Health-related variables and predictors of Health-promoting Lifestyle in cardiovascular disease patients

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Type of article: Original

Abstract

Introduction: The principal cause for death in the world is cardiovascular disease. Poor lifestyle is a contributing element in this regard. The objective of this study was to estimate the effects of health-related variables and lifestyle variables on the results of exercise stress tests in patients with cardiovascular disease in Iran.

Methods: The study population in this case-control study was 220 patients who were candidates for exercise stress tests in Mazandaran Province (Iran) in 2015. The patients were divided randomly into two groups based on the results of their exercise stress tests, i.e., positive (110 patients) and negative (110 patients). The data collection tool was a standard questionnaire entitled "Health promotion lifestyle profile-II." The data were analyzed using mean, standard deviation, the chi-squared test, and logistic regression by SPSS version 22 software.

Results: The risk of a positive exercise stress test increases with age. The age group above 65 was 1.049 times more at risk of a positive exercise stress test than the age group of less than 45. The people with dyslipidemia had 1.635 times greater risk of positive exercise stress tests than the group without dyslipidemia. In addition, patients with hypertension had 1.579 times greater risk of positive exercise stress tests than the group without hypertension. The lack of individual health responsibility (Odds ratio (OR): 1.622), stress management (OR: 1.592), and physical activity (OR: 1.245) contributed more to positive exercise tests than the other risk factors.

Conclusion: Educational interventions can improve the responsibility for health, physical activity, and stress management among people with the risk of cardiovascular disease.

Keywords: cardiovascular disease; exercise stress test; health-promoting lifestyle

1. Introduction

One-fifth of deaths are cause by cardiovascular disease, and coronary heart disease is one of the major causes of death among people around the world. The elements that contribute to cardiovascular disease include family history, dyslipidemia, hypertension, diabetes, and smoking (1). It has been estimated that eighty-four billion U.S. dollars have been spent on cardiac disease, stroke, and diabetes in 23 developing countries from 2006 to 2015. These three diseases account for 80% of the total deaths caused by chronic diseases. Twenty-four million deaths in low- and

middle-income countries could be prevented if non-communicable diseases could be reduced (2). Also, in Iran, coronary heart disease (CHD) is the main cause of mortality, morbidity, and disability (3), and, as mentioned in the latest report by World Health Organization (WHO) 2011, this disease causes about 45% of all deaths in Iran (4). In long-term epidemiology studies, the development of CHD risk factors can be controlled by a healthy lifestyle that includes appropriate behaviors, such as a prudent diet, not smoking, maintaining a healthy weight, and physical activity (5). If high-risk people modify their lifestyles and undergo therapies at the early stages, the primary prevention will turn out to be cost effective (6). People can improve their health through health-promoting behaviors (7). According to Pender's classification, health promoting behaviors include health responsibility, nutrition, physical activity, spiritual growth, interpersonal relationships, and stress management (8). Based the findings of clinical studies, changing one's lifestyle will have a positive effect on risk factors, such as smoking, hypertension, and hypercholesterolemia (9). Moreover, pharmacological therapies, such as lipid-lowering and anti-hypertensive drugs also can help decrease risk factors (10). For instance, they have been shown to reduce the risk of heart disease by 20 to 30% (10, 11). The effect of pharmacological therapies on the reduction of the risk of heart disease is comparatively low compared to lifestyle changes (12). However, the lack of knowledge concerning how to manage the disease and the lack of family support result unsuccessful attempts to modify lifestyles among the majority of patients (13). Despite many references to the importance and efficiency of intervening measures in reducing the risk factors of cardiovascular diseases (14, 15), many patients do not have sufficient knowledge of the relationship between a healthy lifestyle and CHD. As a result, the current study aimed at determining the relationship between a health-promoting lifestyle and its predictors among cardiovascular diseases.

2. Material and methods

This case-control study was conducted in 2015. After assessing all patients in terms of the eligibility criteria, the patients were given a short explanation about the study, and informed consent was obtained from all of the participants. The entry criteria included being willing to participate in the research, not having an emergency situation, and not having any speech and hearing problems. The sample of the study included 110 patients in each group (positive and negative exercise test) with 95% confidence level and 80% testable. We used the formula "n = $(z_{1-\alpha/2} + z_{1-\beta})^2/d^2 = (1.96 + 0.84)^2/0.27^2 = 107.5 \cong 110$" to determine the required sample size. Instruments used in this study were 1) a demographic questionnaire containing questions about age, gender, educational level, lodging, and employment status; 2) health–related variables, such as a history of hypertension, dyslipidemia, diabetes, and smoking; and 3) the Health Promoting Lifestyle-II (HPLP II) developed within the framework of the Health Promotion Model (8), which was used to measure the extent to which the individuals were engaging in health-promoting and health-related behaviors (16). The 52-item Health-Promoting Lifestyles Profile-II (HPLP-II) was used to measure health-promoting behaviors. The items on this questionnaire include six subscales, i.e., 1) physical activity, which is concerned with the amount of exercise necessary for a healthy life; 2) spiritual growth, which is a person's positive attitude towards him/herself and the ability to improve her/his capabilities, and creativeness in reaching his/her objectives; 3) health responsibility, which is a person's sensitivity about her/his health; 4) interpersonal relationships, which are concerned with the ability to interact and maintain relationships with others; 5) nutrition, which relates to what one eats; and 6) stress management, which is the ability to identify what causes a person to feel stress and how he/she can overcome those causes (17). The Likert scale contains 1 (never) to 4 (routinely) as the responses to the items, and the total possible scores can range from 52 to 208. Higher scores suggest that the participants have healthier lifestyles. This questionnaire has been used extensively in medical research with high Cronbach's alpha coefficients to measure both the total scale and subscales (16, 18). The criteria of lifestyle categories were based on the first and third quarters. The first quarter's scores were considered as weak points, between the first and third quarters as medium, and the third quarter as high. The data were analyzed using IBM-SPSS version 22 and chi-squared, and logistic regression tests were used for analysis.

3. Results

The mean ± SD age of the participants was 57.45 ± 1.08 in the experimental group and 58.75 ± 1.11 in the control group. There was no difference between demographic variable scores of positive and negative exercise stress test groups (p > 0.05) (Table 1). The logistic regression model was used to determine the factors that affected positive exercise stress test. Positive exercise stress test was considered as the dependent variable, and gender, age, education, lodging, occupation, and marital status were considered as independent variables. Based on the logistic regression analyses, the risk of positive exercise stress test increased with age. The age group above 65 years was 1.049 times more at risk of positive exercise stress test compared with the age group of less than 45 (Table 2). Based on the logistic regression analyses, with the existence of hypertension and dyslipidemia, the risk of positive exercise stress test increased. So that, the people with dyslipidemia were 1.635 times more at risk of positive exercise stress

tests than the group without dyslipidemia. In addition, the patients with hypertension were 1.579 times more at risk of positive exercise stress tests than the group without hypertension (Table 3). The highest risk of a positive exercise stress test was related to health responsibility. The people having poor responsibility for health were 1.622 times more at risk of positive exercise stress tests than people with high health responsibility. Those patients with lack of individual stress management (OR: 1.592) and physical activity (OR: 1.245) were more at risk of positive exercise tests (Table 4).

Table 1. Frequency distribution of patients in the two study groups

Demographic variables		Study groups		p-value
		Negative test	Positive test	
Age (years)	<45	22 (20%)	27 (24.54%)	0.069
	45-65	61 (55.45%)	64 (58.18%)	
	>65	27 (24.54%)	19 (17.27%)	
Sex	Male	76 (69.1%)	79 (71.8%)	0.384
	Female	34 (30.9)	31 (28.2%)	
Lodging	City	44 (40%)	53 (48.2%)	0.139
	Village	66 (60%)	57 (51.8%)	
Educational Level	Illiterate	83 (75.5%)	80 (72.7%)	0.814
	High school diploma	22 (20%)	23 (20.9%)	
	Collegiate	5 (4.5%)	7 (6.4%)	
Occupation	Homemaker	69 (62.7%)	53 (48.2%)	0.385
	Worker	21 (19.1%)	27 (24.2%)	
	Retired	9 (8.2%)	15 (13.6%)	
	Farmer	4 (3.6%)	7 (6.4%)	
	Employee	2 (1.8%)	2 (1.8%)	
	Freed	5 (4.5%)	6 (5.5%)	
Family history	Yes	45 (40.9%)	52 (47.3%)	0.21
	No	65 (59.1%)	58 (52.7%)	
Smoking	Yes	31 (28.2%)	39 (35.5%)	0.155
	No	79 (71.8%)	71 (64.5%)	

Table 2. Estimated logistic regression coefficients and odds ratios between demographic factors and exercise stress test

Demographic variables		B	S.E[1]	OR[2]	95% CI[3] for OR		p-value
					Upper	Lower	
Age (years)	>65	0.048	0.179	1.049	1.490	0.739	0.788
	45-65	0.521	0.290	0.594	1.047	0.337	0.042
	<45	-	-	1	-	-	-
Sex	Male	-0.065	0.161	0.938	1.285	0.684	0.688
	Female	-	-	1	-	-	-
Lodging	City	0.186	0.204	0.830	1.238	0.557	0.362
	Village	-	-	1	-	-	-
Educational level	Illiterate	0.037	0.157	1.037	1.410	0.763	0.814
	High school diploma	0.044	0.298	0.957	1.716	0.533	0.822
	Collegiate	-	-	1	-	-	-
Occupation	Homemaker	0.264	0.183	1.302	1.862	0.910	0.149
	Worker	-0.251	0.291	0.778	1.376	0.440	0.388
	Retired	0.511	0.422	0.600	1.371	0.263	0.226
	Farmer	-0.981	0.677	0.375	1.414	0.099	0.147
	Employee	1.099	1.155	3.000	28.841	0.312	0.341
	Freed	-	-	1	-	-	-

1: Standard error, 2: Odds ratio, 3: Confidence interval

Table 3. Estimated logistic regression coefficients and odds ratios between health factors and the results of exercise stress test

Health-related variables		B	S.E[1]	OR[2]	95% CI[3] for OR		p-value
					Upper	Lower	
Family history	Yes	-0.186	0.204	0.830	1.238	0.557	0.362
	No	-	-	1	-	-	-
Smoking	Yes	-0.172	0.240	0.842	1.348	0.526	0.474
	No	-	-	1	-	-	-
Hypertension	Yes	0.547	0.243	1.579	2.932	0.359	0.024
	No	-	-	1	-	-	-
Diabetes	Yes	-0.504	0.301	0.604	1.809	0.335	0.094
	No	-	-	1	-	-	-
Dyslipidemia	Yes	0.491	0.238	1.635	2.604	1.026	0.039
	No	-	-	1	-	-	-

1: Standard error, 2: Odds ratio, 3: Confidence interval

Table 4. Results of logistic regression analysis for examining the relationship between lifestyle factors and exercise test results

Lifestyle factors		B	S.E[1]	OR[2]	95% CI[3] for OR		p-value
					Upper	Lower	
Health responsibilities	Weak	0.448	0.190	1.622	2.352	1.119	0.011
	Medium	-4.143	1.008	0.016	0.114	0.002	0.001
	Good	-	-	1	-	-	-
Physical activity	Weak	0.219	0.192	1.245	1.813	0.855	0.254
	Medium	-4.043	1.009	0.018	0.127	0.002	0.001
	Good	-	-	1	-	-	-
Dietary habits	Weak	0.090	0.245	1.094	1.766	0.677	0.714
	Medium	-0.095	0.195	0.909	1.333	0.620	0.626
	Good	-	-	1	-	-	-
Spiritual growth	Weak	0.159	0.253	1.172	1.924	0.714	0.529
	Medium	-0.199	0.191	0.820	1.191	0.564	0.297
	Good	-	-	1	-	-	-
Individual communication	Weak	-0.040	0.200	0.961	2.410	0.649	1.422
	Medium	-0.182	0.247	0.833	2.448	0.513	1.353
	Good	-	-	1	-	-	-
Stress management	Weak	0.465	0.182	1.592	2.275	1.114	0.011
	Medium	-4.060	1.009	0.017	0.124	0.002	0.001
	Good	-	-	1	-	-	-

1: Standard error, 2: Odds ratio, 3: Confidence interval

4. Discussion

This study was conducted to determine the effects of health-related variables and predictors of a health-promoting lifestyle in patients with cardiovascular disease. In this study, based on the logistic regression analyses, the risk of positive exercise stress test increased with age. Several reports (19-23) have defined the relationship between age and occurrence of coronary artery events. It seems that by ageing, the accumulation of plague atherosclerosis increased the possibility of coronary events and the severity of coronary artery diseases. Although most cardiovascular diseases are known as diseases of the elderly, almost 50% of the diagnoses and 15% of cardiovascular deaths occurred under the age of 60 (24). In Doughty's 2002 study, 10% of patients who had been hospitalized because of heart attacks over a three-year old period were under the age of 46 (25). Thus, it can be inferred that the age at which cardiovascular disease occurs has decreased, which is suggestive of our need for major lifestyle alterations in teenage and middle age population. Our findings showed that hypertension and dyslipidemia independently predicted risk of positive exercise stress test. Some studies (26-29) have reported hypertension as an independent risk factor for the severity of coronary artery disease. For instance, the study by Abbasi in 2012 was the closest to our results, reporting that hypertension was related to heart disease and coronary artery stenosis (OR: 3.45,

95% CI: 3.28-3.61) (30). Also, in Armstrong's 2013 study that was conducted to evaluate the relative contribution of modifiable cardiovascular risk factors to the development of major cardiac events in aging adult survivors of childhood cancer, hypertension significantly increased the risk for coronary artery disease (RR: 6.1) (31). However, in Veeranna's 2010 study, hypertension did not correlate with coronary artery disease (22). This contradiction can be due to the various factors, such as target population, sample size, and the geographical location. In this study, dyslipidemia was reported as an independent risk factor for positive exercise stress test. Various studies (21, 28, 30, 32) have shown that dyslipidemia plays an important role in coronary artery disease. For example in Sadeghi's 2012 (26) and Rasheed's 2014 (27) studies, dyslipidemia was significantly associated with the extent and intensity of coronary stenosis. The results of Varbo's 2013 study showed that the increase of 1 mmol/L (39 mg/dL) (LDL) increased the risk of ischemic heart disease as much as 2.8 times (33). In a study, Berry 2012 observed marked differences in the lifetime risks of cardiovascular disease among participants who were 55 or older, those with an optimal risk-factor profile (total cholesterol level, <180 mg per deciliter [4.7 mmol per liter]; blood pressure, < 120 mmHg systolic and 80 mmHg diastolic; nonsmoking status; and non-diabetic status) had substantially lower risks of death from cardiovascular disease through the age of 80 than participants with two or more major risk factors (34). The results are in line with our findings. Without doubt, the lack of physical activity and an unhealthy lifestyle result in obesity, hypertension, diabetes, and cardiovascular diseases. The researchers believe that modifying one's lifestyle may contribute to reducing obesity and hypertension and may reduce the risk of cardiovascular diseases (35-37). Therefore, this implies the vital role that a healthy lifestyle plays in reducing cardiovascular diseases, and it emphasizes the necessity to become more engaged in this matter. The comparison of the results of the study in terms of patients' lifestyles indicated that health responsibility, physical activity, and stress management affect the positive exercise stress test. The results of Mansourian's 2012 study showed that there was a significant relationship between responsibility, physical activity, stress management and hypertension (38). In Khairkhou's 2013 study on the lifestyle of women with rheumatoid arthritis, there was a significant relationship between two groups (healthy women and women with rheumatoid arthritis) with respect to two factors, i.e., responsibility for health and physical activity, which can be due to the nature of disease (39). Physical activity has always been the main intervening factor in reducing of heart disease. The results of Nagi's 2011 study showed that people who do physical activities regularly have less cholesterol, triglycerides, and blood pressure and also have a more appropriate Body Mass Index (BMI) (40). This study had some limitations. The data were collected through a self-report questionnaire, which may possibly tempt the participants to present a more desirable image of themselves. Moreover, participants may tend to overestimate or underestimate their health-promotion activity.

5. Conclusions

As the main finding of this study, it was indicated that there is a significant relationship between hypertension, dyslipidemia, and increasing age and the risk of positive exercise stress test and coronary artery stenosis. Also, having a healthy lifestyle brings some consequences that lead the patients of cardiovascular diseases to have positive health outcomes. It seems that educational interventions can improve the responsibility for health, physical activity, and stress management among people with cardiovascular disease risks. Therefore, there is an urgent need for the development and implementation of health education programs to raise health literacy and enhance people's knowledge concerning the risk factors of heart disease and to encourage them to adopt a health promotion lifestyle. It is recommended that further research be conducted on this significant issue to discover other effective factors that could lead to improved physical, psychological, and social condition of patients.

Conflict of Interest:
There is no conflict of interest to be declared.

Authors' contributions:
All authors contributed to this project and article equally. All authors read and approved the final manuscript.

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