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Surveying the Intensity of Perceived Stress and its Relation with Some of Cardiovascular Diseases Risk Factors in Patients with Myocardial Infarction

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Abstract: Stress is one of the factors that may be accompanied with the increase of the possibility of cardiovascular diseases. This research is aimed to survey the relationships between the rate of perceived stress with the other factors causing cardiovascular diseases in patients confined in myocardial infarction. In this cross sectional descriptive-analytic research, 800 patients with myocardial infarction diseases who were hospitalized in Ghaem and Imam Reza Hospitals in Mashhad were chosen randomly. To collect data, a questionnaire was used to gather their demographic characteristics a questionnaire for perceived stress and a form to record laboratorial test and ECG changes' results. The results of this research showed that 45% of the patients were suffering of moderate stress and 55% of intensive stress. Also, finding of the research indicated that there were significant differences between the mean of stress level in the various categories of the variables such as; sex, education, blood pressure, the history of hypertension, diabetes, cigarette smoking, exercising, job and family history of myocardial diseases. Regarding the high level of perceived stress in patients with myocardial infarction, it is necessary to devise a program and determine stressor factors to decrease or remove them.

Key words: Intensity of perceived stress, cardiovascular diseases, myocardial infarction, risk factors, remove, Iran

INTRODUCTION

Today, cardiovascular diseases are considered as most common and serious diseases in developing countries (Kasper *et al*., 2005). The rate of prevalence of cardiovascular diseases was about 71.3 million that is around 34.2% in America in 2003 (Rezaei, 2005). Of this, heart coroner vessel diseases are the first rate and these kind of diseases are the most causes of death in both developed and developing countries (Bahar *et al*., 2003; Reynolds *et al*., 2001). According to the statistics provided by American Heart Association in 2003, there were about 13.2 million patients confined in heart coroner vessel diseases (6.9% of the whole American people) and the rate of death was about 479,300 people that involved around 53% of the total deaths occurred in this country (Rezaei, 2005). The results of researches have shown that the rate of survival after confining to this disease is so low (Rosamond *et al*., 2007). Through this, World Health Organization's report approves this matter that the rate of cardiovascular diseases are increasing so that in 2000 AD about 48.6% of the whole death belonged to cardiovascular diseases and it is expected that this rate in 2020 will reach to 46.4% (Aboderin *et al*., 2001). Cardiovascular diseases in Iran also like most of the countries is the main cause of deaths (Kabir *et al*., 2005). Today, about 35% of the whole deaths in Iran is also because of cardiovascular diseases. According the statistics of 1380, the number of deaths from cardiovascular diseases in Tehran was 15,326 cases (36.35% of the whole deaths rate) (Zadeh *et al*., 2003).

There are much more risk factors in relation to cardiovascular diseases that are too important to study. Recent advancements to control the risk factors in relation to these diseases, considerably made the procedure of cardiovascular diseases slower (Brindle *et al*., 2003). The researches and studies about the context of cardiovascular diseases was more based on the treatment of these diseases but in the recent years, this concentration have shifted so that several researches are accomplished to determine their risk factors. One of the most important researches in this context is Framingham's

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heart research and the results of this research indicated that about 50% of cardiovascular diseases depend on nine main risk factors that include the factors such as; age, gender, family history of cardiovascular diseases, the rate of blood cholesterol, the rate of blood lipoprotein with high density, hypertension, smoking, diabetes mellitus and left ventricular hypertrophy (Nanchahal *et al*., 2002; Knoflach *et al*., 2003; Bastuji-Garin *et al*., 2002). The factors that are mostly in relation to cardiovascular diseases are divided in three main types including unchangeable factors like; age, gender, preterm menopause and family history; changeable factors like; smoking cigarettes, fatness, hypertension, diabetes mellitus, insufficient physical activities, increase of blood cholesterol, increase of the level of blood lipoprotein with low molecular weight, decrease of lipoprotein level with high molecular weight and unapproved risk factors like; insufficient use of vitamin B-complex and hyper insulinemia (Kohpaye *et al*., 2005). Another group of risk factors related to cardiovascular diseases are the psychological factors like; depression, anxiety disorders, anger, roughness and chronic stresses during life period (Jiang *et al*., 2002; Lett *et al*., 2004; Rugulies, 2002). Stress is one of the risk factors that may be accompanied with the increase of possibility to be affected with cardiovascular diseases.

The main point is that although, the results of some researches demonstrated stress as an important risk factor in cardiovascular diseases but in several resources, it is not considered as a main risk factor of these diseases (Woods *et al*., 2005). Stressor conditions have adverse effects on peoples' health and can cause killing diseases, like coroner vessel disorders and hypertension (Kiani, 2000). Stress activates biologic stress responses and these responses also activate Neurological System, Glands and Immune system. One of the main events that occurs in biologic stress response is Sympathetic System activation and releasing epinephrine. The most important systems that are affected by release of epinephrine are the cardiovascular systems so that increasing the heart rate and also hypertension are the chief consequences of stress (Urden *et al*., 2006).

Surveying the results of some researches indicated that activation of sympathetic systems by different stressors and release of epinephrine causes the heart rate (Lu *et al*., 2005; Drummond, 2003) blood pressure and pulse rate increase (Woodrow, 2004; Pickering, 2003; Bruehl *et al*., 2002; Al'Absi and Petersen, 2003) but the volume of lungs decrease and finally, they may cause myocardial ischemia (Briggs, 2002). As observed before, stress by activating biologic stress response also indirectly by increasing the possibility of occurring other risk factors may cause cardiovascular diseases. However, there had not been done any researches about the relations between stress with other risk factors of cardiovascular diseases so, this research is accomplished to survey the relationships between the rate of perceived stress with other main risk factors of heart coroner vessels in patients with myocardial infarction.

MATERIALS AND METHODS

This research is a cross-sectional descriptive-analytic, one that is accomplished from May to September 1386 on 800 patients affected with cardiovascular diseases that were hospitalized in heart units of Ghaem and Imam Reza Hospitals during the process of research accomplishment in Mashhad. Sampling was done by impossibly and accessible method. The research pre-requisites were patient's awareness and helping, approval of myocardial infarction by clinical symptoms, serum enzyme tests and heart tape changes. To collect data, a questionnaire was utilized that consisted of three parts including a demographic information questionnaire (including subjects such as; age, gender, marriage status, education, weight and height) a special form to record laboratorial findings and tape changes by content validity method and a questionnaire to record perceived stress. The validity of demographic information questionnaire, the special form of recording laboratorial findings and tape changes were approved by content validity method and utilizing 10 teachers opinions in Mashhad Medical University. The perceived stress questionnaire is designed by Kohn and Kamark (Ramirez and Hernandez, 2007). When this criteria is utilized that the objective is to determine the rate of stress created of life situations by oneself. These questions are designed for respondents to express their ideas about life uncontrollability, unpredictability and hardness. It is determined for times and times that these three factors are the main factors of stress experiencing. Perceived stress criteria is constituted in usual subjects (they who were not affected by acute psychological diseases). Its sentences were understandable, easily. Moreover, questions had a total identity and because of this were exempt of any special content that is the specification of a special group. The first version of this instrument had 4 question, the second version 10 question and the third one had 14 question. In this research, the third version, means 14 question instrument was utilized. This instrument is designed based on Likert criteria including five choices (from never or none = 1; to very much = 5) and is utilized in many more researches thus, its validity and reliability are approved. As a first research document, researchers can mention Salehy Federy's research that was accomplished on a number of women teachers. In this

research for the first time, this index is utilized to compare the rate of perceived stress in women and their several roles. Also, Alpha-Chronbakh was used as an index to determine internal similarities, the result was 0.89 that was acceptable. Also, Salehi again in this research mentions as another approving element that can approve the reliability and validity of this instrument, it was utilized on different groups of subjects that were students of Ferdosi University in Mashhad by Alpha-Cronbakh index. This time, 0.84 was resulted that is acceptable too (Javad, 1997). The questions of this index about ones thoughts and feelings are so designed that the person had during last year. Questions number 4, 5, 6, 7, 9, 10 and 13 are scored, reversely (Never or none = 5, very much = 1). According to this criteria, the least score gained of perceived stress would be 14 and the most 70.

To implement this research, researcher refereed to research environment every day and at first selected the subjects according to predetermined criteria and after introducing her/himself and providing information about the research objectives informed consent forms were completed by the subjects. Also, subjects were insured that they are free to participate, not participate or leave the research, each time they decide to and their information will be analyzed, secretly and without mentioning their names. Then, introduced questionnaires were completed by utilizing available documents in patients' files and interviewing them by researcher. Data analysis were accomplished by utilizing SPSS Version 11.5 software and statistical tests such as: t-test, one-way variance analysis and K2.

RESULTS AND DISCUSSION

About 800 patients have participated in this research. In this research, subjects were analyzed according to their demographic information. About 6.5% of the subjects (53 persons) were <40 years, 15% (120 persons) between 41-50 years, 33% (264 persons) between 51-60 years and 45.5% (364 persons) >60 years. About 43.5% of the subjects (363 persons) were women and 56.5% (452 persons) were men. About 81% (65 persons) were married and the souses of 19% (152 persons) had been died.

About 45.5% (364 persons) of the subjects were illiterate, 31.5% (252 persons) had elementary education, 17.5% (140 persons) high school education and 5.5% (44 persons) had university education. About 10.5% of the subjects (84%) had less than normal body mass, 50.5% (84 persons) had normal body mass and 39% (312 persons) had body mass more than normal. About 65% (520 persons) of the subjects had normal blood pressures and 35% (280 persons) of them had hypertension. About 2.6% (21 persons) of the subjects had hypertension history, previously while 97.4% (779 persons) of the subjects did not have hypertension. 84% (672 persons) of the subjects had normal serum level, 16% (128 persons) had serum level more than normal. About 805 (640 persons) had normal serum level triglyceride and 20% (160 persons) of the subjects had more than normal serum level triglyceride.

About 15.5% (124 persons) of the subjects were affected with diabetes and 84.5% (676 persons) were not affected with diabetes. About 66% (528 persons) never had smoked cigarettes before, 23% (184 persons) had cigarette smoking history before but had given up before this research and 11% (88 persons) were smoking cigarettes during this research. About 4% of the subjects (32 persons) were exercising regularly, 30% (240 persons) were exercising irregularly and 66% (528 persons) had not exercised at all. Regarding the job, 10.5% (124 persons) were employees, 11.5% (92 persons) were workers, 38% (304 persons) were housekeepers, 2% (16 persons) were jobless, 11.5% (92 persons) were retired and 26.3% (212 persons) had free jobs. About 88.5% of the subjects (708 persons) were living in cities and 11.5% (92 persons) were living in villages. Regarding the history of cardiovascular diseases, 25.5% (204 persons) of the subjects were positive while 74.55 (596 persons) were negative. About 82.6% of the subjects (661 persons) had not used contraceptive tablets before and 17.4% (139 persons) had the history of utilizing contraceptive tablets before. The mean and standard deviation of age, body mass, serum level of cholesterol, serum level of triglyceride of the subjects were 59.18±11.06, 24.87±3.74, 154.62±88 and 206.70±56.39, respectively.

The results of this research showed that more than half of the patients bore much more stress before hospitalization during last year and rest of them that is 45% of the subjects, according to stress intensity were in moderate level (Table 1). The results of statistical tests such as independent t-test and one-way variance analysis indicated that there were no significant differences between stress in between various classes of stated variables (age, marriage status, body mass index, blood cholesterol level, blood triglyceride level and the location of heart engagement) (Table 2).

Table 1: Absolute and proportional distribution of the subjects according to the intensity of perceived stress

The intensity of stress	No.	Percentage
Low (14-32)	-	-
Moderate (33-51)	360	45
Severe (52-70)	440	55
Total	800	100
mean±SD	51.41±7.89	

Table 2: The results of statistical test like one-way variance analysis and independent t-test about the rate of perceived stress in relation to various variables

The types of the test and the level of significance	Age	Marriage status	Body mass index	Cholesterol	Triglyceride	Contraceptive tablet	Types of relativity
Stress intensity							
F-statistic	0.780	-	0.981	-	-	-	0.394
The level of significance	0.506	-	0.37	-	-	-	0.811
t-statistic	-	1.690	-	0.691	0.912	0.641	-
The level of significance	-	0.092	-	0.691	0.912	0.641	-

Table 3: Absolute and proportional distribution of the subjects according to their sex, stress intensity and stress mean regarding their sex

	The intensity of stress					
	Moderate		Severe			
Sex	No.	Percentage	No.	Percentage	The mean of stress	SD
Women	108	30	240	54.5	54.51	5.995
Men	252	70	200	45.5	49.12	8.103
Total	360	100	440	100.0	51.47	7.725

t = 5.20; p<0.0001

Table 4: Absolute and proportional frequency of distribution of the subjects according to the rate of education, stress intensity and the mean of stress according to the rate of education

	The intensity of stress					
	Moderate		Severe			
Education	No.	Percentage	No.	Percentage	The mean of stress	SD
Illiterate	92	25.6	272	61.80	54.96	6.265
Primary	122	36.7	120	37.30	50.23	7.151
Secondary	92	56.6	48	10.90	48.51	6.975
University	44	12.2	0	0.00	39.09	5.629
Total	360	100.0	440	100.00	51.47	7.725

F = 24.12; p<0.0001

The results of t-test showed that the mean of stress intensity in women was significantly more than the mean of stress intensity in men (Table 3). As observed in Table 4, the results of one-way variance analysis indicated that there were significant differences between the mean of stress according to various education levels between subjects. Also, the result of t-test indicated that the stress intensity in patients with hypertension was significantly more than stress in patients with normal blood pressure (Table 5). The results of t-test also showed that the mean of stress intensity in patients with the history of hypertension in the past was significantly more than that of patients without history of hypertension in the past (Table 6). As shown in Table 7, the results of independent t-test indicated that the differences between the mean of stress intensity in patients with diabetes was not significantly different from that of the patients without diabetes. Regarding the variable cigarette smoking, the results of one-way variance analysis statistical tests indicated that the mean stress of the patients that never had smoked cigarettes was significantly more than that of patients with the history of cigarette smoking (Table 8). In one side, the results of one-way variance analysis showed that the of stress intensity in people that did not exercise was significantly more than people who exercised, regularly or irregularly (Table 9). Also, the results of one-way variance analysis indicated that the mean of stress intensity in between the groups of

Table 5: Absolute and proportional frequency distribution of the subjects according to hypertension, stress intensity and the mean of stress according to high blood pressure history

	The intensity of stress					
	Moderate		Severe			
Hypertension	No.	Percentage	No.	Percentage	The mean of stress	SD
Have	120	33.3	160	36.4	52.414	7.228
Have not	240	66.7	520	65.0	50.961	7.960
Total	360	100.0	440	100.0	51.470	7.725

t = 3.129; p<0.019

Table 6: Absolute and proportional frequency of distribution of the subjects according to high blood pressure, stress intensity and the mean of stress, regarding to having the history of hypertension

	The intensity of stress					
	Moderate		Severe			
The history of hypertension	No.	Percentage	No.	Percentage	The mean of stress	SD
Have	8	2.2	12	2.7	49.400	7.154
Have not	328	91.1	424	16.4	51.723	7.735
Total	336	100.0	436	100.0	51.663	7.756

t = 3.921; p<0.017

Table 7: Absolute and proportional frequency of distribution of the subjects according to affected with diabetes, intensity of stress and the mean of stress regarding affecting with diabetes

	The intensity of stress					
	Moderate		Severe			
Diabetes	No.	Percentage	No.	Percentage	The mean of stress	SD
Have	76	21.1	48	10.9	49.741	7.793
Do not have	284	78.9	392	89.1	51.787	7.693
Total	360	100.0	440	100.0	51.470	7.725

t = 1.357; p<0.176

Table 8: Absolute and proportional frequency of distribution of the subjects according to be accustomed to smoking cigarettes, intensity of stress and the mean of stress depending on smoking cigarettes

	The intensity of stress					
	Moderate		Severe			
Smoking cigarette	No.	Percentage	No.	Percentage	The mean of stress	SD
No smoking at all	208	57.8	320	72.7	52.727	7.684
Smoked in past	92	25.6	92	20.9	49.478	7.444
Smoking now	60	16.7	28	6.4	48.090	7.137
Total	360	100.0	440	100.0	51.400	7.725

F = 5.632; p<0.004

Table 9: Absolute and proportional frequency of distribution of the subjects according to exercising intensity of stress and the mean of stress depending on exercising

	The intensity of stress					
	Moderate		Severe			
Exercising	No.	Percentage	No.	Percentage	The mean of stress	SD
Yes, regularly	28	7.8	4	0.9	44.250	5.120
Yes, irregularly	132	36.7	108	24.5	48.650	8.029
No	200	55.6	328	74.5	53.189	7.094
Total	360	100.0	440	100.0	51.470	7.725

F = 11.944; p<0.0001

Table 10: Absolute and proportional frequency of distribution of the subjects according to job, intensity of stress and the mean of job dependent stress stress

	The intensity of stress					
	Moderate		Severe			
Jobs	No.	Percentage	No.	Percentage	The mean of stress	SD
Employee	64	17.8	20	4.5	46.142	7.792
Worker	8	2.2	84	19.1	55.782	4.601
Housekeeper	496	26.7	208	47.3	54.618	5.944
Jobless	4	1.1	12	3.7	57.250	5.277
Retired	68	18.9	24	5.5	47.826	6.820
Free job	120	33.3	92	20.9	48.339	8.435
Total	360	100.0	440	100.0	51.470	7.725

F = 11.611; p<0.0001

Table 11: Absolute and proportional frequency of distribution of the subjects according to the family history, the intensity of stress and the mean of stress depending on family history

	The intensity of stress					
	Moderate		Severe			
Family history	No.	Percentage	No.	Percentage	The mean of stress	SD
Have	140	38.9	64	14.5	49.352	6.799
Have not	220	61.1	376	85.5	52.194	7.908
Total	360	100.0	440	100.0	51.470	7.725

T = 2.291; p<0.002

various jobs had significant differences (Table 10). The results of independent t-test indicated that the mean of stress of the people that had not family myocardial infarction history was significantly more than the patients with family history of myocardial infarction (Table 11). In between the subjects that all were affected with myocardial infarction there was no one with low stress (score <23). This matter demonstrates that the patients with myocardial infarction had more stress. It may be because of the increase of life stressors in various dimensions of life such as social, political, cultural and economical dimensions of the life and now, it indicates the importance of considering the role of stress in developing the context of cardiovascular diseases. According to American Heart Association idea (Rosamond *et al*., 2007), increase of age is accompanied with the increase of cardiovascular diseases. The findings of this research according to the factor age is compatible with the results of Framingham's research. In Framingham's research, 45% of subjects had >65 years and only 5% of them had <40 years (Smith *et al*., 2000; Bastuji-Garin *et al*., 2002). So, it is believed that the factor age is related to the time of being exposed to the factor or factors that are responsible for arteriosclerosis.

The results of this research indicated that the rate of the men affected with cardiovascular diseases were more than the women. The results of previous researches also showed that the rate of prevalence of cardiovascular diseases in men were more than women. The reason of this matter is possibly dependent to the hormonal differences between men and women. The results of Framingham research in 1976 indicated that the incidence of cardiovascular diseases in women after menopause was 2.6 times more than women before menopause. The risk of cardiovascular diseases in women that were reached menopause period by surgery was 2.7 times more than the women with the same age that have not been reached menopause period. Also, this risk was equal to 2.2 times of the women that were reached menopause period normally (Jukic *et al*., 2008; Collins *et al*., 2007; Wenger *et al*., 2002; Grady *et al*., 2002; Kok *et al*., 2006). Regarding education most of the subjects were illiterate. Then this subject indicates the necessity and importance of education, especially to learn some points about preventing cardiovascular diseases and emphasizes the role and importance of education to develop person's ability to struggle correctly with difficulties and life problems and find right resolutions to encounter with life stressors and control them.

About 65% of the subjects did not have high blood pressure and only 35% of them had high blood pressure (systolic blood pressure >140 mm hg^{-1} and diastolic >90 mm hg^{-1}) and between them, 94% even did not have blood pressure in the past. The results of researches also indicated that high systolic and diastolic blood pressures, accompanied with other risk factors are the most important factors to develop cardiovascular diseases (Grady *et al*., 2002). Also, the results of this research revealed that the mean of stress intensity in patients with high blood pressures is significantly higher than persons without high blood pressures regarding the activation of biologic stress response following releasing psychological transmitters of sympathetic systems like epinephrine, the rate of blood pressure is higher in persons with high stress (Urden *et al*., 2006; Rezaei *et al*., 2007). According to the affection with diabetes, the results of the research indicated that 84.5% of the subjects were not affected with diabetes but 15.5% of them were affected with diabetes. Also, the results of this research showed that the mean of stress intensity in the subjects without diabetes was higher than the subjects with diabetes however, this difference was not significant. The results of this research indicated that 34% of the subjects either now or before have smoked cigarettes and

66% of them had not smoked cigarettes at all yet. On one side, the results of the research indicated that the mean of perceived stress in cigarette smoking subjects was less than the other two groups (non-smokers and patients that have given up smoking). This may be because of the psychological belief based upon this matter that cigarette smoking will relieve and decline stress. Regarding exercising, the results of the research indicated that subjects that exercised regularly had less stress than the subjects that did not exercise. So, exercising through increasing person's psychological comfortability and emptying their excitement causes stress decrease (Underhill, 2005). According to the job, the most rate of stress were seen in jobless subjects. Also, the rate of perceived stress had significant differences between various jobs and this may be because of the various stressor factors that various jobs have. The results of this research revealed that there were significant differences between the mean of perceived stress in the subjects with high serum cholesterol and triglyceride levels in compared with the subjects with normal serum cholesterol and triglyceride levels this may be because of the utilization of fat decreasing medications by the subjects.

CONCLUSION

Findings of the research indicated that entirely, the rate of stress between the patients affected with myocardial infarction was moderate to high degree and because stress in between other risk factors is a very strong risk factor to onset and accelerate cardiovascular diseases. It is necessary to take it into consideration and decrease it and the necessity to design educational programs to determine its preterm resources also doing inhibiting and supportive activities about that accompanied with providing necessary awareness and education specially to the patients that are affected with cardiovascular diseases and generally to the whole society is of great importance.

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