Original Article

The effect of cardiac rehabilitation on quality of life in patients with acute coronary syndrome

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Abstract

Background: Acute coronary syndrome is one of the major cardiovascular diseases that leads to a significant amount of morbidity. The purpose of the present study was to investigate the effect of cardiac rehabilitation on quality of life in patients with acute coronary syndrome.

Materials and Methods: This was a clinical trial study conducted on 50 patients with acute coronary syndrome admitted to the coronary care units of Shohada Hospital in Isfahan in 2013-2014. The participants were randomly assigned to control (n = 25) and study (n = 25) groups. The study group received cardiac rehabilitation in phase 1 and 2. Phase 1 was conducted in a hospital in Isfahan province that had no cardiac rehabilitation center but had minimal cardiac rehabilitation equipments. Phase 2 was conducted at home by follow-up through telephone and referring the patients to the hospital. The control group received usual cardiac rehabilitation. The data were collected via a demographic questionnaire and SF-36 quality of life questionnre before and 1 month after intervention by the researcher. Data were analyzed by independent samples t-test.

Results: In the study group, the mean scores in all domains of quality of life increased significantly after intervention ($P < 0.05$). In the control group, the mean scores of quality of life were not significantly different before and after intervention ($P > 0.05$). A significant difference was found between the study and control groups in all domains of quality of life except for general health and social function ($P < 0.05$) in favor of the study group.

Conclusions: The results of this study showed that cardiac rehabilitation program could lead to improving the quality of life in the patients with acute coronary syndrome.

Key words: Acute coronary syndrome, cardiac rehabilitation, Iran, quality of life, rehabilitation

Introduction

One of the important cardiovascular diseases is acute coronary syndrome that threatens life. The range of such a situation can vary from unstable angina to the most acute condition, i.e., acute myocardial infarction and irreversible necrosis of the myocardium.[1] About 1 million people are involved every year in acute or recurrent coronary syndrome in the USA.[2] Based on WHO estimation, about 23.6 million people will have died of cardiovascular diseases by the end of 2030.[3] About 12 million people suffer from coronary artery diseases, of whom 600,000 die due to coronary arteri diseas. Despite the vast advancements concerning prevention, diagnosis, treatment, and rehabilitation of cardiac patients, these diseases account for a high mortality.[4] One of the interventions used in improvement of cardiovascular diseases is cardiac rehabilitation programs, about which there is a bulk of studies, especially on the effect of such programs across the world.[5-8] Cardiac rehabilitation is conducted through promotion and preservation of cardiovascular health through unique programs designed to improve patients' physical, psychological, social, occupational, and emotional conditions.[9] The goal of cardiac rehabilitation is speeding up the trend of secondary prevention and improvement of patients' quality of life (QOL)[10]. QOL not only refers to individuals' personal health status but also to their physical

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and mental conditions as well as psychological factors such as social and functional interactions and their level of independency.[11,12] Previous studies mostly measured the effect of rehabilitation programs on the physiological improvement and exercise tolerance, as well as modification of the risk factors.[13] These studies revealed that cardiac rehabilitation activities have positive effects on mortality rate, physical health, socio-psychological function,[14,15] levels of blood lipids, hypertension, dyspnea, weight loss, smoking, and level of stress.[16,17] In recent years, some studies have been conducted on the effect of rehabilitation programs on patients' QOL. These studies are different concerning the type of intervention, length of intervention, study population, and subjects' demographic characteristics and have shown controversial results.[18,19] Zwisler *et al.* showed an improvement in QOL after cardiac rehabilitation.[20] Shabani *et al.* also reported the positive effect of cardiac rehabilitation on patients' QOL after coronary bypass or vascular reconstruction surgeries ($P < 0.05$).[21] Failde and Soto, in a study conducted in Spain, showed a significant reduction in the QOL score 3 months after acute coronary syndrome incidence, in the domains of physical role, general health, and vitality.[22] Mohammadi *et al.* reported that cardiac rehabilitation did not lead to an improvement in QOL in the study group compared to the control group.[23] Bettecourt *et al*., in a study conducted in Portugal, showed that there was no significant change in QOL between rehabilitation and control groups.[24] Cieslik *et al.*, in their study from Turkey, reported no significant difference in QOL between rehabilitation and control group ($P > 0.05$).[25] With regard to the existing shortage in knowledge and related research and the reported controversial results on the effect of cardiac rehabilitation on QOL, the researchers decided to design and conduct the present research. It is hoped that the obtained results can somehow modify the existing shortage of knowledge in this regard.

Materials And Methods

This was a clinical trial conducted to investigate the effect of the independent variable of rehabilitation interventions on the dependent variable of QOL. The present research was a two-group (study and control) two-stage (before-after) prospective study, with subjects' random allocation conducted between Oct 9 and Feb 17, 2013. The study population comprised 233 patients hospitalized in the CCUs of selected hospitals affiliated to Isfahan University of Medical Sciences (Shohada Lenjan Hospital), with diagnosis of acute coronary syndrome. Inclusion criteria were: having no history of: joint disease, cardiac surgery, uncontrolled hypertension, complete heart block, uncontrolled arrhythmias and thrombophlebitis. In case of loss of interest at any stage to remain in the study or a change occurring in any of the inclusion criteria, the subjects were excluded. Finally, the study was conducted on 50 patients who had been hospitalized with diagnosis of acute coronary syndrome. Convenient sampling was followed. Then, the subjects were randomly allocated to study and control groups by random numbers table. Data were collected through interviews, observation, and questioning and by use of patients' medical files, demographic characteristics questionnaire, and QOL questionnaire (SF-36). The latter questionnaire contains two general sections of physical health and mental health. This questionnaire measures eight sub-scales including physical function index, physical role, emotional role, vitality, mental health, social function, pain, and general health status.[26] Cronbach alpha of this questionnaire was calculated between 0.71 and 0.93 in eight sub-scales in the study of Chan *et al*. conducted on acute coronary syndrome patients.[27] Cronbach alpha of the Persian version of this questionnaire was calculated between 0.70 and 0.85 in Asghari-Moghadam's study[28] and its reliability was estimated between 0.77 and 0.9 in the study of Montazeri *et al*. After obtaining a written consent from all the subjects, demographic characteristics and QOL questionnaires were filled for the subjects in both groups by the researcher. Physical rehabilitation interventions in phases 1 and 2 were administered to the subjects in the study group. Conventional rehabilitation (phase 1) was administered for the subjects in the control group. To administer rehabilitation in phase 1, the rehabilitation program was conducted for five straight days under the researcher's and a cardiologist's supervision in the hospital. This program was designed based on the amount of permitted energy consumption measured by MET with regard to the number of hospitalization days. For instance, on the first day of hospitalization, the upmost permitted energy consumption was 1 MET, and then the patient remained in complete bed rest for 12 h. On the second and third days, the amount of permitted energy consumption was at the most 2 METs. Then, the patient was permitted to have activities up to an optimum of 3 METs until the fifth day, if there was no chest pain, dyspnea, dizziness, and other signs.

After the end of the first phase (at the time of patients' discharge), the rehabilitation program was administered in phase 2 for four straight weeks. As Shohada Lenjan Hospital lacks treadmill, barbell, stationary bicycle, and other professional rehabilitation devices, rehabilitation program in this phase was designed by simulation of rehabilitation activities according to the energy consumed based on MET, with the cooperation of a cardiologist, a CCU nurse, and one of the academic members in the nursing school teaching cardiology subject. For instance, the patient was educated about what activities he/she was permitted to do in the first week and how to increase his/her activities in the absence of no abnormal signs in the following week. The subjects were followed up through phone calls in the second and third weeks to monitor the trend of rehabilitation and to supervise the appropriateness of administration of the

prescribed activities during the second phase. The subjects were asked to refer to the hospital in the first and the fourth weeks. At any time of their referral, the patient was visited by a cardiologist and an ECG was taken, and after taking the cardiologist's permission, the patient was asked to walk a certain distance in the hospital hall for a certain period of time. Immediately after, the patient underwent cardiac monitoring for 10 min concerning arrhythmia, chest pain, dyspnea, and other related signs. Patients' BP and pulse were measured before and after intervention. In case of patients being in stable condition, the activities requiring more energy were prescribed for the patients. Through follow-up phone calls, the subjects were asked about their physician status and existing signs, and their questions in this regard were answered. Patients discussed their problems and were educated about appropriate activities based on their permitted and safe energy consumption. Therefore, in the present study, resuming the physical activities started from very light activities (1, 2, and 3 METs) and continued up to moderate level activities under the supervision of the related physician.[29] If the patients did not feel any chest pain, fatigue, respiration distress, or abnormal changes in heart rhythm and rate while doing the activities, the severity of activities would be elevated to a higher level. Otherwise, it would be stopped with the permission of the physician. The subjects in the control group underwent conventional and routine rehabilitation of phase 1 in the hospital and received no further interventions in the following 4 weeks after their discharge. One month after intervention, the questionnaire of QOL was filled by the subjects in both groups.

Ethical consideration

The study was approved by research committee of Isfahan University of Medical Sciences. the study was explained verbally to patients and they also receive a written explanation. they were informed that participation was voluntary and that they could withdraw from the study at any time. it was emphasized that non of the informations would be identifiable and then informed consent was obtained.

Results

The results showed that the subjects' age ranged between 29 and 25 years. About 27 subjects were male and 23 were female, and 46 were married and 4 were either divorced or widowed. Statistical tests showed no significant difference in subjects' age, gender, marital status, occupation, and level of education ($P > 0.05$). Regarding the cardiac risk factors (lack of exercise, hyperlipidemia, hypertension, diabetes, overweight, and smoking), there was no significant difference between the study and control groups. Independent *t*-test showed a significant difference in the scores of QOL

Table 1: Comparison of QOL domain scores before and after intervention in the two groups

Quality of life	Intervention group	Control group	*P* value
Physical function			
Before	67.2±24.9	75.4±19.7	0.2
After	80.6±17.3	66.4±17.9	0.006
P value	<0.001	0.002	
Physical role			
Before	34±20.1	31±21.6	0.39
After	60±40.2	28±33.3	0.004
P value	0.009	0.14	
Body pain			
Before	31.6±20.8	39.2±20.8	0.2
After	72.2±25.5	49.8±32.9	0.01
P value	<0.001	0.02	
General health			
Before	39.5±20.3	41.2±17.6	0.76
After	54.8±17.1	51.1±18.8	0.47
P value	<0.001	0.03	
Vitality			
Before	55.2±18.3	53±20.5	0.7
After	66.2±14.9	52.2±14.7	0.002
P value	0.006	0.8	
Social function			
Before	59.9±33	57±29.1	0.75
After	71.5±26.4	59.5±24	0.1
P value	0.04	0.66	
Emotional role			
Before	29.3±35.1	29.3±38.9	1
After	69.3±37.2	38.7±34.3	0.004
P value	0.001	2.0	
Mental health			
Before	47.7±22.9	45.4±16.1	0.7
After	61.1±17.1	46.9±19.8	0.009
P value	0.003	0.67	

Table 2: Comparison of QOL domains' mean score changes 1 month after intervention in the two groups

Variable	Mean±SD		Independent *t*-test
	Intervention	Control	*P*
Physical function	13.4±14.5	−9±12.9	<0.001
Physical role	26±25.9	−3±18.1	0.001
Body pain	40.6±27.1	10.6±21.9	<0.001
General health	15.3±15.1	9.9±21.5	0.3
Vitality	11±18.1	−0.8±16.6	0.02
Social function	11.7±26.6	2.9±27.9	0.2
Emotional role	40±50	9.3±36.4	0.02
Mental health	13.4±20.7	1.4±16.9	0.03

between the two groups before intervention in any of the domains. Paired *t*-test showed a significant difference in the domains of physical function, pain, and general health mean scores ($P < 0.05$), but not in the other domains in the control group after intervention compared to before intervention.

In the study group, mean scores of all QOL domains increased after intervention compared to before intervention ($P < 0.05$). On comparison of mean scores of QOL in the two groups 1 month after intervention [Table 1], it was found that these mean scores were significantly higher in its all domains ($P < 0.05$) except general health and social function ($P > 0.05$) in the study group compared to control. Comparison of mean QOL score changes in the two groups 1 month after intervention [Table 2] showed that except in the domains of general health and social function ($P > 0.05$), changes in mean scores were significant in the other domains ($P < 0.05$).

Discussion

The findings of this study show that QOL of acute coronary artery syndrome patients is significantly improved after cardiac rehabilitation ($P < 0.05$). Sandvik *et al.* and Yu *et al.* showed that cardiac rehabilitation resulted in improvement of QOL in the study group.[8,30] Similar to the present study, in Yu's study, comparison of general health domain in two groups showed no significant difference. In Isfahan, Iran, Mostafavi *et al.* showed that cardiac rehabilitation could improve patients' QOL ($P < 0.05$).[31] Although Mostafavi's study was a retrospective, one-group study conducted on the medical files of 100 cardiac patients and was different from the present study, Attarbashi-Moghadam *et al.* and Abbasi *et al.* conducted their studies with a two-group design. These studies also reported an improvement of QOL after rehabilitation.[32,33] In the study of Attarbashi-Moghadam *et al.,* an improvement was observed in all domains of SF-36 questionnaire ($P < 0.005$), although it was conducted on 44 patients and their QOL was measured after a coronary bypass surgery. Meanwhile, the present study was conducted on 50 patients who had not undergone coronary bypass surgery as these cases were excluded from the study. Abbasi *et al.,* who investigated the effect of taking a walk on Chronic heart failure patients, reported an improvement in patients' QOL ($P < 0.05$). The questionnaire adopted in Abbasi's study was Minnesota, but their results are in line with those of the present study.

The study of Dugmore *et al.* showed that rehabilitation activities could have positive effects on QOL, well-being, and mental and psychological factors ($P < 0.05$),[5] although the QOL was also significantly increased in the control group. The difference between their results and those of the present study may be due to the difference in the study populations. In Dugmore's study, these were 122 male and 2 female subjects (subjects were mostly male). In addition, the length of monitoring was different. During 12 months, there might have been more adaptation with the disease condition in the control group, which might have resulted in improvement of QOL. Grace *et al.* found out that rehabilitation could lead to an increase in and improvement of QOL and anxiety ($P < 0.05$). They also reported that rehabilitation could also improve signs of depression ($P < 0.05$).[10] Although anxiety and depression were not investigated in the present study, a significant improvement was observed in the dimensions of exhilaration, vitality, and mental health. Briffia compared QOL scores in the study and control groups after intervention and reported a significant difference just in physical function,[34] which is consistent with the present study. Samartzis *et al.*, in a meta-analysis study on 1074 patients in the study group and 1106 patients in the control group, reported that cardiac rehabilitation improved patients' QOL through mental and psychological effects ($P < 0.05$), which is in line with the present study.[11] Pasqali *et al.* and Koertage *et al.* also reported positive effects of rehabilitation intervention on patients' QOL in the study group compared to control.[6,7] In the literature review and meta-analysis studies, it was found that cardiac rehabilitation resulted in a reduction in mortality rate and a significant increase in O2 consumption and QOL.[35,36] Chan *et al.,* in a clinical trial conducted in Hong Kong, showed an improvement in subjects' QOL, regardless of them being in either control or study group, although the difference was not significant ($P > 0.05$). The reason for the difference in their results and those of the present study, especially in the control group, might have been the difference in the number of subjects and the length of monitoring (6 months) as well as a high number of subjects dropping out of the study.[27] In Portugal, Bettencourt *et al.* showed that cardiac rehabilitation had no significant effect on the domains of QOL ($P > 0.05$), except on the dimensions of exhilaration and general health, possibly due to an equal distribution of the subjects into study and control groups (31 in study vs 95 in control group after subjects' dropout).[24]

Conclusion

The results of most of the above-mentioned studies are in line with those of the present study. It seems that administration of cardiac rehabilitation activities could lead to improvement of QOL in patients with acute coronary syndrome. As educating the nurses about cardiac rehabilitation and its administration in clinical setting does not impose high costs, their education in CCUs can result in improvement of patients' QOL and their physical and mental health indexes. Patients' education about the principles of rehabilitation and the gradual trend of resuming activities can improve their QOL and prevent complications which result from their inadequate knowledge and disobedience of doing

appropriate activities in their recovery period after discharge. As such a study was conducted for the first time in Isfahan province in which cardiac patients have inadequate access to cardiac rehabilitation and as the study yielded positive results, cardiac rehabilitation is recommended to be administered in all provinces in Iran to move toward promotion of public health. In this way, frequent hospitalizations of patients and their imposed costs can be diminished.

The present study showed that cardiac rehabilitation could improve QOL of the patients with acute coronary syndrome, although rehabilitation activities need patients' education and supervision on their rehabilitation activities. One of the limitations to the present study was patients' personal differences that may have affected their QOL and were out of researchers' control. Finally, the researchers suggest conducting such a study with a higher number of subjects and for a longer period of time.

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