Original Article

Application of Pender's Health Promotıon Model to Post-Myocard Infarction Patients in Turkey

Sibel Sevinc PhD, RN
Assistant Professor, Mustafa Kemal University, Hatay School of Health, Hatay, Turkey

Gulumser Argon, PhD, RN (Retired)
Professor, Ege University Faculty of Nursing, Internal Medicine Nursing Department, Izmir, Turkey

Corespondence: Sibel Sevinc, Assistant Professor, Mustafa Kemal University, Mustafa Kemal University, Hatay School of Health, Hatay, Turkey E-mail: sibelsevis@gmail.com

Abstract
Background: Coronary heart disease, in Turkey and across the globe, is a major cause of mortality, morbidity and disability among adults, and accounts for a considerable share of health spending.
Aim: The aim of this study was to examine the effectiveness of a theoretically based training program built on the health promotion model (HPM) and individual counseling based on the patient's level of self-efficacy, prognosis, functional capacity and risk factors for post-myocardial infarction (PMI) patient.
Methods: We used a prospective, pretest–post-test quasi-experimental study design. The study sample consisted of 70 patients who were PMI. The control group (n=35) consisted of patients receiving routine clinical care, the experimental group (n=35) consisted of patients who received care based on the HPM accompanied by individual counseling.
Results: We observed a statistically significant difference when comparing repeated measures of smoking status, exercise and dietary status and total cholesterol, waist circumference, HbA1C results, functional capacity, and self-efficacy level in the experimental group to those of the the control group.
Conclusion: Consequently, we suggest that the HPM is an effective tool for use in patients PMI.
The HPM should be implemented in cardiology clinics for PMI patients by cardiology nurses, following studies using larger study samples.
Implication for nursing and health policy: We suggest that Pender's health promotion program is an effective tool for patients PMI and should be implemented in cardiology clinics.
Key Words: Health Promotion, Myocardial Infarction, Nursing

Introduction

Coronary artery disease (CAD), in Turkey and across the globe, is a major cause of mortality, morbidity and disability among adults, and accounts for a considerable share of health spending. Seventy percent of deaths caused by heart diseases and 50% of deaths due to myocardial infarction (MI) occur in patients previously diagnosed with CAD (Erol, 2008). Further, maintenance of adequate physical function and prevention of secondary coronary events and accompanying re-hospitalization represent major preventive health care problems and require a systematic approach. In this regard, lifestyle changes and improved medical management are important (Perk *et al.*, 2012). Data from the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE III) study revealed that Turkey is falling behind in achievement of cardiovascular protection outcomes (Tokgözoğlu *et al.*, 2010). To date, in Turkey, patients with an MI receive intensive care and treatment in hospital, but are typically discharged with only standard care instructions.

Purpose of the study

The purpose of this study was to examine the effect of Pender's HPM on self-efficacy, risk factors and functional capacity of PMI patients in Turkey.

Conceptual framework

It is important to improve self-efficacy in patients who are PMI so that they more effectively improve their health status. The concept of self-efficacy was first introduced by Albert Bandura in 1977. Behavioral theories focus on behaviors, environment and cognitive theories are based on the manner in which individuals handle, perceive, and interpret stimuli and how they store knowledge (Anderson *et al.,* 2010; Bandura, 2004). The HPM, developed by Nola Pender, is based on perceived self-efficacy and integrates nursing and behavioral science approaches. The model provides insight the manner in which individuals learn how to and then start to promote their health (Pender, 2011). In order to achieve a better prognosis in patients who are PMI, it is essential to develop health promotion behaviors to improve control of cardiac risk factors such as low functional capacity as well as poor self-efficacy.

Background

Woodgate and Brawley (2008) described several studies showing significant impact of perceived self-efficacy on behavioral change, rehabilitation results, and exercise tolerance. Similarly, other studies found that self-efficacy effects diet and exercise status, and other investigators reported that self-efficacy plays an important role in weight control behaviors, physical activity and healthy diet (Kaiser *et al.,* 2010; Rajati *et al.,* 2014).

The aim of PMI care is to ensure that patients regain their place in the community and resume an active life style in the shortest period of time. Well-planned rehabilitation decreases cardiovascular mortality and psychosocial problems while improving patients' functional capacity, adaptation to disease and quality of life (Murphy *et al.,* 2011; Shah *et al.*, 2011). Regular exercises, good nutrition (as recommended by cardiology nurses), high perceived self-efficacy and improvements in cardiac risk factors affect functional capacity.

We were designed this study specifically to examine the impact of a training program based on Pender's HPM administered in combination with individualized counseling about' self-efficacy, risk factors and functional capacity in the PMI period.

Methods

We used a prospective, pretest–post-test quasi-experimental study design to test factors that influence health promotion behaviors in PMI patients, adapted from Pender's model (Figure 1) (Health Promotion Model http://currentnursing.com/nursingtheory/health promotion model.html). The study initially included 100 patients diagnosed with MI who presented at the State Hospital Cardiology Clinic and were non-randomly assigned to the control (C; n=50) or the health promotion program (HPP; n=50) groups. At the time of final analyses, 35 HPP, 35 control patients comprised the study sample.

Application of Pender's HPM to patients who are PMI

Individual Characteristics and Experiences

We inquired about previous experiences with MI or have family members with angina or MI. Evaluation also included questions about characteristics. To explain risk factors, arterial blockage and pathophysiology of infarction to study participants, we used power point presentation accompanied by simple description. Other risk factors modifications were discussed such as management of diabetes, hypertension and medication adherence, smoking cessation and consumption of a low fat diet. According to cardiologist recommendations for study participants, at 6 weeks (45 days) PMI patients should start a routine of walking 20 minutes per day, 3 days per week.

Behavior-Specific Cognitions and Affect

We evaluated the perceived benefits of action, i.e., perceptions of the positive consequences of risk factor modification, and improvements inn eating habits and exercise. The effect of modification of risk factors in patients with CAD and the potential for modification of such risk factors with improvements in exercise and eating habits was explained to the study participants. We also discussed perceived barriers to action that is patient perceptions of the blocks, hurdles, and personal costs of risk factor modification and improvements in eating habits and exercise. Such barriers were discussed with both the patient and family.

We also evaluated perceived self-efficacy, that is the patients' judgment of their personal ability to organize and execute a particular eating and exercise routine; as well as their confidence regarding successful achievement of recommended changes in eating and exercise behaviors. Further, we discussed the benefits of behavioral change and improvements in diet and exercise self-efficacy as well as the benefits of dealing with negative emotions; we explained all of these actions are needed to achieve healthy lifestyle behaviors.

Activity-related affect

The study team also analyzed subjective feeling states or emotions occurring prior to, during and following risk factor modification, and improvements in eating habits and exercise. Patients may be very willing to change behavior shortly after discharge, but symptoms that occur later or social pressures may cause a reduced ability to continue lifestyle modifications. Therefore, shortly after patient discharge, nurses follow up with further counseling. It has been support from patient's social around to develop and maintain positive feelings.

Next, we evaluated interpersonal influences (family, peers, and providers), such as social support, role models; patients are influenced by the behaviors, beliefs, or attitudes of relevant other individuals when making decisions about eating habits and exercise. Individuals who do the cooking at the patients' home (wife, daughter, husband etc.) were included in discussions about recommended of **eating habits.**

Situational influences (options, demand characteristics, aesthetics) can have an effect on patients' perceptions about compatibility of their lifestyle or environment with the proposed risk factor modification and improvements in eating habits and exercise. In particularly, sedentary individuals who are accustomed to high-fat food diets and who had one MI may be reluctant to behavior change. These possibilities were discussed with the patient and family.

Commitment to a plan of action

Intention to carry out a particular health behavior including the identification of specific strategies to do so successfully is an important factor in risk factor modification. Accordingly, the nurse researchers requested that the patient comply with the program and made plans to meet two weeks after the initial session. Immediate competing demands and preferences

Alternative behaviors that intrude into consciousness as possible courses of action just prior to the intended planned health behavior can impede behavioral improvements. Further, recommendation for coronary angioplasty bypass by the physician may affect the patient's motivation to make lifestyle modifications.

Desired Behavioral Outcome

Health promoting behavior is the desired behavioral end point or outcome of health decision-making. After two weeks and again at twelve weeks post discharge, the patient was given additional counseling and we evaluated risk factors, functional capacity and self-efficacy as a behavioral outcome.

Inclusion and exclusion criteria

Inclusion criteria consisted of the following: ST elevation or non-ST elevation MI, ability to read and verbally assist in planned discharge from inpatient cardiology clinic. Exclusion criteria were the following: other disabilities such as diagnosis of musculoskeletal, neurological, vascular or psychiatric disorders, uncontrolled angina, hypertension, arrhythmia, or failure on the six-minute walk test (see below for description of this test)(ATS, 2002).

Data Collection

First, we collected pre-intervention data for the HPP group, including measurement of functional capacity. Then, we administered the training program, which included individualized counseling appropriate for each patient's cardiac risk factors, functional capacity. Presentation methods included.

PowerPoint presentations to patients and family members, arranged on an individual basis, focusing on risk factors and aiming to improve health through modification of each individual's risk factors. Education was presented in a single 60 to 90 minute session that included active participation during the typical 4 to 7 day hospital stay. Counseling includes low-fat diet recommendations and general nutrition education; nutritionist support was provided for obese patients and those with multiple risk factors or diabetes. We also distributed an informational brochure concerning patient risk factors and individual patient characteristics (developed by the authors and approved and printed by the Turkish Society of Cardiology). Participants could also obtain additional assistance face-to-face or by telephone during working hours. In the second stage, 2 weeks after discharge, we re-measured self-efficacy. Lastly, 12 weeks after discharge, we re-measured self-efficacy, functional capacity and risk factors noted above. At that time, patients in the control group received the same routine clinical care and informational brochure concerning their risk factors, but did not receive counseling or listen to the PowerPoint presentation. The experimental group was studied first.

Data Collection Tools

Data were collected on socio-demographic, clinical and laboratory variables. Risk factors assessed included smoking habits, exercise status, total cholesterol (TK), HDL, LDL, triglycerides, fasting blood glucose, and HbA1c levels (Perk *et al.,* 2012).

Exercise Self-Efficacy Scale (ESE)

For purposes of this study, we defined exercise self-efficacy (ESE) as participants' confidence in their ability to exercise regularly (most days of the week). The ESE assessment is an18-item scale developed by Bandura (1997), with possible scores ranging from 0 (I cannot do this activity at all) to 100 (I am certain that I can do this activity successfully). Higher scores indicate higher individual self-efficacy and vice versa. Validity and reliability of the ESE in Turkey was reported by Bozkurt (2009); the Cronbach alpha value was 0.97 and the test-retest reliability coefficient value was 0.97. The Cronbach Alpha value for this study was 0.92.

Self-Efficacy for Regulation of Eating Habits

Self-efficacy for regulation of eating habits is defined as participants' confidence in their ability to eat regularly (most days of the week). The assessment instrument for self-efficacy for regulation of eating habits consists of a 30-item scale developed by Bandura, with scoring similar to that of the ESE.

Validity and reliability of the scale was assessed in Turkish cardiac patients prior to its application in this study (Sevinç & Argon, 2014); the Cronbach's Alpha value was 0.98.

Life Event Stress Scale

The Life Event Stress scale is used to predict the likelihood that of acquiring a stress related illness. The scale developed by Thomas Holmes and Richard Rahe (1962) and consisting of 43 items was used first in Turkey by Birsoz (1980). There has not been a sufficiently extensive validity and reliability study published to date. Scores of 0- 149 indicate slight risk of illness, 150- 299 indicate moderate risk of illness and 300 and higher indicate highest risk of illness (Birsoz, 1980).

Six-minute walk test (6MWT)

The American Thoracic Society (ATS) 'Guidelines for the Six-Minute walk Test' were used for this study. A 40-m course in a hospital corridor was marked out, and we instructed participants using the ATS standardized instructions along with encouragement from the investigator, who underwent training to administer the test.

The 6 MWT is a safe and reproducible measurement of functional capacity in stable patients after a non-complicated MI, when performed within a week of the event (Nogueira *et al.,* 2006).

Prior to commencing the test, participant's blood pressure, heart rate and oxygen saturation were recorded, along with a patient-reported rating of exertion using the Borg Scale and Numerical Rating Scale (NRS). We used the 6MWT as a measure of functional capacity and to assess the pre- and post-intervention differences in functional capacity.

Data Analysis

For data analyses, we used SPSS (version 15.0, SPSS Inc., Chicago, IL, USA). We compared baseline characteristics of the HPP and control groups using student t, chi-squared and analysis of variance analyses methodologies. Self-efficacy, functional capacity, risk factors at baseline and post-intervention data were compared using repeated-measures analysis of variance, in addition to Bonferroni testing for determining the group causing the difference.

Since non-normality was present for triglyceride level analyses, we used the Mann-Whitney U test. We used a confidence interval of 95% and statistical significance was set at $p < 0.05$. Lastly, we used Cronbach's alpha to calculate internal consistency of the questionnaire.

Ethical Considerations

We obtained approval for this study from the ethics committee of Ege University, School of Nursing (No:2010-90). The office of the head physician of the State Hospital granted permission to use the data from patients presenting at the Cardiology Clinic and all patients gave informed consent in writing prior to study participation.

Results

Descriptive Characteristics, Risk Factors, Functional Capacity and other Findings

There were no significant differences between study groups with regard to socio-demographic characteristics, sex, or clinical variables (P>0.05; Table 1). Baseline data and differential findings after the HPP intervention for total cholesterol, waist circumference, HbA1C, functional capacity are summarized in Table 2. Baseline data and differential findings after the HPP intervention for smoking status, exercise and dieting status are summarized in Table 2.

Table 1 Comparison of patient characteristics enrolled in the HPP and control groups

Characteristic	HPP Group		Control Group		Total		X^2 P
	n	%	n	%	n	%	
Age Group							
50 y	8	20.5	12	30	20	25.3	
51- 60	20	51.3	16	40	36	45.6	X^2= 1.275
60 or more y	11	28.2	12	30	23	29.1	P = 0.528
Mean Age							
X ± SD	57.15	8.47	55.70	9.25			
Gender							
Women	3	7.7	4	10	7	8.9	X^2= 0.130
Men	36	92.3	36	90	72	91.1	P = 0.718
Education							
Elementary school	27	69.2	29	72.5	56	70.9	X^2= 0.102
High school/University	12	30.8	11	27.5	23	29.1	P = 0.749
Marital Status							
Marriage	35	89.7	37	92.5	72	91.1	X^2= 0.186
Single	4	10.3	3	7.5	7	8.9	P = 0.666
Occupation							
Home maker	3	7.7	5	12.5	8	10.1	X^2= 4.627
Retired	21	53.8	12	30	33	41.8	P = 0.099
Working	15	38.5	23	57.5	38	48.1	
Family Type							
Core	34	87.2	37	92.5	71	89.9	X^2= 0.614
Extended/Alone	5	12.8	3	7.5	8	10.1	P = 0.433
MI type							

Anterior	6	15.4	8	20	14	17.7	
İnferior	21	53.8	20	50	41	51.9	X^2= 0.475
Antero Septal/							P = 0.924
Lateral	8	20.5	7	17.5	15	19	
Non-ST	4	10.3	5	12.5	9	11.4	
Hospital Treatment							
STK	12	30.8	6	15	18	22.8	
tPA	17	43.6	15	37.5	32	40.5	X^2= 4.906
Medical	10	25.6	19	47.5	29	36.7	P = 0.086
MI No							
One	28	71.8	34	85	62	78.5	X^2= 2.039
Multiple	11	28.2	6	15	17	21.5	P = 0.153
Ejection Fraction							
X ± SD	41.12	8.17	41.07	7.18			T = 0.31
							P = 0.976
Stress Rating							
0 – 149 score	30	76.9	30	75	60	75.9	X^2= 0.571
150 – 299 score	7	17.9	9	22.5	16	20.3	P = 0. 752
Higher than 300	2	5.1	1	2.5	3	3.8	
Total	39	100	40	100	79	100	

SD, Standard deviation; STK, Streptokinase; tPA, Tissue Plasminogen Activator HPP, Health Promotion Program

Table 2 Findings Regarding Risk Factors and Functional Capacity

Before Health Promotion Program					After Health Promotion Program			
	Experimental	**Control**			**Experimental**	**Control**		
	Mean ±SD	Mean ±SD	T	P	Mean ±SD	Mean ±SD	F	P
Waist circumference (m)	100.74 ± 9.23	100.03 ± 9.06	0.327	0.745	98.26 ± 7.03	100.97 ± 9.16	13.348	*0.001*
HbA1C (%)	8.73 ± 1.64	8.38±1.74	0.412	0.687	7.62±1.94	8.34±1.40	5.887	*0.031*
Glucose	120.46±39.10	117.17±37.14	0.360	0.720	104.77±21.61	113.71±37.58	0.136	0.714
Hb (g/dl)	13.98±1.80	14.48±1.63	-1.208	0.231	13.94±1.48	14.13±1.49	1.282	0.262
Hct (%)	40.80 ± 6.35	42.74±4.61	-1.470	0.146	41.31±4.08	41.95±4.23	1.725	0.193
BMI (kg/m²)	26.99±3.78	27.13±3.86	-0.153	0.879	26.77±3.30	27.55±4.05	0.266	0.607
Blood pressure (mm Hg)								
Systolic	108.00±13.68	106.57±8.72	0.521	0.604	112.86±13.84	115.71±14.61	0.082	0.776
Diastolic	69.43±9.06	71.43±7.72	-0.994	0.324	72.28±10.02	72.86±10.16	0.493	0.485
Total cholesterol (mmol/l, mg/dl)	193.77±37.10	196.48±39.44	-0.297	0.768	166.97±45.90	192.46±38.83	6.558	*0.013*
LDL (mmol/l, mg/dl)	127.01±27.81	125.96±37.24	0.024	0.981	100.54±36.33	111.85±29.00	0.664	0.418
HDL (mmol/l, mg/dl)	36.20±11.49	32.03±8.69	1.713	0.091	37.17±8.20	37.08±8.51	2.091	0.153
Triglyceride	4.93±0.47	5.09±0.69	Z -1.157	0.247	4.92±0.50	5.12±0.57	2.108	0.151
Functional capacity 6 MWT (m)	399.96±73.29	409.08±55.94	-0.585	0.560	490.34±56.15	438.78±58.23	32.323	*<0.001*
Exercise+ Activity increase	18 46.2	1 35	1.019	0.313	35 100	15 28.6	30.000	*<0.001*
Diet	-	-	-	-	33 94.3	8 22.9	35.796	*<0.001*
Smoke	26 66.7	21 52.5	2.944	0.229	5 14.3	10 28.6	Cessation Rate	
							HPM %77.3	Control %44.4

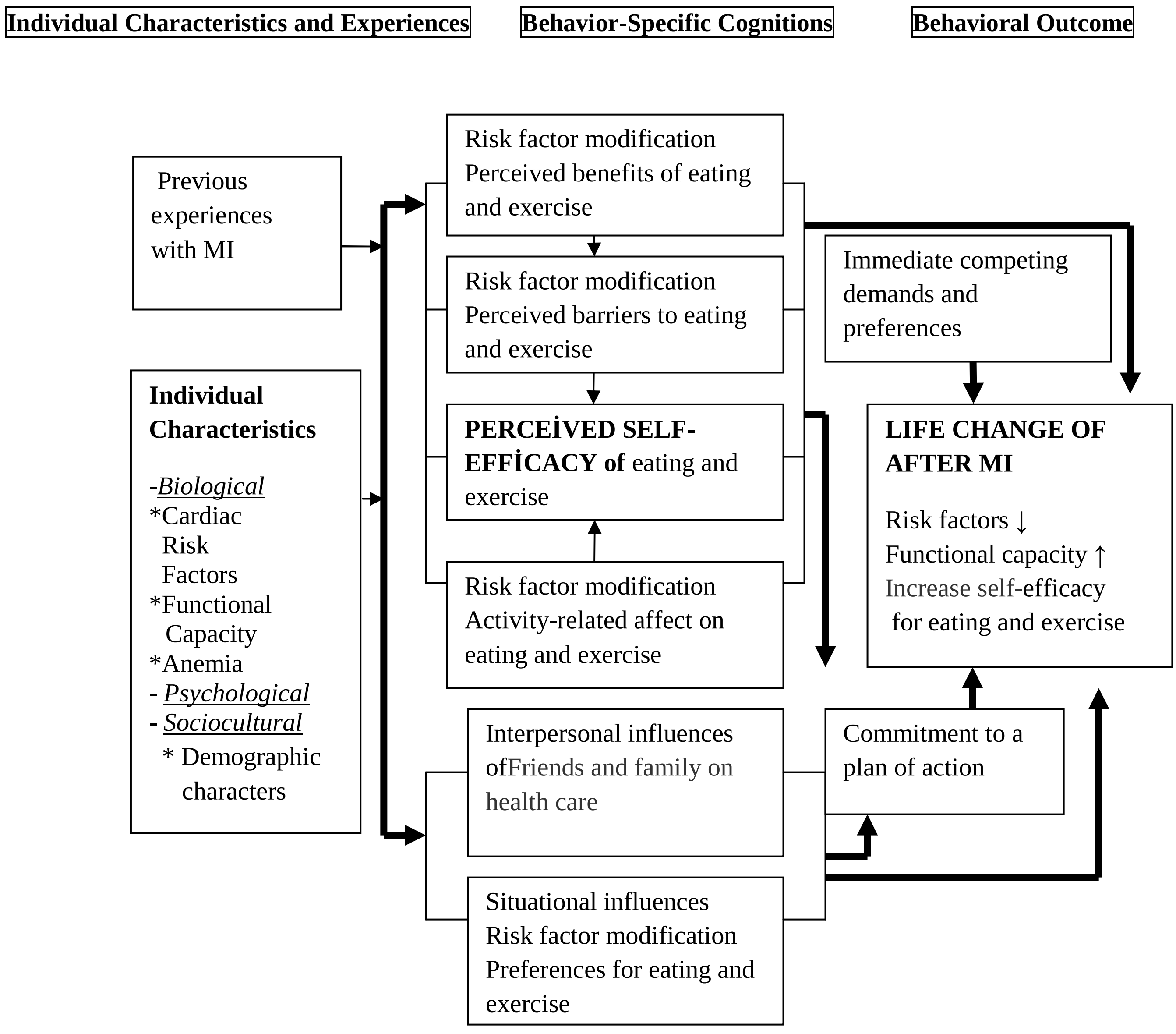

Figure 1. Application of Pender's Health Promotion Model to patients post-MI

Self-Efficacy

There were no significant differences in mean self-efficacy score between the HPP and control groups at baseline (T=1.777 P=0.080, T=1.247 P=0.217). Self- efficacy scores of the HPP group were significantly improved compared to the control group at the 2- weeks and 12- weeks HPP time points (F= 19.498 P= <0.001, F= 31.749, P<0.001).

Discussion

Demographic characteristics of the study participants are in accordance with EUROASPIRE III reported results; however, we report on more modifiable risk factors than that study.

In this study, control patients maintained their baseline self-efficacy level, the experimental group showed increasing scores over the 12 weeks period, inferring that those who were given training and counseling improved their self-efficacy and those with increased self-efficacy experienced positive behavioral change regardless of baseline self-efficacy. This is in agreement with results reported in the literature for self-efficacy in relation to exercise in cardiac rehabilitation, in that many studies reported that higher self-efficacy results in significant behavioral change, improved rehabilitation results, and improved exercise tolerance (Woodgate & Brawley, 2008; Rajati *et al.*, 2014). Similar results exist in the literature for the role of self-efficacy in weight control behaviors, perceived obstacles to lifestyle modification and adherence to a healthy diet (Kaiser *et al.*, 2010; Sol *et al.*, 2011).

Risk Factors

Therefore, we infer that smoking cessation rates can be further increased with PMI interventions. Luo et al. (2011) reported that a majority of males were previously smokers but 42.5 % quit after MI. In other studies, smoking cessation rates were similarly (Zhang *et al.*, 2015; Gerber *et al.*, 2011).

Normal baseline blood pressure points to the effectiveness of patient diagnosis and treatment of hypertension and normal blood pressure at week 12 imply high levels of treatment compliance.

Lower fasting glucose values at week 12 might be due to previously regulated baseline values of while hospitalized. Normal fasting glucose levels recorded during week 12 imply that compliance to treatment was satisfactory in both groups. In the control group, diabetic patients had lower HbA1C averages compared to the experimental group. The difference may have occurred because diabetic patients recently diagnosed with MI and high levels of HbA1C were likely to present at internal medicine clinic, start treatment, and initiate therapy as suggested, including monitoring of blood glucose levels. Taveira et al. 2010 implemented a training and follow-up program for mitigating cardiac risk factors in patients with type 2 diabetes. In other studies, investigators observed a significant relationship between diabetes, intensive glucose control and cardiovascular disease (CVD) risk to CVD events and mortality (Wannamethee *et al.*, 2011; Marso *et al.*, 2010).

Even in such a short period, we anticipated that the participants with increased self-efficacy for exercise would start losing weight during the experimental period and would continue losing weight, eventually reaching their target weight.

Participants with increased self-efficacy regarding exercise and diet in the experimental group did indeed start to lose weight, and their waist circumference values significantly decreased in agreement with results from the literature (Lavie *et al.*, 2009). We therefore suggest that implementation of Pender's health promotion program and counseling services is influential for patient weight loss. Lavie *et al.* (2009) observed that overweight and obese participants participating in a cardiac rehabilitation and exercise training (CRET) program who lose weight had improved exercise capacity, lipid levels, inflammation and quality of life.

The dietary recommendation compliance status of patients at week 12 shows was 94.3% and 58.6% for the experimental and control group, respectively. Since most patients were married, training was also provided for their spouses as support for recommended dietary modifications. Attendance of the family member with primary responsibility for cooking resulted in increased compliance with dietary recommendations. In Sharp and Salyer's study (2012), patients receiving cardiac rehabilitation care noted higher self-efficacy for healthy eating and reduced barriers.

In our study, both groups reported increased walking distance at week 12, but only the increase in the experimental group was statistically significant. Functional capacity improved in parallel with increased activity for the experimental group. Previous studies involving CAD patients showed that those with post-cardiac catheterization have low functional capacity, and those with poorer results on the 6MWT are at higher risk for cardiovascular death and recurrent hospitalization (Alahdab *et al.*, 2009; Wegrzynowska-Teodorczyk *et al.*, 2013).

Study Limitations

This study was limited to patients at the Cardiology Clinic of a State Hospital. Because the hospital does not an invasive cardiology laboratory or coronary by-pass surgical facilities, some patients were referred to other hospitals after MI diagnosis. These patients tended to undergo therapy and follow-up care at those hospitals to which they were referred, which resulted in some data loss. Lack of randomization in this study is also a limitation.

Implications for nursing and health policy

Pender's HPM focuses on helping people achieve improved well-being. It encourages health professionals to provide positive resources to achieve behavior specific changes (Pender, 2011).

Conclusions

In conclusion, self-efficacy, functional capacity and risk factors of patients PMI who underwent the HPP intervention showed significant improvement at week 12. Therefore, we suggest that Pender's health promotion program is an effective tool for patients PMI and should be implemented in cardiology clinics. However, we recommend conduct of other studies including larger study groups and longer term observation of effects of the health promotion program on patient PMI.

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