

Evaluating the Effect of Cardiac Rehabilitation Care Plan on Quality of Life of Patients Undergoing Coronary Artery Bypass Graft Surgery

Seyedeh Zahra Masoumi ¹, Farideh Kazemi ², Somayeh Khani ^{3*}, Hazhir Seifpanahi-Shabani ⁴, Maryam Garousian ⁵, Mehran Ghabeshi ⁶, Fatemeh Razmara ⁷, Ghodratollah Roshanaei ⁸

¹ Assistant Professor, Child & Maternity Care Research Center, Hamadan University of Medical Sciences, Hamadan, Iran

² PhD Candidate of Reproductive Health, Department of Midwifery & Reproductive Health, School of Nursing & Midwifery, Shahid Beheshti University of Medical Sciences, Tehran, Iran

³ Student Research Center, Midwife, Hamadan University of Medical Sciences, Hamadan, Iran

⁴ Student Research Center, School of Medicine, Hamadan University of Medical Sciences, Hamadan, Iran

⁵ Supervisor Training- Master of mental health education, Hamadan University of Medical Sciences, Hamadan, Iran

⁶ Clinical Supervisors & IT Supervisor- nursing expert, Hamadan University of Medical Sciences, Hamadan, Iran

⁷ CCU nurse Heart - nursing expert, Hamadan University of Medical Sciences, Hamadan, Iran

⁸ Associate Professor, Department of Biostatistics and Epidemiology, School of Health, Hamadan University of Medical Sciences, Hamadan, Iran

* Corresponding author: Somayeh Khani, Student Research Center, Student of Medwifery, Hamadan University of Medical Sciences, Hamadan, Iran. Tel: +989184150690. Email: somayeh.khani91@gmail.com

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Abstract

Introduction: Cardiovascular surgeries are among the conventional surgeries aimed at increasing the survival rate and improving the quality of life of patients. This study aimed to evaluate the effect of cardiac rehabilitation on quality of life of patients undergoing Coronary artery bypass graft (CABG) surgery.

Methods: This was a semi-experimental study performed on 160 patients undergoing CABG surgery. The rehabilitation program was carried out for 13 weeks (three sessions per week) in 40 sessions, six weeks after the CABG surgery. The MacNew standard questionnaire and the general health questionnaire (S-f 36) were completed before the beginning of rehabilitation sessions as well as after completion of these sessions by patients.

Results: According to the results, the quality of life of patients significantly increased in the physical and emotional areas after the rehabilitation program. The results also indicated that there was a significant difference between various levels of research in the physical functioning variables, dysfunction due to physical health, dysfunction due to emotional health, energy/fatigue of individuals, emotional well-being, social functioning, pain, and general health.

Conclusions: The present results indicated the improved quality of life of patients in all the areas after cardiac rehabilitation intervention, compared to before that. Therefore, paying more attention to cardiac rehabilitation is necessary due to its positive effects on increasing the quality of life of patients.

INTRODUCTION

In recent decades, quality of life evaluation has been one of the topics discussed in clinical research. The importance of quality of life evaluation is to the extent that its improvement is mentioned as the most important objective of therapeutic interventions. This becomes more important particularly in the chronic diseases with definitive treatment [1-3]. The most common cardiovascular disease is coronary artery disease. Atherosclerosis is the most common cardiac disease in the United States, specified with abnormal accumulation of lipids, fat and fibrous tissue in the vessel wall, which causes artery stenosis, blockage and reduced blood flow to the myocardium. Coronary artery bypass graft (CABG) surgery is a temporary and non-definitive treatment [4]. The new developments such as thrombolytic therapy, angioplasty through balloons and lasers and atherectomy reform and develop medical measures in the management of cardiac patients; however, still in many of these patients surgery is the only preferred treatment [5]. Statistics show that heart surgery is the most common type of cardiothoracic surgery [6]. Every year, more than eight million of this surgeries are performed in the world and 40,000 open heart surgeries are carried out in Iran [7]. It is estimated that ischemic heart disease is ascending to the 15th peak of mortality cause of people in all ages in the world [8]. In the United States, there are more than 12 million people suffering from coronary artery disease. This disease has led 17 million people to death and is predicted to become the most common cause of death in the world by 2020. If there is no preventive measures, it will reach to 24.8 million [9]. It was shown in the studies that one person dies due to cardiovascular disease per second [1]. In Iran, coronary heart disease is allocated the first place by 21% [10]. The quality of life is considered as the sign of quality for health care and a part of health plan, and its measurement in chronic diseases is a useful guide to improve quality of care [5], while in some studies the quality of life of patients has been described unfavorable after cardiovascular surgeries [11]. One of the most effective measures for efficacy of cardiac surgery and decrease of its complications is cardiac rehabilitation [7]. Cardiac rehabilitation includes activities such as comprehensive medical evaluation, exercise, risk factor modification, education, observation and patient's change of behavior. Rehabilitation is learning the process of living with chronic diseases or debilitating conditions [12]. Rehabilitation programs have beneficial effects on mortality decrease, activity tolerance and functional capacity, diet observation, blood pressure and fat levels control, angina and dyspnea symptoms, weight loss, smoking, stress levels and mental functioning. This can be done through exercise, relaxation, education and consultation, and behavior change in the individuals [13]. Rehabilitation as part of secondary preventions is aimed at improving the patient status to the highest possible level of physical, mental and social abilities, especially after open heart surgery [14]. Different data in the United States indicates that cardiac rehabilitation services are only used in 14-31% of qualified patients. According to a study, in our country only 10% of hospitals with heart surgery services provide rehabilitation programs to their patients after surgery [5], which is mostly limited to patients undergoing open heart surgery and despite the importance of cardiac rehabilitation, there is not enough coherent information in this regard [15]. Due to the importance of cardiac rehabilitation programs, and on the other side

the lack of enough information about cardiac rehabilitation effects on quality of life of patients in Iran, this research was essential and its results can help the evaluation of cardiac rehabilitation programs. It is hoped that, the results of this study can highlight the importance of cardiac rehabilitation program in order to optimize physical, mental and social functioning and improve the quality of life of cardiac patients after open heart surgery. The present study aimed to assess the effect of cardiac rehabilitation on quality of life of patients undergoing open heart surgery.

METHODS

This was a semi-experimental study performed to determine the effect of cardiac rehabilitation on quality of life of patients undergoing CABG surgery. The protocol for this study was approved by the Medical Ethics Committee of Hamadan University of Medical Sciences.

Patients

First, the list of qualified people was provided to the CABG surgery ward and then according to the table of random numbers, 160 cardiac patients (110 males and 50 females) who were in need of CABG surgery were chosen using simple sampling method. Sample collection was carried out from the beginning of December 2014 to the end of May 2015 for six months. The inclusion criteria of patients undergoing CABG surgery included no previous history of heart surgery, no history of recognized mental illness, no anti-anxiety or psychotropic drug consumption, no unusual stressful events such as returning to operating room, the ability to understand and speak and the minimum literacy for reading and writing or living with a literate person. The exclusion criteria in these patients were non-cooperation of the patients and history of heart attack or stroke. Then, regarding the study and its objectives, the necessary explanations were provided to the qualified subjects and in the case of tendency to participate in the study, first, they completed the consent form of participation and then the demographic characteristics, MacNew quality of life standard and the SF-36 questionnaires were completed by them.

Questionnaires

MacNew standard questionnaire contains 27 questions and evaluates the quality of life of patients in three areas of emotional, physical and social functioning. The score of each person in the physical functioning category was obtained with computation of the mean score of five questions in the same area, in emotional functioning with mean score of 11 questions related to the emotional functioning area, and in social functioning with the mean score of 10 questions in the social functioning area. The final score was also computed by calculating the score of all the questions. In each area, the maximum score was 7 and the minimum was 1, representing high and low qualities of life, respectively. Furthermore, in studying the level of quality of life, the minimum score of 26-65 was considered poor quality of life and maximum score of 146-182 was considered excellent quality of life. The unanswered questions were not included in the evaluation and final conclusion. The questionnaire was normalized in

2010 for cardiac patients in Isfahan by Yousefi. The reliability of the questionnaire in research of Yousefi and Jafari was obtained 94% using Cronbach's alpha [16]. SF-36 is a common tool used for general assessment of health-related quality of life and consists of eight subscales, including physical functioning, social role functioning, vitality, emotional role functioning, bodily pain, physical role functioning, mental health and general health perceptions. The eighth item assesses perceived changes in general health over a one-year period (health transition). In addition, there is a general health transition question. There is also a global question about the respondents' perceptions of their health. The questionnaire items are given scores of 0 to 100, with higher scores indicating a better quality of life [17]. This questionnaire was first translated and validated in Iran by Montazeri et al. in 2005 [18].

CABG Surgery

The patients were discharged after the CABG surgery and six weeks after, they were referred to participate in the rehabilitation program. The patients qualified to participate in the study completed a series of questionnaires before beginning the rehabilitation sessions as well as after completion of these sessions. The rehabilitation program was carried out for 13 weeks (three sessions per week) in 40 sessions. Each rehabilitation session was performed for 1-1.5 hours.

Intervention

The programs provided in these rehabilitation sessions for the patients were as follows. 1: Examination by the cardiac rehabilitation doctor, general check-up and control of risk factors for cardiovascular diseases, including high blood pressure, high blood lipids, diabetes, smoking, sedentary lifestyle, obesity, and mental stress. 2. Nutrition counseling program and diet therapy, weight control, and providing health nutrition orders. 3. Control of conflicts and mental diseases with adverse effects on cardiology and the process of cardiac diseases (such as stress, anxiety, depression, etc.) and holding relaxation sessions. 4. Physiotherapy and proper physical activities consultation under the supervision of physiotherapist. 5. Nursing care and patient education. 6. Standard medical exercise program using individual exercise power by modern devices under the supervision of doctor and physiotherapist. The people who formed the cardiac rehabilitation team included a cardiac rehabilitation doctor, trained nurses, physiotherapist, nutritionist and psychologist. The proposed exercise program included: 1. Warm up exercises 2. Main exercise phase: treadmill, stationary bike and handy bike (ergometer logo) 3. Cooling and stretching exercises. In this phase, the patients were also participated in the training, nutrition, psychology and relaxation sessions. All the patients participating in the study stayed until the final phase of rehabilitation sessions. At the end of the last rehabilitation session, the initial quality of life questionnaires were completed by these patients.

Variable	N (%)
Gender	
Female	50 (31.2)
Male	110 (68.8)
Age	
20-35	1 (0.6)
36-45	11 (6.9)
46-55	30 (18.8)
56-65	65 (40.6)
66-75	40 (25.0)
76-85	13 (8.1)
Educational level	
Primary school	76 (47.5)
Secondary school	70 (43.8)
High school	5 (3.1)
Academic	9 (5.63)
Occupation	
Working	79 (49.4)
Non-working	81 (50.6)
Number of children	
0	1 (0.6)
1-4	58 (36.2)
5-8	86 (53.8)
9-12	15 (9.4)
Region	
Urban	100 (62.7)
Rural	60 (37.5)

Statistical Analysis

All the data were presented as mean ± SD. Data analysis was performed using descriptive statistics. In order to compare the features of both groups before and after the rehabilitation, paired t-test was used. SPSS 16 software was used for data analysis and the significance level of tests was considered to be < 0.05.

RESULTS

In this study, among all the patients undergoing CABG surgery who referred to Ekbatan Hospital in Hamadan from the beginning of 2015, 160 patients who qualified and consented to participate in the study were included. In this study, P value lower than 0.05 was considered significant. The mean age of participants was 61.5 ± 3.10. The minimum and maximum ages were reported 21 and 86 years old, respectively. Demographic characteristics are available in Table 1.

In the information obtained in comparing the quality of life before and after the implementation of the cardiac rehabili-

tation program after CABG surgery using MacNew specific questionnaire, the scores of subjects with poor qualities of life reduced from 2 to 0, with medium score reduced from 34 to 5, the subjects with good qualities of life increased from 69 to 74, and the ones with excellent scores increased from 55 to 81. The differences between mean scores of quality of life areas before and after the rehabilitation in terms of quality of life was -15.3 ± 1.2, emotional area 29.9 ± 1.1, and physical area -35.7 ± 0.7, and these statistical differences were significant with P < 0.001; but, in terms of social area, no statistically significant difference was obtained (P = 0.14) (Table 2).

In the results obtained using the Sf 36 questionnaire, the mean score difference in quality of life areas before and after the cardiac rehabilitation program indicated the great impact of the program on quality of life of cardiac patients after the rehabilitation. The mean score of quality of life of subjects in all areas of SF 36 also increased significantly compared to before the rehabilitation; these results showed the importance of paying more attention to the implementation of rehabilitation program and the various methods to perform this program (Table 3).

Table 2: Frequency Distribution of Different Levels of Quality of Life (McNew Specific Questionnaire) before and after Cardiac Rehabilitation

Quality of life	Before Intervention N (%)	After Intervention N (%)	P-value
Low (26-65)	2 (1.25)	0 (0.0)	< 0.001
Moderate (66-105)	34 (21.25)	5 (3.13)	< 0.001
Good (106-145)	69 (43.13)	74 (46.25)	< 0.001
Excellent (146-182)	55 (34.38)	81 (50.63)	< 0.001
Total	160 (100.0)	160 (100.0)	< 0.001
Total score	Mean difference: -15.3		< 0.001
	SD: 1.2		
	t: -12.3		
Emotional Domain	Mean difference: -29.9		< 0.001
	SD: 1.1		
	t: 28.2		
Physical Domain	Mean difference: -35.7		< 0.001
	SD: 0.7		
	t: -49.4		
Social Domain	Mean difference: -1.5		0.15
	SD: 1.0		
	t: -1.5		

SD: Standard Deviation; t: Statistic

Table 3: Comparison of Differences in Quality of Life Areas (Sf 36) before and after Cardiac Rehabilitation

Variable	Mean Difference	SD	t	P-value
Physical functioning	2.7	0.6	3.4	< 0.001
Role limitations due to physical health	-26.7	3.4	-8.0	< 0.001
Role limitations due to emotional problems	-26.0	3.2	-8.1	< 0.001
Energy/fatigue	-4.8	0.7	-6.5	< 0.001
Emotional well-being	-1.5	0.3	-4.9	< 0.001
Social functioning	-5.8	1.0	-5.7	< 0.001
Pain	-3.6	0.7	-4.9	< 0.001
General health	-11.0	1.0	-10.8	< 0.001
Health Somatic	-11.0	1.1	-9.9	< 0.001
Health Psycho	-9.5	1.1	-8.6	< 0.001

SD: Standard Deviation; t: Statistic

Table 4: Total Score and Eight-Dimension Score of Quality of Life (Sf_36) before and after Cardiac Rehabilitation

Variables	Before Intervention Mean (SD)	After intervention Mean (SD)	p-value
Physical Functioning	67.4 (30.0)	70.1 (26.0)	< 0.001
Role limitations due to physical health	45.8 (43.9)	72.5 (39.7)	< 0.001
Role limitations due to emotional problems	48.1 (45.1)	74.2 (41.5)	< 0.001
Energy/Fatigue	58.6 (13.9)	63.3 (12.8)	< 0.001
Emotional well-being	56.9 (15.5)	58.4 (15.0)	< 0.001
Social functioning	75.8 (24.8)	81.6 (21.1)	< 0.001
Pain	67.6 (26.1)	71.2 (24.8)	< 0.001
General health	53.0 (17.7)	64.0 (14.5)	< 0.001
Health Somatic	58.4 (22.7)	69.4 (19.2)	< 0.001
Health Psycho	59.8 (18.9)	69.4 (14.8)	< 0.001

SD: Standard Deviation

DISCUSSION

This study aimed to evaluate the effect of cardiac rehabilitation care plan on quality of life of patients undergoing CABG surgery. According to the information obtained from this study, in the evaluation of frequency distribution of quality of life in different levels (MacNew) in patients undergoing CABG surgery and after the rehabilitation sessions, the quality of life score increased from poor and medium levels to good and excellent. The difference of the mean score of quality of life areas before and after rehabilitation increased generally in terms of quality of life, emotional and physical areas with statistically significant differences, but in terms of social area no significant difference was obtained with $P = 0.15$. This conclusion is in agreement with the results of Mohammadi and Hirano [19, 20]. In their studies, regarding the significant areas of quality of life, no significant relationship was obtained in terms of the social area. In a study by Amirian et al. the quality of life score of patients increased after rehabilitation and was 6.51 ± 70.9 [21], which is in agreement with the present study. Siavashi et al. did not obtain significant results in terms of mental health and pain, but there was a significant difference in terms of the physical role variable (physical limitation) as well as in improvement of the emotional role (emotional limitation), which is in agreement with the results of the present study [10]. The findings of the present study are in agreement with Seki's study. However, it should be noted that Seki's study had only 20 subjects in the intervention group and 18 in the control group, and the quality of life score was measured after six months [22]. On the other hand, some studies have shown that in subjects with more complicated mental problems, the effect of cardiac rehabilitation on quality of life is more [12]. Nevertheless, various studies have conflicting results in this regard. Serber et al. showed that patients with more complex mental problems also had lower qualities of life in terms of physical, mental and social areas with more depression and anxiety. However, cardiac rehabilitation was also performed on them [23]. Mostafavi et al. found that women had greater improvements in terms of mental health and the constraints were caused by physical problems [24]. In general, it can be attributed to the lower initial quality level of females and their exercise capacity compared to males [25, 26]. The findings of the present study also approve the Merkris's results. In this study, in order to evaluate the quality of life, the MacNew questionnaire was used and the quality

of life of patients was investigated before the surgery, four months after the surgery and one year later. The results of this study showed that the quality of life of patients increased significantly four months after the CABG surgery and this improvement was observed with lower degrees for one year after [27]. Wissler et al. found that the quality of life of patients improved after rehabilitation [28]. Arigo et al. showed that the impact of a cardiac rehabilitation period improved the quality of life of patients for one year after the cardiac rehabilitation [29]. Muller-Nordhorn et al. found that cardiac rehabilitation caused significant improvement in quality of life of patients after the open heart surgery [30]. Alexander et al. evaluated the impact of cardiac rehabilitation program for 12 weeks on patients and a significant improvement was observed both in short and long periods in quality of life of patients [31]. Grace et al. approved the improvement in quality of life and anxiety after cardiac rehabilitation in women [32]. Kaliani et al. in evaluating and determining the impact of cardiac rehabilitation on quality of life found that a significant difference was observed after one year since the intervention started in the quality of life in both test and control groups [33]. The results of systematic review studies showed that cardiac rehabilitation both at rehabilitation centers and at home improved quality of life of patients [34, 35]. Also, according to the results obtained in the present study using SF36, the cases of dysfunction due to physical health, dysfunction due to emotional health, energy/fatigue, emotional well-being, pain, general health, total physical health and total mental health had significant and considerable improvements after the cardiac rehabilitation than before it. In 2002, Lindsay et al. performed a study on 183 patients undergoing bypass surgery and SF36 questionnaire was completed to measure the impact of cardiac rehabilitation after bypass surgery for both control and test groups. The results showed that after the implementation of cardiac rehabilitation programs with major contribution of education, a significant difference was observed between both groups in terms of physical functioning, general health, social functioning, and physical role limit [36]. Cardiac rehabilitation program can reduce the mental stresses associated with cardiovascular diseases and improve quality of life of patients [34]. Izawa et al. found that a 12-month cardiac rehabilitation improved the physical and quality of life indices in cardiac patients [37]. Sebergetz et al.

during a clinical trial on patients with myocardial infarction and coronary artery bypass reported that patients' training in the follow-up programs reduced fatigue and depression symptoms in the intervention group [38]. The exercises considerably increased the quality of life and patients' heart functioning [39]; the patients showed a significant difference after receiving the cardiac rehabilitation compared to the beginning of intervention in terms of frequency, duration and intensity of the hiking program. Also, the mean incidence of physical symptoms such as dyspnea, chest pain and fatigue decreased during these exercises. In this regard, Cugila and Cooper reported that regular exercises reduced the blood pressure and balanced the weight; also, 12-week implementation of physical activities such as walking with moderate intensity in the home rehabilitation program had positive impact on cardiovascular risk factors (hyperlipidemia) [40]. Patients who received the rehabilitation program compared to the ones who did not receive it returned to work faster and showed signs of improvement in the quality of life and mental functioning [41]. Studies have shown that cardiac rehabilitation decreases mortality up to 34% and cardiac diseases recurrence up to 29% [13]. In another study, the number of cardiovascular events in patients who participated in a comprehensive cardiac rehabilitation program 10 years after open heart surgery was 18%, compared to 35% in patients who refused to participate in cardiac rehabilitation [20]. Looking at the significant cardiac rehabilitation effects shown in the present study, the results are similar to the previous studies. In Iran, most cardiac rehabilitation programs are limited to patients undergoing open heart surgery and despite the importance of cardiac rehabilitation, there is not enough coherent information in this regard [15]. Due to the importance of cardiac rehabilitation programs, and on the other side not enough information on cardiac rehabilitation effects on quality of life of patients in Iran, as well as approving the impact of rehabilitation programs, research was essential in this regard, and the findings can be useful in evaluation of cardiac rehabilitation programs. As mentioned earlier, the results of the present study and previous studies on cardiac rehabilitation indicate the improved quality of life of patients undergoing CABG surgery with cardiac rehabilitation intervention. Therefore, accurate implementation of cardiac rehabilitation by nurses and motivating patients for participation can have positive impacts on improvement of quality of life of patients compared to before rehabilitation. Nurses and other personnel such as clinical psychologists who are related to these patients undoubtedly play an important role in efficacy and continuity of rehabilitation services in the society. More attention to cardiac rehabilitation is also necessary due to its positive effects on increasing the quality of life of patients.

Limitations

One of the most important limitations of this study was lack of a control group. Therefore, all the results may be dependent to post-operation recovery or other interventions such as nutrition and other consultations.

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CONFLICTS OF INTEREST

There is no conflict of interest.

AUTHOR'S CONTRIBUTIONS

Conception or design of the work: Masoumi, Khani
 Data collection: Ghabeshi, Razmara, Seifpanahi-Shabani
 Data analysis and interpretation: Roshanaei, Masoumi, Khani
 Drafting the article: Masoumi, Kazemi, Khani
 Critical revision of the article: Masoumi, Khani, Kazemi
 Final approval of the version to be published: Masoumi, Khani, Kazemi

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