Relationship between Physical Activity and Risk Factors in Patients Suspected with Coronary Artery Disease (CAD) with the Number of Involved Arteries in Tehran City

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ABSTRACT

Purpose: Due to unhealthy lifestyles, there has been an increase in the prevalence of coronary artery disease (CAD) and a reduction in its age of onset. Given the high cost of diagnosis and treatment of CAD, there is an urgent need to teach people strategies helpful in changing their lifestyles as this can help reduce the risk factors of the disease. Therefore, the goal of the present study was to examine the relationship between physical activity and risk factors of CAD in patients suspected with thid disese in Tehran City.

Methods: In this cross-sectional study, a total of 92 patients with suspicion of CAD were examined. Interviews, patient medical history, and angiography reports were used to collect data. In addition, the International Physical Activity Questionnaires (IPAQ) was used to determine the level of physical activity of the patients.

Results: The study results indicated 6% increase in the chance of having CAD for each one-year increase in age. Patients who smoked cigarettes were about four times more likely to have coronary atherosclerosis than non-smokers. Among all participants, 34.7% had low physical activity, 43.47% had moderate physical activity, and 21.73% had high physical activity. A reverse and significant relationship was seen between the level of physical activity and number of narrowed coronary arteries. There were direct and significant relationships between blood glucose, cholestrol , and LDL with the number of involved coronary arteries.

Conclusion: Among the effective factors for heart diseases, older age and smoking had the highest correlations with the chance of catching CAD. Based on the study results, changing lifestyle, including diet and more physical activity is related to the number of involved coronary arteries.

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1. Introduction

Cardiovascular Disease (CVD) is one the most common and costly diseases that can lead to disability and finally death [1, 2]. In 2006, the prevalence of CVD in the United States was reported to be 36.9% for both men and women. It was also estimated that the diagnosis and treatment of CVD cost more than 500 million dollars in the United States in 2010 [3]. Although the prevalence of CVD is higher in men, its mortality has been reported to be higher in women. Unfortunately, there is no information about the prevalence of this disease or its treatment and diagnostic costs in Iran. Coronary Artery Disease (CAD), the most common type of CVD, involves atherosclerosis that occurs in the epicardial coronary arteries. Atherosclerotic plaques narrow progressively the internal canal of coronary arteries, leading to reduced blood supply to the myocardium. The low blood flow in coronary artries will results in manifestation of signs and symptoms in rest and activity that in severe cases of reduced blood flow to myocardium can lead to myocardial infarction [3].

CAD is very common among the Iranian population and is responsible for about 50% of deaths in Iran each year [4]. Research studies have shown that 80% of patients with CAD live in countries with low or moderate income [5]. Many diagnostic and therapeutic methods are available for these patients, but these methods are too costly. Therefore, it is necessary to develop prevention strategies for this disease and reduce its cost of treatment especially in poor and developing countries. In this regard, detecting the risk factors for CAD and preventing them is one of the highest priorities. Age, gender, high blood pressure, smoking, diabetes, body fat, low physical activity, and family history of the disease are among the most important risk factors of CAD [6-10].

Low physical activity has been regarded as a major factor that increases the chance of CVD [10-12]. Inactivity refers to the lack of activity that increases the heart and breathing rate [3]. According to the reports by the American Heart Association [15], all people need to do moderate-intensity activities for 30 minutes a day (5 days a week) or high-intensity activities for 20 minutes a day (3 days a week). Many studies have examined the relationship between higher physical activities and lower chance of getting CVD. [14-22]

As modern today's living has changed people's lifestyle, especially their diet and activity level , there is a probable increase in the chance of catching related diseases. Therefore, the goal of the present study is to examine the physical activity and predisposing factors of CAD in suspected patients in Tehran City.

2. Materials and Methods

This study is a cross-sectional research and explored the relationship between level of physical activity and the predisposing risk factors of CVD in suspected patients. Using a convenience sampling method, a total of 92 patients suspected of CAD, aged 20-80 years, who had been admitted to the Shahid Rajaee Heart Center in Tehran, were selected as the study sample and evaluated. Interviews, patient medical history, and angiography reports were used to collect data. In addition, we used the International Physical Activity Questionnaires (IPAQ) (translated into Persian and validated by Vashaghani et al.) to determine the level of physical activity of the participants, one week before the first sign of pain in the chest or back [23].

IPAQ has 27-item and 7-item forms and can be completed in three ways: by patient, by phone, or by interview. In the present study, the 27-item form of the questionnaire was completed using interviews. The 27-item form of the questionnaire has 7 items about job-related activity, 6 items about patient transportation, 6 items about housework, and 6 items about recreation activities and 2 items about resting time. The level of physical activity was recorded with regard to the number of days per week, total time spent on each activity, and the index for moderate and intense activities for four domains of activity.

Procedure

After obtaining the angiography reports, patients who signed the informed consent forms approved by the University of Social Welfare and Rehabilitation Sciences were included in the study. It was decided that the examiner himself completed the demographic questionnaire and IPAQ after asking the patient in order to prevent problems, such as illiteracy of some old participants and also to reduce the number of unanswered questions. The data related to blood glucose and cholestrol were extracted from the last laboratory results in patient's file. Weight was calculated in kilograms, using a digital scale; during scaling, participants wore a thin cloth without shoes. Height was calculated in centimeters, using a tape measure attached to the wall; when measuring the height, the participants stood barefoot in the standard manner, so that their shoulders were in a normal position.

The study data from questionnaires were analyzed using SPSS 21. In this study, to present descriptive sta-

tistics of quantitative variables, measures of central tendency (mean), and dispersion (standard deviation, and range) and in qualitative variables, number and frequency were calculated. The Kolmogorov–Smirnov test (K-S test) was used to test the normality of the data. Also, the Pearson and Spearman correlation were used to determine the linear relationship between variables. The odds ratio and relative risk with %95 CI were calculated with regard to different variables to chance of catching CAD.

3. Results

Table 1 shows the descriptive characteristics of the quantitative variables and normality of variables. Of the total study sample, 62% were males and 38% females. It was found that 19.6% smoked at the time of the study or had a history of smoking. Angiography examination results indicated that 28.1% of the participants had no atherosclerosis in their coronary arteries, 41.6% had atherosclerosis in one artery, 23.6% had atherosclerosis in two arteries, and 6.7% had atherosclerosis in three arteries. About 55.6% of the participants, needed other invasive methods for revascularization of arteries, such as angioplasty, were used, but this was not necessary for the remaining 44.4% of the participants.

Of 95 participants, 32 (34.7%) had low physical activity, 40(43.47%) had moderate physical activity, and 20(21.73%) had high physical activity. There was a reverse but insignificant relationship between moderate physical activity and the number of involved coronary arteries (r=-0.17, P=0.1). However a a reverse and significant relationship was seen between high physical activity and the number of involved coronary arteries (r=-0.27, P=0.01). There was a significant relationship between blood glucose, cholesterol, and LDL with the number of involved coronary arteries. However no significant relationship was seen between diastolic/systolic pressure and trigyceride level with the number of coronary arteries involved (Table 2).

The results of inferential statistics indicated 6 fold increase in the chance of having CAD for each one-year increase in age. The probability for smokers to have CAD was about four times higher than that for non-smokers. The group with low physical activity was considered as the reference group, and the relative chance for moderate and high activity groups to have CAD was determined to be 45% and 42%, respectively (Table 3).

4. Discussion

The purpose of the present study was to examine the relationship between physical activity before start of first sign of pain in the chest and back of patients suspected with CAD with some predisposing factors of this disease and its effects on the chance of catching it in Tehran City. The results indicated that age and smoking had the strongest correlations with the probability of catching CAD. It was also found that a one-year increase in age increased the probability of having CAD by 6 fold. This finding is consistent with the findings of Ferrari et al. [21] who examined the prevalence of CAD in relationship with age and gender. They selected patients with CAD (22.5% females and mean age of 64 years) from

Table 1. Measures of central tendency and dispersion (n=92).

Variables	Mean	SD	Minimum	Maximum	K-S Values
Age (year)	54.69	10.49	24	79	0.658
Height (cm)	165.27	9.14	145	188	0.380
Weight (kg)	78.86	16.59	43	167	0.083
Systolic blood pressure (mm/Hg)	134.53	19.30	100	193	-
Diastolic blood pressure (mm/Hg)	77.69	11.07	45	100	-
Blood sugar	122.73	56.52	73	449	-
Cholesterol	166.22	55.10	97	395	-
Triglyceride	142.35	63.05	59	341	-
HDL	43.53	12.71	31	135	-
LDL	95.77	43.77	36	292	-

Table 2 . Relative chance of CAD for age, smoking, and physical activity variables.

Variables	Chance for Having CAD	Confidence Interval
Age	1.062	1.01-1.11
Smoking	4.10	1.14-14.7
Low physical activity	-	-
Moderate physical activity	0.45	0.16-1.31
High physical activity	0.42	0.12-1.47

PHYSICAL TREATMENTS

Table 3. The odds ratio of catching coronary artery disease with respect to variables of age, smoking, physical activity.

Variables	Odds Ratio	Confidence Interval
Age	1.06	1.01-1.11
Smoking	4.10	1.14-14.7
Moderate physical activity	0.45	0.16-1.31
High physical activity	0.42	0.12-1.47

PHYSICAL TREATMENTS

45 countries in Africa, Asia, Australia, and North, South, and Central America. They found that the CAD symptoms were more prevalent among women than men, and women with CAD were older than men with this disease. the elderly people, maybe because they were less active.

The study results also showed that the chance of having CAD was about four times higher in smokers than in non-smokers. Hatmi et al. [4] and Namayandeh et al. [25] also found smoking to be a major risk factor for catching CAD. Smoking damages artery walls , including nourishing arteries to heart, brain and other organs. the damaged artery walls are prone to create atherosclerosis plaques. On the other hand, smoking increases the platelets aggregation which leads to blood clot and arteries blockades [26, 27].

The other finding of this study was the relationship between blood glucose and fat with the number of the involved coronary arteries. A lot of studies have been done in this topic which confirms this relationship [28, 30]. high blood fat leads to gradual creation of fat precipitation or plaques in the inner layer of arterial walls. This percipitation constrict blood flow and eventually blocks it.

The study results also indicated a reverse and significant relationship between harsh physical activity (high heart and breath rate) before start of pain in the chest and back with the number of involved coronary arteries. Consistent with this finding, the results of a study on examining the role of physical activity and the risk factors for CAD in healthy men and women, showed that people with higher physical activity in their lifetime were at a lower risk of having CAD [31]. In another study, the effect of long-term exercise on baroreflex[1] and cardiopulmonary function was studied [32]. Their results indicated that long-term exercise led to positive effects on baroreflex and cardiopulmonary function in patients with CAD.

The modern urban lifestyle leads to low physical activity and sometime inactivity of people. Long before, physical activity and exercise was considered a theraputic and preventive methods of diseases especially CVDs. Exercise could reduce the incidence of heart attacks to a large extent. It also prevent the progress of atherosclerosis by reducing risk factors including hypertension,

1. Baroreflex is a mechanism that regulates blood pressure using baroreceptors. When blood pressure increases, this reflex leads to widening of the blood vessels and a reduction in the heart rate, and when blood pressure decreases, this mechanism regulates that by narrowing the blood vessels and increasing the heart rate.

blood glucose and fat [32]. Therefore, based on the results of this study, we can argue that it is possible to decrease the chance of having CAD with regular exercise.

The present study had some limitations. One of them lack of studying the physical activity of patients with CVD after their treatment. It is suggested that in the future studies, the level of physical acticities of patients with CVD were compared before and after treatment. Conducting prospective studies could study better the relation between physical activity and the chance of catching CAD.

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Conflict of Interest

The authors declared no conflict of interests.

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