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The effect of self-management intervention program on the lifestyle of postmyocardial infarction patients

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Abstract:

BACKGROUND: Most patients with myocardial infarction (MI) suffer from one or more risk factors such as obesity and overweight, unhealthy diet, lack of physical activity (PA), and high blood pressure. Individual control of these risk factors by lifestyle modification raises the probability of survival in these patients; hence, we used a self-management intervention to assess its effect on the lifestyle of post-MI patients.

MATERIALS AND METHODS: This quasi-experimental study was conducted on 92 hospitalized MI patients in Hamadan province in 2016. Convenience sampling method was used for selecting the participants. The patients were selected and assigned to experimental and control groups. The main parameters (diet, blood pressure, waist circumference, and body mass index [BMI]) were measured at the baseline and 8 weeks after discharge. Domestic PA was the only parameter measured 8 weeks after their discharge. A self-management intervention was adopted for the experimental group. The data were analyzed using paired and independent-sample *t*-tests with SPSS software version 16.

RESULTS: The comparison of the scores obtained for diet, blood pressure, waist circumference, and BMI in post-MI patients revealed no statistically significant difference between the two groups at the beginning of the study ($P > 0.05$). Following the intervention, the experimental group had a significantly higher mean score for diet and domestic PA (walking program from 1st week to 8 weeks), compared to the control group ($P < 0.001$); however, the intervention had no significant effect on BMI, waist circumference, and systolic and diastolic pressure ($P > 0.05$).

CONCLUSION: The findings indicated that the program had an impact on some risk factors. Therefore, it is recommended to use self-management support in MI patients during the discharge process to improve their lifestyle.

Keywords:

Postmyocardial infarction, risk factors, secondary prevention, self-management

Introduction

Myocardial infarction (MI) is the leading cause of morbidity and mortality worldwide.[1] The National Health Interview Survey reports indicate that the prevalence of MI is 3.0% in US adults in 2016.[2] In Iran, the incidence rate of MI is 73.3 per 100 000 and considerably varies from 24.5 to 152.5 per 100,000 persons in different age groups.[3,4] In developed countries, mortality from ischemic heart disease (IHD) including MI is considerably decreased over the last decades; however, it has remained as a health problem in low-income countries.[5] In Iran, IHD was the first cause of death and DALY, accounting for about 26% of total deaths and 11% of total burden of the disease in 2015.[3]

Secondary prevention, as one of the IHD prevention levels,[6] is essential for patients who survived from IHD including MI.[7] Individual control of the risk factors raises the quality of life[8] and probability of

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survival in patients with IHD;[9] hence, it could decrease the mortality from IHD by 30%–40%.[7] The literature review shows that exercise-based programs for coronary heart disease (CHD) patients decrease cardiovascular mortality and re-hospitalization.[10] Moreover, patients with Cerebrovascular diseases with more total physical activity (PA), leisure-time PA, and domestic and work-related PA have lower mortality at seven years follow-up.[11] Furthermore, it has shown with a reduction of 2300 mg/d sodium for 4 weeks or more, and systolic blood pressure decreases about 5.8 mmHg.[12] Moreover, 5- and 10-year mortality rates are greater in patients with obese Class III after coronary artery bypass graft.[13]

It is well documented that most MI patients suffer from one or more risk factors.[14] High blood pressure and blood lipids, abdominal fat, smoking, unhealthy lifestyle, and psychosocial factors have been reported in most patients.[15] In most countries, especially developing countries, cardiovascular diseases are associated with risk factors such as sedentary lifestyle and unhealthy diet.[16,17]

These risk factors are behaviorally modifiable; hence, they should be focused on secondary prevention programs (i.e., cardiac rehabilitation (CR) for MI patients[18,19] with more effective approaches).[9] These approaches must be multifaceted by more than a few interacting components.[20] One of the strategies to reduce cardiovascular risks is the lifestyle self-management intervention, which is based on the transtheoretical model of behavior change and consists of patients' setting goals, reaction to individual risks, teamwork, visiting GPs, phone calls, attaching messages by fridge magnets, and recording a diary.[21]

The results of a study conducted in Iran revealed that cardiovascular patients have more risk factors than healthy people.[22] For example, hypertension, dyslipidemia, and obesity were seen in 38.2%, 64%, 23.2%, and 22.8% of coronary artery disease patients, respectively.[23] In another study, the mean score of lifestyle of coronary patients and their counterpart control groups was compared. The results showed that the difference of body mass index (BMI), dietary habits, and PA was significant between the two groups. The mean BMI score of the patients was higher than that of the control group, and patients had more unhealthy dietary habits and less PA compared with the control group.[24] Accordingly, the modification of these risk factors in MI patients is needed[25] and should be considered in secondary prevention programs in post-MI patients. Since the lifestyle self-management intervention has been demonstrated as a proper intervention for the modification of risk factors among Australian patients with CHD,[26] the authors of this study are interested to apply this program for post-MI patients in Iran; therefore, this study aimed to determine the effect of self-management intervention on the lifestyle of post-MI patients.

Materials and Methods

A quasi-experimental pretest-posttest design was conducted on MI patients hospitalized in a hospital affiliated with Hamadan University of Medical Sciences, Iran, in 2016 (Research number: 9406173175 with the code number of IRCT2015061422712N1). The self-management program was run for the experimental group over 8 weeks, in addition to their routine education; however, the control group (sociodemographically homogeneous to the experimental group) received the routine educational program. The main parameters concerned in this study included diet, domestic PA (walking program in home), blood pressure, waist circumference, and BMI.

Study population

In this study, 92 hospitalized MI patients (90% power with a two-sided significance level of $\alpha = 0.05$) participated.

The inclusion criteria encompassed doctor's permission (not having high-risk criteria according to the New York Heart Association), having at least one heart risk factor, inability to participate in CR programs, aged 75 or below, appropriate cognitive abilities, and ability to read and write. The patients with the incidence of other diseases (renal, endocrine, orthopedic, cancer, and stroke) throughout the study period were excluded.

Convenience sampling method was used to select the patients with regard to the inclusion criteria. Then, the patients were randomly assigned into two groups, with 46 patients in experimental (receiving the self-management program and routine education) and control (receiving routine education) groups. Two groups were homogeneous in terms of demographic information (age, gender, marital status, and occupation) and initial risk behavior scores (diet, BMI, waist circumference, and blood pressure) [Figure 1].

Measures

The measures of this study were: Demographic data, risk factors (systolic and diastolic blood pressure, waist measurement, and BMI, diet, domestic PA (walking program in home).

Blood pressure was measured according to the American Heart Association guidelines using a Heine sphygmomanometer and stethoscope. The waist circumference and BMI were measured based on the standard guidelines.[27]

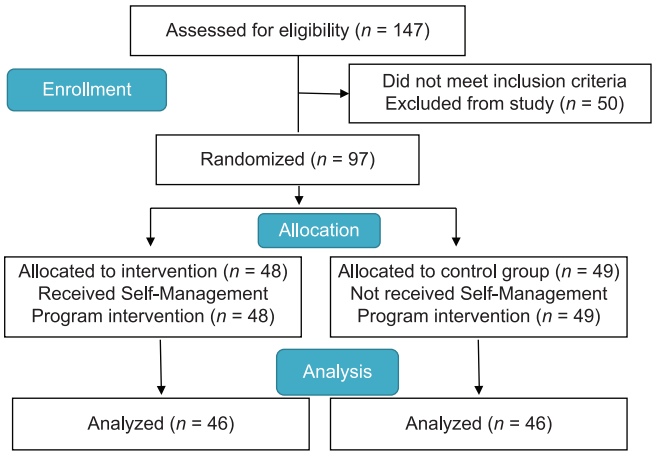

Figure 1: Consort flowchart of the study

To measure diet and domestic PA, a researcher-made questionnaire was developed based on the existing Cardiac Rehabilitation (CR) program of the Specialized Heart Center in Hamadan University and relevant articles.[21,28] Then, the questionnaire was sent to 10 health professionals (six academic, three clinical professionals, and one specialized cardiovascular nurse). The validity of the questionnaire was confirmed by quantitative content validity through content validity ratio (CVR) according to Lawshe's test (CVR ≥ 0.65). The reliability of the diet questionnaire was determined when it was completed by 36 patients. The internal consistency of this questionnaire was $\alpha = 0.81$.

The diet questionnaire compromises 10 items scored based on a 4-point Likert scale ranging from 1 to 4: (1: never, 2: sometimes, 3: often, and 4: always). The patients were asked about the consumption of low-fat milk and dairy product/daily (at least two units/day), vegetable and fruits (at least two units/day), white meat and fish, all kinds of beans (at least three times/week), canned foods (<two times/week), only 2–3 tablespoons of unsaturated fatty acids per day, simple carbohydrates such as sugar, whole-meal bread, their cooking methods (e.g., boiling and steaming), and low-salt diet. The scores of this questionnaire ranged from 10 to 40, with a higher score indicating a more favorable status.

PA has four dimensions (mode or type, frequency, duration, and intensity) and four common domains for adults (occupational, domestic, transportation, and leisure time).[29] In order to assess PA, the patients were asked to use a pedometer (installed on their mobile phone) and record their steps on the patients' diaries on a daily basis. Then, the researcher observed the participants' adherence to home-based (domestic domain and low-intensity PA) walking program according to the patients' diaries. This program adopted from the hospital CR program (1st week: 400 steps [5 min] per day, 2nd and 3rd weeks: 400 steps [5 min] twice a day, 4th week: 800 steps per day, 5th week: 1200 steps per day, 6th and 7th weeks: 1600 steps per day, and 8th week: 2400 steps per day). To calculate the PA score, the average number of daily steps per week (during 8 weeks) was considered.

Intervention

After obtaining the approval of the University Ethics Committee, the researcher explained the participants the objectives of the study, and the written consent forms were collected from the participants. The patients were asked to complete the diet questionnaires at the baseline and 8 weeks after being discharged (postintervention). Blood pressure, waist measurement, and BMI were measured by the researcher at the same time; however, domestic PA was only assessed 8 weeks after being discharged.

The intervention for the experimental group included routine hospital education and self-management program which contained three 40–45-min face-to-face teaching sessions held during the patients' hospitalization, at discharge time, and 1 week after being discharged from the hospital. Furthermore, the researcher made three phone calls in 2, 4, and 6 weeks after being discharged. It must be mentioned that the control group only received routine hospital education.

In the first and second sessions of self-management program, the participants were taught about the MI-related risk factors and disease control strategies. In the third session, the patients were asked to write down their specific goals regarding the reduction of MI risk factors and were submitted a booklet containing information on how to modify MI risk factors. The physician took part in this session and answered the patients' questions. At the end of this session, the patients were encouraged to stick essential preventive messages on the refrigerator and complete their diaries (PA) every day after being discharged. Follow-ups were made by three phone calls. All the patients referred 8 weeks after discharge to be reassessed in terms of MI risk factors.

Statistical analysis

All statistical analyses were performed using SPSS version 16.0 for Windows (SPSS Inc., Chicago, IL, USA). Statistical significance was set at $P < 0.05$ (SPSS 16.0 is a comprehensive system for analyzing data). The Kolmogorov–Smirnov test (to check normality assumption) showed the normal distribution of the variables; hence, paired Student's *t*-test (to compare the mean of paired samples) and independent-sample *t*-test (to compare the mean of two independent samples) were used in this study.

Results

The mean age of the experimental and control groups was 49.67 ± 11.02 and 49.96 ± 10.36. There was no significant difference in the mean scores of age between the two groups (independent *t*-test $P = 0.318$). As presented in Table 1, a majority of the participants in the experimental (58.7%) and control groups (67.4%) were male. No significant differences were observed with regard to the gender between the two groups (the Chi-square test $P = 0.684$). The education level was diploma for most of the experimental (52.2%) and control groups (63%), and thus, the two groups were not significantly different in this regard (the Chi-square test $P = 0.929$). The occupation of most of the participants in the intervention (45.7%) and control (56.5%) groups was unemployed and self-employment, respectively. There was no significant difference between the two groups in terms of job status (the Chi-square test $P = 0.515$). Moreover, most of the subjects in the intervention (91.3%) and control (93.5%) groups were married; hence, no significant differences were observed with regard to the marital status (the Fisher's exact test $P = 0.709$) [Table 1].

As presented in Table 2, there was no significant difference between the two groups regarding diet status at the beginning of the study (the independent *t*-test $P > 0.05$); however, the average score of diet after the intervention increased in the experimental group in comparison to the control group (the independent *t*-test $P < 0.001$). Moreover, the average number of daily steps per week (PA) was higher in the experimental group in comparison to the control group at the 1st week (the independent *t*-test $P < 0.001$), the 2nd and 3rd weeks (the independent *t*-test $P < 0.001$), the 4th week (the independent *t*-test $P < 0.001$), the 5th week (the independent *t*-test $P = 0.002$), the 6th and 7th weeks (the independent *t*-test $P = 0.041$), and the 8th week (the independent *t-test* $P = 0.004$) after discharge.

As shown in Table 3, there was no significant difference between the two groups regarding BMI, waist circumference, and systolic and diastolic pressure at the beginning of the study ($P > 0.05$); so, it can be concluded that the program had no significant effect on BMI, waist circumference, and systolic and diastolic pressure ($P > 0.05$).

Discussion

This study aimed to determine the effect of self-management intervention on the lifestyle of post-MI patients. According to the results, self-management intervention improved the diet status and domestic PA; however, it had no significant effect on BMI, waist circumference, and systolic and diastolic blood pressure.

A review of the studies shows differences in the effects of an education program on lifestyle modifications. A Danish study also indicated that a multifactorial treatment program reduces the patients' heart disease risk.[30] In another study, an educational program modified some cardiac risk factors in patients undergoing coronary surgery.[31] Although the findings of the other study revealed that text messaging did not lead to risk factor management.[32] The differences may be related to factors such as intervention duration, number of training sessions, and not adopting behavior modification techniques.[33,34]

In the present study, the improvement of diet and domestic PA status indicates the positive effect of

Table 1: Demographic variables in two groups

Variables	Levels	Experimental group, *n* (%)	Control group, *n* (%)	Statistical test
Age	25-34	4 (8.7)	2 (4.3)	χ^{2*}=0.127, *P*=0.899
	35-44	11 (23.9)	10 (21.7)	
	45-54	13 (28.3)	20 (43.5)	
	55-64	14 (30.4)	9 (19.6)	
	≤65	4 (8.7)	5 (10.9)	
Gender	Male	27 (58.7)	31 (67.4)	χ^{2*}=1.49, *P*=0.684
	Female	19 (41.3)	15 (32.6)	
Education	Elementary	10 (21.7)	7 (15.2)	χ^{2*}=6.18, *P*=0.929
	Middle school	7 (15.2)	8 (17.4)	
	Diploma	24 (52.2)	29 (63)	
	College graduate or higher	5 (10.8)	2 (4.3)	
Occupation	Unemployed	21 (45.7)	17 (37)	χ^{2**}=1.7, *P*=0.515
	Self-employment	20 (43.5)	26 (56.5)	
	Employee	5 (10.9)	3 (6.5)	
Marital status	Single	1 (2.2)	2 (4.3)	χ^{2**}=1.35, *P*=0.709
	Married	42 (91.3)	43 (93.5)	
	Divorced or widow	3 (6.5)	1 (2.2)	

*Chi-square, **Fisher's exact test

Table 2: Comparing the mean scores of diet and domestic physical activity

CHD Risk factors	Mean±SD		Independent *t*-test
	Experimental group	Control group	
Diet†			
Before	26.95±2.8	27.2±4.3	*t*=-0.331, *P*=0.741
After	31.5±2.17	27.7±3.4	*t*=6.42*, *P*=0.000*
Paired *t*-test	*t*=51.43, *P*<0.001*		*t*=0.44, *P*=0.662
Domestic physical activity††			
The first week (daily steps)	376±19.2	345±16.9	*t*=8.37*, *P*=0.000*
The second and third weeks (daily steps)	694±52.5	627±72.8	*t*=5.05, *P*=0.000*
The fourth week (daily steps)	719±69.3	648±70.5	*t*=6.20, **P*=0.000*
The fifth week (daily steps)	1056±97.5	988±110.6	*t*=3.13, *P*=0.002*
The sixth and seventh weeks (daily steps)	1484±107.9	1436±117.7	*t*=2.07, *P*=0.041*
The eight week (daily steps)	2212±156.7	2106±181.8	*t*=2.97, *P*=0.004*

†Diet range score (10-40), ††Domestic physical activity (the average number of daily steps per week). CHD=Coronary heart disease, SD=Standard deviation

Table 3: Comparing the mean scores of other coronary heart disease risk factors

CHD Risk factors	Mean±SD		Independent *t*-test
	Experimental group	Control group	
BMI (kg/m^2)			
Before	26.27±1.93	26.39±1.72	*t*=-0.314, *P*=0.754
After	26.12±1.86	26.28±1.69	*t*=-0.915, *P*=0.363
Paired *t*-test	*t*=-0.530, *P*=0.398	*t*=-0.443, *P*=0.66	
Waist circumference (cm)			
Before	104.80±11.29	106.85±11.34	*t*=-1.067, *P*=0.289
After	101.23±11.18	104.76±11.08	*t*=-1.092, *P*=0.278
Paired *t*-test	*t*=1.124, *P*=0.267	*t*=2.467, *P*=0.07	
Systolic pressure (mm of Hg)			
Before	128.57±15.26	126.83±14.01	*t*=0.563, *P*=0.575
After	127.13±15.14	126.54±13.57	*t*=0.195, *P*=0. 846
Paired *t*-test	*t*=1.74, *P*=0.15	*t*=1.42, *P*=0.23	
Diastolic pressure (mm of Hg)			
Before	73.37±11.24	73.65±10.32	*t*=-0.320, *P*=0.749
After	72.65±11.61	73.34±10.38	*t*=0.297, *P*=0.767
Paired *t*-test	*t*=1.305, *P*=0.21	*t*=0.459, *P*=0.747	

CHD=Coronary heart disease, SD=Standard deviation, BMI=Body mass index

this program. The results of a 30-month follow-up in a community-based study also demonstrated the PA development and consequently decreased risk of heart diseases in patients.[35] Our findings are also consistent with those of some interventional studies in which PA improved after training in overweight women with hypertension[36] or cardiac telerehabilitation could improve walking activity of cardiac patients.[37]

Regarding diet as one of the healthy lifestyle factors improved in the present study, another research study also concluded that the text-messaging lifestyle program increased patients' adherence to dietary guidelines.[38,39] The results of a cross-sectional survey also showed that CHD patients who received dietary instruction were significantly more likely to be on a healthy diet.[40] Accordingly, it can be concluded that education and follow-up programs are required for the establishment of a healthy diet.

In the present study, the waist circumference, systolic and diastolic blood pressure, and BMI of the experimental group were slightly modified after the intervention; however, the difference was not statistically significant. In studies examining the effects of community-based nursing training on heart disease, however, BMI reduced in the experimental group.[41] In a study, the effect of similar supporting interventions on BMI, history of smoking, diet, PA, blood pressure, cholesterol, and blood glucose was investigated, and systolic blood pressure reduced in patients with blood pressure.[42] The present findings are consistent with the findings of a study conducted by Melchart, in which Taylor's lifestyle self-management intervention had no effect on weight loss.[43] Previous studies also revealed no change for the systolic and diastolic blood pressure.[35] In a study in China, however, the systolic blood pressure reduced significantly.[41] Furthermore, in a meta-analysis study to evaluate the benefits of mobile apps in the self-management of heart diseases, it was

confirmed that blood pressure, waist circumference, and BMI were improved in the mobile app users.[43,44] The difference in the findings might be caused by longer duration of intervention and a 6-month follow-up in this study.

It is important considering cardiac risk factors after MI (secondary prevention). To our knowledge, this study was one of the first studies in Iran exploring the effect of health-related lifestyle self-management intervention modifying the lifestyle of post-MI patients. This transtheoretical model of behavior change could increase the patients' responsibility to control their cardiac risk factors. Therefore, it is suggested that this program be used to control the risk factors for other heart diseases.

One of the main limitations of this study was the use of a self-report instrument as the participants may provide inaccurate information, and this might cause overestimation, memory issues, recall bias, and estimation problems. In order to solve these problems, the participants were informed about the importance of accuracy.

Conclusion

This study showed that the self-management intervention modified some of cardiac risk factors such as dietary and domestic PA of post-MI patients; however, this intervention had no effect on systolic and diastolic blood pressure, waist measurement, and BMI. It could be inferred that the interventions aimed at improving MI-related risk factors require longer training time and more consistent and frequent follow-ups. Furthermore, in addition to the type of intervention and duration of the implementation, the individual and underlying features and community variations should be considered in modifying the above program.

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Conflicts of interest

There are no conflicts of interest.

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