Angina Self-Management Plan and Quality of Life, Anxiety and Depression in Post Coronary Angioplasty Patients

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Background: Coronary artery diseases are the most frequent cause of mortality in industrialized countries as well as Iran. Coronary artery disease affects patient's quality of life (QoL) and produces some degrees of anxiety and depression. Although self-management programs have shown significant impact on chronic diseases, there is limited evidence in Iran regarding the effectiveness of these interventions, particularly in patients with coronary artery disease.

Objectives: This study aimed to evaluate the effects of angina plan on QoL, anxiety, and depression in post coronary angioplasty patients referred to selected hospitals in Shiraz.

Patients and Methods: This parallel randomized, controlled trial was conducted in selected hospitals in Shiraz, Iran. We enrolled 80 post coronary angioplasty eligible patients in the study. After acquisition of the informed consent, eligible patients were randomly divided into two groups: control and experimental. Pretest data were obtained by using a demographic data form and two valid and reliable questionnaires for QoL, anxiety, and depression. Blood pressure, weight, and height (to calculate body mass index) were measured too. Patient's history of smoking, diabetes, hypercholesterolemia, hypertension, and coronary vascular involvement (with grade and severity) were obtained from their medical records. A 12-week angina plan intervention consisted of a 30 to 40 minutes of counseling interview and telephone follow up at the end of 1, 4, 8, and 12 weeks were performed for experimental group. Post-test data were obtained three months after the pretest using the same questionnaires as pretest. QoL data were analyzed by analysis of co-variance (ANCOVA). The results (before and after intervention) regarding anxiety and depression were analyzed by independent t-tests or their equivalent nonparametric Mann-Whitney test using SPSS v. 11.5.

Results: There was no statistically significant difference in demographic variables between two groups. Baseline mean scores for QoL, anxiety, and depression did not differ between the two groups. There was a significant difference between the experimental and control groups in terms of changes in perception of QoL before and after the intervention. Adjusted mean ± SD of perception of QoL for the control group was 38.48 ± 13.38 and for the experimental one was 56.30 ± 13.38, with a P value of less than 0.001. The mean difference of anxiety scores (before and after intervention) in experimental and control groups were 1.15 ± 1.99 and 0.07 ± 2.22, respectively with a P value of less than 0.01. The mean difference of depression scores (before and after intervention) in experimental and control groups were 0.4 ± 2.89 and 0.13 ± 2.76, respectively (P > 0.05).

Conclusions: Our results show that the self-management angina plan was effective in improving perception of QoL and reducing anxiety. Further studies with a larger sample size and a longer follow-up period are recommended to better understand the effectiveness of this plan.

Keywords: Self-Care; Iran; Cardiovascular Disease; Patient Education

1. Backgrounds

No-communicable diseases are the most prevalent disease throughout the world, including developing nations like Iran. Cardiovascular diseases (CVDs) comprise the largest group of no-communicable diseases (1, 2). CVDs are the most common chronic, and progressive life-threatening disease (3), which is the most common cause of adult hospitalization too (4). The increase in CVDs is a large and costly burden worldwide, (5, 6) as well as Iran (7). Despite the lack of accurate statistical evidence on the incidence of coronary artery disease (CAD) in Iran, different studies have reported a mortality rate of 20% to 45% (8).

Several techniques such as coronary artery bypass graft or percutaneous trans luminal coronary angioplasty are utilized to treat CAD; however, recent trials have consistently reported that approximately one-third of patients continue to complain of angina after successful revascularization (9). In a three-year follow up, over 30% of patients with prior revascularization still complained of episodes of angina (10). Hence, the treatment modalities used for these patients failed to prevent the occurrence of chest pain (angina). Angiographic findings have shown new significant coronary lesions in the patients under-

went repeated coronary angiography for recurrence of angina following successful coronary angioplasty, restenosis, and incomplete revascularization. Even patients without significant angiographic findings report recurrent angina (11).

Recurrent angina may be related to structural causes such as stretch pain, in-stent restenosis, in-stent thrombosis, incomplete revascularization, progression of coronary atherosclerosis or functional causes that include coronary micro vascular dysfunction and epicardial coronary spasms (12). Recurrent angina after angioplasty may be due to the continuation and persistence of the atherosclerosis process (13) and is a frequent problem encountered by numerous cardiologists during daily clinical practice (14); this pain causes severe limitations in quality of life (QoL) for most patients (15). Importantly, patients with CAD experience anxiety and depression. These conditions affect approximately 30% to 40% of CAD patients, decreasing their QoL (16). According to Vogelzangs et al. (17) the prevalence of coronary heart disease has especially increased among patients with anxiety disorders. High prevalence of coronary heart disease among depressed individuals has been attributed to the comorbid anxiety. Anxiety alone or in combination with comorbid depressive disorders is considered an important risk factor and a serious cause of coronary heart disease (17). One study has shown that despite similar angiographic findings in different patients with CAD, those with significant psychiatric morbidities (anxiety and depression) experienced more serious symptoms and increased severity of angina compared to patients without psychiatric problems (18).

Regardless of whether anxiety and depression are risk factors or the consequences of angina, it should be noted that negative emotions play an important role in producing and maintaining anxiety and depression. Therefore, correction of negative emotions should be considered as a part of patient care. In general, negative emotions may be due to the misbeliefs and misconceptions in the process of searching for causes of a patient's illness, which significantly impacts its prognosis (19). Several studies have shown that one reason for anxiety and depression in CAD patients is disease-related misconceptions affecting patients' coping strategies (20). Behaviors of individuals are influenced by their attitudes and beliefs. For instance, if patients with CAD believe that their problem is genetic or hereditary they may hold a misleading attitude and continue harmful behaviors such as smoking and poor diet. On the contrary, people who believe that their illness may have been caused by poor lifestyle choices are more willing to change their behavior (21). Controlling over the course of one's illness is not only an important and necessary cognition for change in behavior but also for mood (22). Therefore, correction of patients' misconceptions leads to decrease in anxiety, depression, treatment costs, and improve in their QoL (20).

Correction of patients' misconceptions should be considered as a part of any cardiac rehabilitation (CR) program. The American Heart Association emphasizes psychosocial intervention as one of the components for CR. Of course, the patients' misconceptions can be considered as a part of psychosocial intervention when CR is patient-focused. Home-based programs that use a patient-focused approach such as the heart manual and angina plan have evolved to provide a nurse-led, community-based self-help program for patients unable to participate in hospital-based programs (23, 24).

The angina plan is a cognitive behavioral self-management program for people with chronically stable angina. Patients work through this condition with the help of a trained facilitator (www.anginaplan.org.uk). The success of this strategy requires sufficient knowledge about angina and its treatment, ability to perform management activities and application of the required skills to protect psychosocial functions (25).

In general, rehabilitation programs are designed to help patients with CAD in a number of ways. However in Iran, rehabilitation programs are mostly provided by educational nurse-led sessions in which the patients are taught about risk factors such as diabetes mellitus, hypercholesterolemia, hypertension, smoking, and obesity or, in general, patients learn how to change their sedentary lifestyles. Although the value of these educational programs cannot be disregarded, it is important to highlight the roles of patients in disease management. Patient empowerment through self-management training is necessary for those with CAD, which may lead to better outcomes. In line with this notion, evidence exists that support the transcendence of an empowerment program (angina plan) to traditional educational sessions (24, 26). Based on a literature review of studies performed in Iran, the effectiveness of self-management training has been proven for other chronic diseases such as diabetes mellitus (27) and chronic renal failure (27). However, a self-management program for post coronary angioplasty patients is a rarity in Iran. In this regard, we intend to modify patients' misconceptions about their disease and help them manage CAD more effectively.

2. Objectives

This study aims to assess the effect of the angina plan self-management program on QoL, anxiety, and depression in post coronary angioplasty patients.

3. Patients and Methods

This was a parallel-group controlled clinical trial that assigned eligible patients who were undergoing coronary angioplasty to receive either routine care (control) or the angina plan (experimental). The simple randomization method was used for group assignment. We enrolled 80 patients (40 in each group) based on a study by Miche et al. (28) in order to detect a 0.63 difference (SD: 0.94) between two groups in terms of physical function as a di-

mension of QoL with a type I error rate of 0.05, power of 80%, and 10% dropout rate. We approached potential participants over a 4-month period at Nemazee and Faghihi Hospitals, which are general and referral hospitals with 540 and 372 beds, respectively, and the Kowsar Heart Center, which is a private, referral hospital with more than 300 beds. All facilities are located in Shiraz, Fars Province, Iran.

Out of 202 post coronary angioplasty patients in these hospitals assessed for eligibility, 20 declined to participate and 102 were excluded because of lacking inclusion criteria. Eighty patients met the inclusion criteria and agreed to participate. These 80 patients provided their informed consent in writing for study participation. All patients in the control and experimental groups entered in the post-test at the end of the self-management angina plan. Inclusion criteria included the following items: treatment with coronary angioplasty according to the patient's clinical report, 40-70 years of age, educational level of at least equivalent to primary school sixth grade, ability to understand and follow the instructions for the intervention based on the researcher's judgment, ability to understand Persian, willingness to participate in the research, accessibility by the telephone, and ability to perform the intervention plan. Exclusion criteria included patients with dementia, mental and psychological confusion (as diagnosed by the patient's physician and noted in the medical record), severe or life-threatening diseases, coronary vascular disease (as diagnosed by the patient's physician and noted in the medical record), taking 11 or higher score for anxiety and depression on the hospital anxiety and depression scale (HADS), previous participation in any formal or informal coronary vascular disease programs (as reported by the patient), history of coronary artery bypass graft, and history of three vessel involvement of coronary vascular based on the angiography report. We also excluded any patient lacking a completed, signed consent form.

Patients included in this study were those who had been admitted to the post-angioplasty ward after treatment. When the patient's condition stabilized (the same day or one day after this procedure) the personal characteristics form, the Seattle angina questionnaire (SAQ), and HADS were completed in the course of a face-to-face interview with one of the researchers. We recorded each patient's demographic data that included age, sex, marital status, educational level, and height and weight to calculate body mass index (BMI). Body weight was measured (in light clothing) to the nearest 0.1 kg and height was measured in bare feet without hair ornaments to the nearest 0.5 cm. Blood pressures were measured using a calibrated sphygmomanometer. All measurements were performed under the same conditions using the same calibrated devices and by the same researcher. To control for extraneous factors, we recorded smoking history, and the presence of diabetes, hypercholesterolemia, and hypertension in each patient's individualized data form

during the interview. We retrieved data for disease grade and the severity of coronary vascular involvement (single vessel, two vessels) from patients' medical records. Disease grade and severity were determined by the treating physician according to the angiography report.

SAQ and HADS questionnaires were completed by both experimental and control groups at baseline and immediately after intervention under the supervision of the researchers. The SAQ is the leading health-related QoL measure for patients with CAD. This instrument measures 5 dimensions of QoL for CAD patients: physical limitation, angina stability, angina frequency, treatment satisfaction, and perception of QoL. This questionnaire is in accordance with the Canadian Cardiovascular Society classification for angina and all physical limitations due to CAD can be determined by it (29, 30). In the first part of the questionnaire, physical limitations with two subconstructs measure the limitations on daily activities by angina symptoms (9 questions). The second part of the questionnaire is an angina stability scale that assesses change in the frequency of angina for the patient's most strenuous activity (1 question). In the third part, angina frequency of symptoms measures how often a patient experiences symptoms (2 questions). The fourth part consists of a treatment satisfaction scale that assesses overall satisfaction, satisfaction with treatment, and the physician's explanations (4 questions). Finally, the fifth part of this questionnaire pertains to perception of QoL (3 questions), which measures the effect of angina on QoL (29, 31). The questionnaire has been translated into Farsi with a standard translation method by two bilingual translators. Factor analysis of the translated questionnaire determined that the number of dimensions were consistent with the original questionnaire. The dimensions comprised of physical limitation of light activities (3 questions), physical limitation of heavy activities (6 questions), angina stability, and frequency of symptoms (3 questions), treatment satisfaction (4 questions) and perception of QoL (3 questions) (32). Farsi version of SAQ had a reported acceptable range of convergent validity (0.47-0.97) and desirable reliability according to Cronbach α (0.91) (32).

All items in the questionnaire used 5- or 6-point descriptive scales. This questionnaire is scored by assigning each response an ordinal value, beginning with 1, for the lowest level of functioning. The items are summed within each of the five or six subscales. Then, scale scores were transformed to a range of 0 to 100 by subtracting the lowest possible score, dividing by the range of the scale, and multiplying by 100. Because each scale monitors a unique dimension of CAD-related QoL, no summary score is generated (30, 31).

Another instrument, the HADS, was developed by Sigmond and Snaith in 1983 (33). Herrmann confirmed the validity and reliability of HADS (34). Montazeri et al. verified the validity and reliability of the Farsi version of this scale for use in Iran (25, 35). The Cronbach α coefficient

for items on anxiety was 0.78 and for items on depression was 0.86 (25, 35). Of note, this scale is only suitable for screening purposes and a definite diagnosis of anxiety or depression should be made by a specialist (25). HADS has been used previously in Iran to study the anxiety and depression rates in patients with renal failure and other chronic diseases (35). This questionnaire contains 14 items with two subscales: anxiety (7 questions) and depression (7 questions). Each item is scored from 0 to 3. Total score for both anxiety and depression ranges from 0 to 21 and is classified into three levels for the domains of anxiety and depression: normal (score: 0-7), doubtful (score: 8-10), and definite (score: ≥ 11) (25, 33, 34).

The intervention used in the experimental group was a self-management plan for angina. This intervention was implemented based on a manual from York University (www.anginaplan.org.uk). One of the researchers successfully completed a distance-learning course to become a facilitator for the angina plan and obtained a practicing certificate from the University of York, UK. The process for the implementation of angina plan commenced with a 30-to 40 minute interview and assessment conducted as follows:

1) Introduction of the angina plan and its contents such as patient-held workbook and audiotaped relaxation.

2) Assessment of patient's misconceptions in relation to CAD and angina by means of the angina plan questionnaire, recording the misconceptions on a chart, discussing and correcting the misconceptions with the patient and, if possible, in the presence of the closest relative or companion try to correct their understanding of the illness and to explain how such beliefs can lead to maladaptive trends in lifestyle.

3) Working with the patient to identify all personal risk factors for coronary heart disease according to the risk quiz in the angina plan. Risk factors such as hypercholesterolemia, hypertension, diabetes, obesity or overweight according to the calculated BMI as well as smoking status were assessed separately for each patient. Then, the facilitator provided basic descriptions of risk factors for each patient and assessed the patients' priorities for lifestyle change and formulated the first week's goals. Hence, the patient could decide which section of the patient-held workbook they wanted to read and apply first as directed by the quiz.

4) By explaining the harmful effects of the over activity and rest cycle, the facilitator helped patients to break this vicious cycle and increase their physical activity levels by using goal setting and pacing to improve fitness. The intent was to assist the patients in returning to previously abandoned activities. Therefore, the patients identified and set their personal goals for activities. In pacing, patients selected a baseline level of activity that was symptomless and practiced this activity daily for one week. Patient's baseline activity was set to 80% of his or her ability to walk or perform other activities without symptoms. If, after one week, the activity became easy then the baseline activity would be slightly increased.

5) Patients were asked to practice relaxation by listening to the audio cassette for 20 minutes each day. The facilitator described the merits of the relaxation technique in controlling angina, and strategies to overcome barriers were explored to perform relaxation techniques.

6) The workbook contained supplementary written information about the role of frightening thoughts and misconceptions in triggering adrenaline release and anxiety, and how this could result in poor coping strategies like the 'over activity-rest cycle'. Additionally, standard advice on risk factors, medications, and what to do in the event of a suspected heart attack were provided.

At the end of the session, the goal for the first week was set according to the assessment undertaken as well as the patient's preferences. Furthermore the exact time of the call and subsequent follow up was agreed upon with the patient. The facilitator contacted the patient with a brief phone call at the end of weeks 1, 4, 8, and 12. During these phone calls, the facilitator reviewed the patient's misconceptions and recorded them on the checklist, which had been completed in the first session. Goals and targets were revised as progress was made. Risk factor modifications were checked in each follow up session. These factors comprised of regular daily activity, healthy eating by reductions in the amount of fat and meat, increased consumption of fruits and vegetables, consumption of oily fish 2-3 times per week, and reducing salt intake in addition to weight loss, smoking status, and taking medication regularly. Overall, during these phone calls, any achieved target was rewarded with praise and encouragement.

3.1. Data Analysis

Descriptive and inferential statistics, including frequency, percentage, mean, standard deviation, ANCOVA, and independent t-test or its equivalent nonparametric test (Mann-Whitney U-test) were used for data analyses using SPSS version 11.5. Inferential statistics were selected for the variables based on the result of the Kolmogorov-Smirnov test and the magnitude of measures for the dependent variables. All study patients were included in the analysis. QoL data were analyzed based on SAQ (Farsi version). Anxiety and depression were analyzed according to HADS.

3.2. Ethical Consideration

Institutional Review Board (IRB) approval for the study was obtained from the Ethics Committee at Shiraz University of Medical Sciences (ECSUMS). Written consent was obtained from each patient. The purpose of the study, voluntary participation, confidentiality and freedom to discontinue at any time without being left untreated was reviewed with all patients (ethical code/date: CT-88-4884/22.12.2009).
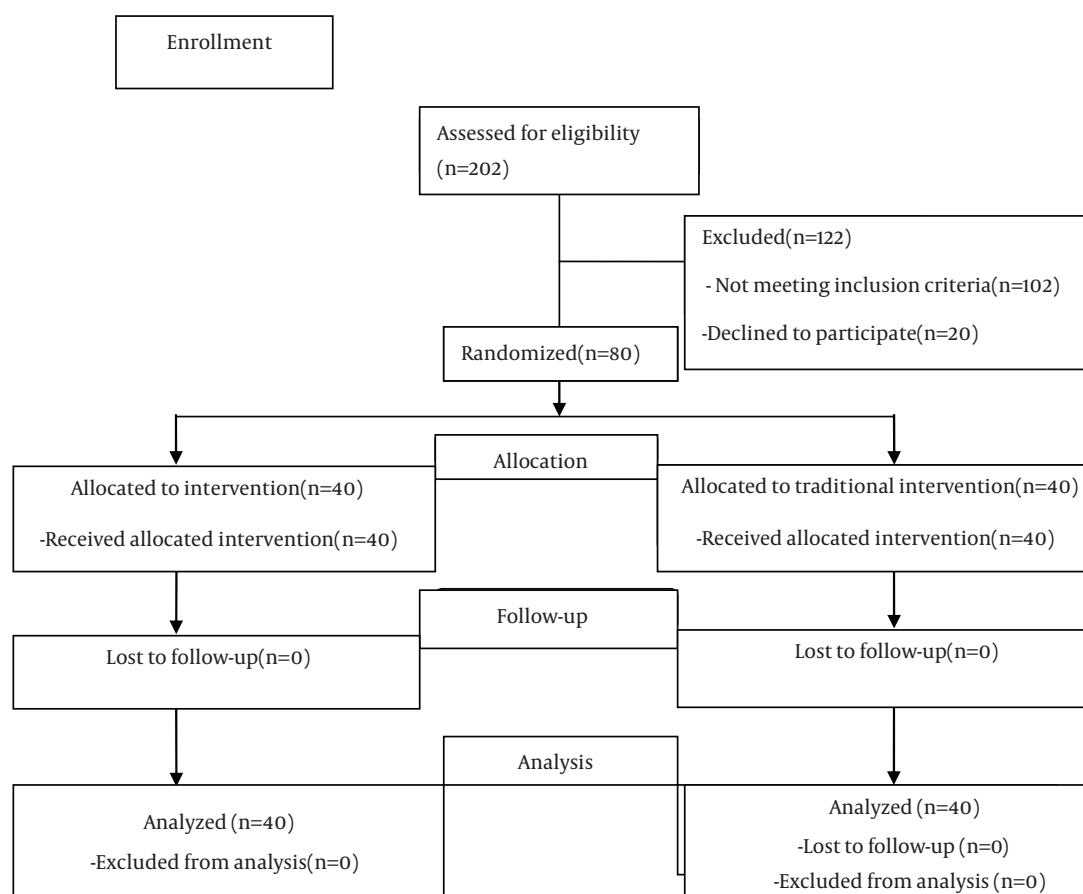
Figure 1. Consolidation Standards of Reporting Trials (CONSORT) 2010 Study Flow Diagram

4. Results

The results of this study are based on the analyses of 80 patients (Figure 1).

4.1. Patient Characteristics

Table 1 shows demographic variables for the study population. A total of 86.3% of the participants were male. Patients had a mean age of 54.32 years and 97.5% were married. To ensure that the experimental and control groups were matched in terms of qualitative and demographic variables, the Chi-square test was used before the intervention for all demographic variables, smoking history, history of diabetes, hypercholesterolemia, hypertension and disease severity based on coronary vascular involvement. This test confirmed no statistically significant differences between experimental and control groups for any of these variables. P values for different variables were as follows: smoking history = 0.175, history of diabetes = 0.317, hypertension > 0.9, hypercholesterolemia > 0.9, and disease severity > 0.9. Two groups did not differ significantly in terms of education levels (P = 0.279).

Prior to the intervention, there were no statistically significant differences between two groups in terms of BMI (P = 0.268), blood pressure (P = 0.561), and weight (P = 0.071). There were no significant differences in any baseline measures.

4.2. Effect of Intervention on QoL

Table 2 shows adjusted mean scores for QoL in both groups and adjusted mean difference between groups. Based on the results of ANCOVA, we observed a significant change between the groups in the perception of QoL dimension of SAQ. However there was no significant difference in the other dimensions of the QoL.

4.3. The Result of Nonparametric Test for All Variables in This Table Was the Same as ANCOVA

4.3.1. Effects of Intervention on Anxiety and Depression

Results regarding anxiety and depression are shown in Table 3. Mean changes between two groups was significant for anxiety but not depression as measured by the HADS.

Table 1. Baseline Demographic and Medical Variables [a, b, c]

Measured Variables	Control Group	Experimental Group
Age, y	55.22 ± 8.27	53.42 ± 8.82
Males	34 (85)	35 (87.5)
Married	39 (97.5)	39 (97.5)
Education	10 (25)	13 (32.5)
Primary school	11 (27.5)	10 (25)
Secondary school	7 (17.5)	4 (10)
Associate degree	9 (22.5)	4 (10)
Undergraduate degree	2 (5)	7 (17.5)
Master's degree level or higher	1 (2.5)	2 (5)
Disease grade		
Single-vessel disease, SVD	20 (50)	19 (47.5)
Two-vessel disease, 2VD	20 (50)	21 (52.5)
Cardiac risk markers		
Hypertension	24 (60)	24 (60)
Systolic blood pressure	120.62 ± 11.72	115.80 ± 20.29
Diabetes	16 (40)	18 (45)
Hypercholesterolemia	23 (57.5)	24 (60)
Currentor previous smokers	14 (35)	20 (50)
BMI	24.95 (2.39)	25.71 (1.42)

[a] Abbreviation: BMI, body mass index.
[b] All comparisons are non-significant at P > 0.05.
[c] Data are presented as Mean ± SD or No. (%).

Table 2. Adjusted Mean Scores for QoL in Both Groups and Between Groups Adjusted Mean Difference [a]

Variables	Adjusted		Adjusted Mean Difference (95% CI)	P Value
	Control	Experimental		
Physical limitation 1 [b]	90.65 ± 10.67	91.62 ± 10.67	-0.97 (-5.72 to 3.78)	> 0.683
Physical limitation 2 [c]	82.19 ± 14.95	82.49 ± 14.95	-0.294 (-6.95 to 6.36)	> 0.95
Angina stability and frequency	78.13 ± 12.79	75.025 ± 12.79	3.12 (-2.58 to 8.81)	> 0.285
Treatment satisfaction	73.65 ± 11.35	73.28 ± 11.35	0.37 (-4.68 to 5.42)	> 0.885
Perception of QoL	38.48 ± 13.38	56.30 ± 13.38	-17.82 (-23.78 to -11.86)	< 0.001

[a] Data are presented as Mean ± SD.
[b] Physical limitation of light activities.
[c] Physical limitation of heavy activities.

Table 3. Change in Scores for Psychological Measures in Both Groups Before and After the intervention [a]

Psychological Variables	Experimental		Control		P Value
	Pretest	Post-test	Pretest	Post-test	
Anxiety [b]	7.72 ± 2.27	6.57 ± 1.72	5.85 ± 2.14	5.92 ± 2.30	0.008
Depression [c]	5.92 ± 2.65	5.52 ± 3.13	4.90 ± 2.91	4.77 ± 2.61	0.457

[a] Data are present as Mean ± SD.
[b] Mann-Whitney U-test.
[c] Independent t-test for normally distributed variables.

5. Discussion

This randomized controlled trial aimed to investigate the effect of the angina plan on QoL, anxiety, and depression in a group of post coronary angioplasty patients. The results of this research supported the positive effect of the angina plan on improving perception of QoL and reducing patients' anxiety levels. The results could be attributed to the nature of the angina plan applied in this study. Strong points of this study included recognition of the patients' risk factors, including risk factor modifications according to patients' priorities; identifying patients' misconceptions related to disease and correcting these misconceptions through intervention; emphasis on the essential strategies for goal setting and pacing; avoiding over activity and rest cycle since the beginning and during the intervention; and identification of each patient's new priorities on any changes in lifestyle like regular daily activities, quitting smoking, healthy diet, weight loss, and reductions in alcohol consumption during the follow-up process. As another strong point of this study, we have requested participation of one of the patients' family members in the intervention program. This involvement is very productive in our Iranian cultural context in which families support the patient in solving their problems. A mutual cooperation between the education provider and patients was considered in the follow-up program. Cooperation between patients and nursing staff has been emphasized in identifying patients' problems as a key point in the process of empowerment (36, 37).

Perception of QoL can be influenced by many internal and external factors. In another study, the overall perception of QoL in patients with multiple sclerosis has been identified to be associated with depression, educational level, rural versus urban living area, religious and social support (38). Of note, most of our study participants had high school or higher levels of education. In addition, through angina plan we were concerned about patient anxiety by identification and correction of misconceptions. We asked patients to listen and practice the relaxation techniques provided in the study's audio cassettes. Providing feedback, encouragement, and support through the angina plan might have contributed to the improved perceptions in QoL.

Despite the improvement in QoL perception, which could be seen as the first important parameter for evaluating CR effectiveness (39), other dimensions of QoL remained unimproved. However in a study conducted by Lewin et al. (24) the positive effect of the angina plan on physical activity but QoL perception was observed after six months of follow up. In the mentioned study, the researchers also measured the frequency of episodes of angina, number of short acting glyceryltrinitrate (GTN) tablets or puffs of sublingual spray taken daily, in addition to the severity and duration of pain. They found a significant change in angina attacks and number of taken GTN tablets per week (24). McGillion et al. reported evidence supporting the effectiveness of the chronic angina self-management program in the angina frequency and stability dimensions of QoL after six weeks (40). In another study, the same program with a 12-month follow-up showed significant improvement in physical activity levels among CHF patients up to 6 months after the end of the program (41). Hofman et al. conducted a study in an outpatient clinic of Cardiology Department at Karolinska Hospital. In this study, a 12-month rehabilitation program was implemented that included a 4-week residential stay at the intervention unit, which focused on health education and the achievement of behavior change followed by an 11-month maintenance program among post coronary angioplasty patients (42). In the present study, it was possible that the angina plan did not impact other aspects of QoL in study patients, however due to limitations, we could neither measure the episodes of angina, number of taking short acting GTN tablets or puffs of sublingual spray each day, nor could we measure pain severity and duration. These variables, if measured in future studies, could provide additional documentation regarding the effect of the angina plan.

The results of this study supported the beneficial effects of the angina plan on reducing the patients' anxiety levels. However, no significant difference was observed between groups regarding depression score. The reduced anxiety attributed to this three-month intervention was of value. Anxiety is known as a psychological factor as well as a risk factor for CAD and its unfavorable consequences (43). Several studies have shown that CAD patients with moderate anxiety were four times more likely to develop angina, while patients with clinical depression were three times more susceptible to have frequent angina (44). A similar study by Lewin et al. in patients with CVD reported a reduction in patients' depression rate six months after the intervention (24). Moore et al. used a six-week educational plan for refractory angina, which included education, medical information and rehabilitation. The results confirmed the effectiveness of this plan for anxiety and depression after one year (45). In another study, Lewin et al. evaluated the effects of a comprehensive home-based CR program that included education, a home-based exercise program, tape-based relaxation, and stress management program on psychological distress in patients with post-myocardial infarction (23). Anxiety and depression, as psychological factors, showed improvement in the experimental group for 12 months (46).

Depression among patients with CAD is very important and needs intervention modalities. Of note, the present study has excluded patients with high levels of anxiety and depression. Future researches are suggested to evaluate the effectiveness of the angina plan on patients with higher scores for anxiety and depression. According to the results of this study and positive impacts of the angina plan in reducing anxiety as an important factor in CAD prognosis, it is hoped that the implementation of such

programs plays an important role in coping with and controlling the process of CAD as well as prevention of coronary events. Therefore, the results of this study have supported the effects of the angina plan on perception of QoL and anxiety in post coronary angioplasty patients. However, the effect of the intervention on other aspects of QoL and depression may need a longer course of intervention and follow up. Additional studies are recommended with a larger sample to better understand the effects of the angina plan on QoL, depression, and anxiety.

Acknowledgements

Authors' Contributions

Marzieh Moattari devised the study concept, developed the study design, contributed in the design of the study intervention, supervised the intervention process, data collection and analysis, drafted the manuscript, and was involved in the coordination of the study; Fakhteh Adib contributed in the design of the study, collected the data, run the intervention of the study, was involved in the study conception and performed the analyses and drafted the manuscript; Javad Kojuri contributed in the design and intervention of the study, supervised the study and provided feedback in the process of implementing the intervention; Seyed Hamid Reza Tabatabaee helped in the analysis of the study findings.

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