

The effects of an educational program based on PRECEDE model on depression levels in patients with coronary artery bypass grafting

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Abstract

BACKGROUND: Depression is among the most important barriers to proper treatment of cardiac patients. It causes failure in accepting their conditions, decreases their motivation in following the therapeutic recommendations, and thus negatively affects their functionality and quality of life. The present study aimed to investigate the effects of an educational program based on Predisposing, Reinforcing, Enabling Constructs in Educational Diagnosis and Evaluation (PRECEDE) model on depression level in coronary artery bypass grafting (CABG) surgery patients.

METHODS: This was a quasi-experimental study in which 54 post-bypass surgery patients of Isfahan Cardiovascular Research Center were investigated. The patients were randomly divided into two groups of intervention and control. The data was collected using two questionnaires. Primarily, the cardiac depression scale was used to measure the degree of depression followed by PRECEDE model-based educational questionnaire to identify the role of the educational intervention on patients. The PRECEDE model-based intervention composed of 9 educational sessions per week (60-90 minutes each). The patients were followed up for two months post-intervention.

RESULTS: Following the educational intervention, mean scores of predisposing, enabling, and reinforcing factors, and self-helping behaviors significantly increased in the intervention group compared to the control group ($P < 0.001$). In addition, a significant difference in mean scores of depression was observed between the two groups following the educational intervention ($P < 0.001$).

CONCLUSION: The findings of the current study confirmed the practicability and effectiveness of the PRECEDE model-based educational programs on preventing or decreasing depression levels in CABG patients.

Keywords: Educational Program, PRECEDE Model, Depression, Coronary Artery Bypass Surgery.

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Introduction

Cardiovascular diseases are the main cause of mortality worldwide. They are responsible for 17 million deaths per annum (one out of three deaths). The figure is estimated to reach 24.8 million if no special preventive measures are taken by 2020.¹ Coronary artery bypass grafting (CABG) surgery is one of the most common surgical methods to treat cardiovascular diseases. It constitutes 60% of all open heart surgeries in Iran.² CABG improves a significant number of angina symptoms and exercise performance and promotes major indicators of quality of life (QoL) in patients.^{3,4}

One of the dimensions of QoL in the recovery period after CABG is the mental status of these patients which has an undeniable role in social functioning and restarting activities. Depression is the most important and most common mental outcome in such a period and can affect the recovery course of patients.⁵ Clinical depression has been reported in 54% of patients after CABG. It has been found to be correlated with high mortality risk, inability, increased medical care, and decreased daily activities.^{6,7} These patients have no desire for continuation of rehabilitation programs and are often socially isolated. They are low-tolerance

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people about diet, medication, and smoking withdrawal and do not usually implement the recommended exercise activities.⁸ Health education is a process that influences on and is influenced by QoL and social environment of individuals. Educating patients strongly reduces cardiac mortality, improves mental status, QoL, and satisfaction from medical care, and decreases behavioral risk factors in patients after CABG.⁹ The value of educational programs depends upon the efficacy of the programs which is itself influenced by appropriate use of educational models.¹⁰ Predisposing, reinforcing, enabling constructs in educational diagnosis and evaluation (PRECEDE) model has been developed by Green et al. as a theoretical model to identify the needs of educational programs and health promotion. This model begins from final results (causes) and proceeds in design, implementation, and evaluation through seven consecutive stages. It shows how social diagnosis, epidemiology, and behaviors lead to a clear understanding from the needs, problems, and tendencies of people. It also evaluates the causes of a group of behavioral factors which are closely associated with health.¹¹ The present study aimed to determine the effects of an educational program based on PRECEDE model on depression of patients after CABG.

Materials and Methods

This quasi-experimental study was conducted on cardiovascular patients who underwent CABG surgery for the first time. The patients with an age range of 35 to 70 years were referred to Isfahan Cardiovascular Research Center (Isfahan, Iran) 4 to 8 weeks after the surgery by receiving a referral letter from a heart surgeon for participation in educational programs. Out of 80 referral patients, 62 patients who had referred were randomly divided into 2 groups of intervention and control. During the course of the study, 7 patients were excluded due to various reasons and one patient died. Therefore, 27 patients in each group continued the study while considering a type I error of 5% and a type II error of 20%, each group was calculated to include 24 patients.

Cardiac depression scale (CDS) was used in order to assess depression among patients. CDS consists of 6 personal questions and 26 attitude questions which are assessed based on a 7-point Likert Scale (from completely agree to completely disagree). It covers 7 dimensions including lack of pleasure, sleep, judgment and vision, memory, mood and desperation.¹² A Cronbach's alpha coefficient of 0.90 proves the efficacy of the scale in assessment of depression in cardiac patients. The scale was translated to Persian by health education experts, cardiologists, and psychiatrists and its validity was confirmed.

The second questionnaire was based on the PRECEDE educational model and included basic data such as predisposing, enabling, and reinforcing causes as well as behavioral causes. It has been designed according to the National Plan for Prevention and Control of Cardiovascular Diseases of Isfahan Healthy Heart Program.¹³ Cronbach's alpha coefficient of this questionnaire was calculated as 0.81. It consisted of 11 items about awareness survey with four choices of "Yes" (2 positive points), "No" (one negative point), "Probably" (one positive point), and "I have no idea" (0 points). It also had 8 attitude-related items assessed by a 5-point Likert Scale. Skill-related items 5 educational resource Yes/No (1/0) questions and skills questions in which correct answers had 2 positive points, average had 1 positive point, and incorrect answers had 1 negative point. This questionnaire also included four questions about behaviors with answers of "Always" (3 positive points), "Often" (2 positive points), "Sometimes" (1 positive point) and "Never" (0 points). A single behavioral question was also scored as "Yes" (2 positive points), "Partly" (1 positive point), and "No" (zero points).

The pretest, including completion of the questionnaires, was done for both groups. Both intervention and control groups received ordinary cares prescribed by a cardiologist. The educational intervention was about atherosclerosis and its risk factors, CABG and lifestyle modification after the surgery, familiarization with anxiety symptoms, depression, and type A behavior and its correlation with cardiovascular disease, familiarization with relaxation and health behaviors, breathing exercises, exercises for heart patients, formation of supportive system, participation in cardiac rehabilitation program, and implementation of these behaviors. The intervention was performed in 9 sessions during 2 months and included lectures, question and answer sessions, group discussions, scientific shows, and also a scientific trip. Members of the intervention group also met other CABG patients and learned about each other's feelings. In order for group support, the intervention group was divided into three educational groups. Weekly 60 to 90-minute educational sessions were held for every educational group. In most sessions, one of the family members of the patients participated, too.

The final stage included the completion of the questionnaires immediately after the intervention by the intervention group and two months after the intervention by both groups. These patients learned about the continuation of health behaviors for two months. During the follow-up, a representative was selected for each group who was in contact with the

patients. The patients referred to the center twice a week for implementation of exercise behaviors and relaxation. They then completed checklists about relaxation and exercises.

Data analysis was performed through analysis of variance (ANOVA), and paired-t, independent-t, Mann-Whitney, chi-square, and Wilcoxon tests.

Results

Out of 27 patients in each group of intervention and control, 77.8% were male and 22.2% were female. The mean age of patients was 56.85 ± 7.21 years in the intervention group and 56.56 ± 7.56 years in the control group. In addition, 40.8% did not have a high school diploma, 16.7% were high school graduates, 24.1% had higher education, and only 18.5% were illiterate. In terms of employment, 33.3% were retired, 33.3% were employed, 20.4% were housewives, and the rest were unemployed. There was no significant difference between the two groups in terms of mean age, sex, literacy, and employment status. None of the groups suffered from mental problems or diseases other than cardiac disease.

There was no significant difference between the two groups in mean scores of awareness, attitude, skills, self-help behaviors, and depression before the intervention. However, the values significantly differed after the intervention. Awareness and attitude toward risk factors of atherosclerosis, CABG surgery, depression symptoms, and preventive methods such as walking, relaxation, exercising, formation of a supportive system, and participation in cardiac rehabilitation program were considered as predisposing causes in which there were no significant differences between the two groups before the educational intervention ($P < 0.0001$). After the intervention however, the same values significantly differed between the two groups. Educational resources included

educational pamphlets, trainers, psychologists, rehabilitation nurses, educational classes, relaxation educational tapes, educational films about appropriate exercises for cardiac patients, pictures and educational slides about appropriate and deep breathing after the surgery, and rehabilitation programs. Although there were no significant differences in using educational resources between the two groups before the intervention, significant increases were observed in application of the resources in the intervention group immediately after the intervention and even at the second month. However, little change was detected in the control group ($P < 0.0001$).

The trained skills included walking, exercising, relaxation, breathing exercises, formation of a supportive system with a group of patients who participated in the program, and learning how to measure heart rate during physical activity. These skills, considered as enabling causes, were not significantly different between the two groups before the intervention. However, there was a significant difference between the two groups after the educational intervention ($P < 0.001$) (Table 1).

Before the intervention, most patients of both groups lacked the skills of walking, exercising, relaxation, deep breathing exercises, and formation of supportive system ($P > 0.05$). After the intervention however, most patients of the intervention group fully or partly learned the mentioned skills and a significant difference was found between the two groups ($P < 0.0001$) (Table 2). Before the educational intervention, the reinforcing causes (encouragement of others) after self-help behaviors were almost absent in both groups ($P > 0.05$). However, encouragement of others after the educational intervention increased behaviors to prevent depression and made a significant difference between the two groups ($P < 0.001$).

Table 1. Comparing the mean scores of awareness, attitude, skills, behaviors, and depression between the two groups

Assessment Time	Before intervention			Immediately after intervention			Two months after intervention		
	Intervention group	Control group	P	Intervention group	Control group	P	Intervention group	Control group	P
Awareness	66.8 ± 11.3	73.8 ± 15.1	0.06	156.8 ± 2.3	-	-	174.4 ± 2.45	69.2 ± 18.5	<0.01
Attitude	24.6 ± 2.04	25.2 ± 1.9	0.22	39.1 ± 1.75	-	-	38.2 ± 2.6	24.2 ± 3.01	<0.01
Skills	1.22 ± 0.6	1.29 ± 0.6	0.66	9.1 ± 1.2	-	-	9 ± 1.2	1.7 ± 0.9	<0.01
Self-help behaviors	1.6 ± 1.2	2.3 ± 1.2	0.29	12.6 ± 3.17	-	-	12.5 ± 3.4	3.5 ± 2.4	<0.01
Depression score	112.8 ± 21.9	104.5 ± 30.4	0.25	78.4 ± 18.4	-	-	66.2 ± 22	89.2 ± 27.8	0.001

Table 2. Comparing the frequency of implementing the skills between the intervention and control groups

Skills	Time	Before intervention		Immediately after intervention		Two months after intervention	
		Intervention group	Control group	Intervention group	Control group	Intervention group	Control group
		Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)
Walking	Unable	3 (11.1%)	2 (7.04%)	0 (0%)	-	0 (0%)	0 (0%)
	Partly able	24 (88.8%)	25 (92.5%)	0 (0%)	-	0 (0%)	24 (88.8%)
	Fully able	0 (0%)	0 (0%)	27 (100%)	-	27 (100%)	3 (11.1%)
Test Result		P = 0.2				P < 0.01	
Exercising	Unable	26 (96.2%)	27 (100%)	0 (0%)	-	0 (0%)	24 (88.8%)
	Partly able	1 (3.5%)	0 (0%)	4 (14.8%)	-	2 (7.4%)	2 (7.4%)
	Fully able	0 (0%)	0 (0%)	23 (85.1%)	-	25 (92.5%)	1 (3.7%)
Test Result		P = 0.31				P < 0.01	
Relaxation	Unable	27 (100%)	27 (100%)	0 (0%)	-	0 (0%)	26 (96.2%)
	Partly able	0 (0%)	0 (0%)	5 (18.5%)	-	6 (22.2%)	0 (0%)
	Fully able	0 (0%)	0 (0%)	22 (81.4%)	-	21 (77.7%)	1 (3.7%)
Test Result		P = 1				P < 0.01	
Breathing exercises	Unable	25 (92.5%)	25 (92.5%)	1 (3.7%)	-	0 (0%)	25 (92.5%)
	Partly able	2 (7.4%)	2 (7.4%)	3 (11.1%)	-	4 (14.8%)	2 (7.4%)
	Fully able	0 (0%)	0 (0%)	23 (85.1%)	-	23 (85.1%)	0 (0%)
Test Result		P = 1				P < 0.01	
Supportive system	Unable	21 (77.7%)	23 (85.1%)	2 (7.4%)	-	1 (3.7%)	18 (66.6%)
	Partly able	6 (22.2%)	4 (14.8%)	9 (33.3%)	-	13 (48.1%)	9 (33.3%)
	Fully able	0 (0%)	0 (0%)	16 (59.2%)	-	13 (48.1%)	0 (0%)
Test Result		P = 0.48				P < 0.01	
Total		27 (100%)	27 (100%)	27 (100%)	-	27 (100%)	27 (100%)

Although most patients of both groups never or sometimes conducted self-help behaviors before the educational intervention, most patients of the intervention group always or often performed the trained self-help behaviors after the intervention and a significant difference was detected between the two groups (Table 3).

Before the intervention, mean scores of depression in the intervention and control groups were 112.8 ± 21.9 and 104.5 ± 30.4 , respectively ($P > 0.05$). Immediately and 2 months after the intervention, the mean scores of depression in the intervention group decreased to 78.4 ± 17.4 and 66.2 ± 22 (41% reduction), respectively ($P < 0.001$). In the control group, mean score of depression had a significant reduction to 89.2 ± 27.8 two months after the intervention (14% reduction) ($P < 0.001$).

Discussion

The present study showed that after the educational intervention, the intervention group obtained higher score in predisposing (awareness and attitude), score reinforcing, and enabling causes. Positive feelings

after self-help behaviors (reduction of depression and severity) which were considered as reinforcing causes occurred only in the intervention group and after the educational intervention. In fact, 100% of the patients in the intervention group were encouraged after self-help behaviors by their families, trainers, and a group of cardiac patients.

The mean score of self-help behaviors after the intervention was lower in the control group than the intervention group. Therefore, lack of awareness in individuals can be the main cause for not using the mentioned methods. The results of a study in Stanford University on 57 50-60-year-old men and women with 4 different exercises showed that despite various exercises, the amount of mental pressure, emotion, and depression decreased to 30% in all groups.¹⁴ The effects of relaxation on anxiety and depression reduction and self-confidence enhancement have been proved in primiparous women.¹⁵ Studies have shown individuals receiving proper social support to be less anxious, depressed, or diseased and to have lower levels of physiological

Table 3. Comparing the frequency distribution of behaviors preventing depression between the intervention and control groups

Skills	Time	Before intervention		Immediately after intervention		Two months after intervention	
		Intervention group	Control group	Intervention group	Control group	Intervention group	Control group
		Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)	Freq. (n%)
Walking	Never	7(25.9%)	5 (18.5%)	0 (0%)	-	1 (3.7%)	5 (18.5%)
	Sometimes (1-2 times a week)	9 (33.3%)	7 (25.9%)	0 (0%)	-	0 (0%)	8 (29.6%)
	Often (3-5 times a week)	10 (37.03%)	11 (40.7%)	5 (18.5%)	-	3 (11.1%)	5 (18.5%)
	Always (1-2 times a day)	1 (3.7%)	4 (14.8%)	22 (81.4%)	-	23 (85.1%)	9 (33.3%)
Mann-Whitney Test Result		P = 0.26				P < 0.01	
Exercising	Never	27 (100%)	27 (100%)	0 (0%)	-	1(3.7%)	23 (85.1%)
	Sometimes (1-2 times a week)	0 (0%)	0 (0%)	2 (7.4%)	-	4 (14.8%)	1(3.7%)
	Often (3-5 times a week)	0 (0%)	0 (0%)	9 (33.3%)	-	4 (14.8%)	3 (11.1%)
	Always (1-2 times a day)	0 (0%)	0 (0%)	16 (59.2%)	-	18 (66.6%)	0 (0%)
Mann-Whitney Test Result		P = 1				P < 0.01	
Relaxation	Never	27 (100%)	27 (100%)	0(0%)	-	1(3.7%)	27 (100%)
	Sometimes (1-2 times a week)	0 (0%)	0 (0%)	4 (14.8%)	-	3 (11.1%)	0 (0%)
	Often (3-5 times a week)	0 (0%)	0 (0%)	10 (37.03%)	-	5 (18.5%)	0 (0%)
	Always (1-2 times a day)	0 (0%)	0 (0%)	13 (48.1%)	-	18 (66.6%)	0 (0%)
Mann-Whitney Test Result		P = 1				P < 0.01	
Breathing exercises	Never	19 (70.3%)	17 (62.9%)	0 (0%)	-	0 (0%)	9 (33.3%)
	Sometimes (1-2 times a week)	7 (25.9%)	9 (33.3%)	0 (0%)	-	1(3.7%)	11 (40.7%)
	Often (3-5 times a week)	1 (3.7%)	1(3.7%)	8 (29.6%)	-	3 (11.1%)	4 (14.8%)
	Always (1-2 times a day)	0 (0%)	0 (0%)	19 (70.3%)	-	23 (85.1%)	3 (11.1%)
Mann-Whitney Test Result		P = 0.58				P < 0.01	
Supportive system	Never	24 (88.8%)	24 (88.8%)	12 (44.4%)	-	14 (51.8%)	20 (74.07%)
	Partly (1-2 times a month)	3 (11.1%)	3 (11.1%)	5 (18.5%)	-	3 (11.1%)	7 (25.9%)
	Yes (1-2 times a week)	0 (0%)	0 (0%)	10 (37.03%)	-	10 (37.03%)	0 (0%)
Mann-Whitney Test Result		P = 1				P < 0.001	
Participation in cardiac rehabilitation program	Never	27 (100%)	27 (100%)	15 (55.5%)	-	15 (55.5%)	24 (88.8%)
	Sometimes (1-2 times a week)	0 (0%)	0 (0%)	1 (3.7%)	-	0 (0%)	1 (3.7%)
	Often (3-5 times a week)	0 (0%)	0 (0%)	1 (3.7%)	-	4 (14.8%)	0 (0%)
	Always (1-2 times a day)	0 (0%)	0 (0%)	10 (37.03%)	-	8 (29.6%)	2 (7.4%)
Mann-Whitney Test Result		P = 1				P < 0.01	
Total		27 (100%)	27 (100%)	27 (100%)	-	27 (100%)	27 (100%)

stress.¹⁶ Furthermore, deep breathing is considered as one of the simplest and most effective methods to control mental pressures.^{17,18} Roohafza and Sadeghi¹⁹ and Nejatian²⁰ reported the effectiveness of cardiac rehabilitation programs on reducing anxiety and promoting QoL among cardiac patients.

While behaviors to prevent depression were seldom employed before the intervention, they were almost always used by the intervention group following the educational program. After the educational intervention, the mean score of depression decreased in both the intervention and the control group. However, the percentage of reduction in the intervention group was three times more than the control group. This finding is of high importance in patients' improvement and recovery. In a study by West et al. on patients with congestive heart failure, 6 months of counseling sessions reduced depression rate from 92.9% to 76.6%.²¹ Likewise, Sheikholeslami showed the effects of group therapy program on reducing depression in patients with myocardial infarction.²² Michalsen et al. suggested stress management and lifestyle modification programs to decrease depression scores in their both intervention and control groups of cardiovascular patients.²³ The study of Sebregts et al. on cardiovascular patients showed that the educational intervention was effective on decreasing anger and A type behavior. However, it had no effects on depression.²⁴ Since no research similar to this study has ever been performed, the significant reduction in depression score in the intervention group compared to the control group might have been due to the application of an intervention based on the PRECEDE model and its components in which responsibility and self-care are considered as vital principals. The findings of this study about components of PRECEDE model including predisposing causes (awareness and attitude), enabling causes (educational resources and skills), reinforcing causes, behavioral causes, and health problems were in accordance with the results of other studies.²⁵⁻²⁸ On the other hand, the differences between this study and previous researches could have also been a result of using cardiac depression scale in the present study while others used Beck Inventory.

Since many health problems are closely associated with the lifestyles and families of individuals, health educators have an important role in modifying behaviors of patients. The collaboration between health officials, policy makers, hospitals, and research centers would be beneficial in implementing more extensive behavioral-interventional educational programs to prevent depression, reduce probable

recurrent coronary artery diseases and unhealthy behaviors, and decrease health costs. Such programs would finally be able to effectively promote QoL in patients.

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Conflict of Interests

Authors have no conflict of interests.

References

1. Sharifi Rad GH, Mohhebi S, Mottalebi M. Reviewing the relationship between cardiovascular diseases in elderly of Isfahan Retirees Association with a history of physical activity during middle-age period. *Ofoogh-e-Danesh* 2007; 13(2): 57-63.
2. Babaee G, Keshavarz M, Hidarnia A. Evaluation of quality of life in patients with coronary artery bypass surgery using controlled clinical trial. *Acta Medica Iranica* 2007; 1: 69-74.
3. Panagopoulou E, Montgomery A, Benos A. Quality of life after coronary artery bypass grafting: evaluating the influence of preoperative physical and psychosocial functioning. *J Psychosom Res* 2006; 60(6): 636-44.
4. Bruner S. *Internal-Surgical Nursing, Cardiovascular Diseases*; Trans. Oveisi S, Ghabeljou M. 3rd ed. Tehran: Shahrab Publication; 1996. p. 16-19.
5. Davoudi V. Reviewing the comparison of physical, psychological and social status in males and females after Coronary Artery bypass Graft surgery in Chamran Hospital, Isfahan [MSc Thesis]. Isfahan: School of Nursing and Midwifery, Isfahan University of Medical Sciences; 1999. p. 7-22.
6. Fraguas JR, Ramadan ZB, Pereira AN, Wajngarten M. Depression with irritability in patients undergoing coronary artery bypass graft surgery: the cardiologist's role. *Gen Hosp Psychiatry* 2000; 22(5): 365-74.
7. Lopez V, Sek YC, Poon CY, Wai Y. Physical, psychological and social recovery patterns after coronary artery bypass graft surgery: a prospective repeated measures questionnaire survey. *Int J Nurs Stud* 2007; 44(8): 1304-15.
8. Momeni H. Reviewing the effect of education and implementation of health behaviors on MI patients' back to work admitted in CCU of public hospitals in Isfahan in 2001 [MSc Thesis]; Isfahan: School of Nursing and Midwifery; Isfahan University of Medical Sciences, 2001. p. 39-41.
9. Mohajer T. *Principal of patient education*. 1st ed. Tehran: Salemi Publication; 2001. p. 9-11.

10. Allahverdipour H. Moving from traditional and conventional health education to theoretical-based health education. *Specialized and Scientific Journal of Health Education* 2004; 1(3): 75-9.
11. Green LW, Kreuter MW. *Health promotion planning: an educational and environmental approach*. 2nd ed. Palo Alto: Mayfield Pub. Co; 1991.
12. Hare DL, Davis CR. Cardiac Depression Scale: validation of a new depression scale for cardiac patients. *J Psychosom Res* 1996; 40(4): 379-86.
13. Evaluation of knowledge, attitude and performance of society about cardiovascular disease and its related risk factors. National Plan of Isfahan Heart Program; Collaborating with World Health Organization, Planning and Budget Organization, Health Department of Ministry of Health in 1999 and National Health Plan for Prevention of Cardiovascular Diseases and Stroke; Planning and Budget Organization [Online]. 2000; Available from: URL: www.ihhp.ir/ihhp/display.aspx?id=1573/
14. Impacts of exercise and physical activity on mental and physical health [Online]. 2008 [Cited 2008 Feb 23]; Available from: URL: <http://ylym.wordpress.com> dated /
15. Rees BL. Effect of relaxation with guided imagery on anxiety, depression, and self-esteem in primiparas. *J Holist Nurs* 1995; 13(3): 255-67.
16. Kine KA. *Life Skills*. Trans. Mohammad Khani SH. 2nd ed. Tehran: Espand Honar Publication; 2001. p. 32-5.
17. Earnish D. *Heart Health Rehabilitation with no Need to Surgery and Medication*. Trans. Shadan M. 1st ed. Tehran: Ghoghnoos Publication; 1997. p. 7-80.
18. Wilson P. *Instant Calm: Over 100 Easy-to-Use Techniques for Relaxing Mind and Body*. Trans. Tamadon T. 1st ed. Tehran: Peykan Publication; 2000. p. 1-40.
19. Rouhafza H, Sadeghi M. Effect of a cardiac rehabilitation program on psychological stress on Iranian population. *Journal of Research in Medical Sciences* 2003; 8: 95.
20. Nejatian M. Effect of a cardiac rehabilitation on cardiac patients after CABG and PCL in Tehran Heart Center. *Proceedings of the 6th National Congress of Cardiology News in Mashhad*; 2004 May 22-25; Mashhad, Iran; 2004.
21. West JA, Miller NH, Parker KM, Senneca D, Ghandour G, Clark M, et al. A comprehensive management system for heart failure improves clinical outcomes and reduces medical resource utilization. *Am J Cardiol* 1997; 79(1): 58-63.
22. Sheikholeslami F. Reviewing the effect of group therapy on depression level of patients with MI in selected hospitals of Isfahan University of Medical Sciences. *Scientific Journal of Hamadan University of Medical Sciences* 2004; 11(2): 48-53.
23. Michalsen A, Grossman P, Lehmann N. Psychological and quality of life outcome from a comprehensive stress reduction and lifestyle program in patients with coronary artery disease: Results of a randomized trial. *Psychother Psychosom* 2005; 74(6): 344-52.
24. Sebrechts EH, Falger PR, Appels A, Kester AD, Bar FW. Psychological effects of a short behavior modification program in patients with acute myocardial infarction or coronary artery bypass grafting. A randomized controlled trial. *J Psychosom Res* 2005; 58(5): 417-24.
25. Parslow RA, Jorm AF. Improving Australians' depression literacy. *Med J Aust* 2002; 177(Suppl): S117-S121.
26. Lesan SH. *Reduction of stress in firefighters using PRECEDE model and combination with educational theories in Tehran* [PhD. Thesis]. Tehran: Tarbiat Modares University; 2003.
27. Taghizadeh M. *Application of PRECEDE model combined with self-regulatory theory in controlling the premenstrual syndrome* [PhD Thesis]. Tehran: Tarbiat Modares University; 2003.
28. Jalili Z. *Controlling iron deficiency anemia in 1 to 5-year-old children using PRECEDE model in Kerman City* [PhD Thesis]. Tehran: Tarbiat Modares University; 2003.

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