Factors in relation with fatigue and illness perception in patients with myocardial infarction and the changes in fatigue due to intervention on illness perception: Research design, methodology, and preliminary results

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Original Article

Abstract

BACKGROUND: In physical diseases including cardiovascular diseases (CVDs), illness perception (IP) plays an important role in illness outcomes. Fatigue is a major bothersome symptom after myocardial infarction (MI). This manuscript presents the research design, methodology, and primary findings of a study on factors in relation with fatigue and IP in patients with MI, and changes in fatigue after intervention on IP.

METHODS: 241 patients with MI who experienced a first-time acute MI (AMI) participated in this study in 2016-2017. During hospitalization, the demographic and clinical information of participants were collected. After four months, the information regarding fatigue, IP, coping with stress, type D personality, perceived social support (PSS), and locus of control of the participants was collected at their houses. About one year later, based on the results of phase one of the study, a psychoeducation course was conducted for 35 of the patients as intervention group while 36 patients were supervised as control group. Two months later, the role of IP in fatigue changes of the participants was assessed.

RESULTS: 155 (65%) of the patients had positive family history of coronary heart disease (CHD). 103 (43%) were cigarette smokers, 100 (43.5%) had high blood cholesterol, and 72 (30%) had sedentary life style before MI.

CONCLUSION: The overview of the factors related to fatigue and IP of the patients with MI could help the care teams to provide better care in the recovery period of the illness.

Keywords: Myocardial Infarction, Perception, Fatigue, Education, Structural Equation Modeling

Introduction

The number one cause of death all around the world is cardiovascular diseases (CVDs). Every year, 17.7 million people die because of CVDs. This forms 31% of all global deaths, and 13% of that is because of coronary heart disease (CHD). 80% of all CVD deaths are due to heart attack and stroke.[1] A major part of underlying causes of death and disability in Iran is due to CVDs. The first cause of death in Iran (39.3%) is because of CVDs, and 19.5% of that is due to myocardial infarction (MI).[2] The cognitive representation of illness which is called illness perception (IP) is formed by patients' beliefs and understood information about their condition, and the individual's mental health and dealing with the illness can be affected by these factors.[3]

In physical illnesses including CVDs, illness outcomes are considerably varied by IP.[4] It has been shown that IP is capable of affecting patients' taking part in care, obeying physician order and health behaviors, responses to illness, and the strategies chosen while suffering from illness.[5-7]

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In some studies on patients with MI, it has been shown that their IP (attitude and feelings regarding their disease) extensively impacts on recovery process.[8] IP is a set of psychological ideas. It has been developed as a basic construct of Leventhal's Common Sense Model (CSM).[9] Each patient makes her/his own illness representation in this model. The dimensions of this representation are: identity, timeline, cure/control, consequences, and causation of the illness.[5] A symptom is a subjective experience[10] and after MI, fatigue is a tormenting symptom.[11] Andersson et al.,[12] one year post-MI found an extreme and constant physically and mentally fatigue that was difficult to manage and caused obvious restrictions. Fatigue remains in nearly half of patients for four months[13,14] and two years after MI.[15] In a study regarding symptom experiences in post-MI period, four months after treatment, fatigue was reported by 50% of the participants[13] and this proportion remained after two years.[15] Tiredness is a response to stressors which is adaptive, and fatigue shows a reduced adaptability. Inability to respond to stressors may lead to exhaustion.[16] Normal tiredness is different from post-MI fatigue, and also is unintelligible because it is not related to any specific activity, and hence it is unpredictable and coping with it is difficult.[11] Persons think in different ways about their illness (symptoms). In the experience of symptoms many factors may take part, though, physical, cognitive, behavioral, and motivational factors are important.[17]

In post-MI period, negative IPs are related with fatigue. Those who experience fatigue expect longer duration for their illness and more serious consequences. They have more negative emotional beliefs. More fatigue is related with limited personal control of perceptions and not being sure about the cure.[13,14] Some of the negative beliefs were associated with fatigue such as: IP changes over time from feeling the MI as an acute event to a more chronic illness, and feeling decreased personal and treatment control.[14]

The interventions on IP usually consist of brief classes regarding pathophysiology of MI and associated symptoms, exploration of the patients' ideas about the disease, the role of life style modification in management of MI, discussing and explanation of identity, timeline, cure/control, consequences, and causation of MI. It is very important to alter the highly-negative perceptions, address the misconceptions of the patients, broaden the patients' causal model to alter the patients' views of the timeline and consequences of their illness, and provide them with a recovery plan.[18-20] The external and internal factors affect formation of IP such as: social environment and support, attachment styles, demographics, health conditions of individuals for example past history of MI which makes more negative cognition, locus of control, personality traits such as type D, depression, information obtained through other people, mass media, or health workers, mood, and personal beliefs.[3,5,20-24]

In this paper, the focus is on the methodology of the study, on factors related to fatigue and IP in patients with MI, and the changes in fatigue due to intervention on IP.

The objective of this study was exploring the relations between some psychological, clinical, and demographic factors and fatigue and IP, then exploring the effect of intervention of IP on fatigue changes.

The specific aim was identifying the relationship between the followings in patients with MI:

I- Relationship of the demographic factors of age, sex, and education with perceived social support (PSS), type D personality, coping with disease, locus of control, fatigue, and IP.

II- Relationship of some of the clinical factors with PSS, type D personality, coping with disease, locus of control, fatigue, and IP.

III- Relationship of PSS, type D personality, coping with disease, locus of control with fatigue and IP.

Materials and Methods

Study design and participants' recruitment

The design of this cross-sectional study (which is the corresponding author's PhD thesis) has been approved by Vice Chancellor for Research (registration No. 395045) and the Ethics Committee of Isfahan University of Medical Sciences, Isfahan, Iran (IR.MUI.REC.1395.3.045).

Settings: The two main cardiac care units in Isfahan were the places of conducting this study: Shahid Chamran Hospital (the main academic heart center) and Shariati Hospital (affiliated to the Social Security Insurance Organization).

Sample size: By means of formula $n = (z1 + z2)^2 * S^2 / d^2$ and considering 95% confidence interval (CI), coefficient (Z1) of 1.96, study power of 80% equal to 0.84, standard deviation (SD) of IP questionnaire which is one sixth of the changing range of its score (8 to 80) equal to 13.3, and sampling error (d) equal to 2.5,

the calculated sample size was 181. To have a safety factor, 241 patients were included in the study.

Conducting procedure: The observational cross-sectional phase of the study included two steps of data collection. During a 9-month period (from April 2016 to January 2017) nearly 750 patients with MI were admitted in Chamran (600) and Shariati (150) Hospitals. The necessary permissions obtained from hospital authorities. The related staff was informed about the study; hence, they had a very good cooperation. In the first week of post-MI period, two questionnaires of clinical and demographic information were completed by the researcher for 350 consecutive MI patients who captured the inclusion criteria in either coronary care unit (CCU) or cardiac ward of the mentioned hospitals. After delivering an introduction including the aim of the study to the patients and collecting the written informed consent (only if they were ready), the questionnaires were completed by conducting an interview. The time needed to complete the said questionnaires for each patient was about 20 minutes. Also some information was collected from the patients' hospital files. The obtained information was kept secret carefully. To complete this step of the study, the researcher has gone nearly 90 times to Chamran and 60 times to Shariati Hospitals.

About four months after the first step, at the second one, 6 questionnaires namely PSS, type D personality, locus of control, coping with stress, fatigue, and IP were completed for 241 patients. Before commencement of the second step, 109 participants were excluded from the study due to some reasons such as undergoing a surgical operation, suffering from another MI, changing address, or death. After briefing, 10 questioners (with psychology or health education bachelor degree) completed the questionnaires by the means of interview at the patients' houses which were located in different districts and locations of Isfahan Province such as Shahreza, Shahinshar, Mobarekeh, etc. Prior to interview, the patients were informed by phone. If they were ready, the interview would be set. The average time for each interview was less than one hour, though because of long distances in some instances, 1 to 3 hours was needed to reach the participants. The questioning fee was paid to the questioners after completion of the work.

One year after completion of the phase one, the second phase of the study was conducted and an educational intervention was performed on some of the patients participated in the phase one, by means of

determining the contribution and the role of each variable in IP variance and the role of IP in the patients' fatigue. 35 patients as the case group and 36 patients as the control group were randomly selected. The case group was divided into two batches. Five psychoeducation classes including following topics were held for each batch of the case group: mechanism of atherosclerosis and MI, the role of life style in developing heart diseases, life style modification, mindfulness and its role in stress management, self-control, self-evaluation, self-reinforcement, self-value, self-care, and IP and its role in management of MI and fatigue. During the classes, participants were actively involved in the discussions. Two brochures containing necessary information regarding post-MI period and angiography were given to the control as well as case group participants. The aim of the intervention was assessing the role of IP improvement in fatigue status of the patients with MI. Before holding the classes and 2 months after that, IP and fatigue of the participants in the case and control groups were assessed. Figure 1 shows the steps of the phase one of the study.
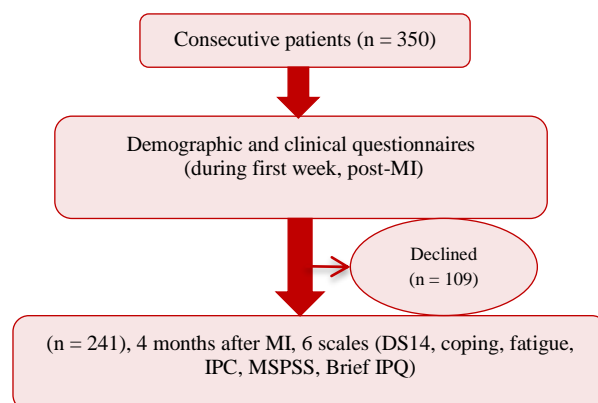
Figure 1. Data collection, handling, and quality assurance (12 months)
MI: Myocardial infarction; DS14: 14-item Type D Personality Scale; IPC: Internal, powerful others, chance; MSPSS: Multidimensional Scale of Perceived Social Support; IPQ: Illness perception questionnaire

Study instruments

Clinical characteristics: Data regarding the clinical characteristics of the participants were collected mainly by means of history taking, though some data were collected from the patients' hospital files. The participants answered to some of the questions regarding important items such as: the critical time needed to be hospitalized after commencement of symptoms, family history of CHD, if any of the consanguineous relatives had the disease, past history of CHD, if in the past the participant suffered from CHD, past history of intervention for CHD, if the

participant in the past had undergone any intervention for CHD such as medical, surgical, or percutaneous coronary intervention (PCI), physician visit prior to hospitalization, type of vehicle which transported the patient to hospital, cigarette smoking before MI, suffering from high blood cholesterol (> 240 mg/dl) and/or high blood triglyceride (TG) (> 200 mg/dl) before MI, suffering from high blood pressure (systolic > 140 mmHg and/or diastolic > 90 mmHg), history of diabetes, fasting blood sugar (FBS) > 120 mg/dl and/or hemoglobin A1c (Hb A1c) > 6.5%, history of obesity [body mass index (BMI) > 30 kg/m²] before MI, and having a sedentary life style (less than 20 minutes regular physical activity per day, five days per week).

Illness perceptions: For basic evaluation and follow-up of IP score, a short form of IP Questionnaire (IPQ) called Brief IPQ was used. In various conditions, this questionnaire has been reported as a reliable and valid tool. It has a good test–retest reliability.[25] Except the causal, the other questions of the nine subscales have a 10-point (1 to 10) response scale. Each subscale assesses one component of IP: 1) consequences, 2) timeline, 3) personal control, 4) treatment control, 5) identity, 6) concern, 7) illness comprehensibility, and 8) emotional response. The cause of the illness is assessed by an open-ended question.[21] Item 9 was excluded in this study since the cause of the illness was not considered.

For each of the subscales, the reliability coefficient by test-retest method was from r = 0.48 (understanding) to r = 0.70 (consequences).[25] Cronbach's alpha was 0.84 for the Farsi version of the Brief IPQ. Its correlation with Farsi version of the revised version of IPQ (IPQ-R) was 0.71. The Farsi version of the Brief IPQ has a good validity.[22]

Type D personality: It refers to individuals with a joint propensity toward negative affectivity (NA) as well as social inhibition (SI) and is related to poor prognosis of heart failure.[26] Its related scale, 14-item Type D Personality Scale (DS14), has two subscales. Each of them consists of 7 questions and are answered on a five-point Likert scale from 0 (false) to 4 (true). The maximum score is 28 for NA and for SI as well.[26,27] Denollet conducted a study on psychometric properties of DS14. According to that, NA and SI scales were internally consistent (α = 0.88 and α = 0.86, respectively; N = 3678) and also were stable over a period of 3 months (test–retest r = 0.72 and 0.82, respectively).[26] For the Farsi version of the 14-item scale over a 2-month period, the subscales of NA and SI have a good reliability (test–retest r = 0.86 and 0.77, respectively) and internal consistency of Cronbach's alpha

coefficient as 0.84 and 0.86, respectively, in patients' group and 0.87 for NA and 0.75 for SI subscales in healthy group. Also for this version (Farsi DS14), a structural validity was confirmed by factor analysis of the NA and SI items.[28]

Multidimensional Scale of Perceived Social Support (MSPSS): Zimet et al. developed the first version of this 12-item scale. It has three subscales: family, friends, and significant others.[29] From the psychometric properties point of view, the MSPSS showed high internal consistency, reliability, validity, and utility of the scale in a sample of urban, largely African-American adolescents.[30] A study was carried out in Iran on 176 patients with MI admitted to the CCU as well as 71 subjects from the general population for assessing the psychometric properties of the Farsi version of the MSPSS. A three-factor structure of family, friends, and significant others was provided by factor analysis of the scores of the patients and healthy samples. The percentages of variance of the three factors were 77.87% in the patient sample and 78.55% in the healthy sample and the scale's Cronbach's α coefficient was 0.84 among MI patients and healthy samples. The Farsi version of the MSPSS is a reliable and valid scale.[31]

Iowa Fatigue Scale (IFS): Hartz et al. developed an 11-item scale. On a data set of 409 primary care patients, factor analysis was used and validated on 816 additional subjects. In that study, correlations of the overall measure with other overall measures ranged from 0.82 to 0.96. This scale synthesizes information from several fatigue instruments.[32] We used its Farsi manuscript which was translated (forward and backward method) under supervision of an English language professor from Shiraz University of Medical Sciences, Shiraz, Iran. Two specialists (an endocrinologist and a social medicine specialist) approved validity of the questionnaire. Cronbach's alpha test was used for reliability (r = 0.84). These aspects of fatigue are assessed by the scale: cognitive aspects (4 questions), physical fatigue (2 questions), energy rate (3 questions), and work output (2 questions).[33]

Levenson Multidimensional Locus of Control Scale (IPC): Internal, powerful others, chance (IPC) scale of the Levenson includes 24 items for three components of internal, powerful others, and chance, eight questions for each. It is rated on a six-point Likert scale. The validity of this scale has been verified with Rotter's Internal-External (I-E) scale (1996). Kuder-Richardson's reliability coefficient of 0.50, 0.61, and 0.77 was reported by Levenson for the IPC subscales, respectively. The validity and

reliability of the Farsi version of this scale were reported by Farahani et al. The reliability coefficients for I, P, and C components were 0.76, 0.56, and 0.67, respectively, in a sample of students.[34] On the first and second administration, the mean differences between scores were non-significant and internal consistency estimates were moderately high. The construct validity of the scale was supported by the differences among diagnostic categories and between normal and hospitalized subjects.[35] In a study, the concurrent validity of the Farsi version of the Multidimensional Health Locus of Control (MHLC) scale was measured by Levenson's IPC Scale and showed satisfactory results for all of the three subscales.[36]

Coping Inventory for Stressful Situations (CISS): Endler and Parker developed this reliable and valid multidimensional coping scale. The CISS has three dimensions: task, emotion, and avoidance. Respondents were asked to rate each of the 48 items of the scale on a five-point Likert-type rating scale.[37-39] It can be concluded from the results of four studies that the CISS is a valid and reliable scale as far as the basic coping styles are concerned.[40] To validate Farsi version of Endler and Parker's CISS, a study was carried out with participation of 410 high school students. It revealed that this scale had suitable validity and

there was relation and correlation between scale factors. The scale and its subscales have an acceptable validity and reliability.[41]

Data collection, entry, handling, and quality assurance The researcher supervised the process of interviews continuously during the 12 months of data collection, and in different stages, the credibility of the data was investigated. The questionnaires were checked regularly. By using the computerized process, the data were entered into the electronic sheets and to identify missing values and outlier items, the computerized data were rechecked.

Statistical method: To describe the quantitative data, mean and SD and to describe the qualitative data, frequency and percentage indicators were used. In analyzing the data, to explore the relationship between demographic, clinical, and psychological variables, Structural Equation Modeling (SEM) was used. The indicators which were used to examine the goodness of fit of the model are: Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), probability of Root Mean Square Error of Approximation (RMSEA), Comparative Fit Index (CFI), Tucker-Lewis index (TLI), and probability of Standardized Root Mean Square Residual (SRMR). Figure 2 shows the diagram representing the possible relationships of demographic, clinical, psychological, IP, and fatigue variables in patients with MI.
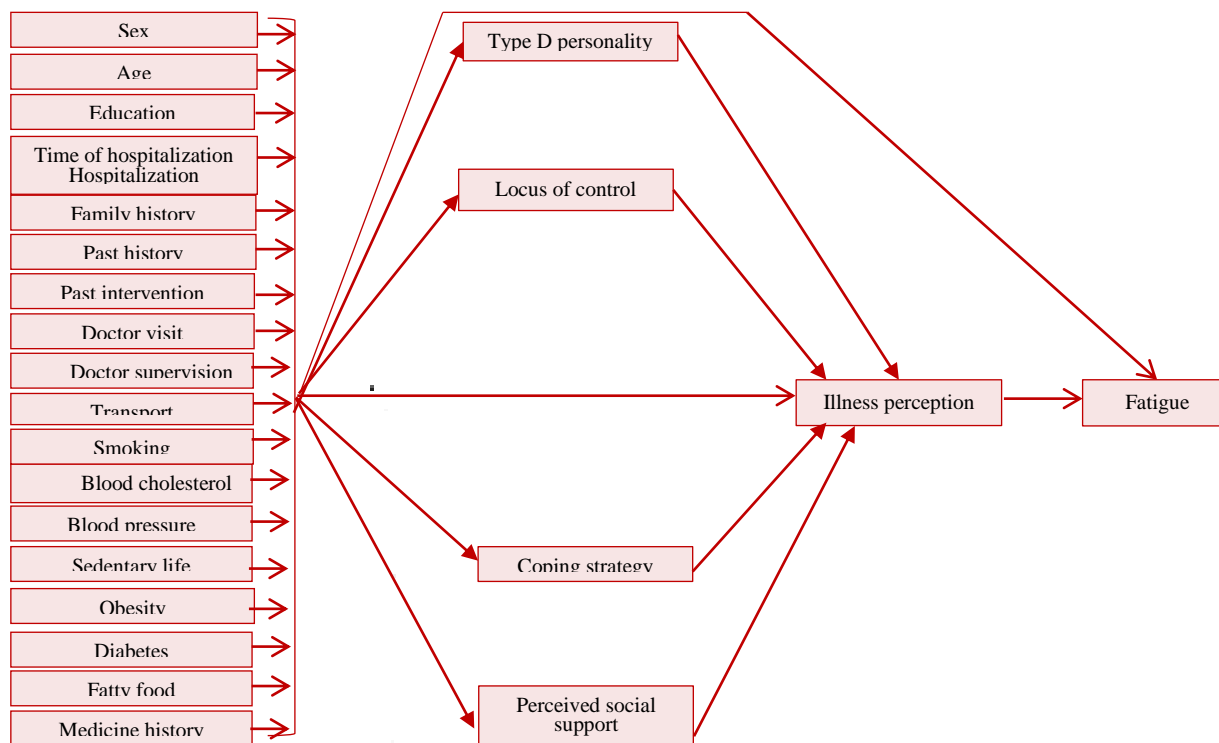
Figure 2. The possible relationships of demographic, clinical, psychological, illness perception (IP), and fatigue variables in patients with myocardial infarction (MI)

Results

Demographic: 241 patients with MI participated in the study, 173 (72%) from Chamran and 68 (28%) from Shariati hospital; finally, we had 1 missing case. The mean age of participants was 54.53 years (SD = 9.76). Demographic characteristics of the participants can be seen in table 1.

Table 1. Demographic characteristics of participants

Characteristics	n (%)
Sex	
Male	200 (83.0)
Female	41 (17.0)
Marital status	
Married	231 (96.0)
Single	10 (4.0)
Education	
Completed high school	63 (26.0)
Below high school	147 (61.0)
University degree	30 (12.5)
Occupation	
Non-governmental	101 (42.0)
Government employee	33 (13.7)
Non-employed	5 (2.1)
Retired	63 (26.1)
Housewife	39 (16.2)

Clinical findings: The clinical findings of the participants can be seen in table 2.

Conclusion

Surviving an MI is often the beginning of a long period of rehabilitation. Cardiac rehabilitation and lifestyle modifications are essential components of successful recovery after MI.[13] We hope to help the promotion of MI rehabilitation process by identifying the relations of some of the psychological factors in order to optimize patients' recovery.

Exploring the relationships between demographic and clinical characteristics and psychological variables of locus of control, coping with stress, type D personality, and PSS with fatigue and IP in patients with MI could help the care teams to provide better care in the post-MI period by considering these important factors.

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None.

Conflict of Interests

Authors have no conflict of interests.

Table 2. Clinical findings

Characteristics	n (%)
Hospitalized within 1st hour after symptoms commencing	84 (35.0)
Hospitalized within 1 to 2 hours after symptoms commencing	29 (12.0)
Hospitalized after 12 hours of symptoms commencing	83 (34.0)
Positive family history of CHD	155 (65.0)
Past history of CHD	61 (25.0)
Having some intervention for CHD (66% medical, 30% PCI, 4% surgery)	51 (22.0)
Having a physician visit prior to hospitalization	125 (52.0)
Being regularly under supervision of a physician before MI	53 (22.5)
Being transported to hospital by ambulance	72 (30.0)
Being transported to hospital by a taxi or a private car	165 (70.0)
Being cigarette smoker before MI	103 (43.0)
Having high blood cholesterol before MI	100 (43.0)
Having high blood pressure before MI	87 (37.0)
Having diabetes	55 (23.0)
Having sedentary life style before MI	72 (30.0)
Presence of obesity	49 (21.0)
Used to have fatty (greasy) food before MI	156 (65.0)
Used to take medicine regularly before MI	124 (52.0)

CHD: Coronary heart disease; PCI: Percutaneous coronary intervention; MI: Myocardial infarction

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References

1. World Health Organization. Cardiovascular diseases (CVDs) [Online]. [cited 2017]; Available from: URL: https://www.who.int/news-room/fact-sheets/detail/cardiovascular-diseases-(cvds)

2. Shams M, Samavat T, Hojatzadeh A, Afkhami A, Mahdavi A, Bashti S. The ways of prevention and control of cardiovascular diseases. Tehran, Iran: Javan Publications; 2013. [In Persian].

3. Leventhal H, Nerenz DR, Steele DJ. Illness representation and coping with health threats. In: Baum A, Taylor SE, Singer JE, Editors. Handbook of Psychology and Health: Social Psychological Aspects of Health. Mahwah, NJ: Lawrence Erlbaum; 1984. p. 219-52.

4. Lett HS, Blumenthal JA, Babyak MA, Sherwood A, Strauman T, Robins C, et al. Depression as a risk factor for coronary artery disease: Evidence, mechanisms, and treatment. Psychosom Med 2004; 66(3): 305-15.

5. Hagger MS, Orbell S. A meta-analytic review of the common-sense model of illness representations. Psychology & Health 2003; 18(2): 141-84.

6. van Esch SC, Nijkamp MD, Cornel MC, Snoek FJ. Illness representations of type 2 diabetes patients are associated with perceptions of diabetes threat in relatives. J Health Psychol 2014; 19(3): 358-68.

7. Woith WM, Rappleyea ML. Emotional representation of tuberculosis with stigma, treatment delay, and medication adherence in Russia. J Health Psychol 2016; 21(5): 770-80.

8. Wearden AJ. Illness perception interventions for heart attack patients and their spouses: Invited commentary. J Psychosom Res 2009; 67(1): 25-7.

9. Diefenbach MA, Leventhal H. The common-sense model of illness representation: Theoretical and practical considerations. J Soc Distress Homeless 1996; 5(1): 11-38.

10. Dodd M, Janson S, Facione N, Faucett J, Froelicher ES, Humphreys J, et al. Advancing the science of symptom management. J Adv Nurs 2001; 33(5): 668-76.

11. Alsen P, Brink E, Persson LO. Living with incomprehensible fatigue after recent myocardial infarction. J Adv Nurs 2008; 64(5): 459-68.

12. Andersson EK, Borglin G, Willman A. The experience of younger adults following myocardial infarction. Qual Health Res 2013; 23(6): 762-72.

13. Alsen P, Brink E, Brandstrom Y, Karlson BW, Persson LO. Fatigue after myocardial infarction: relationships with indices of emotional distress, and sociodemographic and clinical variables. Int J Nurs Pract 2010; 16(4): 326-34.

14. Alsen P, Brink E, Persson LO, Brandstrom Y, Karlson BW. Illness perceptions after myocardial infarction: relations to fatigue, emotional distress,

and health-related quality of life. J Cardiovasc Nurs 2010; 25(2): E1-E10.

15. Alsen P, Brink E. Fatigue after myocardial infarction-a two-year follow-up study. J Clin Nurs 2013; 22(11-12): 1647-52.

16. Olson K. A new way of thinking about fatigue: A reconceptualization. Oncol Nurs Forum 2007; 34(1): 93-9.

17. Leventhal H, Brissette I, Leventhal EA. The common-sense model of self-regulation of health and illness. In: Cameron LD, Leventhal H, Editors. The self-regulation of health and illness behaviour. Abingdon, UK: Routledge; 2003. p. 42-65.

18. Broadbent E, Ellis CJ, Thomas J, Gamble G, Petrie KJ. Further development of an illness perception intervention for myocardial infarction patients: A randomized controlled trial. J Psychosom Res 2009; 67(1): 17-23.

19. Petrie KJ, Cameron LD, Ellis CJ, Buick D, Weinman J. Changing illness perceptions after myocardial infarction: An early intervention randomized controlled trial. Psychosom Med 2002; 64(4): 580-6.

20. Broadbent E, Ellis CJ, Thomas J, Gamble G, Petrie KJ. Can an illness perception intervention reduce illness anxiety in spouses of myocardial infarction patients? A randomized controlled trial. J Psychosom Res 2009; 67(1): 11-5.

21. Yaraghchi A, Rezaei O, Mandegar MH, Bagherian R. The Relationship Between Illness Perception and Quality of life in Iranian Patients with Coronary Artery Bypass Graft. Procedia Soc Behav Sci 2012; 46: 3329-34.

22. Bagherian SR, Bahrami EH, Sanei H. Relationship between history of myocardial infraction and cognitive representation of myocardial infraction. Research in Psychological Health 2008; 2(2): 29-39.

23. Madani MS, Salesi M, Mohammadi J. The effect of dimensions of illness perceptions on the variation of quality of life in patients with coronary artery disease. Acta MedIran 2018; 56(3): 189-95.

24. Stafford L, Berk M, Jackson HJ. Are illness perceptions about coronary artery disease predictive of depression and quality of life outcomes? J Psychosom Res 2009; 66(3): 211-20.

25. Broadbent E, Petrie KJ, Main J, Weinman J. The brief illness perception questionnaire. J Psychosom Res 2006; 60(6): 631-7.

26. Denollet J. DS14: standard assessment of negative affectivity, social inhibition, and Type D personality. Psychosom Med 2005; 67(1): 89-97.

27. Pedersen SS, Denollet J. Validity of the Type D personality construct in Danish post-MI patients and healthy controls. J Psychosom Res 2004; 57(3): 265-72.

28. Bagherian R, Bahrami EH. Psychometric properties of the Persian version of type D personality scale

(DS14). Iran J Psychiatry Behav Sci 2011; 5(2): 12-7. [In Persian].

29. Zimet GD, Dahlem NW, Zimet SG, Farley GK. The multidimensional scale of perceived social support. J Pers Assess 1988; 52(1): 30-41.

30. Canty-Mitchell J, Zimet GD. Psychometric properties of the Multidimensional Scale of Perceived Social Support in urban adolescents. Am J Community Psychol 2000; 28(3): 391-400.

31. Bagherian-Sararoudi R, Hajian A, Ehsan HB, Sarafraz MR, Zimet GD. Psychometric properties of the persian version of the multidimensional scale of perceived social support in Iran. Int J Prev Med 2013; 4(11): 1277-81.

32. Hartz A, Bentler S, Watson D. Measuring fatigue severity in primary care patients. J Psychosom Res 2003; 54(6): 515-21.

33. Hadi N, Khademalhosseini Z, Khademalhosseini M. Comparison of prevalence of fatigue in adult diabetic mellitus patients with healthy population in Shiraz 2010. Shiraz E-Med J 2012; 13(3): 94-101.

34. Farahani M, Cooper M, Jin P. Is locus of control unidimensional or multidimensional? Data from Persian translations of Rotter's I-E scale and Levenson's I, P, and C scales. Psychol Res 1996; 2: 38-62.

35. Levenson H. Multidimensional locus of control in psychiatric patients. J Consult Clin Psychol 1973; 41(3): 397-404.

36. Moshki M, Ghofranipour F, Hajizadeh E, Azadfallah P. Validity and reliability of the multidimensional health locus of control scale for college students. BMC Public Health 2007; 7: 295.

37. Endler NS, Parker JD. Multidimensional assessment of coping: a critical evaluation. J Pers Soc Psychol 1990; 58(5): 844-54.

38. Endler NS, Parker JD. State and trait anxiety, depression and coping styles. Aust J Psychol 1990; 42(2): 207-20.

39. Endler NS, Parker JD. The multidimensional assessment of coping: Concepts, issues, and measurement. In: Van Heck GL, Bonaiuto P, Deary IJ, Nowack W, Editors. Personality psychology in Europe. Tilburg, Netherlands: Tilburg University Press; 1993. p. 309-19.

40. Endler NS, Parker JD. Assessment of multidimensional coping: Task, emotion, and avoidance strategies. Psychological Assessment 1994; 6(1): 50-60.

41. Ghoreyshi Rad F. Validation of Endler & Parker coping scale of stressful situations. J Res Behav Sci 2010; 1: 1-7.