198	33.6	100	Follow up nursing care at home	9
34.9	104	65.1	194	Priority and making the patient ready to be dismissed.	11
26.5	79	73.5	219	Supervision on implementing nursing care action.	12
62.4	186	37.6	112	Chang of position of patients without physician's order	16
19.5	58	80.5	240	Cooperation in nursing researches	18
73.8	220	26.2	78	Limiting the Patient with limiting vests	20
35.6	106	64.4	192	Doing (total parental nutrition)	21
31.2	93	68.8	205	Giving suppository and the other rectal drugs	23
43.6	130	56.4	168	Consulting with the patient in the case of reference necessity	24
6.0	18	94.0	280	Giving instruction to the patient before discharge	27
14.1	42	85.9	256	Eye care in patients in coma ststus	30
5.4	16	94.6	282	Careful attention to drug expire date	32
11.7	35	88.3	263	Preventing the side effects of blood transfusion	33
24.5	73	7.5	225	Controlling the effect of blood transfusion	34
41.9	125	58.1	173	Participating in medical students training	36
56.7	169	43.3	129	Irrigation of the bladder	39
46.0	137	54.0	161	Lavage	40

In this survey the frequency and its percentage of questions about the nurses approved tasks showed that the knowledge of the nurses was low, such as "Follow up nursing care at home, NG.tub inserting, changing the position of motionless patients, without the physician's order, restricting the patient with limiting vests, and also irrigation of bladder.

Table (4): frequency and percentages of nurse's answers to questions that are not their sighted tasks.

Nurse's answers to tasks are not their approved tasks					**Question Number**
Wrong Answer		**Right Answer**		**Question**	
Percent	**Frequency**	**Percent**	**Frequency**		
81.9	244	18.1	54	Getting written consent from the patient	1
17 .4	52	82.6	246	Arterial blood gases sampling	3
31.2	93	68.8	205	Changing the ventilator settings	6
69.5	207	30.5	91	Informing patient family (death)	8
33.9	101	66.7	197	Insertion endotheracheal tube(emergency)	10
52.3	156	47.7	142	Expressing the patience diagnosis to her/his family	13
50.0	149	50.0	149	Getting the blood sample for culture	14
59.7	179	40.3	120	Preparing the record of the discharged patient	15
29.2	87	70.8	211	Getting Jugular iv line	17
61.4	183	38.6	115	Telling the patient's lab study tests	19
72.1	215	27.9	83	Getting sputum sample	22
56.7	169	43.3	129	Getting secretions culture sample	25
57.7	172	42.3	126	Helping the patient to take a bath	26
78.2	233	21.8	65	Feeding the handicap patient	28
74.5	222	25.5	76	Sponge of the patient who has a fever	29
59.7	178	40.3	120	Take apart the patient endotheracheal tube	31
43.3	129	56.7	169	Take apart the chest tube	35
38.9	116	61.1	182	Physician Telephonic orders	37
31.9	95	68.1	203	Physician oral orders	38

The frequency and percent of answer to the questions that are not nurses tasks, showed that the nurse's knowledge and awareness are low. It meant that most of the nurses believed, doing the above-mentioned activities table (4) which are performed by them routinely or under system pressure in the hospital is their tasks. It is while in the case of occurring problems for the patient or suing from one of his/her accompaniments for the above activities, they are considered as interferences in medicine affairs and cause the nurse to be condemned.

4. Discussions

Findings of this research showed that in terms of the awareness of the nurses employed in internal-surgical wards of educational centers of Tabriz medical sciences university about the nursing sighted takes, most of the nurses (81.2%) had an average awareness thereof and just little percentages(7.4%) and (11.4%) had a weak a good one , respectively. Results of the studies conducted in this regard are somewhat different from the present one. For example, the results of Madershahiyan's study (1998) in exploratory the employed nurses' awareness and attitude towards the nursing job description in Mashhad showed that 15.5% of the nurses had a good awareness and familiarity. (Madarshahian and Pakdel, 1998) .In addition, the results of Hashemi's study (1998) conducted in Ahwaz showed that the level of nurses' knowledge about the nursing sighted tasks c has partly been acceptable. Therefore, these results match the findings of current study. On the other side, Negaradeh and Ghobadi (Negarendeh and Gobadi, 2001) reported that the level of nurses' awareness about nurses tasks had been good in 57.5% of the cases studied. This finding does not match with the findings got out of the current study. There are some laws in Iran called. "Nursing approved sighted tasks " within whose framework the nurses should work. This framework has generally been composed in 1989 (Ataran et al., 1998), revised in 2009, and then notified to the hospitals. There are some laws called "nursing standards "in other countries which draws the nurses ' activity framework.

According to Gilis's theory (1994) ,setting the duties composition and delineating communicative lines and their purposes help influentially to make proper and suitable working conditions. Setting and enforcing the duties composition is sensible and necessary for the whole nursing rankings and levels (Hashemi, 1999).

In Iran's nursing system in which treatment is done in team working, nurse and doctor belong to medical team, the nurses suppose that they work under the doctor's supervision and their order. But based on nursing approved sighted tasks, however, the nurses are responsible for their activities, and independent interventions . Nursing independent activities are the ones done based on the nursing assessments and nursing diagnosis. such as changing the position of motionless patient, promoting the awareness level of the patient and his/her family about medical cares, and using relaxation methods in reducing the anxiety(Nursing system organization, 2009) . In this study, 62.4% of subjects maintained they cannot change the patients' positions without the physician's permission. In addition, 59.7% of the subjects had stated that they can getout the patient's chest tube based on physician's order, while it is not nurses' approved sighted tasks. It seems as if the participated nurses have not currently believed that nursing profession as an independent one, that is to say, they look forward to hearing from the physicians to do the takes being their duties

If the nurses' do treatment actions or assigned duties in accordance with the medical principles and his/her own governing ministry instructions and professional standards of the country, there will be no rational for the patient's complaint and even if it occurs, it will be of no results and uses (Gheshlaghi, 2001). Therefore, one of the ways to decrease these problems is the nurse's awareness and information of the nursing tasks and working within them. Nurse's awareness and acquaintance of different nursing group's duties, the respective ministry instructions, and regarding them can definitely cause the complaints not to be raised, or to be at most cleared from the accusations (Juibari and Navipoor, 1994).

In a study conducted in Mashhad medical sciences university, it was determined that 95% of the nurses had deemed it necessary to be informed of the nursing approved tasks (Madershahiyan, 1998). Results obtained from our research in Tabriz showed that 67.4% and 29.9% of the subjects knew the existence of nursing approved tasks are very necessary and necessary, respectively. Accordingly , the sum of sample's statements 97.3% of subjects considered the existence of nursing approved tasks very necessary , it is inferred that most of the nurses tended to inform of their own duties composition , It is while just 24.2% of the nurses had stated that there is something called the nursing established duties composition . There cases can indicate the low level of academic educations and lack or shortage of the nurse's in- service trainings in such fields. Respectable nursing board authorities, and nursing system organization should think of fitting a credit called nursing lines duties composition in university curriculum and also adding the courses of meantime retraining .

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Effectiveness of Semmes–Weinstein monofilament examination for diabetic peripheral neuropathy screening in Ahvaz, Iran

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Abstract: Foot care prevention programs can reduce the occurrence of foot ulcerations and amputations. This investigation evaluated Effectiveness of Semmes–Weinstein monofilament examination for diabetic peripheral neuropathy screening in Ahvaz, Iran. In this quasi-experimental design 150 patients with diabetes mellitus were recruited by purposive sampling. All patients were tested for sensory neuropathy using Semmes-Weinstein Monofilament Examination. In the next phase nerve conduction velocity was examined. The sensitivity of Semmes-Weinstein Monofilament 10 g was 38.5-61.5% at sites 1-8, whereas the specificity was 77.5-95.5%. Monofilament was found to be simple, cheap and useful method and suitable for detection of sensory neuropathy in clinical examinations. Hence, we recommend screening of patients for neuropathy as soon as they are diagnosed with diabetes.

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Keywords: peripheral sensory neuropathy, diabetes, monofilament, screening, nerve conduction velocity, Iran

1. Introduction

Diabetic Peripheral Neuropathy (DPN) is one of the most prevalent Complications of diabetes mellitus (DM), which can lead to noticeable morbidity and mortality, foot ulcers and amputation among the diabetic patients (Harklessa et al. 2006, Nather et al. 2008). Hence, the identification of individuals who are prone to neuropathy would result in a decrease in amputation and morbidity (Boyko et al. 1999, Levin 1996, Pliskin et al. 1994). Studies have shown that 11 percent of patients suffer from neuropathy when being diagnosed to have DM and Fifty percent of patients with DM are afflicted with it after 25 years suffering from the disease. More than 50000 amputations take place annually in the USA, for which the peripheral neuropathy is responsible in 85 percent of cases (Pham et al., 2000, Pop-Busui et al., 2007).

DPN is not always obvious clinically and it has a sub-clinical state in most cases. Therefore, if a given physician just suffices to mental symptoms during the routine checkups, the diagnosis of DPN would be inevitably delayed which would accordingly influence the treatment and prognosis of the disease (Kamei et al. 2005).

Diabetic neuropathy affects the patients' quality of life and prognosis of the disease. In addition, it can lead to sudden death, orthostatic hypotension, and lower limb amputation. In other words, recovery from these complications can be attained through early screening and diagnosis of DPN. Also, diagnosing sensory neuropathy among patients helps us to give them comprehensive training about taking care of foot and manner of wearing shoes so that the progression of diabetic foot complication would be hampered by doing such interventions (Nather et al. 2008). Thus, early diagnosis and treatment of DPN is critical when doing outpatient checkups. According to the American Diabetics Association (1996), the diagnosis of DPN requires the follow-up of these cases: a) clinical manifestations, b) clinical examinations, c) electro-diagnostic studies, d) sensory tests, and e) autonomic performance tests (Nather et al. 2008). Nonetheless, conducting electro-diagnostic studies, including nerve conduction tests or electromyography as screening tests at outpatient settings are difficult and expensive. So, the diagnosis of DPN is carried out by combining 4 of the 5 aforementioned methods. Among the quantitative sensory tests, the old and new monofilaments

including the Semmes-Weinstein Monofilament Examination (SWME) alongside other sensory tests have attracted a lot of attention as appropriate, accessible and cheap methods for early screening of DPN(Abbott et al. 2002, Dimitrakoudis and Bril 2002, Dyck et al. 2000, Perkins and Bril 2003, Tesfaye et al. 1996, Valk et al. 2000).

This test is a simple method which is used for identifying the amount of sensory neuropathy and predicting the likelihood of having diabetic foot ulcers in patients with DM so that the costs and complications that are imposed on the society due to this disease would be minimized.

Although by virtue of sensation it is easy to use SWM, the use of this test has yielded different results in different parts of the world. However, no universal standard instruction does exist with regard to how and where to use the monofilaments or interpret their results. As the SWM is the best option for clinical diagnosis due to being cheap and safe and being able to predict the likelihood of having the risk of diabetic foot ulcers or the consequent amputation and the reduction of psychological problems followed by an early diagnosis among susceptible patients alongside the increase in the quality of life (Modawal et al. 2006, Rahman et al. 2003), and considering the novelty of this method in our country, we decided to determine the sensitivity and specificity of SWM in patients referring to the Diabetic Clinic of Golestan Hospital in Ahvaz,Iran.

2. Material and Methods

A quasi-experimental design and purposive sampling were conducted. This research was conducted from 2009 to 2010 on 150 patients suffering from DM, type II, without the diabetic foot ulcers who had referred to the Diabetes Clinic of Golestan Hospital in Ahvaz.

The research sample was determined through purposive sampling by suing the following statistical formula:

$$n=\frac{\left(z_{1-\alpha/2}+z_{1-\beta}\right)^2\left[p_1(1-p_1)+p_2(1-p_2)\right]}{(p_1-p_2)^2}=148\cong 150$$

In this formula which has been adopted from previous studies, the amounts are $\alpha=0.05$ ، $\beta=0.2$ ، $p_1=0.86$ ، $p_2=0.96$ (Miranda-palma et al. 2005).

The patients who had the following criteria entered the study: (a) Patients who had a stable clinical situation and were able to cooperate with the researcher, (b) Patients who were able to have verbal communication, (c) those who were interested to participate in the study.

The patients, who had the following conditions, were excluded from the study: (a) patients who suffered from psychological problems, (b) patients who had the history of neuropathy due to other reasons like hereditary-acquired neuropathy or Guillain-Barré Syndrome, (c) pregnant women, (d) patients who had the history of brain stroke, (e) patients who had callous or any other complications in their feet, (f) and patients who were under neuropathy treatment

The 5.07 gram Semmes- Weinstein Monofilament Test

The monofilament test was conducted on the patients' both feet of by two researchers who had received the required training about the application of the monofilament under the supervision of an endocrinologist. This test was done at eight points in each foot (the dorsal aspect of the first, second, third, fourth, and fifth digits; the dorsal aspect of medial, central, and lateral aspect of mid foot) by the monofilament Semmes- Weinstein (5.07/10g). The way of doing the test was as follows:

The monofilament was accidentally placed on palm of patient's hand while his/her eyes were closed and the patient answered the following questions:

- Do you feel the monofilament placed at your palm?
- Which part of your hand is touched by the monofilament?

After making sure about this point that the patient has understood the manner of doing and responding the questions, we tested the monofilaments on the sole of both feet while the patient had closed his/her eyes.

1- The monofilament was placed on the patient's skin on which there was no callus and it was pressed to the extent that it was bent. 2) The patient was asked if s/he feels something on the foot sole; in which part of the foot is that sensation felt: left or right. 3) The test was repeated three times for each point. 4) If the patient answered wrongly two or more times after three rounds of tests on any given point, that point was recorded as positive. 5) These acts were repeated for other points too (Forouzandeh et al. 2005, Kamei et al. 2005, Mayfield and Sugarman 2000, Modawal et al. 2006). Both feet were tested for 5 to 10 minutes. The total time for implementing the intervention lasted for 8 months which started in November, 2009 and finished in June, 2010.

Diagnostic Criteria for DPN: In order to diagnose the diabetic neuropathy, the nerve conduction velocity (standard test) was also done. The doer of the nerve conduction velocity was quite blind about the clinical examination. For identifying the sensitivity and specificity, the results of the

monofilament examination were compared with the nerve conduction velocity as the gold test. The neural conduction tests have been recommended by medical studies as the gold test for assessing and validating the screening tests of diabetic neuropathy (Forouzandeh et al. 2005, Mason et al. 1999, Shin et al. 2000).

The neuropathy was approved through conducting the neural conduction test which was done by a neurologist when there was disturbance in two or more nerves and in symmetrical mode. The set applied here for taking neuromuscular graph was the Biomed, model 3520 belonging to the Negar Andisheh Company.

Data analysis: The data analysis was performed using the SPSS software Ver.16. The Sensitivity and specificity of the SWME were measured. The data were presented as means and standard deviations, and percentiles.

Ethical Considerations: After the approval of the study at the Ethics Committee of Jundishapur Medical Sciences University, Ahvaz, Iran, informed consent was taken from the patients for participating in the study. Also, the patients received enough information about the safety of this method and their freedom for entering into or exiting the study.

3. Results

Among 150 patients participating in the study, there were 47 male (31.3%) and 103 female (68.7%). The average age of the patients was 55.71 years (SD= 8.95 years) and the mean of their disease duration was 7.7 years (SD = 6.1 years). We assessed sensitivity and specificity of 10-g monofilament in terms of neuropathy trace as follows:

At least one point out of 16 points on both feet should be reported as insensate; at a minimum, two points out of 16 points on both feet should be reported as insensate; no less than 8 points out of 16 points on both feet should be reported as insensate. We found that the sensitivities of the monofilament ranged from 38.5 to 61.5 % while the specificities ranged from 77.5 to 95.5 percent (Tables 1-2).

Table 1. Sensitivity and specificity of 10 g monofilament according to the number of insensate

Testing site	Sensitivity	specificity
Semmes-weinstein 10g≥1/16	61.5	77.5
Semmes-weinstein 10g≥2/16	59	79.3
Semmes-weinstein 10g≥8/16	38.5	95.5

Data are %

Table 2. The sensitivities of the monofilament

patients	*EMG-NCV*		*Semmes-weinstein 10 gr*	
	abundance	percentile	**abundance**	percentile
One point*				
neuropathy	39	26	20	13
No-neuropathy	111	74	130	87
total	150	100	150	100
Two points†				
neuropathy	39	26	18	12
No-neuropathy	111	74	132	88
total	150	100	150	100
Eight points ‡				
neuropathy	39	26	15	10
No-neuropathy	111	74	135	90
total	150	100	150	100

* Cutoffs of ≥1 insensate sites of 16
†Cutoffs of ≥2 insensate sites of 16
‡ Cutoffs of ≥8 insensate sites of 16

4. Discussions

We applied the Semmes-Weinstein monofilament at eight points on each foot in this study. This test is one of the most important tests in clinical examination. The sensitivity of this test was 38.5-61.5 % and its specificity was 77.5-95.5% in screening the diabetic neuropathy. The almost moderate sensitivity indicates that unusual cases and numb points can be diagnosed only in highly severe neuropathy. The use of this test in our study showed that the Semmes-Weinstein 10 gram monofilament can be effective in tracing and screening the decreased of protective sense of diabetic foot. Nonetheless, those complications which are often something impossible to be diagnosed with reflexive or vibrating tests are barely diagnosed by the monofilament test. So, using this test alongside the above methods is more effective in screening the neuropathic cases. Other studies also recommended that the likelihood of screening and early diagnosis of peripheral neuropathy by using a mixture of different methods, especially a combination of monofilament with clinical examinations or clinical symptoms or sensory tests is a little increased (Abouaesha et al. 2001, Olmos et al. 1995).

Nozomu kamei (2005) tested the sensitivity and specificity of two types of monofilaments, through which the sensitivity and specificity of the SWM 10 gram was 30% and 92%, respectively. This amount was lower with respect to the sensitivity of monofilament in our study but higher with regard to its specificity which can be attributed to the number of samples, type of sampling and other characteristics of patients, including the level of HbA1c, controlling of diet and duration of DM, medications regiments (Kamei et al. 2005).

We got a sensitivity and specificity of 38.5-61.5% and 77.5-95.5% for the Semmes-Weinstein 10 gram monofilament. However, a sensitivity and specificity of 32.5-47.5% and 73.8-92.9% (Dyck et al. 2000, Valk et al. 2000) and 65-86% and 58-71% (Abbott et al. 2002, Dimitrakoudis and Bril 2002) have been reported in other studies.

The prevalence of diabetic neuropathy has been between 9.33 to 14 percent based on the positive results of the SWMF 10 gram. These findings are different from other studies' findings, including Foruzandeh's study, in which the prevalence of diabetic neuropathy was 23.9 percent based on the positive results of the monofilament test. This discrepancy can be due to the number of samples participating in the study, the type of sampling and the number of examined points (Forouzandeh et al. 2005).

Considering this point that the monofilament test has been used a lot for tracing neuropathy recently, no definite information exists about the optimal use of this test for screening the numbness of foot and accordingly the diabetic foot ulcers. Although lots of studies have used monofilaments for screening purposes, no precise data is available about the application of a standard method for monofilament up to now (Mayfield and Sugarman 2000).

A limitation with this study, the number of participants in this study was relatively small and a prospective study with sufficient power is performed to compare monofilament with other testing modalities, definitive conclusions cannot be drawn.

Conclusion

The use of monofilament alone or alongside with other methods and criteria for screening neuropathy is an easy, useful and accessible way. Following due diagnosis, therapeutic measures and required trainings, this method can prevent the great number of complications of neuropathy, especially ulcers and amputation of the diabetic foot.

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The study of students' computer knowledge in the Shahrekord University of Medical Sciences

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Abstract: Today's world is facing daily with advances in technology. Computer is one of the most important displays of such development. Nowadays, computers play a vital role in business, technical activities, and general fields of activity and the use of it has turned into an essential skill. The meaning of computer knowledge is the ability of a person to use a computer to get their required information for professional or general purposes. Just as literacy plays an important role in the individual and social life of people, computer knowledge is also unavoidable for students and computers are considered a change in the way of teaching. The purpose of this research was to study the level of students' computer knowledge of students and to aid in educational planning. This descriptive – analytic research carried out on 300 students in Shahrekord university of Medical Sciences. Data gathered using standard valid – questionnaires containing demographic data of the students, and questions about passing a training course and their inclination on passing a course in the future. The gathered data was processed analyzed by SPSS13, descriptive parameters, Chi- square test, independent t- test and ANOVA. Sixty five percent of the students were female and 35% were male. Sixty percent of them had a personal computer. Most of their usage was to search the internet for information, searching for information through Medline and computer games; while the least usage was for programming, using Excel, using statistical software, and chatting online. 57.7% had passed a computer training course. The biggest students' interest was to take part in classes for advanced searching and using Microsoft Office Word. The most computer knowledge belonged to the students of medicine and the least, to the family health students. This, of course, was directly related to owning a private computer. Computer knowledge was greater among native and daily students. This also was directly related to owning a private computer. There was not a significant difference between female and male student's computer knowledge. A significant difference between female and male didn't observe in having a passed computer course, possessing a private computer and computer knowledge score, whereas there was a significant difference between native and non-native students. The findings of this research indicates that the assessment and analysis of computer knowledge of students can determine the type and the content of the courses chosen for them, which is in turn essential for the improvement of their skill and knowledge of computer. Planning and putting an IT course is essential in the student's educational curriculum with emphasis on how to search for scientific sources in the internet.
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Keywords: Computer knowledge, students, IT.

1. Introduction

The world confirmed the increasing advances in technology and computer is one of the most important displays of such development. Nowadays, computers play a vital role in public activities, commercial activities, professional, fields and the use of it turned into a skill. Computer literacy means the ability to use computers to obtain needed information or to perform daily normal activities in their careers(Morris D 1998). The individuals with computer literacy will not be a specialist in this field, but they are aware of basic information about computer system and are able to use it(Snder Robin 1998;winters sj, chudola km, & Gutel BA 1999). As literacy has considerable importance in personal and social development, computer literacy, in personal and social development, computer literacy, especially for students and medical students is inevitable and computers are considered as tools in education. E-mail, computer tests, computer training aids, reference books and digital images, and information and valuable resources are available on the Internet and a basic learning tool for even first year students. Otherwise, subjects taught in a training course aren't enough and professional training is required by learning continuously learning throughout life(Gibson KE & Silverberg 2000). As the America Association of Medical Colleges (AAMC) recommends to doctors in twenty-one century that medical education must take steps towards the preparation of medical students to gain and use skills and information technology during their career. In this regard the computer is introduced as the primary instrument of medical education in new technology. Electronic writing, computer-based tests, text and digital images are considered as Internet resources

now, even for basic training the first year students(Marz R 2009). So teaching a computer how to use is detected the main qualification for training and practice of modern medicine(Sarabi A & Bahaaldini k 2005). Medical students who cannot get basic information technology skills of IT to the third year, they are not able to perform good at the end of clinical course(Seago BL, schelesinger JB, & Hampton CL 2002). If a strategy based on Benner's novice to expert theory is implemented, computer literacy among frontline users could be assessed and appropriate education and training programs can be developed. Ultimately, these programs would promote positive perception of the clinical information system, which would result in a better adoption rate of the electronic medical record(Turner MP 2010). So it seems medical students need computer skills and use of information management at the beginning of medical education (holander su 1999). Nowadays, most universities in America have come to the conclusion that the train equipment by the computer training program should be included. Due to this problem, AAMC recommends that IT should be a student's education curriculum in the reform process. Students should be able to use word processor WORD, e-mail and use the database and medical sources and search the information at the end of fourth year(Brain E & Smith JM 1997;Crowe P, howie C, & Thorpe M 1998). Despite this and changing rapidly the world, it is undeniable the importance of computer literacy. Reports show slowly motion of integration for computer curricula in training program. Studies, particularly in developing countries and African show the barriers to computer literacy development, budget shortage,, lack of space, lack of faculty members believed important role in training students and lack of computer programming in long-term use of computers in education Medicine(Gibson KE & Silverberg 2000). At the Present, various studies indicate international attention to this matter and has been measurement in different forms the students' computer literacy and styles of program presentation. Review of ten years indicated that the highest computer knowledge of students was provided by University of Virginia in software applications for word processing, word, essay writing, using e-mail, computer games and search for information(Seago BL, schelesinger JB, & Hampton CL 2002). In another study in University of Illinois, student's computer literacy was word processing software, mail, and searching for information on the Internet(holander su 1999). College of Michigan and University of Australia reported the most familiar students with software word processor(Brain E & Smith JM 1997;Crowe P, howie C, & Thorpe M 1998). But African students' skills has been reported less than Europe and America students' skills(Nuriiahan MI et al. 2000;Samuel M et al. 2004). In the study the Mashhad University of Medical Sciences on associate and bachelor degree students, eight were 54% level of operation and 9/4% in the advanced level were familiar with computers(Sarbaz M & Vahedian M 2006). A study Medical Students in the Kerman University in 2004 took 65% of their students had a private computer and 56% in total score were acquired computer literacy. The results of this study have shown that the highest use of medical sciences students was in computer mail, gaming, and search the web(Sarabi A & Bahaaldini k 2005). In Chahar Mahal and Bakhtiari province, to follow the whole country in recent years and to try increase education and Computer literacy in society, it has been considered in various fields *need for computer literacy training in Shahrekord Uni*versity of Medical Sciences. A study has been done about computer literacy among students to determine the appropriate educational policies and programming in this context.

2. Material and Methods

This cross-sectional descriptive-analytic study performed on the statistical population of. Students in three colleges, the night course and containing all entrances. Sampling conducted using multiple- stages(stratified and randomly) from different schools and students based on sample size set in each school. Sample size was calculated 300 students based on p obtained in the pilot study totally. In this study, computer literacy levels of students detected using the items raised in the questionnaire in using computer. This is only that individuals never performed received scoring one , twice scoring two and more than three times scoring three. Inclusion criteria determined being a student of university of medical sciences and was not participated guests in the study. Data collection instruments was applied valid and reliable standard questionnaire used in the universities of America that is also used to study in Kerman(Gibson KE & Silverberg 2000; sarabi A & Bahaaldini k 2005). The questionnaire was translated, they adjusted to the University conditions, and some of the questions were not used. The student questionnaire contained demographic information, questions about training courses, assessment questions of computer literacy, students tend to spend training courses. Questionnaire rendered by trained interviewers to the university students to complete. Data collected were analyzed through software parameters spss13 using descriptive and chi square tests, t-test and independent analysis of variances.

3. Results

The average age of subjects included 21.3±3.15. 65% of cases were female, 35% of them were male and 69.4% and 30.6% attended in day and night courses respectively. They determined 58% native and 41% non- native of this province. Mean average calculated 16±1.25. Students studied in the fields of Family Health, Associate and Bachelor degree of Health, Anesthesia Technician, Associate Midwifery, Associate Disease, Laboratory Sciences Technician, Operating Room Technician, Radiology Technician, and Associate degree of Nursing fields. 57.7% of subjects from this group had completed the computer training courses. 40.3% had trained privately, 41.7% in universities, 12.2% in schools, and 5.8% in other cases. Students training conducted 95.6% in the software field, 2.9% in the hardware field and 1.5% in the design and analysis system field. 60% of the subjects had a personal computer. In general, the most grade level doing daily work through a personal computer is pertained to required texts in computer 2.48%, search required information in Medline database 2.35%, computer game 2.19% and lowest cases related to Programming 1.24%. The use of Excel software 1.49, and using statistical software program 1.51% and participate in a chat program 1.51. Table 1 displays Mean scores and percentage of personal tasks identified by computer.

Table 1: The rate of computers activities of students

Computer activities	Never (%)	Once or twice (%)	More than twice (%)	Mean score (%)
Writing a text by word software	32	25.3	42.7	85±2.1
Send or receive email	51	16.6	32.4	89±1.81
Participation to discussion groups about email	67.2	12.9	19.9	8±1.52
Computer game	29.8	21.2	49.2	86±2.19
Search for subjects and required text	16.2	19.1	64.7	75±2.48
Search for subjects and required texts by help of librarian and informed individuals	35.5	35.1	29.3	8±1.93
The use of information database program for information organization	75.1	19.2	23.8	83±1.66
The use of statistical software	62.2	23.7	14.1	73±1.51
Having a computer program	82.1	10.8	6.7	56±1.24
The use of excel	64.7	20.7	14.5	73±1.49
Review of subjects in internet	40.2	23.2	36.5	87±1.96
Search for required information	20.4	23.3	56.3	8±2.35
Participation to communication groups	65.6	17	17.4	77±1.51
downloading	51.5	17.8	30.7	88±1.79

The intend of participation in workshops and training classes detected searching for medical sources via the Internet 9.6% and then the use of word processing software 80.4% respectively (Table 2).

Table 2: The rate of students' inclination for participation for workshops and training class

Computer activities	Tendency %	Non- tendency%
Word processor	80.4	19.6
Search for medical sources by internet	90.6	9.4
Search for texts through information database, Medline	77.4	22.6
e-mail	71.2	28.8
The use of news parts	74.3	25.7
Search WEB	82	18

A comparison Based on the amount of computer use showed that the highest degree of computer-related fields was respectively, Medical Laboratory Sciences, Anesthesiology, and Bachelor degree of Environment Health. Table 3 indicates the status of computer activity levels in various courses and training courses and the percentage ownership of the computer. There was not significant between passing computer training courses and life location. although the most percentage of non-native students have passed computer training than native students. (60% vs. 50%. A significant relation was not found between age.sex, day and night courses and passing training computer courses.64.6% day students and

48% night students had a computer that was statistically significant(p=0.015). Computer ownership among students, native and non-native ingredient students, was a significant difference that the highest rate of computers belonged to medical field (93.4%) and the lowest rate to family health (31%). (p=0.001).Table 2. Among individual computer activities were required only texts search and software internet download assisting librarians and informed persons. Girls mean score (82.2%± 2.10) was higher than boys mean score (74% ± 1.78) and significant differences indicated (p=0.03). The download score of boys 89%±1.98 considered more than girls(86%±1.68)and significant differences recognized (p=0.01). The rate of computer activities native compared with non – natives' individuals that showed 9 examined cases of 14 cases were significant and score of non – native students was higher than native students (Table 3).

Table 3: A comparison between native and non-native students about computer activities

Titles	Score%		p-value%
	Native	Non-native	
Scripts and sending email	82±1.65	89±2.03	0.01
Participation to discussion groups through email	72±1.4	88±1.68	0.01
Search for text and content by computer	79±1.36	67±2.65	0.002
Search for text and content by help oh librarian and informed individuals	78±1.83	81±2.08	0.01
The use of information database for organization of information	77±1.54	89±1.83	0.01
The use of statistical software program	68±1.43	77±1.64	0.02
Search for information using the Medline database	82±2.33	73±2.52	0.005
Chat	73±1.41	79±1.64	0.02
Downloading texts and software through internet	86±1.66	87±1.95	0.01

Computer activities of day and night student's courses studied and determined that daily students obtained 9 cases of 14 cases in computer activities more than the night students. Computer activities of different fields compared with each other and revealed that excluding the case of the difference was significant (Table 4).

Table 4: A comparison day and night students about computer activities

Titles	Day%	Night%	p-value%
Type and sending email	9±1.92	8±1.55	0.02
Participation to discussion groups through email	84±1.61	68±1.3	0.09
Search for text and content by computer	69±2.58	84±2.24	0.03
Search for text and content by help of librarian and informed individuals	86±1.76	72±1.43	0.03
The use of information database for organization of information	86±1.76	72±1.43	0.02
The use of statistical software program	76±1.46	87±2.1	0.03
Search for information using the Medline database	81±1.63	6±1.26	0.001
Chat	81±1.63	6±1.26	0.001
download texts and software through internet	9±1.89	79±1.56	0.05

Programming in the use of statistical software, search texts aided informed individuals and, librarians and play in other cases.

Table 5: The relationship of computer activities and deferent fields

Field	Interance	e-mail	Discussion group	game	Search of web	Search by librarian	Information database	Statistical database	Writing Computer program	excel	Review internet	medline	chat	download	General percent
Family Health	48	20	13	62	74	66	30	33	13	10	32	62	7	20	35
Environmental health	86	60	23	55	83	66	46	63	48	75	69	86	29	49	60
Environmental health	68	48	44	55	81	26	38	28	32	36	64	68	40	44	51
Anesthesia	58	72	72	77	100	100	86	43	0	15	72	67	58	43	62
Midwifery	33	17	34	50	100	34	17	0	0	17	17	67	50	34	44
Diseases	60	60	23	76	84	48	94	44	48	20	56	74	28	48	49
Laboratory sciences	84	84	34	84	100	75	50	33	17	67	75	100	50	59	63
Opratopi operation roo	100	0	0	67	100	100	25	25	25	67	100	100	25	67	57
Medline	85	76	50	83	92	61	57	35	35	44	70	91.4	57	76	65
Nursing	56	47	33	63	72	68	42	33	24	19	52	73	26	40	47
Radiology	75	38	25	88	100	88	38	38	13	15	63	100	38	63	57
Percent whole	68	47	32	69	89.6	66.5	47.5	34	23	35	61	80	37	49	53.6
p-value	0.003	0.001	0.02	-	0.04	-	0.05	-	-	0.001	0.03	0.001	0.007	0.001	-

4. Discussions

The study performed to determine literacy and computer information of students in ShahreKord University of Medical Sciences. The research will help to acquire information of the students status , to create the appropriate policy and planning , to

develop training and information of students to provide computer literacy. The results showed that most information literacy of students indicated based on the amount of computer use , the performance of personal tasks relating to content ,search for texts needed by computer (2.46), Medline search for needed information (2.35), computer game (2.19), writing a text using Word program (2.1). The lowest cases included Programming (1.24), using Excel software (1.49), using a statistical software program (51 / 1) , participate in a communication program and chat (1.51). In the study of Kerman University of Medical Sciences, students in the highest computer use were ranked using e-mail, computer games, and Web searching for information(sarabi A & Bahaaldini k 2005).

In another study, researchers groups had performed on freshman university students in Shahrekord University of Medical Sciences, none of the subjects did not conduct using electronic messages, participate in discussion groups, programming and using the Excel software. The highest rate of use indicated to work with the Internet and search for different subjects and downloading the content. In the study of ten- year on medical students in University of Virginia, it was published in USA 2002, that the highest computer literacy of students has been in the field of software application to write MS-word word processor, use the mail, computer games and searching Information(Seago BL, schelesinger JB, & Hampton CL 2002). In another study conducted in America in 1999 , the highest of students skills recognized using software Word, and e-mail and search information from the Internet respectively (holander su 1999) . The other results revealed in the University of Michigan ,College Australia, the most amount of students knowledge found using word processor software(Brain E & Smith JM 1997;Crowe P, howie C, & Thorpe M 1998). The results of studies in African students indicated the low skills of medical students in the software application of Word, compared with Europe and the U.S(Samuel M, Coombs JC, Miranda JJ, Melvin R, Young EJW, & Azarmina P 2004).Results of this study demonstrated that computer data between male and female students were significantly different only in two parts, content and search texts needed to inform and assist librarians one or was an Internet software Search the scores and texts needed to help librarians Vafrad inform the girls and scores more were downloading. and in other cases (12 cases) there was no significant difference. The cause of this difference could be the nature of computer applications and possibly two more girls interested in getting help and information from other people. Kerman University of Medical Sciences in the study of literacy found a significant male students than female students(sarabi A & Bahaaldini k 2005). In other studies such as European studies and a study in Malaysia, a significant difference between computer literacy considered(Matteos N et al. 2005;Nuriiahan MI, LIMT A, FOONG A, Yeong SW, & Ware j 2000). In the study because of Kerman Author The result more likely to complete the questionnaire, lack of interest by girls Vahtmal boys who have lower computer literacy as well as generalized probability of unknowingly being involved in cultural issues, as has is(sarabi A & Bahaaldini k 2005). In this study a significant difference between the boys and girls was not revealed. In the current study the number of non-native students using computers were more than the native students. This difference was observed between night and day students as well. The reason probably was that daily and non-Native students had the private computer, in comparison with others. While a greater percentage of non-indigenous students computer had passed training courses (60 vs. 50). The result of a study on university freshman students also showed significant differences between passing training courses, having personal computer and the score of computer literacy in native and non-native students. According to the study of recent results, 60% subjects had a PC. About 67 percent of Kerman students had private computer and determined a significant relationship between computer literacy and student computer ownership (sarabi A & Bahaaldini k 2005).The study of Associate and bachelor degree students in eight field illustrated that more than a quarter of students were the owner of private computer in Mashhad University of Medical Sciences(Sarbaz M & Vahedian M 2006). 24 percent of students had the computer in Studies of Africa(Samuel M, Coombs JC, Miranda JJ, Melvin R, Young EJW, & Azarmina P 2004). The results of another countries studies designated that the increase of students' computer' ownership promoted computer literacy of students and had a significant relationship. The results of this study were to force freshman students to buy a private computer in some medical college of America(Crowe P, howie C, & Thorpe M 1998;holander su 1999;Seago BL, schelesinger JB, & Hampton CL 2002) . In the current study the amount of computer literacy of students, according to the studies in different fields was different, the most in Medicine and the least in the field of Family Health. Of course, it seems this domain is related to computers and possessing a manner most computers having studied medicine and the lowest was dedicated to the field of family health. The tendency to Most training courses existed for courses via the

Internet by medical sources , search the Web and using Word software, and using the Medline database. The highest percentage of Kerman students was willing to train in search of medical resources, Medline search on the Internet. The most freshman university students were interested to seek medical sources as well as. With regard to the existence of desire and valuable medical resources, Internet training in this area should include in the students curriculum especially for medical students. In twenty-one century expected that doctors should have adequate ability in using computer technology for professional decision in order to treat and care patients, doing research Clinical and must meet continuing education(Seago BL, schelesinger JB, & Hampton CL 2002).Due t0 this matter American Association of students of medicine changes in medical education recommended in 1986. One of the recommendations is that information sciences, students should be included in training course of students. They recommended that students must be able to use word processor, email, ability to choose and use educational resources and information search and the evaluation of databases at the end of fourth year in students education (holander su 1999). Although the importance of computer literacy for medical students due to its effect on various grounds is obvious, computer integration in medical education continues in a slow motion. lack of budget, space, faculty members believed in an important role of computer in students training and lack of long-term programs in use of computer are considered medical education barriers in development computer literacy(Gibson KE & Silverberg 2000). Lack of identical educational standards and non-accessibility of technology for learning fundamental skills and primary computer mentioned main factors for lack of appropriate computer literacy(Gibson KE & Silverberg 2000;Seago BL, schelesinger JB, & Hampton CL 2002). According to the results of this study and mentioned studies, it seems IT education and information technology should be considered as a training curriculum, especially in cases of using word processor, email, ability to choose and the use of educational resources, information search and the evaluation of specialized databases. The barriers to the development of computer literacy are removed with appropriate policy, planning, and creating uniform educational standards. Although university of medical sciences students in computer training has taken steps, but these things seem temporarily and require long-term planning and set information technology education as a course is necessary.

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Suffering Sources among the Newly-Graduated Nurses at the Beginning of Their Clinical Work: A Qualitative Study

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Abstract: Suffering is an inevitable reality at the beginning of work that may cause several damages to the amateur nurses and health care organizations. Although suffering has been investigated in some studies, its sources among the newly-graduated nurses have not been investigated so far. The goal of this study is to investigate suffering sources of the newly-graduated nurses at the beginning of work. The present research is a qualitative content analysis study. The participants included 17 amateur nurses of Tehran educational hospitals. The data was collected through a semi-systematic interview. Sampling was made by using a targeted method and was continued until data saturation. All interviews were recorded and were then written down and were analyzed by using the qualitative content analysis method. Findings of this study showed that suffering is a joint experience among the newly-graduated nurses at the first months of their beginning to work. The findings showed the suffering sources among the nurses. Four main themes emerged in this study, namely non-preparedness for working, workplace, patients, and colleagues as the suffering sources. Experiences of the participants showed that suffering of the newly-employed nurses has extensive sources that affect their personal and professional lives. Understanding suffering sources of the newly-employed nurses can be an important factor in helping this group of nurses. Sensitivity of nursing managers to the reduction of these suffering sources and supporting the newly-graduated nurses are very important.
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1. Introduction

Suffering is a complicated, mental and individual concept for which no consensus has so far been achieved by the authorities (Deal, 2011). Suffering is an inevitable reality for nurses at the beginning of their work. Studies on suffering characteristics have indicated that it generally includes much sorrow, loneliness, tension and conflict (Ferrell & Coyle, 2008). Suffering has been described by several characteristics such as loneliness, disappointment, vulnerability, fear and loss (Kazanowski et al., 2007).

Beginning to work has been defined as the most stressful time for most of the newly-graduated nurses (Tung & Chien-Yu, 2009). These nurses face several challenges at the beginning of their works. These challenges may have undesirable effects on their individual and professional aspects (Duchscher & Cowin, 2006). Many studies have pointed to their stresses in facing complicated conditions (Mooney, 2007; Newton McKenna, 2007; Stacey & Hardy, 2011). According to some researchers, the newly-graduated nurses experience different feelings in the first months of their works including as anxiety, inability, incompetency, turmoil, insecurity, insolvency and suffering (Scott et al., 2008; Newton McKenna, 2007).

Several studies have indicated that authorities have high expectations from the amateur nurses at the beginning of their works. Therefore, these newly-graduated nurses cannot meet their expectations and this provides them with feelings such as inability, depression and lack of occupational security leading to their suffering (Sacey & Hardy, 2011; Mooney, 2007). Moreover, some of the existing conditions of workplace such as low number of nurses, shortage of resources and equipment, restrictions imposed by the authorities and high level of works make the newly-graduated nurse to tolerate high levels of hesitation, pressure and suffering (Tung & Chien-Yu, 2009). Suffering may lead to occupational dissatisfaction and exhaustion, service abandonment or even work abandonment by the newly-graduated nurses followed by several

economic damages and losses for health care organizations (Evans, 2001; Tung & Chien-Yu, 2009).

Since the role of nurses is to reduce and to relief man's sufferings (Morse, 2005), one of the roles of nursing personnel, managers and instructors in facing with newly-graduated nurses is to understand them, to help them and to relief their sufferings. Therefore, identification and understanding these sufferings can result in preservation of their health, job satisfaction and finally their job retention. Suffering has been an important concept in nursing discipline since the time of Florence Nightingale; however, few studies have been made in this regard. Most of the studies have been made on the patients and nurses who are permanent accompaniers and witnesses of patients' sufferings (Eifried, 2003) have been addressed very little. In this regard, investigation of experiences of amateur nurses from suffering sources can provide the knowledge based on real experiences. In Iran, newly-graduated amateur nurses should work for public hospitals for 2 years to obtain permission for clinical work. Like most other countries, Iran suffers from shortage of nurses. This problem causes nurses to work more than the necessary shifts which include 192 hours per month (Adib Hajbaghery & Salsali, 2005). Furthermore, high workload, intense work shifts, unequal nurse to patient ratio, dissatisfaction of nurses, governance of physicians on the beds and autocratic management are among other characteristics of nursing in Iran (Khademi et al., 2012). In addition, the community has a negative view to the nursing profession in Iran. People do not consider nurses as people with academic education and they ignore their scientific and practical capabilities. They consider nurses as cheap people with low levels of knowledge. Most of the people even do not know they have academic degrees and that they have graduated from universities. Considering that there is little knowledge regarding the suffering sources of newly-graduated nurses at the beginning of work, it is necessary to make researches in this field. In addition, considering the nature of suffering which is an intellectual, individual and complicated issue, it seems that a qualitative research method is the best way to investigate and study that (Streubert &Carpenter, 2007). On this basis, the present study was designed towards discovering suffering sources of newly-graduated nurses at the beginning of their works.

2. Material and Methods

This study reports a part of the findings of PhD thesis of the researcher conducted by using conventional content analysis method. Considering that suffering is an intellectual, complicated and ambiguous process, it can be accurately examined by a naturalist paradigm. This is because naturalist paradigm and qualitative methods observe reality based on the ground and they accept multi-reality and different structures of a phenomenon and are useful for studying the less known areas (Polit& Beck, 2010; Streubert & Carpenter, 2007; Graneheim & Lundman, 2004).

Research Setting: Study was made in the educational hospitals affiliated to the Tehran University of Medical Science. After obtaining preliminary consent of participants, interviews were made at workplaces or any other places at their own discretion (Streubert & Carpenter, 2007).

Participants: In this study, 17 participants were selected using targeted sampling (table 1). Amateur nurses were passing their first year of service in the training hospital wards. Sampling from hospitals, wards and different working shifts were made.

Table 1. Demographic particulars of participants

Particulars	Mean	Range	Standard Deviation
Age (Years)	24	22-25	1.5
Gender	82.35% Female, 17.65 Male	---	---
Average Work Records (Month)	6.76	3-11	4
Marital Status	17.65% Married, 82.35% Single	---	---

Data Collection Method: Data was collected by using deep semi-structure interviews. Described experiences of the interviewees were recorded on tapes, in the manner that after completion of each interview the recorded findings were written down, the obtained data was analyzed and the next interview was done. Preliminary questions of the interview had been arranged in such a manner to encourage the participants to freely talk about their experiences. For example, the new graduated nurses were requested at the beginning of interviews to explain their experiences in the first days of their workings. After that, based on the collected data more detail questions were asked about their problems and concerns in facing the problems. After completion of interviews, data collection was continued until achievement of data/class saturation, in the manner that no new finding was achieved in the last interviews (Strauss& Corbin, 1998).

Data Analysis: Content analysis was used to analyze data, in the manner that after interviewing with each participant, the texts recorded on the tape were written down. For the purpose of acquaintance and accurate analysis, the data was reviews and reread for several times. To identify the key sentences and concepts in the texts, the texts of the interviews were investigated line by line and word by word and each key sentence or word was given a code. In this way, preliminary codes were identified. In the next step, similar preliminary codes were put in one class and preliminary classes were formed. The classes were again merged and axial classes were formed. To increase data validity, the following arrangements were made: 1) Interview and long meetings with participants, 2) Continuous reading of interviews and thinking deeply on the data, 3) Enjoying supplementary comments and views of colleagues for confirming and correcting the accuracy of codes and extracted classes, in the manner that after coding and classification of data by the first researcher, the consensus among researchers concerning the codes and classes was investigated and the disputed codes and classes were changed until a consensus could be achieved by the researchers. In this research, the researchers investigated the texts, codes and classes for several times so that the validity of codes and accuracy of identified concepts would be ensured. 4) Returning some of the interviews to the participants after coding in order to investigate consensus on the codes among the researchers and participants. Consensus on the two last issues (among researchers and researchers and participants) was higher than 95%. Moreover, to increase data accuracy and stability, four criteria, namely credibility, transferability, dependability and confirmability were used (Tobin& Begley, 2004), in the manner that in order to confirm validity and acceptability, in addition to use of prolonged engagement with data and spending sufficient time for collection and analysis of data, integration method of information sources, multiple methods for collecting information such as interview and noting were also used. Besides, memo, member check, investigation of data by advisors and reviews by colleagues were also used (Polit & Beck, 2010; Streubert & Carpenter, 2007). For the purpose of transferability, the researcher used deep, analytical and rich descriptions of background and particulars of participants, description of study and clear explanation of impediments and constraints to allow the readers to use findings in other contexts (Schmidt and Brown, 2009; Tobin & Begley, 2004). Reliability in this study was made through step by step repetition and auditing (Tobin & Begley, 2004). In this study, data and documents were orderly and accurately investigated by the advisors, consulters and arbitrators. To achieve confirmability, all research steps especially data analysis steps throughout the procedure were recorded in detail so that in case any other researcher intends to continue researching in this field, he/she can easily follow the procedure based on the available documents related to interviews, open coding and other steps (Polite and Beck, 2010). Furthermore, a number of interviews, codes and extracted classes were made available to the researcher colleagues and some of the faculty members who were familiar with analyzing method of qualitative researches and they were asked to investigate the accuracy of coding process.

Ethical Considerations: This study began after obtaining permission from educational department and ethics committee of Tehran University of Medical Sciences and concerned hospitals. All the participants signed the consent form with full knowledge.

3. Results

Analysis and interpretation of data showed that suffering is a common experience among the newly-graduated nurses in the first months of their beginning to work. Suffering was declared by the interviewees for several times in terms of an in vivo code. Findings of this study showed four major themes as sources of suffering including lack of preparedness for working, workplace, patients and colleagues (table 2).

Table 2. Main categories and subcategories of suffering sources in the newly graduated nurses at the beginning of work.

Subclasses	Main classes (Themes)
Emotional unpreparedness	Unpreparedness for working as a source of suffering
Proficiency (performance) unpreparedness	
Communicative unpreparedness	
Managerial unpreparedness	
Physical conditions of workplace	Workplace (hospital) as a source of suffering
Organizational conditions of workplace	
Physical and mental conditions of patient	Patients as a source of suffering
Inappropriate view of patients and their families to nursing	
Annoying behaviors of colleagues	Colleagues as a source of suffering
lack of any support	

1) Unpreparedness for working as a source of suffering: All participants in this research pointed to their unpreparedness at the beginning of work for performing their duties in complicated clinical conditions and they called that as the largest challenge at the beginning of work. Such unpreparedness had a larger extent and caused the appearance of feelings such as insufficiency, disqualification and inability. These negative feelings were a ground for emergence of suffering in them.

1.1) Emotional unpreparedness: Lack of self-confidence, self-esteem, self-hesitation and dependency on colleagues at the beginning of work were ordinary experiences. Most of the participants at this study had not been prepared for clinical works. Therefore, after attending at the workplace in the first days, they faced extreme tiredness, loss of energy, incompatibility with patients, colleagues and the governing atmosphere since they were not accustomed to the existing conditions. They described shift working as a hard work. The suffering resulted by this issue led to appearance of undesirable emotional reactions in some of the amateur nurses, reactions such as crying, sorrow, isolation, anger, misconduct and aggression. In this regard, an amateur nurse said: "It was very hard at the beginning of work. I was not accustomed to that. I became tired very soon. I was very unhappy and I always cried."

1.2) Proficiency: (performance) unpreparedness: Participants of this study pointed to their operational defects in two areas including accuracy and speed for several times. At the beginning of work they evaluated their own capabilities negatively which provided high stress and suffering for them. Suffering level depended on unpreparedness level. The less a nurse's clinical proficiency was, the more would be his/her suffering. Performance defects included preliminary skills and procedures of nursing such as finding patient's vessel, adjustment of serum's droplets, pre and post operation cares, pre-diagnosis care, advanced nursing proficiencies such as replacement of tracheotomy, CPR, pulmonary rehabilitation, etc. In this regard a nurse said, "Whatever I try I cannot use IV Canula."

Sometimes these operational defects appear in special conditions such as emergency situations or when facing with patients in critical conditions. An amateur nurse talked about CPR of a patient at the beginning of her service period (second month). She said, "The patient needed CPR. His vessel had been torn off. We did not have enough time. I could do nothing. I really suffered."

1.3) Communicative unpreparedness: Another suffering source in the newly graduated nurses was their inability in communication, in the manner that some of the amateurs had problems with patients and their family members, patients of the opposite gender and accompaniers. This problem reduced the self confidence of the amateur nurse, caused him/her to feel isolated and alone and intensified his/her suffering. Sometimes, this inability in communication even existed in reporting to the physician. The nurse suffered from such problem. In this regard, a participant said, "At first, I could not communicate with my colleagues. I suffered so much. I feared lest the doctor called and asked me about the patient. What should I answer then? These were all sufferings for me."

1.4) Managerial unpreparedness: One of the major problems that the newly graduated nurses suffered from that was lack of necessary capability to act as a manager, coordinator and in charge of caring team in different working shifts. Considering the fact that treatment system suffered from shortage of nurses, sometimes a newly graduated nurse became manager and in charge of the work shift and since she lacked sufficient competency and qualification to perform the assigned duties she faced problems and sometimes she was ridiculed by her colleagues. These insufficiencies were present in supervision and control of works, decision making, coordination, planning and prioritization, responsibility, time management and designation of duties, in the manner that in such conditions the newly graduated nurse felt powerlessness, inability in accepting responsibility and failure to perform the works in the assigned time. This problem was observed much more at the beginning and middle of their work and they gradually acquired necessary capabilities over time by gaining experience. One of the participants said, "It was very difficult. We had to follow the works all the times. Nothing could be arranged and coordinated. I could not plan accurately. I did not know what to do. I had become aggressive. I murmured all the time. That was quite difficult."

2) Workplace (hospital) as a source of suffering: Suffering caused by workplace formed a large part of daily work experience of nurses. This suffering had been generally experienced in the following sources.

2.1) Physical conditions of workplace: Inappropriate physical conditions, shortage of equipment, insufficient sources and hard and highly turbulent work conditions were the factors that changed the workplace to an annoying and stressful environment for the newly graduated nurses. They declared during their experiences that high volume of work, numerous beds, shortage of facilities and disorderliness imposed high pressures on them. Such conditions sometimes caused them to feel alone,

hopeless and disappointed. They even caused the newly graduated nurse to think of abandonment of her workplaces. In this relation, a nurse said, "It is so crowded here that I cannot plan for anything. There is a high workload. Everything is in a mass. That is why I suffer so much."

2.2) Organizational conditions of workplace: Shortage of nurses, high workload, hard and turbulent work conditions, work shift, rigid work rules and regulations, long work hours, nightly work shifts and working on holidays as relief, cold relations, intensive and heavy work shifts and especially physician-centeredness were factors that caused suffering of the newly graduated nurse. One of the nurses pointed to her bitter experiences and said, "The conditions in hospital are annoying. You will lose your happiness here."

3) Patients as a source of suffering: Participants declared patients' conditions and situation as their source of suffering. Nurses suffer from the conditions of their patients due to their very close and continuous relations with them and with their families. Suffering sources in this section include physical, mental and socioeconomic conditions of patients, inappropriate views of patient and their families and facing with ethical problems.

3.1) Physical, mental and socioeconomic conditions of patients: Different factors were declared as sources of stress and suffering for the amateur nurses, factors including facing with malignant, chronic and incurable patients, observation of pathological results, making the patient aware of the diagnosis, observation of patients' pains, sufferings and deaths followed by observation of their families' reactions by the amateur nurses. Sometimes socioeconomic conditions of patients such as poverty, economical problems and lack of any social support stimulated the feelings of newly graduated nurses followed by their suffering. Patient's age such as children was also another factor for the newly graduated nurses' sufferings. One of the newly graduated nurses said, "We had a child in the ward that had an unsuccessful graft. I became very sad whenever I saw her." Another nurse said, "Each time a patient dies I became so sad. I think about that patient all the times even at home and whenever I remember that I cry."

3.2) Inappropriate view of patients and their families to nursing

Generally, the Iranian community has a negative view to nursing. Some people do not consider them as people with academic degrees and ignore their scientific and practical capabilities. They consider nurses as cheap persons with low knowledge. This problem causes nurses' suffering especially at the beginning of their work when they face such approach. In this regard one of the nurses said, "Some patients never think that we have academic degrees. They have very bad behaviors with us. Their behaviors annoy us. One of the family members of a patient said to me, "If you were educated, you would not need to become a nurse and to be awake all night long."

4) Colleagues as a source of suffering: The results indicate that most of the colleagues including nurses, students and other members of caring and treatment team caused suffering of the newly graduated nurses in different ways. Behaviors of the colleagues had been experienced as follows:

4.1) Annoying behaviors of colleagues: Colleagues' behaviors were described by the participants from different aspects as one of the most important subjects at the beginning of work. These behaviors were mostly shown by nurses with high records of service and included inappropriate, cold and unfriendly behaviors, ignorance of the newcomer nurse, lack of any appropriate communication, no talking, humiliation, insult, exploitation and forced labor. Sometimes discrimination and injustice were also shown by the head nurse, in the manner that newly graduated nurses received hard cases while nurses with high records of service received easy cases. Moreover, hard work shifts were assigned to the newly graduated nurses and easy work shifts were for the nurses with high records of service. There were also discriminations for the monthly programs. The result of such experience included loss of motivation and unwillingness to continuation of working. One of the participants said, "One thing that annoys me is that nurses with high records of service force us. The head nurse had left all hard cases for me. I should do all the works while my colleagues who had high records of service had nothing to do."

4.2) Lack of any support: Participants pointed to lack of suitable support by managers, head nurse and high record nurses especially in the early days of their works. They had experienced lack of support in different conditions and ways. Feelings such as loneliness or having no one to support were the consequences of such non-support which was declared by some of the participants. This problem was observed in terms of insufficiency of orientation programs at the beginning of work, insufficient emotional support, inappropriate declared support and lack of support. One of the newcomer nurses said, "I received no training program at the beginning of my work. Nobody helped me. No one even told me if I had a good performance."

4. Discussions

Findings of this study clarified suffering sources in the newly graduated nurses. These sources included unpreparedness for working as a source of

suffering, workplace as a source of suffering, patients as a source of suffering and colleagues as a source of suffering. Rudolfsson& Flensner (2012) declare that suffering is the common experience of life with which man will face over time (Rudolfsson and Flensner, 2012). Unpreparedness for clinical working is one of the suffering sources in the present study which has also been referred to in many studies (Newton and McKenna, 2007; Stacey & Hardy 2011). Range of unpreparedness for a professional role in the present study was beyond the available definitions. Although the present studies have not directly pointed to the suffering sources, most of them have considered such unpreparedness as a ground for divulging feelings such as disqualification, low self confidence and stress in the newly graduated nurses (Casey et al, 2011; Kelly and Ahern, 2008). After beginning to work, the newly graduated nurses suddenly find that they lack the necessary preparedness for providing services and performing nursing duties. This leads to undesirable reactions in their physical and mental dimensions (Stacy and Hardy, 2011). However, review of the literature showed that clinical training of the bachelor's program of nursing was not efficient enough and failed to prepare the nurses for the changing caring environments (Hickey, 2010; Andersson & Edberg, 2010). In the study conducted by Hickey (2010), most of the participants declared that they had not sufficient time for real nursing works and especially prioritization of caring, learning how to care more than one patient and interaction with the members of health care team. A part of findings of the present study showed that workplace can be a source for suffering. Several studies within the recent years have shown that nurses show high levels of emotional Fatigue. This Fatigue is caused by a series of factors related to workplace such as excessive workload as the result of increased demand, continuous change in working conditions, confliction between nursing care priorities and managerial or financial priorities that may lead to a stressful organizational atmosphere (Manzano Garcia & Ayala Calvo, 2012; Martins et al, 2010). In a study on job satisfaction conducted by Aiken et al. (2001), he concluded that 40% of nurses were not satisfied with their workplace and about 33% of them had plans to abandon their job within the next year (Aiken et al., 2001). Corley and Minick (2005) declare that organizational restrictions including shortage of personnel and increased work hours are among the factors that play a role in increasing stress among nurses (Corley and Minick, 2005). Rudolfsson & Flensner (2012) consider experiences such as nursing shortage, disorderliness in workplace and some of the problems related to physicians as the reasons of nurses' sufferings (Rudolfsson & Flensner, 2012). In a qualitative study made on nursing workplace by Choi et al. (2011), they found that nurses worked in undesirable and inappropriate environments. They further found that stable and instable pressures in the workplace disappointed the nurses and increased their willingness to abandon their workplace (Choi et al., 2011). Real world of work was usually inconsistent with their expectations and this led to a reality shock in them followed by anxiety, stress and pressure (Mooney, 2007, Stacey & Hardy, 2011). A part of findings of the present study showed that patients can be a source of suffering for the newly graduated nurse due to different reasons including medical diagnoses such as incurable, refractory and chronic diseases, observation of painful procedures, inappropriate behaviors and distrust to the newly graduated nurse. In this field, other studies have also pointed nurses' sufferings upon observing patients' sufferings (Maeve, 1998; Rudolfsson, 2012). Some studies have considered nurses as permanent witnesses of patients' sufferings and have mentioned the consequences of such issue (Eifried, 2003). Several studies have pointed rudeness, insults and verbal harassment of patients and their families against nurses. Similar to our study, there are also reports indicating negative stereotypes and viewing nurses as unprofessional people (Khademi, 2012). This is followed by feelings such as disappointment and ambiguity in self image and social identity as well as feeling of a mistake in choosing the field of study. Our findings showed that colleagues acted as a suffering source for the newly graduated nurses. In this regard, several studies have pointed to horizontal violence in hospitals and especially between high records and newly graduated nurses (McKenna, 2003, Newton& McKenna, 2007). McKenna and colleges (2003) identified horizontal violence as an important problem with which the newly graduated nurses face in nursing profession which was both hidden and apparent (McKenna et al., 2003). In the research made by Abe (2010), violent behaviors among nurses were reported in terms of verbal and physical harassment, exploitation and isolation (Abe, 2010). In some studies, newly graduated nurses have reported experiences such as loneliness, isolation, ignorance and lack of any support at the beginning of work (Duchscher, 2008). Most nurses may not be able to provide their patients with appropriate caring services due to negligence or shortage of time. This causes them to suffer and to feel guilty. Furthermore, conflicts between their values and those of their colleagues result in experiences such as hesitation, dichotomy, uncertainty and suffering (Mooney, 2007; Newton McKenna, 2007; Stacey &Hardy, 2011). Therefore,

the required skills for establishing a balance between different roles should be addressed and emphasized by mangers and trainers. Findings of our study may be defined based on the social critical theory. Based on this theory, newly graduated nurses understand the existing discriminations in workplace as a social environment. Under the existing work pressures they have to come along with the rules and regulations governing on workplace even thought they are in contradiction with values and lessons learned by the newly graduated nurses during education. In fact, they withdraw their authority in order to get rid of stress. This leads to internal conflict and finally sufferings of the newly graduated nurses (Duchscher, 2008). Such sufferings may be followed by long term consequences for the newly graduated nurse and for those who need her. Therefore, managers and experienced nurses should support them by establishing suitable communication and interaction with them so that they can adapt to the existing conditions, learn and gain experiences and improve in this way. Managers and experienced nurses should assist them towards finding the meaning of suffering and moving towards exaltation. As a qualitative study, the present study has some restrictions as compared to the studies with qualitative methodologies. The restrictions that challenge the results of qualitative studies include their mental nature and low generalizability. Despite these restrictions, the result of this study produced a deep understanding about suffering sources in amateur nurses at the beginning of their work. Moreover, efforts have been made to extend its transferability to different fields through sampling with maximum diversity and clarification of data analysis stages.

Conclusion: This study can help in development of the little knowledge available concerning suffering sources of nurses and can remove the existing shortage of knowledge in this regard. Furthermore, the present study considerably explained the suffering sources of newly graduated nurses in their transformation from university to clinical nursing. Findings of this study can provide a new approach for thinking about the challenges of newly graduated nurses at the beginning of their work and can serve as a basis for professional and managerial decisions. They can also be used as a basis to develop tools towards the extent and intensity of suffering sources in the newly graduated nurses. Awareness of these suffering sources can develop an approach in clinical and training nurses as well as in managers and can motivate them to assist and help the newly graduated nurses. This study showed that most of amateur nurses need extensive supports at the beginning of their works and it is the responsibility of authorities to reduce the suffering of newly graduated nurses by providing necessary sources and skills in workplaces. Findings of this study provide rich information which can be considered as instructions for managers, trainers, authorities and beneficiaries of nursing towards prevention of work abandonment by such huge workforce. It can also lead to use of efficient strategies in order to support and protect the future generation of nursing. Further researches on each of the concepts are recommended.

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The studying of frequency of Anemia and its related factors among pregnant woman in Shahreza during (2010-2011)

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Abstract: More than half of pregnant women and one third of non-pregnant women suffer from anemia during pregnancy. This research has been carried out in order to examine the frequency of anemia resulting from iron deficiency in women who referred to health centers of Shahreza during (2010-2011). In this cross - sectional study, 170 pregnant women in their forth to ninth months of their pregnancy were selected as the sample. Data were collected through questionnaire and analyzed with SPSS. During the first half of their pregnancy 16.0% of the women suffered from anemia and 27.1 % had anemia during second half of their pregnancy. During the first three months of pregnancy ,there was a significant relationship between the number of deliveries($p\leq.02$) ,the number of stillborn ($p\leq.03$), the number of times red meat was used ($p\leq.04$),the month at which iron pills were started being taken ($p\leq.02$), family income ($p\leq.03$) and taking folic acid before pregnancy($p\leq.02$) and during the third three month of pregnancy had a significant relationship between anemia history before pregnancy($p\leq.001$), the number of times red meat was consumed per week ($p\leq.002$) and the number of eaten red meat slice in each meal (the amount of red meat eaten in each meal) ($p\leq.01$). Anemia is very prevalent among pregnant women. Given that it results directly from iron deficiency, prescription of iron pills, removing influential factors such as malnutrition, pre-pregnancy anemia and numerous deliveries could greatly reduce the prevalence of anemia.
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Keywords: Pregnant woman, Iron Deficiency, anemia, pregnancy cares

1. Introduction

Anemia is one of the most prevalent difficulties during the pregnancy period and form 80% unphysiologically anemia during the pregnancy and cause to premature pregnancy, the low birth weight baby, fetal death increase, post delivery bleeding increase, and fetal distress (Tapiero et al., 2006).

The results of the extensive studies show that there is a significant relationship between the maternal serum conditions, especially anemia during the last trimester of pregnancy, and the negative consequences of pregnancy such as the low birth weight babies at the time of birth (Bondevik et al., 2001). the World Health Organization results indicates that about %58 of pregnant women suffer from anemia in developing countries (Gallowy et al., 2002) and the main part of this anemia results from the iron deficiency (3) that cause the high amount of death (%40) among the mothers in these countries (ghazi jahani, 2002). The results of the studies which have been done in Iran illustrates that there is the iron deficiency and anemia in women that about %30 - %50 occurs especially during pregnancy. Even women lose iron during their normal and developmentally stages and now if this normal process is added by some events such as bleeding, poverty, contextual diseases, geographical conditions, and so on, the iron deficiency effects will be appeared in a severity and acute form (Vahidi niya and asghari, 2008). Two third of women show some symptoms of iron deficiency during their pregnancy ages (Helm, 2000) and a minimum of %50 of them suffer from anemia and %50 of the pregnant women show the symptoms of iron deficiency anemia (Bondevik et al., 2001). Taking this matter into account that women form the main part of societies, their health and wellbeing certainly affect the society health. To achieve such aim, we require to find those factors which put their health and wellbeing at risk.

Extensive universal attempts are being carried to diagnose and to treat iron deficiency anemia; it is necessary that all persons involved in offering midwifery and gynecological cares in all ages be informed of anemia and play a positive role in screening, diagnosis, and treatment (Helm, 2000).

2. Material and Methods

The current study was a cross-sectional research that its investigative samples included 170 pregnant women during the fourth to ninth

month of their pregnancy. The participants were selected among four Health centers in Shahreza.

Materials in this study consisted of a questionnaire with 26 questions about demographic data, and some information about the number of pregnancies, the number of abortion, stillbirth, the number of birth, the number of children, the interval between pregnancies, the amount of family income, the nutrition of individuals during pregnancy, duration and intensity of pica in pregnant women**,** manner of menses before pregnancy. Also, some information such as individuals' BMI in the early stages of pregnancy, pre-pregnancy cares, and Hemoglobin and Hematocrit of the patents' were elicited from patient's records. In order to determine the iron deficiency anemia in the study, less than 11g Hemoglobin per deciliter in the first trimester and less than 10/5 in the third trimester, respectively, were considered as an iron deficiency anemia. Data were analyzed by SPSS and Chi Square. P-value ≤0.005 were considered as significant.

3. Results

In this study, 170 pregnant women were studied that 84/1% were housemakers and 15/9% were employed. In terms of the educational level, 11/2% of persons had elementary educations, 12/4% secondary educations, 35/9% diploma, and 40/6% academic educations. 19/4% had abortion history.17/6% suffered from anemia before pregnancy. 58/2% have taken iron pill after the fourth month of pregnancy. 90/60% have used iron pill (regularly).7/60% have used iron pill irregularly. 1/8% have not used iron pill. 52/4% have used folic acid between one to three months before pregnancy. 27/1% underwent pre-pregnancy cares while 72/90% did not.

16/5% suffered from anemia during the first three months. 27/1% suffered from anemia during the third three months. 14/7% of house makers suffered from anemia during the first half of pregnancy. 25/9% of persons who were employed suffered from anemia. Also, the study showed that as people get older, their anemia exacerbates as well and a significant relationship have been observed between the number of childbirth (delivery) and anemia (P<0.002). And also, there was a significant relationship between anemia and the starting time of using the iron pill during the first three months. Consequently, there are little frequency of anemia by taking iron pill during the first trimester of pregnancy (P<0.002).

And there was a significant relationship between (anemia occurrence) and consumption of folic acid during the first three months of pregnancy. Pregnant women taken folic acid pill during the first three months were less afflicted with anemia (P<0.002).

There was a significant relationship between the family income and anemia during the first three months of pregnancy (P<0.002). Consequently, those whose income were less than 4،000،000 Rials in month, suffered from anemia more than other researchable cases during the first three months. There was a significant relationship between anemia history before pregnancy and anemia (occurrence) during the third three months (P<0.001) (Table 1).

Table (1) Anemia Frequency Distribution during the Third Month according to the Anemia Background in Individual

Anemia	**Yes**	**No**	**Total**
Anemia history	Number (percentage)	Number (percentage)	Number (percentage)
Yes	(%58.8)10	(%41.2)7	(%100)17
No	(%21.1)19	(%78.9)71	(%100)90
Total	(%27.1)19	(%72.9)78	(%27.1)29

P-Value <0.001*

Table (2) Anemia Frequency Distribution during the First Three Months according to the Weekly Used Meat

Anemia	Yes	No	Total
The number of weekly used meat	Number	Number	Number
No	3	0	3
Percentage	%100	%0	%100
One or two times	1	23	24
Percentage	%4.2	%95.8	%100
Two or three times	12	29	41
Percentage	%29.3	%70.7	%100
Four or more times	13	26	39
Percentage	%33.3	%66.7	%100
Total	29	78	107
Percentage	%27.1	%72.9	%100
P-Value<0.004*			

Table (3) Anemia Frequency Distribution during the Third Month according to the Weekly Used Meat

Anemia	Yes	No	Total
The number of weekly used meat	Number (percentage)	Number (percentage)	Number (percentage)
No	(%0)0	(%100)6	(%100)6
1 or 2 times in week	(%14.3)5	(%85.7)30	(%100)35
2 or 3 times in week	(%10.1)7	(%89.9)62	(%100)69
More than 4 times in week	(%26.7)16	(%73.3)44	(%100)60
Total	(%16.5)28	(%83.5)142	(%100)170
P-Value < 0.001*			

On the other hand, the results showed that there was a significant relationship between weekly consumption of red meat per week and anemia during the first three months and the third three (P<0.001, P<0.004). Also, those person who used red meat once or twice a Week, suffered from anemia more than others (Table 2, 3).

During the third half of pregnancy, there was not a significant relationship among the employment, education, the number of pregnancy, childbirth, abortion, stillborn, parasitic disease history, month of beginning taking iron pill, the instruction of taking iron pill, month of beginning taking folic acid pill, amount of menses, duration and intensity of pica, amount of income, the frequency of meat, chicken, and fish intake, weekly consumed cereal, amount of consumed chicken, fish, and cereal in every meal per week, and caring for pregnant women with anemia (P<0.001).

4. Discussions

The results showed that 16/5% suffered from anemia during the first half of pregnancy and 27/1% suffered from anemia during the third half. The carried studies in Arak(1996) and Qazvin (1998),

on non pregnant women in their pregnancy ages (15-45) and by considering Hemoglobin, less than 12 gr/dl, as a diagnostic criteria of anemia, showed that iron deficiency anemia is prevalent 11/2% and 14%, respectively (Moshfeghi et al., 2005; Sheykhol eslami and kabiri, 2007). The obtained results of another study on women, who were in their pregnancy ages from urban and rural areas of country in 1374, showed that according to the indicator of ferritin serum index which shows the iron supply of body, %50 of all women is afflicted with slight degrees of iron deficiency. Also, the study showed that about one third of married women from 15 to 49 years old are afflicted with anemia according to Hemoglobin indicator and Hematocrit (Bandarianzadeh et al., 1997).

The carried studies in several countries showed that the prevalence of anemia in Peru country during 1993 to 1995 was 70/1% (Becerra et al., 1997), in Mexico, 21/6% (Gutierrez et al., 1997) in 1997, and in Spain Valencia 34/44% (Marti et al., 2002). There was a significant relationship between number of delivery and iron deficiency anemia so that the prevalence of iron deficiency anemia in women, who suffered three childbirths or less, was less than women with more childbirth. The carried studies in Peru in 1995 showed that there are a direct relationship between iron deficiency anemia and the number of previous pregnancies and also results showed that there are a reversed relationship between iron deficiency anemia and weight increase during pregnancy periods (Becerra et al., 1997). There was a significant relationship between family income and iron deficiency anemia ($P<0.02$). Women who did not use meat in their food program did not suffer from anemia during the first half but during the third half, all of them suffered from anemia.

The results of various studies shows that suitable regime, population regulation, observing the duration between childbirths, and using iron complements are helpful items to reduce the risk of iron deficiency anemia (Breyman, 2005).

Conclusion

As iron deficiency anemia directly and indirectly increases the possibilities of low birth weight babies, premature childbirth, and prenatal death, and since it is preventable as an eating disorder, it was recommended that in prenatal care program, more attention should be paid to this matter. Also, attempt to remove anemia before pregnancy by doing family plans, providing a suitable duration between children, suitable nutrient status, and doing health cares before pregnancy.

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Living ups and down: The Life Experiences of the Spinal Cord Injured in Winter Sport of Tube-riding: A Qualitative Phenomenology Research

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Abstract: Winter sports are very entertaining, exciting, and pleasurable but they can be simultaneously very dangerous and hazardous with the high ratio of damages. The hostile environment, equipments, devices, and the athlete's lack of sufficient skills cause the increase in the amount of damages and dangers derived from them. One of the winter sports is tube-riding. Because the tube-rider does not have any controls on the tube with regard to the speed control, path direction, brake, and stop, it leads to the high amount of damages; therefore this study aims to investigate the life experiences of the spinal cord injured in the winter sport of tube-riding. The researcher used a quantitative approach of qualitative phenomenology in the study. The participants were the spinal cord injured who were selected among the injured of winter sport of Koohrang tube-riding piste in Chaharrmahal and Bakhtiari province. The sampling was aim based and finally through data saturation, six spinal cord injured were selected for the study. Data were collected by the interviewing the participants deeply and then were noted completely. Data analysis was based on Colaizzi approach. After analyzing the data, the life living up and down theme was elicited. The theme includes four subsets: 1) Physically living ups and down, 2) Mental, psychical, and emotional living ups and down, 3) Economical living ups and down, and 4) Social living ups and down. The obtained results of the study present a deep understanding of the life experiences of the spinal cord injured in the winter sport of tube-riding to the nurses and hygienic observers and also it is a warning for people and authorities to prevent and decrease the damages of this winter sport.
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1. Introduction

Tube Riding: One of the most popular winter sports in our country Iran is a tube riding. Tube riding is a winter sports or better winter recreation that people using inflated car tubes as a device like a sledge for sliding down on gradient snow (Ghani Dehkordi et al., 2012).

Abedi et al (2009) named tube riding winter sport as a non-standard sport, and stated that the amount and severity of injuries resulting from this non standard winter sport is a very high. As well as have expressed that the non standard tubes as a sport tool is the main causes of injuries in tubes riding winter sports. Since the athlete does not have any control over the tube (in terms of speed control and guidance of the tube in the along the track), the extent and severity of injuries is very high than any other winter sports (skiing, snowboarding, sleigh rides, etc). In addition to the nonstandard tube as an sports vehicle, the other factors causing injuries in nonstandard tube riding sports can be included: the lack of standard and special track for tube riding, Encounter tube riders with natural obstacles (trees, shrubs, rocks, ups and downs the surface of track and...), artificial barriers (lights, fences, tables, etc), the overturning tube rider on the ramp of track, encounter tube rider with other tube riders on the surface of track because a lot of tube riders at the same time crowded on the track, encounter tube rider with the viewers that standing round the track, encounter tube riding with people who are climbing from track, On the other hand, because the players ride the tube as groups and collectively, if the event of accident injured several people at the same time (Abedi et al; 2009).

Sporting and amusing activities are one of the most important components of a healthy life style (Marshall and Guskiewicz, 2003; Shephard, 2003). Sporting activities have been converted to the most important components of the modern life and the majority of people are willing to have much time for entertainment. Also, there is a significance increase in the number of club and stadium members (Majewski et al., 2006). The psychical and mental advantages of sport may be decreased by any damages arising with this sports (Marshall and Guskiewicz, 2003; Shephard, 2003). Damage is an unavoidable part of any sports major (Bahr and Reeser, 2003). Increasing the number of athletes and the interested persons toward the sport has led to the increase in damages which depend on sport (Faude et al., 2005). Mainly, winter sports such as snowboarding, skate, and mountaineering which are increased daily in popularity and become more common have a higher ratio of damages among other sports (Steinbru¨ck., 1999). Simultaneously, by increasing the popularity of such sports, the amount of damages arising therefrom will increase too (Majewski et al., 2006). Although attending winter sports may lead to serious deficiencies (Guenther, 2003), fortunately there are little damages arisen from such sports (Muller et al., 2000). Skate, snowboard, sledge and other kinds of such sports are of common winter sports among the people that their popularity is increasing day by day and according to their increasing popularity, the amount of their damages will increase too (Majewski et al., 2006). Tube-riding is one of the most common winter sports in Iran. Ghani Dehkordi et al stated that tube-riding is a non-standard winter sport from which the ratio of damages arisen is high (Ghani Dehkordi et al., 2012). maintain that because tube is below the standard level, it is one of the most important reasons for making damages in tube-riding. Since the athlete does not have any controls on the tube (with regard to his speed control and path direction in the piste), its ratio of damages is higher than the other winter sports (skate, snowboard, sledge…). In addition to being below standard, there are other reasons for tube as a sporting device that causes damages in non-standard sport of tube-riding. These reasons are mentioned below: lack of a private and standard piste for tube-riding, the collision of tube-rider with natural barriers (trees, shrubs, stones, rough surfaces of the piste, …), artificial barriers (poles, fences, curbs, …), tube capsizing, and tube-rider rolling on the slope of the piste, the collision of the tube-rider with other tube-riders for the simultaneous high crowd of tube-riders in the piste, the collision of tube-riders with the spectators who are standing near the piste, the collision of tube-rider with the persons who are climbing the piste surface, and finally because persons ride tube in groups, occurring an event simultaneously makes some persons injured (Ghani Dehkordi et al., 2012).

Although there are much damage arisen from tube-riding, the following reasons can be mentioned to its high popularity among the people: Lack of people's awareness of the ratio of its damages, lack of the need to instruct persons to do it, lack of the need to have a private piste, and tube-riding in groups, and finally because tubes are cheaper in comparison to the other equipments in winter sports such as skate, snowboard, etc (Ghani Dehkordi et al., 2012). As mentioned before, tube-riding is a non-standard sport with a high ratio of damages. According to the pattern and amount of damages in this sport which are arisen from capsizing and rolling the tube-rider during the piste and its slope as well as the collision of the tube-rider with the natural and artificial barriers available in the piste, it can lead to a high ratio of damages on the head and the spinal. Because of the great numbers of the spinal cord injured in tube-riding, the current study is aimed to investigate the life experiences of the spinal cord injured in this non-standard sport and also it is a warning to people and authorities in relation to the high ratio of damages in tube-riding sport. Accordingly, the current study has been done to prevent and decrease these damages.

2. Material and Methods

Nature, subject, and question are the distinguishing factors in selecting the research method (Halloway and Wheeler, 2002; Wood and Harber, 2002). When the aim of the study is the understanding of the participants' experiences, the most appropriate research method is phenomenology (Borns and Grove, 2008). The research subject is the life experiences of the spinal cord injured in winter sport-tube-riding- and also the research is of quantitative descriptive phenomenology. Phenomenology means studying the persons' experiences. In this method, the researcher investigates the persons' experiences through the interview and some explanations that the participants present. In quantitative studies, sampling will be done by the goal-oriented sampling and the maximum difference of approach (Borns and Grove, 2008). The participants were selected after identifying the spinal cord injured in tube-riding sport by using the inclusion criteria into the sample. The entry scales consisted of the injured who suffered from the spinal cord damages arisen from tube-riding in the piste, the spinal cord injured who were willing to take part in interview and could express their experiences about the spinal cord damages; the samples could be both

male and female. Exclusion criteria included the injured that were unable to express their experiences because of their mental, psychical, or physical problems. After the participants were selected, they were informed of the aim of the research by calling. When the participants were ready to take part in the study, the place to give the interview was arranged based on the injurer's comfort. They were interviewed after the attainment of the written and verbal satisfaction of the participants. Besides, they were assured about the confidentiality of the information. All interviews were recorded on the tape and were analyzed by the 7-step Colaizzi method. Immediately after ending the interview, its passage was written. Each interview was recorded and analyzed before doing the next one. After studying, reviewing, and rewriting the data and passage line by line, the researcher determined the main concepts and allocated a code to them. In the next step, significant units and early themes were identified by the permanent comparison of data and codes. The process of analyzing the data was repetitive and the main themes appeared by reviewing the interview passages and development of analysis. The main questions of the interview include the life experiences of persons, their problems in their daily life, the ways of adaptability, and facing the problems. The allocated time for each interview according to the condition, opportunity, and the participants' interests was about 45 to 60 minutes. The final size of the sampling was determined based on the data completion formula and finally the participants included six persons. The reliability and validity of the study were based on the four components of real value, being applied, continuity, and being real (Borns and Grove, 2008). Real value means that the statement which is arisen from the experience should be true for an individual who experienced it in reality. This study was carried out by referring to the participants and affirming the arisen statements. Being applied or applicability means whether the results are generalized in other places and groups or not? In this case, the researchers tried to achieve this aim by selecting the large numbers of participants in terms of their ages and the cultural backgrounds. Stability was achieved when the participants were representing similar answers to the same questions which were formed in different shapes. When the research process is without any biases, a real research will be achieved. During the study, the researchers tried to take away any biases about the researchable event from themselves before and after the interviews.

3. Results

Six persons participated in the study. The participants included both male (4 male) and female (2 female) of the paraplegia or tetraplegia injured. One of them was tetraplegia injured and the rest paraplegia did. The time of the event passed in tube-riding piste was from 2 to 4 years. Two participants were single and four ones married. The life alteration was the first and the most important answer that the spinal cord injured in winter sports gave to the research question, which is their answer about the life experiences after the spinal cord damages and being injured. They used some words such as "Suddenly, everything was finished, my life converted, my life path changed …" The life alteration theme includes four subsets in the study: 1) physically alteration of life, 2) mental, psychical, and emotional alteration of life, 3) economic alteration of life, 4) social alteration of life.

1) Physically living ups and down

Spinal cord injury and incapability was the most important experiences of the injured in winter sports. It can be referred to multiple trauma, head and brain concussion, brain bleeding and other inner bleeding, the fracture of different body's organs, organs and tissues rupture, spinal-column fracture, infections, lacerations, anesthesia, coma, pain ,etc. as other physical experiences. "My shoulder blade, pelvis bone, ribs, and both ankles were fractured while I was tube-riding and colliding with the stones of the piste."

"I rode the tube and I have not yet gone down 10-12 m that the tube was slipped and I rolled during the slope; in addition to other fractures of different body's organs, my neck spinal cord was damaged too." "My bed sore were so severe that consumed 2kg of Gauze. The damage was so serious that my lumbar bone was completely clear." "Since I injured until now, my body is painful, because my spinal cord is damaged, I always feel pain in my hands and feet; at first I thought my hands and feet wrenched into each other, now after passing some years my body is painful. Since I recovered my senses in the hospital, I found that I couldn't move my lips correctly. "I went to Well being social welfare (Behzisty) and formed the file. Then they recorded me as an incapable person, because in that time I was physically incapable and their regulations included me". "My lifetime is divided into two parts, when I wanted to say something, I said before my incapability and after my incapability". "I lost my spouse in the piste, while my children were young and my whole life was destroyed."

2) Mental, psychical, and emotional living ups and down

One of the main problems of the injured who suffer from the spinal cord damages in winter

sport relates to the mental, psychical, and emotional difficulties. As they said, their upset and what they suffered from result from a few minutes of tube-riding pleasure that lead to the irreversible and stable damages. "What is the difference between me and a war Veterans? What is the difference between me and one who was damaged during working? How were they exposed to the spinal cord damages and what about me!" "After I was rolling down the piste, I tried to stand up but I couldn't. I couldn't move my feet. I lost my hope and I was talking with myself that maybe an event was happening to my feet, and during the whole of my life being repentant to this event. Finally, from what I was frightened happened to me, my spinal cord was damaged and I was injured." "I spent very bad days, the ones worse than the piste event. I thought that I was a burden and wasn't able to do something. My husband divorced me and got married again. He told me that I was incapable and my conditions were different from his. He said that I had my own lifestyle and he had his own way. In the first six months after that event, I tried to suicide three times. Several times I wanted to suicide but even I wasn't able to do it. I prayed to God for an end to my sufferings. When God didn't answer me, I pleaded others to end my life."

3) Economical living ups and down

Economical pressures built the basis for establishing new problems for the patients. Because of their job losing and inability to do them, the spinal cord injured meet many economical problems. Going frequently to the hospital and its cost, clinic costs, frequent hospitalization, high therapy costs such as medicine costs, and remedial pursuits caused the increase of life costs for those patients that some of them forced to sell their houses and cars and family income lead to the creation of the economical problems for the patients and their families. Also economical pressures caused the poverty, excruciating life, and the feeling of being a burden. In addition to the above costs, the injured that lost their job hadn't any incomes."I lost my house and life, I had to convey them to the town, I had a house here but it was sold and spent for my therapy. The costs of going to the clinic, costs of home visits, families and friends' costs, cost of sweetness, fruits, dinner, and lunch for the guests were higher than the hospital costs. My father had to sell his car which was his income source and then he was never able to buy a new car and now he has to labor. That time I lost my job, in reality I lost my job. Economically, I really damaged. Before the event I had a computer store, and after that I lost my job because of the spinal cord damages, brain concussion, and memorial problems."

4) Social living ups and down

Losing spouse and life partner while tube-riding and spouse death, losing the partner's life because of divorce, lack of protection for caring children, the destruction of family life, job losing, the abandonment of education, the change of role, the role contrast and so on were factors that affect the insured's lives. "My spouse and I rode the tube and we haven't yet gone down 10-15 m that the tube was slipped and I lost my spouse there, also my neck was damaged in the vertebra of 4 and 5." "You don't deserve us, our daughter couldn't keep you until the end of her lifetime, said my spouse family, and they required her dowry and sued for a divorce. We were married and two weeks were remained to our marriage ceremonies. My spinal cord was damaged in the piste. My husband told me that you were clever and healthy before the event and I wanted to live with you but now how your conditions are? He told me that you are incapable and your conditions are different from me. He abandoned me and got married again. I had two children, my neck spinal cord was damaged, and also my spouse died in the piste that time, my house and properties were lost, I had to sell my properties and spent them for my therapy, my children were fatherless, I had to go and live with my old mother who needs a nurse and now she has to keep us."

4. Discussions

The sport damages as a public health problem were mentioned in recent decades that are followed by harmful influences on health and imposed costs to society (Conn et al., 2003; Burt and Overpeck, 2001). Sport damages are among the most important kinds of damages in modern west countries. Always, their treatments are very time-consuming and expensive. The pattern of damages is different from the kind of snow sport. 23% (about one- third) of the sport damages in Switzerland is related to snowboard and skate in Alp Mountains. The related damages to the spinal cord are different between 2-10% that whose 1% leads to the permanent nervous defects. The most damaged part of the spinal canal relates to the neck spinal (Alp Skate 3/9%, Snowboard 6/8%) (17, 18). Molly and et al measured the ratio of the spinal cord damages in winter sports such as skate and snowboard from 2 to 6 persons for exercising 1000 days while skate and snowboard are among the safe winter sports because of the individuals' control on speed and direction. Also it is said, although the ratio of the spinal cord damages is low in skate and snowboard, the amount of death is high in these individuals (Molly et all., 2011). The ratio of the spinal cord damages which were arisen from the sport was 8%. Other factors of the spinal cord damages include accidents (41/3%),

rolling down the height (27/3%), violence and war (15%), and unknown reasons (8/5%), in turn. 55% of the spinal cord damages occur among the individuals of 16 to 30 years old. Males are the majority of victims in damages of the spinal cord (National Spinal Cord Injury Statistical Center, 2010) and only 9% of the spinal cord damages occur in the individuals up to 60 years old. With regard to the improvement in emergency treatments, pre-hospital and long-period treatment management in the spinal cord injured, the rest of the lifetime of these injured persons were increased in the past decade (Krause and Broderick, 2004). And the increase in lifetime requires the improvements in new technologies to improve the function and to decrease the secondary complications which are related to lack of movement in this group of patients (Chen et al., 2005). Because of the improvements in medicine and lack of reduction in the rest of lifetime in the spinal cord damages, these individuals imposed directly (treatment payments) and indirectly (losing income or efficiency power and production) heavy payments on themselves, family, and society. Therefore, the total amount of direct and indirect payments during the life is more than one to two million dollars for every individual suffering from the spinal cord damages. The total amount of the direct payments for all Americans who suffered from the spinal cord damages was estimated 7/736 billion dollars yearly (National Spinal Cord Injury Statistical Center, 2010). France and Powers (Ferrans and Powers, 1993), and Vin Geit (Wingate, 1995) maintained that the patients' financial problems cause to change not only the life pattern, but also the availability of economic problems to the social valuable sources, individual power5, friends, credit, and self-esteem. The main components of life in the individuals who suffer from chronic illness are the management of the social complicated life and malady. The patients' personalities changed from a quite healthy person to a person who needs care with the special limitations. And because of the inability and losing the job, they face economic problems which are among the most effective reasons on the management of malady (Mendelson, 2006). Without the social and economic sponsor, the patients can't follow the prescript remedial plan (Telford et al., 2006). As Royer says, "because of their physical inability and other reasons such as wasting the time for the malady, lack of the anticipation of the malady, and the most important reason which relates to the deep economic pressures that affect all aspects of their life, the patients can't take a trip and enjoy the life pressures and involve in other daily important affairs (Royer, 2004). Chen and Bour state that the spinal cord damages are among the most disastrous damages that one person may be faced it. The spinal cord damages existed as a deep inability along with many changes in these individuals' life style. Also they impose unimaginable physiological and psychical stresses on these individuals and their families in all contexts of the individual life, family, mental-psychical, and social. They state that these changes, in terms of the function, life style, role, work, family, social connection, and so on involve the patient and his/her family during the whole lifetime and will paralyse the patient and his/her family (Chen et al., 2005). The amount of experienced inability by the patient in the spinal cord damages depends on the surface, intensity, and mechanism of the stroke. Other reasons arisen from the spinal cord damages are based on the distance and adjacency of the spinal cord damage level, because adjacency and distance of any kind of body systems whose nerves are connected with the spinal cord are affected directly and indirectly under the stimulating effects of the nerve, and the reduction of the stimulation leads to the damage in its control process (Boroner and sudarse, 2010). The established clinical manifestation in the spinal cord damage depends on the kind of damage relating to the severity of damages on the spinal cord. Under this level, sensorial and dynamic paralysis, lack of the control of intestine and urinary bladder (usually along with the keeping urine and urinary bladder dilation), lack of Tonous Vazamotor, and perspire function, and the significant reduction of blood pressure arisen from lack of the stability of environmental vessels exist. The quite damages of the spinal cord (lack of sense and ability to autonomic control of organs under the damaged level) cause the appearance of paraplegia or tetraplegia (Boroner and sudarse, 2010). Berry maintains that to be affected with the chronic illness cause some irreversible changes in the patients' life. Biographic disorders arise from disintegration of the patient's daily life structure (Bury, 1991). Chen and Bour stated that the individuals who suffer from the spinal cord damages and their families pass three steps: 1) life catastrophic event, 2) facing the problems and in the third level if the families of the spinal cord injured could be able to adapt themselves with the problems, they achieve stability. But without their adaptability, these families disintegrate (Chen and Boore, 2007). Lon and Sorenson mentioned the incomplete cycle after they investigated the experiences of the spinal cord injured and their hope and toil during the first year after damaging. And it was related to the participants' experiences of the spinal cord damages in the first weeks and months after damaging that they named it life alteration and bad days. Incomplete cycle in this study means all factors which permanently and increasingly destroy individual's life such as

frustration, seclusion, impatience, dependency, violence, mental and psychical problems, physical problems, thoughts and willingness to suicide. Also they state that the spinal cord damages and paralysis often play the role in breaking the marital life, especially if the connection is weak. Illness can be a basis for all sexual, emotional, and communicative problems (Lohne and Severinsson, 2005). Kralik and et al (2003) state that chronic illness makes inability and the majority of persons experience the lack of control on their body and life when they face chronic illness, feeling that is like falling and changing their view toward life. Charmaz (1995) maintain that chronic illness attacks the mind and body and destroys the individuals' daily life and also destroy their personality permanently. They believe that to be affected with a chronic illness is a sudden crisis and an unwilling loss. It is an unpredictable event that separates the individual from his/her previous personality and may be representing of an unclear picture of the individuals in the future. In fact, to be affected with the chronic illness, destroys the family life and the individuals' views in the future (Telford et al., 2006). Freedom threatens them and makes a feeling that they are different from others (Oki and Hoshi, 2004.). Corbin and Strauss (1998) state that experiencing the life with the chronic illness is a permanent and blooming process, and the individuals' talks with him/herself and the world which is accompanied by the destruction of the individual's life in many contexts affect the individual's personality, losing their own worth feeling, and connecting with others and society.

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Wound healing Benefits of Curcumin for Perineal Repair after Episiotomy: Results of an Iranian Randomized Controlled Trial

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Abstract: Pain and discomfort related to episiotomy have been reported to interfere with women's daily activities postpartum, such as sitting, walking and lifting the baby**.** To compare the effects of curcumin and Povidone-iodine solutions for episiotomy healing in primiparous women. 120 healthy primiparous women with a vaginal delivery at term were evaluated in this double-blind randomized clinical trial. Randomization was done using a table of random list numbers. Perineal healing was evaluated by research midwives blinded to random allocation at 24–48 hours and 10 days postpartum. Pain was assessed via a visual analogue scale and wound healing via the REEDA scale. Analysis was done on the intention-to-treat principle. The main outcome measure was the changes in wound healing between the two groups as measured by the REEDA Scale. Secondary outcome measures were perineal pain and wound healing 24–48 hours and 10 days after delivery. There was a greater decrease in the total scores of the REEDA in the curcumin group than in the Povidone-iodine ($P < 0.001$), however; there weren't significant differences between the groups on the VAS scores. The application of curcumin may assist in the episiotomy healing process and could be suitable replacement for Povidone-iodine.

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Keywords: Episiotomy, Curcumin, Povidone-Iodine, Perineal Pain, Wound Healing.

1. Introduction

Perineal trauma is a frequent complication to vaginal delivery, and more than 90% of primiparous women in developing countries sustain episiotomy (Morhe et al., 2004).

Episiotomy's pain and discomfort have been related to difficulties in women's daily activities in postpartum, such as sitting, walking and lifting the baby. (Albers et al., 1999). Pain related to episiotomy is identified to have a negative impact on sexual activities in the first year after childbirth (Glazener, 1997). Midwives and obstetricians increasingly face women who wish to have a caesarean section due to fear of genital tract injuries or following previous childbirth trauma (McCourt et al 2007; Wagner, 2000).

Reducing perineal trauma and associated morbidity has a high importance for childbearing women and health professionals (Homer and Dahlen ,2007). Some existing treatments for episiotomy healing aren't effective and some may prolong the healing processes (Steen et al , 2000).

Povidone-iodine is an antiseptic solution that is usually used in Iran for episiotomy healing. (Vakilian et al., 2011). Tork and Valaei (2002) demonstrated that there was no significant difference between the Povidone-iodine and water in episiotomy wound healing. Cooper et al (1991) even showed that Povidone-iodine suppresses function of fibroblasts and lymphocytes.

Alternative and complementary medicine is used widely in dermatologic surgery such as episiotomy healing. (Reddy et al., 2011). Turmeric is considered as the foundation of an herbal programmed for health. For thousands of years it has been believed to be a key balancing and detoxifying herb. The main biologically active part of Turmeric is curcumin. Curcuminoids are natural phenols that are responsible for the yellow color of turmeric. (Redfern R. 2004). Previous research suggested that curcumin has anti-inflammatory and pro-wound-healing effects

and it exerted its anti-inflammatory effects (Sidhu GS et all 1998).by increasing the mRNA transcripts of growth factor–beta 1 and fibronectin .It is notice worthy that only few number of randomiezed controlled trials have been conducted in humans to demonstrate its effective properties (White and Judkins, 2011; Reddy et al., 2011).

Therefore, this study was performed to compare the effects of curcumin and Povidone-iodine solutions for episiotomy healing in primiparous women.

2. Material and Methods

The prospective, parallel randomized clinical trial was conducted with recruitment through 2009 -2010 in the Alzahra Teaching Hospital in Tabriz, Iran. The study protocol was approved by the Ethics Committee and research center of the Tabriz University of Medical Sciences. (14.89.9 No). The trial was registered at the Iranian Registry of Clinical Trials at www.irct.ir (IRCT138810193027N1).

Eligibility and recruitment

Eligible subjects were primiparous women, without any acute and chronic disease or allergy, and had a healthy pregnancy and delivery after 37 weeks of gestation. The women also had to be able to read and speak in native language. Exclusion criteria were perineal injuries involving the anal sphincter and/or anal mucosa, postpartum hemorrhage, previous perineal surgery, obvious violence and sexual intercourse in the early postpartum period.

Written informed consent was obtained from all women who decided to participate in the study. Participants not meeting the eligibility criteria but randomized included in the analysis according to the intention-to-treat principle.

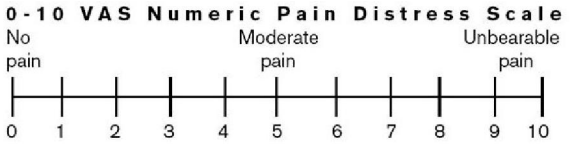
Randomization

In this study, 120 patients participated in research project .We prepared 60 Curcumin solution as well as 60 Povidone –iodine solution tubes. It is notice worthy that all 120 tubes were alike and each tube had its specific code. Therefore, researcher and patients didn't inform of the content of tubes. Participants consumed Curcumin solution categorized as an intervention group, participants who consumed the Povidone-iodine solution were as a control group (60 subjects in each arm). Therefore, each patient had a specific tube and she should consume it three times a day. It is notice worthy those women must wash their hands before using solutions in order to reach acceptable results, and every necessary information related to consuming solutions were explained to each participant individually.

Scales and Outcome of study

REEDA scale is as a descriptive scale, it can measure five components associated with healing process ,they are including :Redness ,Edema ,Ecchymosed, Discharge , Approximation ,and it is graded 0-3 .Therefore ,each category is evaluated and a number assigned for a total REEDA score ranging from 0-15.In this study ,REEDA scale was applied to represent the changes in wound healing among two solutions. Consequently, REEDA scores for curcumin and Povidone-iodine groups were 2.5 ± 0.8 and 3.7 ± 1.6 respectively.

The Visual Analogue Scale (VAS) is a subjective measure of pain. It consists of a 10cm line with two end-points representing ‘no pain’ and ‘Unbearable pain'. Patients are asked to rate their pain by placing a mark on the line corresponding to their current level of pain According to this method, score 0 (No pain), 1-3 (Mild pain), 4-7(Moderate pain), and 8-10 (Unbearable pain). Consequently, Pain was evaluated by VAS method in our research.



Blinding and compliance

Both Curcumin and Povidone-iodine solutions were packed in similar cans containing a code which was known only to the study pharmacist. The study was double-blinded and the contents were known neither to the participants, nor to the research midwives

Statistical analysis

All statistical analyses were done on an intention-to-treat basis. Data were entered twice into the software SPSS 16 software to correct for typing errors. Continuous data with normal distribution were analyzed by independent two-sample *t*-tests and without normal distribution by Mann–Whitney U test. For categorical variables the Chi-Square and Fisher’s exact tests were used. All statistical tests were two-tailed, and the significance level was set at 0.05 (α= 0.05). Values are described as the mean (standard deviation) or the median (interquartile range) if not normally distributed.

3. Results

The CONSORT diagram shows the participant flowchart through the trial (Figure 1). Three women withdrew their consent to participate. Thus, the number of intervention and Control group were 59 and 58 respectively.

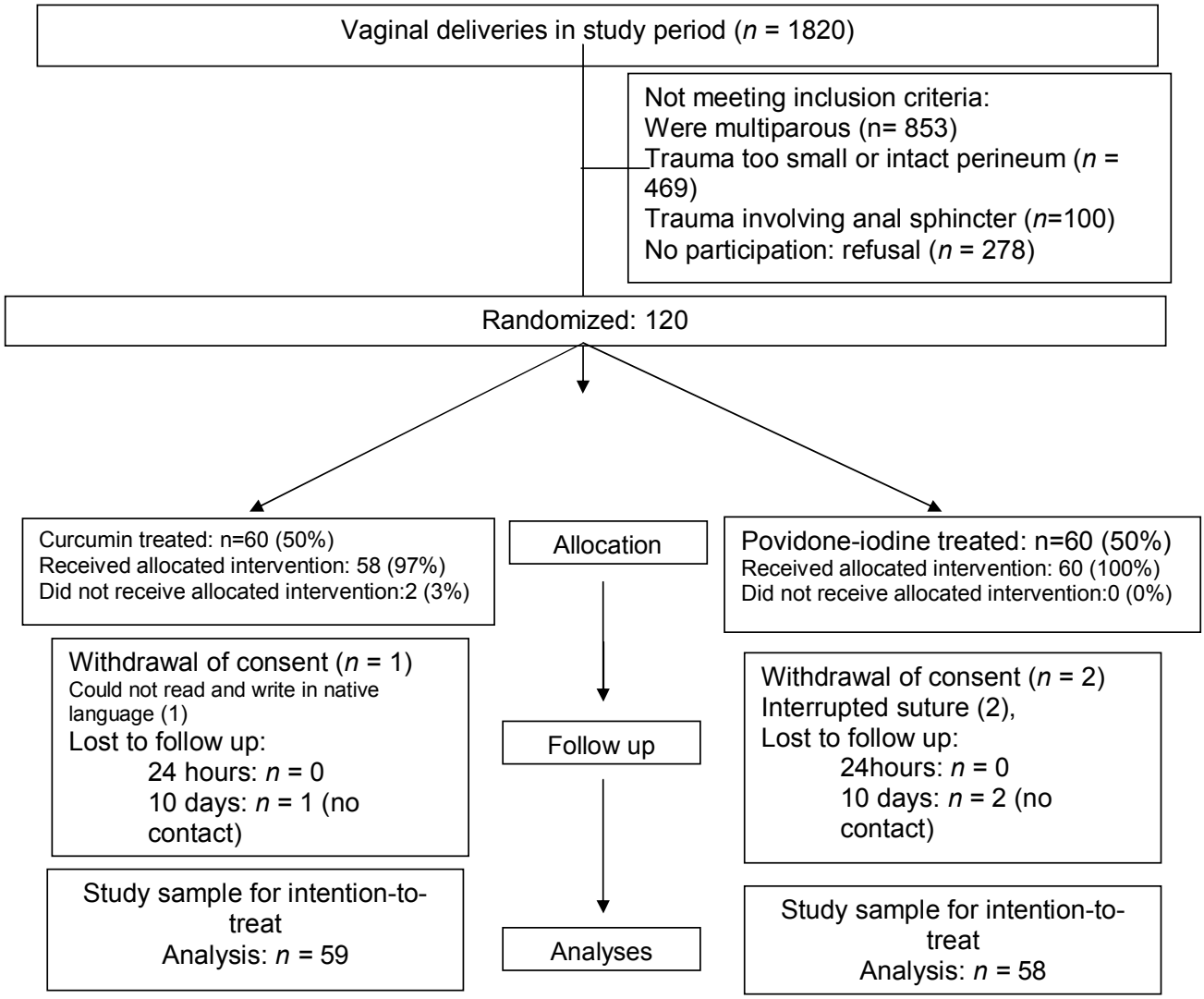


Figure 1 Consort diagram of vaginal deliveries in women during study period

Table 1 shows baseline characteristics of the curcumin and Povidone-iodine groups. The two Groups were comparable and did not differ with respect to any of the baseline demographics and delivery details variables, indicating successful randomization.

Table 2 represents the comparison of episiotomy healing evaluation in the two groups on basis of REEDA scale. As shown in table 2, at 24 hours 8 participants in the curcumin group and 0 of the Povidone-iodine group had ecchymosis. Within 0.25 cm, which was significantly different between the groups (P = 0.006). Within 10 days more participants in the curcumin group than the Povidone-iodine group had redness (P = 0.033) and edema (P = 0.027). The other REEDA parameters were not significantly different between the groups.

According to Table .3, The REEDA scores were significantly differed between the both groups at 24 hours (P = 0.032) and 10 days (P < 0.001). The VAS score differences between the two groups were statistically not significant at 24 hours (P = 0. 2) and significant in 10 days (P < 0.001); however, difference scores between 10th and first day were not statically significant.

Table 1 Characteristics of the two groups at baseline			
Variables	Curcumin group (N = 59)	Povidone - Iodine group (N = 58)	P value
Age (years)	24.2 ± 5.6	22.7 ± 4.0	0.08
Body mass index (kg/m^2)	25.8 ± 3.6	26.1 ± 3.0	0.58
Gestational age (weeks)	38.1 ± 5.1	38.6 ± 0.8	0.46
Education (diploma)	28 (47.5)	21 (36.2)	0.35
Job (housewife)	56 (94.9)	49 (84.5)	0. 61
Status of operator (supervising midwife)	20 (33.9)	11 (19)	0. 61
Note**:** Data are presented as Mean ± SD (standard deviation) and Frequency (Percentage).			

Table 2. Comparison of episiotomy healing evaluation in the two groups				
Variables		Curcumin group (N = 59)	Povidone-iodine group (N = 58)	P value
REEDA Parameters at 24 hours				
Redness				
	None	0 (0)	2 (3.4)	0.244
	0.25 cm or more	59 (100)	56 (96.6)	
Edema				
	None	6 (10.2)	2 (3.4)	0.272
	≤ 1 or more	53 (89.8)	56 (96.6)	
Ecchymosis				
	None	35 (81.4)	37 (100)	0.006
	0.25 cm or more	8 (18.6)	0 (0)	
Discharge				
	None to serum	53 (89.8)	57 (98.3)	0.114
	Serosanguinous or bloody	6 (10.2)	1 (1.7)	
Approximation				
	Closed	53 (89.8)	57 (98.3)	0.114
	Separation <= 3 mm or more	6 (10.2)	1 (1.7)	
REEDA Parameters at 10 days				
Redness				
	None	38 (64.4)	26 (44.8)	0.033
	0.25 cm or more	21 (35.6)	32 (55.2)	
Edema				
	None	50 (84.7)	39 (67.2)	0.027
	≤ 1 cm	9 (15.3)	19 (32.8)	
Ecchymosis				
	None	58 (98.3)	57 (98.3)	1
	0.25 cm or more	1 (1.7)	1 (1.7)	
Discharge				
	None to serum	49 (83.1)	45 (77.6)	0.457
	Serosanguinous or bloody	10 (16.9)	13 (22.4)	
Approximation				
	Closed	55 (93.2)	49 (84.5)	0.133
	Separation <= 3 mm or more	4 (6.8)	9 (15.5)	
Note: Data are presented as Frequency (Percentage).				

Table 3 Comparison of the two Groups at 24 hours and 10 days after deliver				
Variables		Curcumin group (N=59)	Povidone-iodine group (N=58)	P value
VAS score				
	At 24 hours	5 (4,5)	5 (4,5)	0.027

	At 10 days	0 (0,0)	1(0,1)	< 0.001
	Difference scores between 10th and first day	-4 (-5,-4)	-4 (-5,-4)	0.963
REEDA score				
	At 24 hours	5 (4,5)	5 (4,5)	0.032
	At 10 days	0 (0,1)	1 (1,2)	< 0.001
	Difference scores between 10th and first day	-4 (-5,-4)	-3 (-3,-2)	< 0.001
Note: Data are presented as Median (Interquartile Range).				

A per-protocol analysis was performed to investigate whether the noncompliance had contributed to validating a false difference between the two groups. The per-protocol analysis showed statically significant differences in the first outcome measure over again (Ps < 0.05, data not shown). There were no effects for the curcuminand Povidone-iodine groups.

4. Discussions

The main aim of this study was evaluating the role of Curcumin in wound healing in compare to Povidone-iodine .Our results showed that the curcumin solution for perineal episiotomies was more effective way to improvement of wound healing processes than the Povidone-iodine. However curcumin wasn't effective in pain relief.

Wound healing is a dynamic, interactive process concerning soluble mediators, blood cells, extracellular matrix, and parenchymal cells. Wound healing has at least three phases -inflammation, proliferation, and maturation - which overlap in time. (Singer and Clark , 1999).

Treatment with curcumin could enhance the synthesis of collagen, DNA, fibroblast, vascular densities and other important factors in wound healing. (Ghasemi Dehkordi et al (2003) demonstrated that curcumin pretreatment had a helpful effect on the irradiated wound and could be a substantial therapeutic strategy for improving radiation induced delay in wound repair in cases of radiation-induced skin injuries. Also Sidhu et al (1999) showed that curcumin accelerate wound healing in diabetic rats by increased formation of granulation tissue, faster reepithelialization and increased collagenization.

The results of a small clinical trial with 19 HIV patients found that a liquid soap of curcumin could decrease itching symptoms and infectious wound and abscess. [Hong et al., 2004). This study, as of first clinical trials conducted in humans showed that curcumin solution had wound healing effects.

Curcumin solution wasn't effective in episiotomy pain relief in this study. Vakillian et al (2011) also showed that lavender essential oil could not cause to decrease of pain. These studies may highlight the need for future trials that can employ interventions of greater strength of the clinician–patient relationship because pain relief is never about the clinician's intervention alone.

Limitations of the present study might be related to the absent of control on the nutrition and the stresses that may contribute to wound healing and pain relief. The authors believe that future trials could consider these issues.

It seems that curcumin can be used as an appropriate treatment for postpartum episiotomy wound care according to the familiarity of the mothers with complementary medicine. Consequently, the authors suggest the assessment of its application in other areas such as cesarean section and umbilical wound healing and also considering the use of curcumin solution instead of Povidone-iodine for episiotomy wound care.

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Depression and Demographical Features in Diabetic Patients

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Abstract: Depression is one of the psychiatric prevalent illnesses across the world. Depression is an illness which has a direct relationship with diabetes. The purpose of determining the level of depression among the diabetic persons referring to Rasht diabetes center. This research is a correlation – descriptive study which was conducted using the simple random sampling method within 3 months on 144 subjects of the social workers afflicted with diabetes referring to Rasht diabetes center in 2008.Data gathering tool was a questionnaire consisting of two parts . The first and second parts of the questionnaire consisted of demographic data and Back depression standard, respectively. Finally, the data out of this research were analyzed by using the SPSS version 15 statistical software and T-test statistical tests. Results showed that out of 144 subjects, there were 79.86 % female and 20.14% male, 16 people (11.1%) forty years old and younger, 18 people (12.5%) older than 65 years, and 2.1% single and 6.9% divorced .In one hand, in terms of education level, 47.9% and 6.9% were illiterate and educated, respectively . On the other hand, in terms of the illness type, 25 people (17.4%) and 75 people (82.6%) were afflicted with diabetes types 1 and 2, respectively .In addition, statistical tests showed that 35.41% of tester were afflicted with acute depression of which 88.23%,84.31%,and 84.33% were female, married,and afflicted with diabetes type 2, respectively . It was also shown that there is a significant relationship between depression and gender ($p=0.004$), marital status ($p< 0.05$), educations level ($p<0.05$), and jobs of the afflicted ($p<0.05$). The present study shows that there is a significant relationship between the depression in people afflicted with diabetes and their gender, marital status, educations level, and jobs and also 22.22%, 22.22%, 19.47% and 35.41% of the people were afflicted with weak, low, average, and acute depression .
[Sheikholeslami F, Norozi Nia R, Mirpoor ZS, Tavakoly Vardanjani A, Esmaeili Vardanjani SA. **Depression and Demographical Features in Diabetic Patient.** *Life Sci J* 2012;9(4):5542-5547] (ISSN:1097-8135).
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Keywords: Depression, Diabetes, Beck test

1. Introduction

One of the problems which threaten human being from the childhood to the life end has to do with Endocrine illnesses among which diabetes is the most prevalent (Fips, 2008). The number of diabetic people has increased to more than 70 million ones during the ten previous years and so World Health Organization (WHO) has called this event a tocsin for developing countries (Shahbazian et al., 2004). Diabetes is one of the prevalent illnesses in human being societies that unfortunately in spite of the medical sciences progresses, not only its prevalence has not decreased, but also it is ever on the rise (Shahbazian et al., 2004). Diabetes is among the medical disorders it can have psychiatric symptoms .Mode disorders with depression manifestation which are made by the presence of common medical problems are equal in both genders, while the acute depression disorder is dominant among the female (Sadock and Sadock, 2007). Diabetes is an illness which can be treated in spite of its chronicity, in such a way that the person survive and continue his / her life in the case the illness is controlled. Diabetic patients are generally aware of the fact that they are prone to the late coming effects of diabetes and their life time is shortened (Peyrol, 1997).

Recent studies show that depression increases the danger of death in diabetic patients very much (Black, 2003). Depression has since long been mentioned in writings, and Boqrat has also applied the term " hypochondria" (melancholy) to refer to a kind of depression about 450 B.C (Kalpan and sadock, 2007). Depression symptoms consist of fluctuations .in weight, appetite, and sleep hours which if are along with the symptoms resulting from the diabetes, then the depression arising from the diabetes is diagnosed clinically (Ludman et al., 2004). Of course, it is worth mentioning that the researches have shown just 50% of the patients afflicted with depression are identified in the initial

stages (Egede, 2004). Therefore, it is not surprising that emotional reactions towards the diabetes often make problems in treatment (Debra, 1996).

Depression is one of the psychiatric prevalent illnesses across the world with which 15 and 25 percents of the men and women in the society are respectively afflicted in their life spans (Fips, 2008). In the united States, 9.5% of the population, or 19 million people in other words, are yearly afflicted with depression (Regier et al., 1993). Depression is a dangerous disease because it leads to suicide, increases the danger of affliction and mortality resulting from the disease. Decreases the life quality, and is known as a cost taking disorder .Studies show that about 20% of the patients who refer to out clinics suffer from depression. Mentally, the first symptom of depression is reduction in motivation and enthusiasm after which reduction in activity and efficiency, hope in life, self-caring, and also tendency to death are emerged in the person (Kaplan and Sadock, 2002). For the first time, the relationship between diabetes and depression was determined by an English physician called Dr. Tomas Vilis in 1684 (Willis, 1971). In another study done by Grandinei et al, On 574 patients indigenous to Havaei region, it was known that the increase in depression prevalence is observed among the diabetic patients (Grandinetti and Kaholokula, 2000). In addition, there is some relationship between depression and blood sugar controlling in diabetic patients (Gory et al., 2000). It has been mentioned in Lostman's study that depression is along with the increase in blood sugar in the patients afflicted with diabetes of types 1 and 2 (Grandinetti and Kaholokula, 2000). In researches conducted by Gardeo et al. in Mexico in 1998 on diabetic patients of type 2, it was concluded that 46% of diabetic persons are afflicted with depression and also being female and time duration of affliction with diabetes are among the danger factors in depression occurrence (Graduno andTeles, 1998). On the whole, depression is one of the mental disorders which has the most accompaniment with diabetes. The issue whether this relationship has to do with either beginning of progress and deterioration of diabetes or preparation and reaction towards it, is under discussion (Talbot et al., 2000). Accordingly, considering the daily increase in the number of the people afflicted with diabetes and also the role of depression in making and controlling this disease, a study was conducted with the purpose of determining the degree of depression among the diabetic persons referring to Rasht diabetes center.

2. Material and Methods

This research is a correlation – descriptive study which was conducted using the simple random sampling method within 3 months on 144 subjects of the social workers afflicted with diabetes referring to Rasht diabetes center in (2008). Data gathering tool was a questionnaire consisting of two parts. The first and second parts of the questionnaire consisted of demographic data and Beck depression Questionnaire, respectively. Finally, the data out of this research were analyzed by using the SPSS 15 statistical software and T-test statistical tests.

3. Results

Results showed that out of 144 subjects (tested), there were 16 persons (11.1%) forty years old and younger, 18 persons (12.5%) older than 65 years, 66.4% between 41 to 65 years old, 2.1% single,6.9% divorced, and 91% married . In addition, in terms of education level, 47.9% and 6.9% were illiterate and educated, respectively. On the other hand, in terms of the illness type, 25 people (17.4%) and 75 people (82.6%) were afflicted with diabetes types 1 and 2, respectively .Be sides, statistical tests showed that 35.41% of tester were afflicted with acute depression of which 88.23%, 84.31%,60.78%, 80.39%, and 84.33% were female, married, illiterate, in age interval of 41-65 years old, and afflicted with diabetes type 2, respectively .It was also shown that there is a significant relationship between depression and gender($p=0.004$), marital status ($p<0.05$),educations level ($p<0.05$), and jobs of the afflicted ($p<0.05$) . (Table 1)

Table 1: Frequency distribution and relationship between personal identifications and depression in Rasht diabetic patients.

	Percent	Number	Percent	Number	Percent	Number	Percent	Number		
Not Significant	9.80%	5	10.71%	3		0	19.51%	8	40 years old and younger	Age
	80.39%	41	78.57%	22	87.5%	21	63.41%	26	Between 41 to 65 years old	
	9.80%	5	10.71%	3	12.5%	3	17.7%	7	Older than 65 years	
Significant p =0.004	88.23%	45	82.14%	23	75%	18	70.73%	29	Female	Gender
	11.76%	6	17.85%	5	25%	6	29.26%	12	Male	
Significant p <0.005		0		0	4.16%	1	4.87%	2	Single	
	84.31%	43	100%	28	87.5%	21	92.68%	38	Married	Marital Status
	15.68%	8		0	8.33%	2	2.43%	1	Divorced	
	17.64%	9	10.71%	3	4.16%	1	9.75%	4	Free	

Significant p <0.005	7.84%	4	14.28%	4	16.66%	4	39.02%	16	Employee	Job
		0	3.57%	1	8.33%	2	4.87%	2	Jobless	
	74.50%	38	71.42%	20	70.83%	17	46.34%	19	Housekeeper	
Significant p <0.005	60.78%	31	42.87%	12	50%	12	34.14%	14	Illiterate	Education level
	25.49%	13	46.42%	13	33.33%	8	34.14%	14	Secondary	
	11.76%	6	3.57%	1	8.33%	2	19.51%	8	Diploma	
	1.96%	1	7.14%	2	8.33%	2	12.19%	5	University	
Not Significant	6%	3	7.40%	2	4.16%	1		0	Village	Living place
	94%	47	92.59%	25	95.83%	23	100%	39	City	
	29.44%	15	17.85%	5	29.16%	7	21.95%	9	Rental	Living Status
	70.58%	36	82.14%	23	70.83%	17	78.04%	32	Personal	
Not Significant	15.68%	8	17.85%	5	16.66%	4	19.51%	8	Diabetes 1	Type of disease
	84.33%	43	82.14%	23	83.33%	20	80.48%	33	Diabetes 2	

4. Discussions

The present study shows that there is a significant relationship between the depression in people afflicted with diabetes and their gender, marital status, educations level, and jobs. According to the researchers conducted by Sepehrmanesh et al. Regarding the prevalence and types of depression on 300 diabetic persons in 1382, it was shown that men and women were 71% and 57.7% depressed, respectively, and also out of 30% patients afflicted with acute depression, 25 (32%) and 105(47.3%) persons were men and women, respectively .Researches showed that depression in diabetic women was almost 1.4 times as equal as diabetic men. Reference books proclaim acute depression in women about two times as equal as men (Kaplan H & Sadock, 2000). Reached also to the result in their research in 2001 based on which depression in diabetic women was more seen than in diabetic men (Anderson et al., 2001). Soinkok et al., (2001) noticed in their research that depression in diabetic people has just to do with the female gender (Soinkok et al., 2001) .In researches conducted by Gardeo et al in Mexico in 1998 on diabetic patients of type 2, it was concluded that 46% of diabetic persons are afflicted with depression and also being female and time duration of affliction with diabetes are among the danger factors in depression occurrence (Graduno and Teles, 1998).

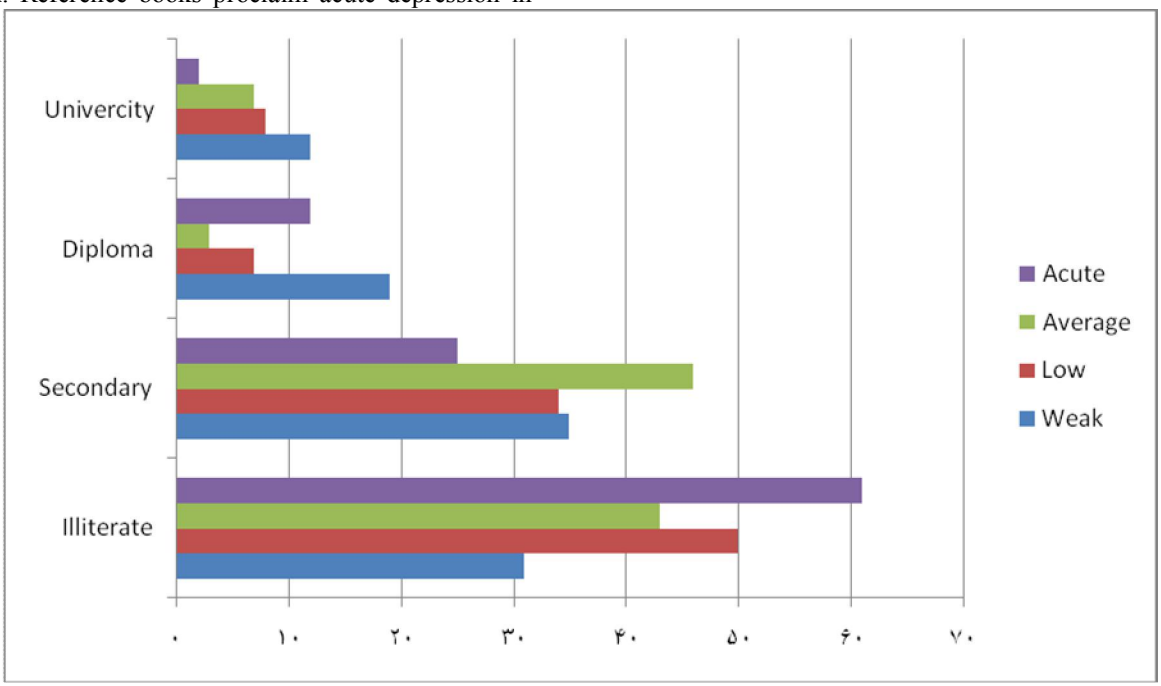

Figure 1: Distribution of individuals' depression types degrees in terms of education level

In another research conducted by Toziki et al., the sexual distribution of the patients under study was as follows: 35 people (34%) of the women were in the group of the undepressed and the other left 68 people (66%) were depressed. In the men's group as well, there were 23 people (48.9%0 undepressed and 24 ones (51.1%) depressed. The data obtained from the study indicate that depression is not under the

influence of gender. A significant relationship was also observed in our research ($p<0.05$) (Talbot et al., 2000). (Figure 2).

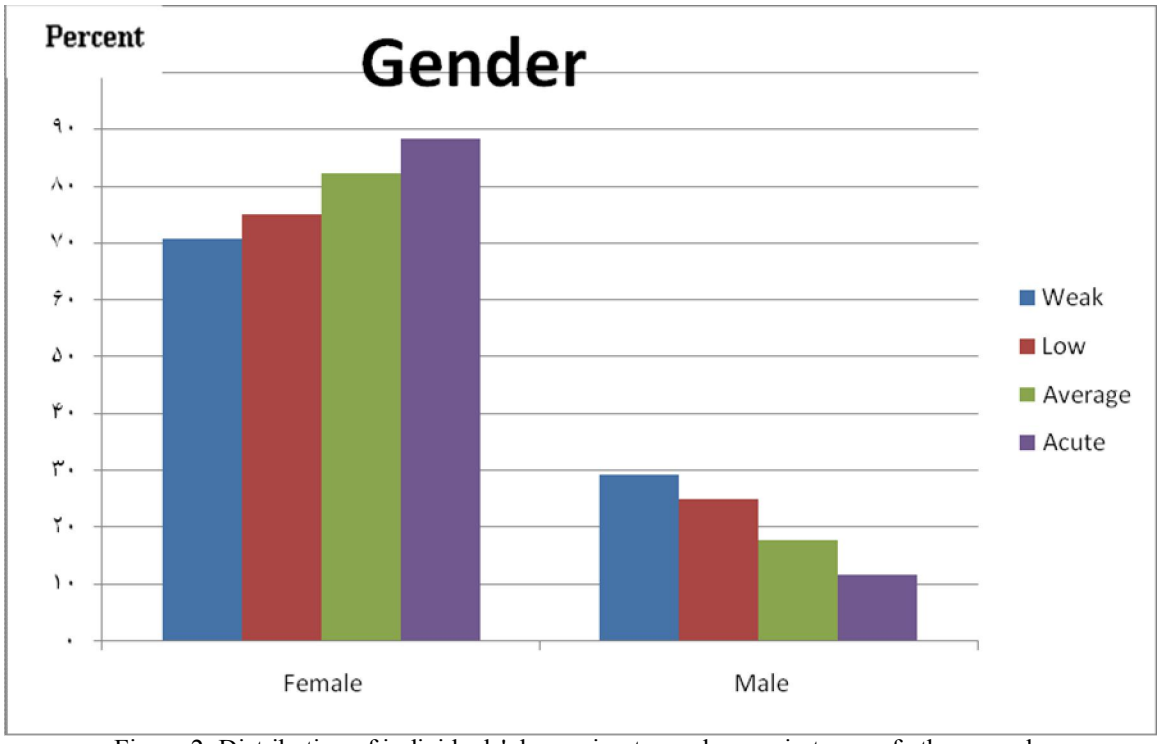

Figure 2: Distribution of individuals' depression types degrees in terms of them gender

In the United States, 6% of the people are afflicted with the depression arisen from diabetes. 1.5% of the people between 20 to 40 years old as well as 20% of the people older than 75 years are afflicted with depression whose 90% are among the diabetic type 2.In the present research, results showed that there were 16 people (11.1%) forty years old and younger as well as 18 ones (12.5%) older than 65 years out of the total 144 subjects (tester) .In addition, in terms of the illness type, there were 25(17.4%) and 75(82.6%) people afflicted with diabetes types 1 and 2, respectively . In addition, statistical tests showed that 35.41% of tester were afflicted with acute depression of which 88.23%, 84.31%,and 84.33% were female, married, and afflicted with diabetes type 2, respectively (Figure 3). According to the psychiatric references, the average age of depression initiation is about 40 years old (Kalpan and sadock, 1998). In our research as well, the people between 41 to 60 years old made up the most distribution of the diabetic. Some researches show the degree of depression occurrence in the people under 20 years old is on the rise (Talbot et al., 2000). Based on the reference books, the acute depression is more seen in the people who do not usually have any close interpersonal relationships (Kaplan and Sadock, 1999). Fisher et al (2001) proclaimed in their research that life stresses such as educations level are effective on occurring depression in the diabetic as the added and independent agents (Fisher et al., 2001). The married made up the most percentage of patients (84.31%) in the study conducted by us. It is while a high percentage of these people were ranked in low levels in terms of the education (Figures 1 – 4). In the research conducted in a clinic in california, it was seen a significant relationship between diabetes and the participants' employment status as well as between the regression analysis of depression variable and the employment status, respectively (Robert and Nanji, 1986). .In addition, it was shown in the study carried by ru-Ling Baia et al, that most of the participants were financially independent (n=113;72.4%), and also the results have not shown a significant difference in terms of the financial status and income level (Yu and Chou, 2008).

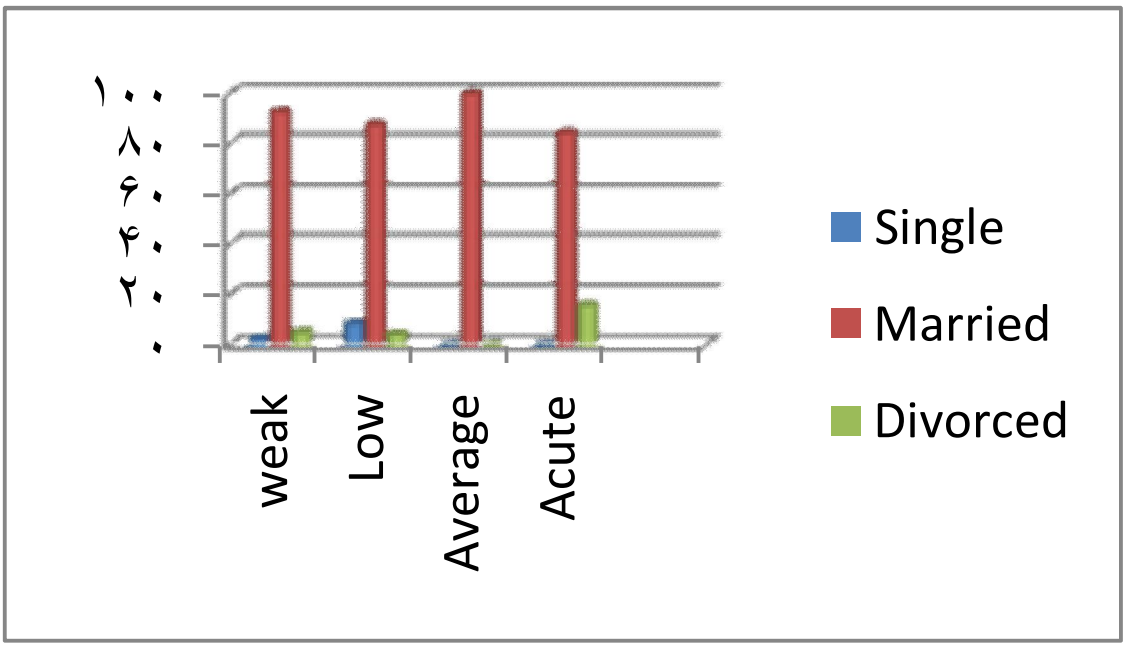

Figure 3: Distribution of individuals' depression types degrees in terms of marital status

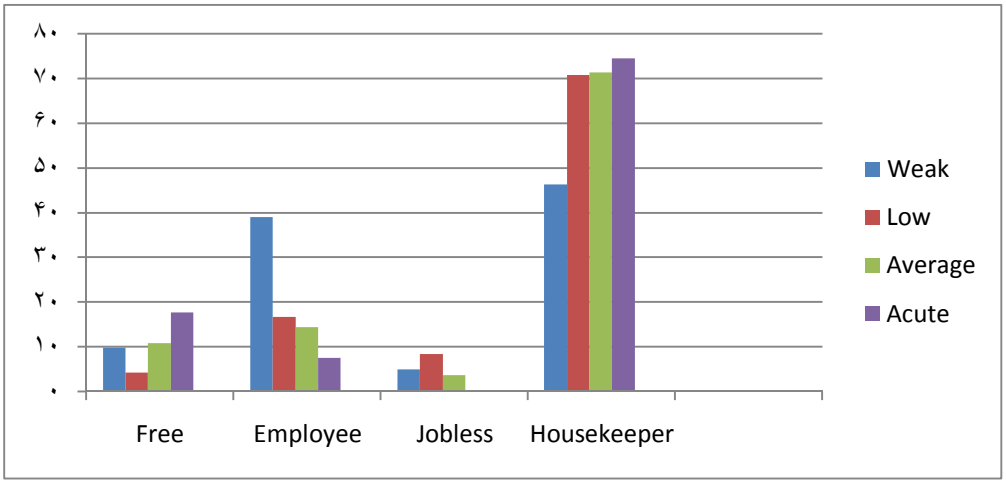

Figure 4: Distribution of individuals' depression types degrees in terms of them jobs

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The effects of Purslane (Portulaca oleracea L.) on serum level of lipids, lipoproteins and paraoxanase 1(PON1) activity in hypercholesterolemia patients

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Abstract: Some unverified reports around the world demonstrated that Purslane has therapeutic effects on some conditions. The aim of this study was to compare the effects of Purslane and Lovastatin therapy in decreasing serum lipids, lipoproteins, and paraoxanase1 (PON1) activity. In this clinical trial study, 93 patients with LDL-C more than 120 mg/dl who referred to the internal clinic of Kashani hospital in Sahrekord, Iran were selected and divided into two groups: Purslane (42 patients) and Lovastatin (51 patients). Fasting venous blood samples obtained before and 45 days after taking Purslane or Lovastatin, levels of all variables in the samples were measured. Our results showed that after receiving Purslane or Lovastatin serum level of cholesterol, LDL-C and OxLDL decreased. PON1 activity, ApoA1 and HDL-C increased but Triglyceride and body mass index (BMI) decreased Only in Purslane group. ApoB decreased only after taking Lovastatin. In conclusion, Purslane reduces some cardiovascular risk factors and increases PON1 activities better than Lovastatin.

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Keywords: Portulaca oleracea L., Purslane, Paraoxanase1, Lovastatin

1. Introduction

Portulaca oleracea L. (Common Purslane, also known as Khurfeh in Iran) grows in most parts of the world and cultures in most countries. There are Water, pectin, protein, Carbohydrates, fatty acids, particularly unsaturated fatty acid ω3, antioxidant substances and Several mineral elements, including: iron, copper, manganese, potassium, calcium and phosphorus in different parts of this plant (Mohamed and Hussein, 1994).

This plant is an edible succulent 'weed' which is widely distributed in Iran. Fresh Purslane has a slightly sour and salty taste and is eaten by most of the southern aborigines of Iran. It is used as salad or is cooked and used as a soup. Its leaves, stems, flowers, and seeds are all used in Iranian folk medicine. Some unverified reports around the world demonstrated that Purslane has therapeutic effects in some conditions (Oh et al., 2000). Purslane has been traditionally used for treatment against parasites, and digestive disorders. It is also used to treat infections or bleeding of the genito-urinary tract. The fresh one may also be applied topically to relieve sore and insect or snakebite (Bensky, 2004).

Purslane contains many biologically active compounds and nutrients, including phenolic alkaloid pigments (Yang et al., 2009), flavonoids, glutathione and alpha-tocopherol (Simopoulos et al., 1992). Reddish Betacyanins and yellow Betaxanthins are also found in Purslane (Wang and Yang, 2010). Most of these compounds are very potent antioxidants and have been found to have anti mutagenic, anti-inflammatory and anti-fungal activities in laboratory studies (Xu et al., 2006).

Purslane contains more Omega-3 fatty acids than any other leafy vegetable plants and it contains extraordinary amounts of eicosapentaenoci acid (EPA). The leaves of Fresh Purslane are rich in alpha-Linolenic acid (Wang and Yang, 2010). It also contains polyphenols, vitamins (A,B,C,and carotenoids) as well as dietary minerals, such as calcium, iron, potassium , magnesium and selenium (Barbosa-Filho et al., 2008).

Cardiovascular risk factors can reduce by these antioxidants, Omega-3 fatty acids and some of vitamins or minerals.

It has been proposed that oxLDL plays an important role in the development of therosclerosis and is well recognized that HDL plays a protective role against atherogenesis and coronary heart disease (Knoflach et al., 2009; Vekic et al., 2007). HDL has also been a carrier of enzymes that destroys the lipid hydroperoxides that oxidize LDL phospholipids. Human paraoxonase-1 (PON1) is a calcium-dependent esterase associated with HDL particles (Vekic et al., 2007) and the antioxidant activity of HDL is largely due to the activity of PON1. Previous studies indicated that PON1 plays a protective role against the oxidative modification of plasma lipoproteins and has been shown to hydrolyze lipid peroxides in human atherosclerotic lesions (Fortunato et al., 2003).

The aim of this study was to compare the effects of Purslane and Lovastatin therapy in decreasing serum lipids, ApoA1 and ApoB containing lipoproteins, oxLDL level and PON1 activity in the two groups of patients with hypercholesterolemia from Iran.

2. Material and Methods

In this clinical trial study, 93 patients with LDL-C over than 120 mg/dl who referred to the internal clinic of Kashani hospital in Sahrekord, Iran were enrolled.

None of the patients was taking lipid-lowering drugs or any other medication known to affect lipid metabolism before beginning the study. The individuals with hypertension, diabetes mellitus, thyroid, hepatic, renal diseases and smokers were excluded from the study.

The patients filled out a consent form in and the Ethics Committee of the Shahre-kord University of Medical Sciences approved the study. The patients were divided in two groups of Purslane (N=42) and Lovastatin(N=51). In the Purslane group, almost 50 gr/day of fresh leaves and stems of Purslane were added to the patient's diet for 45 days. The second group received 20mg/day Lovastatin for the same period.

The study was approved by the Medical plants research center of Shahrekord University of Medical Science and its Ethics Committee. All patients gave their written informed consent. A consent form was read to them carefully and it was explained so that it will be fully comprehended and lastly signed by them. This study was registered in the Iranian

Registry of Clinical Trials (www.irct.ir) with registration number ID: IRCT138902063806N1.

Biochemical analysis:

A fasting blood sample was obtained from the patients before onset of receiving Purslane and Lovastatin and the second one, 45 days after the end of the treatment. Glucose, total cholesterol (TC) and triglycerides (TG) were assayed using standard enzymatic procedures. HDL-C and LDL-C were measured with direct method and ApoA1 and ApoB levels were measured by immunoturbidimeteric method. Creatinine also was measured by Jaffe method for excluding renal patients. All biochemical tests were measured in serum (BT 3000 automatic analyzer) using commercial kits by Pars Azmon Co. (Iran). Arylesterase activity was measured using phenylacetate as the substrate by the modified procedure of Kitchen et al (Kitchen et al., 1973). PON1 activity toward paraoxon was measured after the reaction of paraoxon hydrolysis into p-nitrophenol and diethylphosphate catalyzed by the enzyme (Rainwater et al., 2005). The oxLDL was measured by a sandwich ELISA method using a commercial kit (Mercodia- Sweden).

Data were analyzed using independent t-test, paired Student t-test and SPSS statistical software (ver.=11.5). P value was considered significant $P<0.05$.

3. Results

The patients fulfilled the process of the study and there were no dropouts. The average age of the patients in Purslane group was 44±9.6 and the Lovastatin group was 49±11.6 years old. No significant differences were found between the two groups tested in terms of the mean age and gender

The average Body mass index (BMI) before intervention in Purslane and Lovastatin groups were 27±3.9 and 26±4.9 Kg/m2 respectively ($p>0.05$).

There was a significant decrease in serum cholesterol, LDL-C and oxLDL in the two groups after taking both Purslane and Lovastatin but ApoB was decreased only after taking Lovastatin. PON1 activity was increased in the two groups and PON1 arylesterase activity, HDL-C and Apo A1only were increased in the Purslane group, but BMI and triglycerides were decreased in Purslane group (Table 1).

Table 1: The variables measured before and after receiving Purslane and Lovastatin in the patients studied

Groups Variable	Purslane (N=42)			Lovastatin (N=51)		
	Before Mean ±SD	After Mean ±SD	P value	Before Mean ±SD	After Mean ±SD	P value
BMI (kg/m^2)	27±3.9	25±4.1	0.032	26±4.2	26±4.4	0.65
FBS (mg/dl)	79±17.5	81±19.1	0.34	88±12.6	86±13.5	0.19
Total cholesterol (mg/dl)	215±34.5	197±31.6	0.02	235±29.4	191±31.5	0.01
Triglycerides (mg/dl)	189±75.5	169±61.6	0. 01	189±60.7	180±63.6	0.45
HDL-C (mg/dl)	38±10.5	42±10.2	0.024	39±8.9	41±9.5	0.38
LDL-C (mg/dl)	139±23.3	121±27.5	0.02	149±28.9	99±31.8	0.006
ApoA1 (mg/dl)	125±10.6	131±10.5	0.03	123±21.9	125±29.5	0.56
ApoB (mg/dl)	111±18.1	106±19.2	0.265	125±29.6	98±25.4	0.004
OxLDL (U/L)	68±19.1	61±19.9	0.011	86±14.6	73±15.4	0.007
PON1 arylesterase activity (U/L)	95±42.5	114±53.7	0.012	101±35.6	108±42.1	0.09
PON1 paraxonase activity (U/L)	198±111	276±132	0.034	205±117	265±114	0.021

4. Discussions

Many studies strongly support the hypothesis that oxidative modification of LDL plays a crucial role in the pathogenesis of atherosclerosis (Berliner JA, Heinecke W, 1996). PON1 may be a major defense barrier against lipid peroxides from oxidized LDL (Mackness et al., 1993). It needs to be known that whether factors, such as diet, medical herbs or lipid lowering compounds influence plasma PON1 activity or concentration.

Aryl esterase activity has a direct correlation with mass of PON1 protein (Van et al., 2006) and serum paraoxanase activity seems to have inverse relationship with coronary heart disease (Mackness et al., 2003).

Based on our results, the reduction in serum total cholesterol, LDL, oxLDL, and ApoB was observed in Lovastatin group which is in agreement with several other reports (Clauss et al., 2006).

Purslane contains almost all of the nutrients and it is an excellent source of the antioxidant, vitamins, α-tocopherol, β-carotene, and L-norepinephrine (hanson et al., 2004).

Triglycerides, total cholesterol, LDL and oxLDL were decreased in the group received Purslane. Cholesterol reduction is occurring principally in LDL-C fraction but HDL-C fraction was increased which would be beneficial for reducing the risk of cardiovascular disease.

Purslane is a rich source of Omega 3 fatty acids and it has been reported that Omega 3 fatty acids reduce LDL-C (Chang et al., 2009).

High concentrations of Melatonin, a free radical scavenger, are recently identified in Purslane (Simopoulos et al., 2005; Rodriguez et al., 2004). Melatonin also reduces LDL-C in rats with high cholesterol diet. Therefore, LDL-C reduction seen in our study might be due to Melatonin.

The presence of other active compounds such as alpha-tocopherol, beta-carotene and glutathione in Purslane also may play a role in the observed hypocholestrolemic effects (Hoyos et al., 2000; Liu et al., 2000).

Following taking of Purslane OxLDL decreased. Antioxidant compounds in Purslane probably prevents the generation of lipoperoxides during the process of LDL oxidation. Purslane herb aqueous extracts can prevent oxidant-induced stress in the aging mice**.** The contents of malondialdehyde (MDA) were decreased and the activity of superoxide dismutase (SOD) was increased in the brain and liver of the tested mice (Hongxing et al., 2007). Superoxide anion, nitric oxide and hydroxyl radicals could be significantly scavenged by Purslane polysaccharides (YouGuo et al., 2009). Therefore, LDL could be protected from oxidation by Purslane polysaccharides which is led to decrease level of oxLDL.

This study also showed that Purslane reduces oxLDL level via increasing of paroxonase activity. PON1 activity can be modified by factors such as diet and lifestyle (Mackness et al., 2002). PON1 gene expression has been shown to be affected in vitro and in vivo by statins (Suehiro et al., 2000) which is consisted with Lovastatin effects in this study.

Purslane is a rich source of polyphenols. Polyphenols have antioxidant activity and also, modulates gene expression of PON1 leading to increased PON1 activity (Suehiro et al., 2000). Therefore, the increased PON1 activity was shown in our study could be due to Polyphenol contained in Purslane.

Oleic acid in olive oil is associated with increased PON1 activity (Ferretti et al., 2001). PON1 also was found to be inactivated by oxidized lipids and oxidized LDL (Rantala et al., 2002). It has been shown that anti-oxidant vitamins such as C and E may influence the PON1 activity (Van ET AL., 2005).

Purslane has plenty of antioxidant vitamins and similar to olive oil is rich of oleic acid and alpha-linolenic acid (Simopoulos et al., 1992) and thus could increase PON1 activity.

The minor decrease of ApoB density among Purslane consumers is may be because of the fact that Purslane components less often action the liver receptors of lot eliminator. In other word the effect of Purslane on the LDL-C ingredient is may be due to colestral discharging in gradients not because of lotal eliminating by Purslane receptors. So ApoB density changed a little.

Purslane could reduce some well-known cardiovascular risk factors such as cholesterol, triglyceride, LDL-C and particularly ox LDL. Reduction of ox LDL level is result of increasing paraoxanase 1 protein concentration and this enzyme activity.

Acknowledgements:

The study was approved by the Medical plants research center of Shahrekord University of Medical Science and its Ethics Committee. All patients gave their written informed consent. A consent form was read to them carefully and it was explained so that it will be fully comprehended and lastly signed by them. This study was registered in the Iranian Registry of Clinical Trials (www.irct.ir) with registration number ID: IRCT138902063806N1. Authors would like to thank the research deputy Shahrekord University of Medical Sciences for their financial support.

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