Original Article

Effects of Phase III Cardiac Rehabilitation Programs on Anxiety and Quality of Lifein Anxious Patients after Coronary Artery Bypass Surgery

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Abstract

Background: *Patients with psychological problems after coronary artery bypass graft surgery (CABG) show poorer outcomes; nevertheless, there is a paucity of research into the effects of cardiac rehabilitation programs on such patients. The purpose of this study was to determine the effect of phase III cardiac rehabilitation programs on the anxiety and quality of life of anxious patients who had undergone CABG in Iran.*

Methods: *Six weeks after CABG, 83 anxious patients participated in an 8-week cardiac rehabilitation program that consisted of formal supervised exercise training and educational sessions. The state/trait anxiety inventory and SF-36 questionnaire were two instruments for collecting data in the present study. Of the total of 83, 66 participants saw out the eight-week period.*

Results: *With the exception of the mental health aspect, significant improvements were noted in the following components of the quality of life measures after the cardiac rehabilitation program: physical functioning (P<0.001), role-physical (P<0.001), bodily pain (P<0.001), social functioning, (P=0.003), general health (P=0.020), vitality (P=0.006), and role-emotional (P=0.003). Additionally, significant reductions were observed in state anxiety (P=0.010) and trait anxiety (P=0.010).*

Conclusion: *These findings suggest that phase III cardiac rehabilitation may be an effective therapy for improving psychological outcomes of patients with psychological problems after CABG.*

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Introduction

Cardiac surgery may evoke anxiety, stress, and emotional responses from patients and their families.[1] Anxiety is one of the earliest and most intense psychological responses to ischemic coronary events.[2] Most patients are relieved when

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the surgery is complete, and the biggest reductions in anxiety occur from preoperative to early postoperative times.[3] However, anxiety levels remain higher than normal for some time following surgery.[3-5,6] More than 40% of coronary artery bypass graft surgery (CABG) patients were anxious in the week after discharge.[7] Major personal stress in patients' lives is a stronger predictor of anxiety during recovery post-CABG discharge than are any clinical or demographic factors.[6] Patients with more anxiety after surgery have worse long-term psychological outcomes and poorer quality of life (QOL).[8,9] Anxiety exerts a profoundly negative effect on QOL and adversely influences the outcomes of ischemic heart disease from many standpoints, including recurrent hospitalization, an increased incidence of ischemic events, and higher mortality.[10] Although anxiety is less often investigated,[11] considerable epidemiological evidence indicates that persons with anxiety symptomatology are at increased risk of recurrent ischemic and arrhythmic events.[12-14]

A cardiac rehabilitation (CR) program is a well-established program of secondary prevention for patients with acute coronary disease that leads to clinical benefits and a significant reduction in all-cause mortality and total cardiac mortality through modification of coronary risk factors and unhealthy behaviors.[15] Anxiety may be addressed by CR through reducing uncertainty, providing patients with an optimistic but realistic outlook on recovery, providing psychological support, and promoting coping.[16] Improvement in QOL is an important goal for individuals participating in outpatient CR programs.[17]

It is useful to consider the four phases of CR inasmuch as each presents a different component of the journey of care: inpatient care (phase I), the early post discharge period (phase II), exercise training (phase III), and finally long-term follow-up (phase IV).[18]

The provision of CR services for CABG patients in late period after discharge is new in Iran, which is why only a few heart hospitals possess well-equipped clinic CR facilities. Fortunately, efforts are underway to increase the number of these centers and improve their qualities. Lack of research on this field in Iran is tangible: to date there has been no evidence for the effect of CR programs on the psychological outcomes of anxious Iranian patients after CABG. We, consequently, sought to address this issue by hypothesizing that post-CABG patients participating in phase III CR program would have greater QOL (in the subscales of QOL) and less state/trait anxiety than before the program.

Methods

This study is a quasi-experimental type. The program aimed to decrease the anxiety and improve the QOL of the patients who participated in phase III CR program (6 weeks after discharge) of Tehran Heart Center.

The independent variable was an 8-week exercise training session and 1-week education sessions. The major dependent variables were state anxiety, trait anxiety, and QOL. This convenience sample included 66 patients referred to the CR clinic of Tehran Heart Center 6 weeks after CABG. Patients were selected through the random sampling procedure. The selection criteria were: patients' consent to participate, CABG treatment, no history of a major comorbidity (e.g. cancer, chronic renal failure, or major neurological disorder) except for the risk factors of heart disease (e.g. diabetes), no indication of receiving treatments for anxiety and depression, the age-range of 40 to 65, and the summation of in 120>score>40 of state anxiety and trait anxiety score. Whereas medication for patients with severe anxiety it is possible to necessitate, were excluded patients having severe anxiety. All subjects completed questionnaires at baseline (Time1) and after 8 weeks (Time 2). The completion of the questionnaires lasted 30 to 35 min**.**

Assessment of anxiety and quality of life

The anxiety and QOL of the patients were measured with two questionnaires. Anxiety was measured with the State-Trait Anxiety Inventory (STAI), developed by Charles Spilberger and his colleagues. The state anxiety scale, consisting of 20 statements, evaluates how respondents feel at the moment via a four-point scale. The trait anxiety scale, comprising 20 statements, assesses how people generally feel via a four-point scale (Spielberger CD, Gorsuch RL, Lushene RE. Manual for the State-Trait Anxiety Inventory [Self-Evaluation Questionnaire]. Palo Alto: Consulting Psychologist Press; 1970. Available from: http://www.mindgarden.com/products/staisad.htm. Access: 9 Feb 2008). This scale was adapted and translated into Persian by Dadsetan et al (Dadsetan P, Mansour M. Mental illness. Tehran: Roshd Press;1998). The reliability estimate through Coronbach's ά was 0.82 for state STAI and 0.92 for trait STAI in the present study.

QOL was measured with the Sf-36 instrument. Sf-36 comprises 36 items covering eight domains: physical function (10 items), role limitation caused by physical problems (4 items), bodily pain (2 items), mental health (5 items), role limitations due to emotional problems (3items), vitality-energy (4 items), and general health perception (5 items). This scale was adapted and translated into Persian by Montazeri et al. in 1996.19 Test–retest correlation coefficients were 0.76 with a 2-week interval. A higher score indicated a better QOL.

Interventional program

Exercise training was performed 3 days/week for 24 weeks at an intensity of 70-85% of maximal heart rate for 30 minutes. During each session, the patients utilized a cycle ergometer for 8 minutes and an arm ergometer for 12 minutes.

The participants also utilized treadmills from the third session. The risk levels of the patients were determined on the basis of the results of the exercise test and other variables such as history of heart surgery and myocardial infarction, existence of heart disease, risk factors, and ejection fraction. These parameters helped determine the duration and speed of treadmill exercise. Systolic and diastolic blood pressures were measured before and after treadmill exercise. The duration of the exercise on the treadmill varied from 10 to 15 minutes. While exercising with cycle and arm ergometers, the patients were monitored. Initial exercise intensity was 40-55 % of $VO2_{peak}$ (peak oxygen consumption), which was progressively increased by 0.5 MET (Metabolic equivalent) per week to 70-85%. In the first and fifteenth sessions, electrocardiogram and exercise test for indicating MET and heart rate were done for the patients. Finally, the subjects were encouraged to perform to walk at home. The patients and their family participated in group educational classes 3 times per week. These educational sessions focused on strategies to modify the participants' coronary risk factors. In these classes, a psychologist and a nutrition expert taught the patients about nutrition regimes, coping methods with pain, anxiety, depression and problems after surgery, as well as safe sexual activity, smoking cessation, and exercise. Two educational pamphlets were given to everyone.

Statistical analysis

SPSS for Windows (version 13.0) was used for all the analyses. The independent sample t test was performed to obtain the correlation between the genders and dependent variables (overall QOL and state/trait anxiety). The Pearson correlation test was conducted to obtain the correlation coefficients between age and dependent variables. The One-way ANOVA was utilized to obtain the correlation between education level, marital status and dependent variables. Differences in the QOL domains, state anxiety, and trait anxiety scores between Time 1 and 2 were tested using student's t test for paired sample. The outcome data were presented as mean (S.D.). All P-values were two-tailed and regarded significant if below 0.05.

Results

The average age of the participants in this study was 56.5 years. 68.2 percent of the patients were male and 30.3 percent women. The survey of the education level showed that a majority of the patients (37.9%) had a high school diploma. While 36.3 percent of the patients were employed, 30.3 percent of them were retired. Most of the patients (81.8%) were married. The mean scores of the state and trait anxiety of the subjects at Time 1 (6 weeks after CABG and before CR) and Time 2 (after the end of CR) are depicted in Table 1.

Table 1. Comparison of state and trait anxiety scores between Time 1 and Time 2*

Variable	Time 1	Time 2	P value
State anxiety	44.2±10.9	40.5±10.5	0.01
Trait anxiety	43.7±9.7	41.1±10.7	0.01

* All variables are presented as Mean±SD
Time 1 denotes time before the cardiac rehabilitation program; Time 2 denotes time after the program

Table 2 demonstrates the QOL domains of the patients at Time 1 and Time 2.

Table 2. Comparison of the quality of life domains scores between Time 1 and Time 2*

Variable	Time 1	Time 2	P value
Physical functioning	56.2±18.6	73.5±16.1	<.001
Role physical	18.7±25.1	39±31.3	<.001
Bodily pain	44.5±23.7	61±21.9	<.001
General health	60.6±20.5	67.7±18.9	0.020
Vitality	49.7±17.5	56.4±19.8	0.006
Social functioning	57.2±26	56.4±19.8	0.003
Role emotional	31.4±30.2	50±37.4	0.003
Mental health	58±19.3	61.9±20.5	0.060

* All variables are presented as Mean±SD
Time 1 denotes time before the cardiac rehabilitation program; Time 2 denotes time after the program

No significant difference was observed in the state/trait anxiety scores between the males and females at baseline (Time 1) and 8 weeks (Time 2). A significant difference was, however, observed between sex and overall QOL score at baseline. The women had a lower QOL than the males at baseline.

The education level had no significant correlation with the dependent variables at Time 1 and Time 2. Also, there was no significant association between age and three dependent variables at Time 1 and Time 2. A significant difference was observed between marital status and the dependent variables at Time 1 and Time 2. The subjects who were unemployed had a lower QOL than that of the participants who had employment at Time 1 (P=0.03).

Discussion

This study measured the effects of cardiac rehabilitation on improving psychological outcomes in patients who participated in a cardiac rehabilitation program in Iran. The findings of this study demonstrated that the 8-week cardiac rehabilitation program (phase III) improved all domains QOL as well as decreased state and trait anxiety of patients after CABG.

Our findings are consistent with many studies, which evaluate the effects of cardiac rehabilitation on patients, psychological outcome. For example, Lindsay et al reported that CR programs improving four of the eight components of QOL (general health (P=0.01), physical functioning (P=0.01), role physical (P=0.02) and social functioning (P=0.04)) in attenders to CR than nonattenders.[20] Kennedy et al reported that 14-weeks cardiac rehabilitation (exercise training and life style education) can improve of quality of life and risk factors, patients.[21] Similarly, Benzer et al considered that exercise cardiac rehabilitation will reduce of anxiety and improve the quality of life in patients attending to cardiac rehabilitation than non attending.[22] Also, Choo et al. demonstrated that cardiac rehabilitation program (CRP) can increase greater in the overall quality of life, the health/functioning and the psycho/spiritual subscales in the MI patients receiving CRP than the control group (no receiving CRP) too.[23] Ades and Coello found that CR can improving quality of life and physical functioning in patients with coronary heart disease.[17] Also, Oldridge et al and Stahle et al. demonstrated that CR improving QOL and reducing state anxiety in the experimental group than the control group after 12 months.[24,25]

In the present study, cardiac rehabilitation programs had no significant effect on mental health component of QOL (shows table 2). Since, the aim of a CR program is to improving all components of QOL of patients, we may assume this intervention aren't sufficient and CR in need of specific psychological interventions (e.g. relaxation techniques) for improving mental health and more decreasing anxiety scores. Where it needs for more psychological inputs in cardiac rehabilitation for increasing quality of CR services are sensible.

It was astonished to find that cardiac rehabilitation had equality effect on trait and state anxiety. These findings are different from, other results indicating that trait anxiety is part of one, s personality make up, and therefore, more resistant to change.[26] Further clinical trials may be needed to confirm the effect of cardiac rehabilitation on reducing trait anxiety.

In the present study, women had lower level of state anxiety and trait anxiety as well quality of life in components of role physical, bodily pain, general health, social functioning and overall quality of life than men at baseline. Improving in all components of quality of life except of social functioning and reducing state anxiety and trait anxiety were statistically similarly in men and women after participating in CR program.

These data affirm that women should be routinely referred to and vigorously encouraged to participate in outpatient cardiac rehabilitation after CABG. Similarly Lavie et al found that CR has similarly effects on total scores and all components of quality of life in women and men.[27] But, these findings are different from some study. For example, O, Farrell et al found that women have significantly lower QOL and exercise capacity at first CR and 3 months after CR program than men.[28] Also, Frasure-Smith et al demonstrated that women had more symptomatology and functional impairment at entry to CR program than men and although they made significant physical gains in the program, they continued to exhibit more depressive symptomatology upon completion of the program.[29] Randomized trials are need to better define the role of CR for safely improving QOL and psychological outcomes among female with heart patients.

In the present study, observed that approximately 22% of participants drop out from program in tenth session. This finding is consistent with reviewed literatures, since its shows that approximately 20-25% of patients drop out of CR program within the first three months and about 40-50% at between 6 and 12 months.[30] To investigate the predictors of early drop-out from a CR program, it is clear that three major categories must take into consideration: the health care system, the cardiac rehabilitation program and patients, characteristics.[31] Yohannes et al. demonstrated that Psychological distress, younger age and lower perceptions of consequences, higher perception personal control and lower illness perception of treatment control were personal predictors of early drop-out from a cardiac rehabilitation program.[32] As thought that, one effect factor on drop-out from CR program in Iran may be explained through economic situations, patients (particularly income) and the lake of insurance coverage for CR after discharge.

Although the findings of this study showed that cardiac rehabilitation program in Iran can produce significant improvements in psychological outcomes and QOL of heart patients, a little number of patients refers to cardiac rehabilitation clinics. An understanding of the factors that contribute to this low participation rate is of extreme importance for planning to attract participation. Studies showed that various factors are associated with CR attendance. For example, Cooper et al. found that job status, gender and health concerns play an indirect role in attendance behavior to CR. They demonstrated that nonattenders to CR programs are more likely to be older, to have lower income/greater deprivation, to deny the severity of their illness; they are less likely to believe they can influence its outcomes or to perceive that their physician recommends cardiac rehabilitation.[33] King et al. examined the relations between demographic factors, specific psychological factors, and CR attendance. They found that cardiac patients may have misconceptions about that mandate and potential benefits of rehabilitation programs.[34] It is necessary that personality, demographic and psychosocial factors associated with CR attendance and early drop-out from CR, determine throughout qualitative and quantitative researches.

The limitations of this study include small size of subjects, absence of a control group and short duration of follow-up. Randomized control trials are needed to better define the role of CR programs for improving physical and psychological outcomes of patients. Future studies should include comparisons of the effectiveness of supervised versus home-

based CR interventions. However results in present study can demonstrate the important of CRP in Iran and the point of start, for set up studies related to this field.

Conclusion

What can be concluded is that cardiac rehabilitation programs can serve as a resource for improving psychological outcomes and quality of life in anxious heart patients. It is necessary that more attention be paid to CR programs for such patients.

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