An Epidemiological Study of Cardiovascular Risk Factors in Patients with Myocardial Infarction: A Prospective Study

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Abstract

Background: Stress is one of the most important factors that may be accompanied with increased possible prevalence of cardiovascular diseases including myocardial infarction.

Objectives: The purpose of this study was to investigate the correlation between perceived stress intensity and some cardiovascular risk factors in myocardial infarctions’ patients.

Methods: The design of the study was cross sectional. Overall, 2400 patients with myocardial infarction were chosen through multistage random sampling. A three-part questionnaire including demographic characteristics, perceived stress, and a checklist to record laboratorial test and electrocardiography changes were used for data collection.

Results: The results of the present study showed that 45% of the patients had moderate and 55% had severe stress. Moreover, findings of the research indicated that there were significant differences between the mean stress level in various categories of the variable including gender, education, history of hypertension, blood pressure, diabetes, cigarette smoking, exercising, job, and family history of myocardial diseases.

Conclusions: Regarding the high level of perceived stress in patients with myocardial infarction, it is necessary to devise a program and determine stressor factors to modify and decrease them.

Keywords: Cardiovascular Diseases, Cardiovascular Diseases Risk Factors, Perceived Stress, Myocardial Infarction

1. Background

Today, cardiovascular diseases are considered as the most common and serious diseases in developing countries (1-6). In 2013, the rate of prevalence of cardiovascular diseases was about 71.3 million (34.2%) in the United States (7). Coronor vessel diseases had the first rank and these kinds of diseases were the most common causes of death in both developed and developing countries (8, 9). American researchers of the Heart Association showed that about 13.2 million patients (6.9% of the whole American population) had heart coroner vessel diseases in 2013. The rate of death was about 479300 people, where 53% of the total deaths had occurred in the United States (7). Researchers also...
showed that the rate of survival after confinement was very low (10). The World Health Organization’s report approved that the rate of cardiovascular diseases is increasing, with these diseases being the underlying cause of 48.6% of all deaths, and the rate is expected to rise to 46.4% by 2020 (11-13).

In Iran, like most countries, the main cause of death is cardiovascular diseases (5, 14) and causing 35% of deaths in Iran. The number of deaths due to cardiovascular diseases has been reported as 15326 cases (36.35%) in Tehran for the year 2010 (5).

There are many risk factors associated with cardiovascular diseases. Recent advancements for the control of risk factors associated with cardiovascular diseases can help us deal with this health hazard (15-17). Many researches have focused on the context of cardiovascular diseases. Some studies are based on the treatment of these diseases and others are trying to determine the risk factors. Framingham’s study showed that 50% of cardiovascular diseases depend on nine main risk factors. Risk factors include: age, gender, family history of cardiovascular diseases, the rate of blood cholesterol, the rate of high density lipoprotein of blood, hypertension, smoking, diabetes mellitus, and left ventricular hypertrophy (5, 18-20).

Effective factors in cardiovascular diseases are divided to three main types including: unchangeable factors (age, gender, preterm menopause and family history), changeable factors (smoking cigarettes, fatness, hypertension, diabetes mellitus, insufficient physical activities, increase of blood cholesterol, low lipoprotein and high lipoprotein of blood), and unapproved risk factors (insufficient use of vitamin B-complex, and hyper insulinaemia) (21). Psychological factors are the other group of risk factors. They include depression, anxiety disorders, anger problems, roughness, and chronic stresses during life (22-24).

Stress may be accompanied with increase in the possibility of cardiovascular diseases. Some researches illustrated that stress is an important risk factor in cardiovascular diseases (25). In addition, stressful situations could effect peoples’ health and also cause diseases such as coronary vessel disorders and hypertension (6).

Stress activates biological responses and also activates neural system, glands and the immune system. One of the main effects of biological stress response is sympathetic system activation and release of epinephrine. The most important systems that are affected by release of epinephrine are the cardiovascular systems. Sequential increase of heart rate and hypertension are expected with stress (26).

Studies have shown that the activation of the sympathetic system leads to the release of epinephrine by different stress factors, and subsequently, an increase in heart rate (27, 28). In this condition both blood pressure and pulse rate are increased (29-32) but the volume of lungs is decreased. Finally this marker can cause incidence of myocardial ischemia (33). Therefore, biologic response to stress can increase the possibility of cardiovascular diseases.

2. Objectives

However, this study attempted to show the relationship between rate of perceived stress and other main risk factors of heart coroner vessels diseases in patients with myocardial infarction.

3. Methods

This research was a cross sectional study, conducted from May 2011 to October 2013 on 2400 patients with myocardial infarction. The patients were hospitalized at coronary and post coronary heart units of ten affiliated hospitals to Tehran University of Medical Sciences (TUMS) during the process of research accomplishment. Sampling was done by multistage random sampling. Sampling in the first step was cluster random sampling. All educational and non-educational hospitals affiliated to TUMS were considered. From the 45 affiliated hospitals, ten hospitals were selected. In the second step, all coronary and post coronary heart units were considered as a cluster, and at each hospital, one unit through cluster random sampling was selected. In the third step, simple random sampling through computerized random sampling was done. The sample size was calculated through a pilot study ($\alpha = 0.05$ and $\beta = 0.80$). Ten percent attrition was considered for preventing of sampling bias. Inclusion criteria were patient’s awareness, approval of myocardial infarction by clinical symptoms, serum enzyme tests, and heart tape pathological changes. For data collection, a three-part questionnaire including demographic characteristics (including age, gender, marital status, education, weight and height), perceived stress, and a checklist to record laboratorial test and Electrocardiography (ECG) changes were used. The validity of the three parts of the questionnaire was confirmed by a panel of experts, including three cardiologists, one interventionalist, ten head nurses, and twenty nurses working at the coronary and post coronary units. The perceived stress questionnaire was designed by Kohn and Kamark (34). The Perceived Stress Scale (PSS) is the most widely used psychological instrument for measuring the perception of stress, which is a measure of the degree to which situations in one’s life are appraised as stressful. Items were designed to
determine how unpredictable, uncontrollable, and over-loaded, respondents found their lives. The scale also included a number of direct queries about current levels of experienced stress. The PSS was designed for use in community samples with at least junior high school education. The items were easy to understand, and the response alternatives were simple to grasp. Moreover, the questions were of a general nature and hence were relatively free of content specific to any subpopulation group. The questions of the PSS ask about feelings and thoughts during the last month. In each case, respondents are asked how often they felt a certain way. The first version of this instrument had four questions, the second version had ten questions, and the third one had 14 questions. In this research, the third version, i.e. the 14-question instrument, was utilized. This instrument was designed, based on a Likert criteria including five choices (from never or none=1, to very much = 5), and has been utilized in many researches; which was accomplished by examining a number of female teachers. Internal consistency (Cronbach’s alpha) of the aforesaid study was 0.89 (35). The reliability of the research was examined through internal consistency (Cronbach’s alpha) and was equal to 0.89, which was acceptable. Questions number 4, 5, 6, 7, 9, 10 and 13 are scored reversely (never or none = 5, and very much = 1). The least score that could be gained for perceived stress was 14, and the most 70. The ethical considerations were related to the participants’ autonomy, confidentiality and anonymity during the study period and study’s publication. The participants were informed of the aim, the design of the study, and the voluntary nature of their participation. After data collection, all data were entered in the Statistical Package for Social Sciences (SPSS) software and analyzed by descriptive and inferential statistics, the data included gender, education level, hypertension, history of hypertension, diabetes, cigarette smoking, doing exercise, job, and family history of myocardial infarction.

4. Results

Overall, 2400 patients participated in this research; 6.5% of the patients were under 40 years of age, 15% between 41-50 years, 33% between 51-60 years, and 45.5% more than 60 years. Furthermore, 43.5% of the patients were female, and 56.5% were male; 81% were married, and the spouses of 19% had died. Regarding education, 45.5% of the patients were illiterate, 31.5% had elementary education, 17.5% high school education, and 5.5% had university education. 10.5% of the patients had less than normal Body Mass Index (BMI) (19.9), 50.5% had normal BMI and 39% had BMI more than normal. 6% of the patients had normal blood pressures, and 35% of them had hypertension. 2.6% of the patients had previously history of hypertension; while 97.4% of the patients did not have previously history of hypertension. Eighty-four percent of the patients had normal serum level cholesterol, 16% had serum level cholesterol more than normal. Eighty percent had normal serum level triglyceride and 20% of the patients had more than normal serum level triglyceride. Regarding diabetes, 15.5% of the patients were affected by diabetes and 84.5% were not affected by diabetes. Sixty-six percent had no history of cigarette smoking and, 23% had previous history of cigarette smoking and had given up before the research, and finally 11% were current smokers during the research. Four percent of the patients were exercising regularly, 30% were exercising irregularly and 66% were not exercising at all. Regarding job status, 10.5% were employees, 11.5% were workers, 38% were housekeepers, 2% were jobless, 11.5% were retired, and 26.3% had nongovernmental jobs. Furthermore, 88.5% of the patients were living in cities, and 11.5% were living in villages. Regarding history of cardiovascular diseases, 25.5% of the patients had a history of these diseases while 74.5% did not have so. Finally, 82.6% of the patients had no previous history of the use of contraceptive tablets and 17.4% had a previous history of utilizing contraceptive tablets. The mean and standard deviation of age, BMI, serum level of cholesterol, and serum level of triglyceride of the patients were 59.18 ± 11.06, 24.87 ± 3.74, 154.62 ± 88 and 206.70 ± 56.39, respectively.

The results of the research showed that more than half of the patients had severe stress (55%) (Table 1). Statistical analysis showed that there was no significant differences between perceived stress categories and age (F = 0.780 and P = 0.506), marital status (F = 1.690 and P = 0.092), BMI (F = 0.981 and P = 0.37), blood cholesterol level (T = 0.691 and P = 0.451), blood triglyceride level (F = 0.912 and P = 0.37), blood cholesterol level (T = 0.641 and P = 0.356), and family relationship (F = 0.394 and P = 0.811).

Relative and absolute frequencies, and statistical analyses of gender, education level, hypertension, history of hypertension, diabetes, cigarette smoking, doing exercise, job, and family history of myocardial infarction to compare with perceived stress categories are presented in Table 2.

5. Discussion

All subjects were affected with myocardial infarction; there was no one with low stress (score less than 23). This matter demonstrates that patients with myocardial infarction had more stress. This may be because of the increase of life stressors in various dimensions of life, such as social, political, cultural, and economical dimension, and it indi-
Table 1. Absolute and Relative Frequencies of Perceived Stress Categories

<table>
<thead>
<tr>
<th>Intensity of Perceived Stress</th>
<th>Number</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low (14 - 32)</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Moderate (33 - 51)</td>
<td>1080</td>
<td>45</td>
</tr>
<tr>
<td>Severe (52 - 70)</td>
<td>1320</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>2400</td>
<td>100</td>
</tr>
</tbody>
</table>

Standard deviation ± mean 51.41 ± 7.89

cates the role of stress in development of cardiovascular
diseases.

According to the American heart association (10) ageing is accompanied with an increase of cardiovascular
diseases. The findings of the research according to the
age factor were compatible with the results of Framing-
ham’s research. Framingham’s research showed that 45% of
subjects had more than 65 years of age, and only 5%
had less than 40 years of age (36, 37). Therefore, it is
believed that the age factor is responsible for arteriosclero-
sis. The results of this research indicated that the rate of
males affected by cardiovascular diseases was more than
females. The results of previous researches also showed
that the prevalence of cardiovascular diseases in males
was more than females. The reason for this matter may
be due to hormonal differences between males and fe-
males. The results of Framingham’s research in 1976 indi-
cated that the incidence of cardiovascular diseases in fe-
ales after menopause was 2.6 times more than females
before menopause. The risk of cardiovascular diseases in
females that had reached menopause by surgery was 2.7
times more than females at the same age that had not
reached menopause. Also, this risk was 2.2 times more that
females that had reached menopause normally (38-42).

Regarding education, most of the subjects were illiter-
ate. This indicates the necessity and importance of edu-
cation especially to learn about preventing cardiovascular
diseases and emphasizes the role and importance of edu-
cation to develop people’s ability to deal correctly with dif-
ficulties and life problems and find right resolutions to en-
counter life stressors and to control them.

Sixty-five percent of the subjects did not have high
blood pressure and only 35% of them had high blood pres-
sure (systolic blood pressure more than 140 mm/hg and
diastolic more than 90 mm/hg), while 94% did not have
blood pressure in the past. The results of researches also in-
dicate that high systolic and diastolic blood pressures are
accompanied by other risk factors and also are the most
important factors for the development of cardiovascular
diseases (41).

The results of this research revealed that the mean
stress intensity in patients with high blood pressure was
significantly higher than people without high blood pres-
sure. Regarding the activation of biological stress re-
sponses, release of neurotransmitters of the sympathetic
system such as epinephrine. So, it makes the rate of blood
pressure higher in persons with high stress (26, 43).

According to the association with diabetes, the results
of the research indicated that 84.5% of the subjects were
not affected by diabetes but 15.5% were affected by dia-
betes. Also the results of this research showed that the
mean stress intensity in the subjects without diabetes was
higher than the subjects with diabetes although this differ-
ce was not significant. The results of this research indi-
cated that 34% of the subjects were either current smokers
or had a history of smoking cigarettes and 66% of them had
not smoked cigarettes at all. The results of the research indi-
cated that the mean perceived stress in cigarette smok-
ing subjects was less than the other two groups (nonsmok-
ers and patients that had given up smoking). This may be
because of the belief that cigarette smoking will relief and
decline stress.

The results indicated that subjects, who performed reg-
ular exercise, had less stress than the subjects that did not.
Therefore, exercise through increasing a person’s psycho-
logical comfort and releasing their energy can decrease
stress (44).

Regarding employment, the highest rate of stress was
seen in unemployed subjects. Also the rate of perceived
stress had significant differences between various jobs.
This may be because of the various stressors of different
jobs (5, 45).

The results of this research revealed that there were sig-
ificant differences between the mean of perceived stress
in subjects with high serum cholesterol and triglyceride
levels compared with subjects with normal serum chole-
sterol and triglyceride levels. This may be because of the uti-
лизation of fat decreasing medications by the subjects.

5.1. Conclusion

The findings of this research indicated that the rate of
stress between the affected patients with myocardial in-
Table 2. Comparing Gender, Education Level, Hypertension, History of Hypertension, Diabetes, Cigarette Smoking, Doing Exercise, Job, and Family History of Myocardial Infarction With Perceived Stress Categories

<table>
<thead>
<tr>
<th>Variables</th>
<th>Perceived Stress Categories</th>
<th>Mean ± SD</th>
<th>Statistical Significance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Moderate</td>
<td>Severe</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Number</td>
<td>Percent</td>
<td>Number</td>
</tr>
<tr>
<td>Sex</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>756</td>
<td>70</td>
<td>600</td>
</tr>
<tr>
<td>Female</td>
<td>324</td>
<td>30</td>
<td>720</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>276</td>
<td>33.3</td>
<td>816</td>
</tr>
<tr>
<td>Primary School</td>
<td>364</td>
<td>45.7</td>
<td>360</td>
</tr>
<tr>
<td>Junior School</td>
<td>270</td>
<td>33.3</td>
<td>184</td>
</tr>
<tr>
<td>University</td>
<td>12</td>
<td>1.1</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having</td>
<td>360</td>
<td>33.3</td>
<td>400</td>
</tr>
<tr>
<td>Not having</td>
<td>720</td>
<td>66.7</td>
<td>1560</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>History of Hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having</td>
<td>24</td>
<td>2.2</td>
<td>36</td>
</tr>
<tr>
<td>Not having</td>
<td>972</td>
<td>91.1</td>
<td>1272</td>
</tr>
<tr>
<td>Total</td>
<td>1008</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having</td>
<td>228</td>
<td>20.1</td>
<td>194</td>
</tr>
<tr>
<td>Not having</td>
<td>852</td>
<td>78.9</td>
<td>1176</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>Smoking cigarette</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No smoking</td>
<td>624</td>
<td>57.6</td>
<td>960</td>
</tr>
<tr>
<td>Past smoking</td>
<td>270</td>
<td>25.6</td>
<td>276</td>
</tr>
<tr>
<td>Smoking now</td>
<td>180</td>
<td>16.7</td>
<td>84</td>
</tr>
<tr>
<td>Total</td>
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<td>100.0</td>
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<tr>
<td>Exercising</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, regularly</td>
<td>84</td>
<td>7.8</td>
<td>11</td>
</tr>
<tr>
<td>Yes, irregularly</td>
<td>396</td>
<td>36.7</td>
<td>324</td>
</tr>
<tr>
<td>No</td>
<td>600</td>
<td>55.6</td>
<td>984</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
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<td>1320</td>
</tr>
<tr>
<td>Job</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Employee</td>
<td>152</td>
<td>13.8</td>
<td>66</td>
</tr>
<tr>
<td>Worker</td>
<td>24</td>
<td>2.2</td>
<td>252</td>
</tr>
<tr>
<td>Housekeeper</td>
<td>1488</td>
<td>13.5</td>
<td>628</td>
</tr>
<tr>
<td>Jobless</td>
<td>12</td>
<td>1.1</td>
<td>36</td>
</tr>
<tr>
<td>Retired</td>
<td>204</td>
<td>18.9</td>
<td>72</td>
</tr>
<tr>
<td>Nongovernmental</td>
<td>360</td>
<td>33.3</td>
<td>276</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
<tr>
<td>Family history</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Having</td>
<td>420</td>
<td>38.9</td>
<td>182</td>
</tr>
<tr>
<td>Not having</td>
<td>660</td>
<td>61.1</td>
<td>1028</td>
</tr>
<tr>
<td>Total</td>
<td>1080</td>
<td>100.0</td>
<td>1320</td>
</tr>
</tbody>
</table>
farcion is moderate to high; thus, it is a very strong risk factor for the onset and acceleration of cardiovascular diseases. Therefore, it is necessary to take stress into consideration and decrease it, by designing educational programs to determine its preterm resources. Increasing awareness and education especially for the patients, affected by cardiovascular diseases in the whole society is of great importance.

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References


