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Original research article

The impact of cardiac rehabilitation program on anxiety and depression levels after coronary artery bypass graft surgery



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ABSTRACT

Purpose: To investigate the role of cardiac rehabilitation program in depression and anxiety levels after coronary artery bypass graft surgery. Depression and anxiety are associated with worse outcome after coronary artery bypass graft surgery.

Methods: We enrolled 40 consecutive patients who underwent coronary artery bypass graft surgery. They participated in an eight-week cardiac rehabilitation program (REH). Patients were personally interviewed for assessment of depression and anxiety. A research team member completed Beck's Depression Inventory-II (BDI-II) and Beck's Anxiety Inventory (BAI) for all patients before and after the rehabilitation program. BDI-II and BAI scores were recorded and the changes in the scores were compared using paired t-test. P values <0.01 were considered statistically significant.

Results: Thirty-three male (82.5%) and 7 female patients with an average age of 58.3 ± 8.8 years were studied. Mean BDI-II scores decreased significantly (4.7 ± 4.4 , $t = 6.72$, $P < 0.001$) with participation in REH program. Mean BAI scores also decreased significantly with participation in REH program (4.3 ± 5.7 , $t = 4.74$, $P < 0.001$). There was a positive correlation between pre-REH and post-REH scores of both depression ($r = 0.860$, $P < 0.001$) and anxiety ($r = 0.631$, $P < 0.001$).

Conclusion: Cardiac rehabilitation programs decreased the levels of anxiety and depression in patients after coronary artery bypass graft surgery. These patients may benefit from this program psychologically and therefore, may cope well with the new changes in their health condition.

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Introduction

Cardiac rehabilitation programs reduce mortality and hospital readmissions in patients with coronary artery diseases (CAD) [1]. Benefits of cardiac rehabilitation programs are attributed to a combination of different factors. Physiological effects of exercise trainings, better adherence to pharmacotherapy and promotion of psychological health are among the potential contributors to reducing mortality and improvement of modifiable cardiac risk factors by these programs [2–5].

In recent years, the relationship between psychological disorders and CAD has received significant attention [6,7]. Prevalence of depressive symptoms in patients with CAD is substantially higher than in general population [7]. In addition, depression and anxiety disorders may lead to a poor outcome after coronary artery events [8–10]. Although the role of depression in patients with CAD is a matter of controversy, treating severe depressive disorders in this population improves their adherence to the pharmacological treatments and prescribed lifestyle modifications [11,12]. Rothenhausler et al. described a significant improvement in the quality of life after elective coronary artery bypass grafting (CABG). In this study, the frequency of symptoms related to a lower quality of life compared to others [13]. Recent studies on the psychological benefits of rehabilitation programs after myocardial infarction or CABG have demonstrated promising results in reducing anxiety and depressive symptoms [14–16]. Despite this potential benefit, cardiac rehabilitation programs are generally underused in patients with major cardiac diseases [17].

Considering the fact that CAD are the main causes of morbidity and mortality worldwide, identifying potential factors that may improve the prognosis of the disease is of great importance [18]. Moreover, depression and anxiety disorders are gradually emerging as main sources of morbidity in general population [19]. In this study, we investigated the impact of an eight-week cardiac rehabilitation program including both exercise training and educational programs, on depressive and anxiety symptoms after CABG. We hypothesized that the severity of anxiety and depression decreased following this rehabilitation program.

Methods and materials

Study design

The study design was reviewed and approved by the Institutional Review Board Committee at Tabriz University of Medical Sciences. Voluntary written informed consent was obtained from all participating patients. Researchers interviewed all patients to gather demographic information and completed Beck Anxiety Inventory (BAI) and Beck Depression Inventory-II (BDI-II) questionnaires before beginning of the cardiac rehabilitation program [20,21]. One week following the completion of the rehabilitation program, we interviewed the patients and filled out the BAI and BDI-II questionnaires once again. These scores were recorded and compared to those obtained before cardiac rehabilitation program.

Study sample size determination and power analysis

Sample size was determined using the average of 12.5 ± 8.7 in BDI-II scores reported after CABG surgery by others [22]. Thirty percent reduction in BDI-II scores was considered clinically significant. The required sample size for one-sample comparison of the means with alpha error of 0.05 and power of 0.80 was 28 patients. We enrolled 40 eligible consecutive patients who were referred to an outpatient cardiac rehabilitation program in university clinic after undergoing CABG. The power of the analysis for a sample size of 40 patients was 0.92 for both BDI-II and BAI. Patients younger than 30 years or older than 70 years and patients with a history of pre-morbid depression or anxiety disorders were excluded from the study.

Anxiety and depression screening tools

The second edition of Beck Depression Inventory-II was used to evaluate depressive symptoms. This inventory included 21 multiple-choice questions that self-report the severity of depression symptoms. In this questionnaire each answer has a score on a scale value of 0–3. The cutoff points for different categories were as follows: minimal depression 0–13, mild depression 14–19, moderate depression 20–28 and severe depression 29–63. The Beck Anxiety Inventory (BAI), also a 21-item self-report multiple-choice questionnaire, was used to assess the severity of symptoms related to anxiety. Similar to BDI-II, each answer in BAI had a score on a scale value of 0–3. The range of total scores was from 0 to 63. The cutoff points for classification are as follows: 0–7 minimal anxiety, 8–15 mild anxiety, 16–25 moderate anxiety, and 26–63 severe anxiety.

Cardiac rehabilitation protocol

The cardiac rehabilitation program consisted of supervised exercise training and risk factor modification education. The duration of the program was eight weeks and each session lasted 1 h for three times per week and constituted of warm-up exercises, aerobic training and cool-down exercises. Intensity of exercise was individualized based on patient's clinical status to achieve 60–85% of maximal heart rate. Each patient was consulted and educated individually about the cardiac risk factors and impact of lifestyle modifications on cardiac diseases. Participants received consultations for dietary and lifestyle modifications and smoking cessation, psychological consultations and education about the nature of cardiac diseases.

Statistical analysis

Statistical software SPSS (IBM™ ver. 22.0, Chicago, IL) was used for data analysis. Continuous variables were presented as the mean \pm standard deviation and categorical variables were stated as frequencies and percentages. Fisher's exact test or Chi-square analysis was done as appropriate to compare the frequencies of categorical variables. Paired sample t-test was used to compare the difference of continuous variables before and after cardiac rehabilitation program. Pearson correlation test was used to assess the relationship between continuous

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