Effect of home-based exercise rehabilitation on quality of life early post-dischargeafter coronary artery bypass graft and percutaneous coronary intervention

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Abstract

BACKGROUND: The barriers to participation in cardiac rehabilitation programs are individual and economic problems as well as limited availability of rehabilitation services. Because of the important role of rehabilitation, home-basedexercise rehabilitation is a new approach to participate in such programs. The purpose of this study was to evaluate the effect of home-based rehabilitation on quality of life (QoL) in patients with coronary artery disease after coronary artery bypass graft (CABG) and percutaneous coronary intervention (PCI).

METHODS: Participants included 18 CABG (3 women, 15 men) and 40 PCI (12 women, 28 men) low to moderate risk patients. Finally, 17 patients in the exercise group and 16 patients in the control group remained. The SF-36 was used to evaluate changes in QoL before and after the program.

RESULTS: forty-three percent was dropped out from the program. Before and after program, the exercise group was betterin all domains of QoL ($P < 0.05$). After 8 weeks of cardiac rehabilitation, significant improvements were observed in quality of life in both groups ($P<0.05$) but the exercise group showed more improvements in three domains.

CONCLUSION: Home-based exercise rehabilitation after CABG and PCI may improve QoL and provide an efficient low-cost approach to cardiac rehabilitation. It may be helpful due to limited availability and resources in Iran. Nevertheless, there is a need for more training to increase participation and decrease drop out.

Keywords: Quality of life, Coronary artery Bypass Grafts, Angioplasty.

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Introduction

According to the latest statistics of the World Health Organization (WHO), coronary artery disease (CAD) was the most common cause of mortality in 2004.[1] Its prevalence in Iran also has been reported high.[2] Similar to other cardiac disease, coronary artery bypass graft (CABG) and also percutaneous coronary intervention (PCI) require cardiac rehabilitation (CR).[3,4] WHO has announced the aim of modern cardiac rehabilitation as relief of symptoms and improvement of quality of life (QoL).[5] Exercise rehabilitation is the continuous and an integral part of CR which its main goal is improvement of the physical condition of patient through increasing functional capacity with improvement of quality of life.[6] In order to assess the effect of treatments such as CR, nowadays, the application of health-related quality of life indicators (HRQL) has been known to be more practical.[4] WHO defined QoL as an individual's perception of their positions in life in the context of the culture and value system in which they live and in relation to their goals, expectations, standards and concerns.[7]

Many studies have shown the effect of exercise rehabilitation on patients' QoL.[8] However, in many countries, the number of participants in exercise rehabilitation programs is limited to those in centers.[9]Home-based exercise rehabilitation programs were suggested to increase the participation rate.[3]Few studies have reviewed the QoL in home-based exercise rehabilitation programs.[10] In their review study on patients with myocardial infarction, Dalal et al. found that there was no difference in improvement of QoL of rehabilitation groups in home and hospital for CABG and PCI.[11] Jolly et al. showed that after CABG, home-based rehabilitation more improved the

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QoL compared to hospital-based rehabilitation.[12]In the study of Karapolat et al., both exercise rehabilitation groups (home and hospital) had an improvement in physical function (PF), general health (GH) and vitality (VT) indicators.[13]However, Mohamadi et al. by evaluating the effect of home-based rehabilitation on QoL of patients with myocardial infarction reported the improvement only in mental-psychological indicator.[14]

In Iran, cardiac rehabilitation services are rarely presented by health centers.[15] Therefore, the need for education and guiding for patients with myocardial infarction toward patient-centered rehabilitation programs is clearly felt. Considering the current gaps in the conducted studies in Iran about the home-based rehabilitation, the present study aimed to assess the effect of home-based exercise rehabilitation on patients' QoL immediately after discharging.

Materials and Methods

In a quasi-experimental study, 58 patients (43 males and 15 females) with CAD (18 CABG and 40 PCI) were enrolled in the study with age range of 42 to 72 years and mean age of 59.4 ± 6.3 years. The study subjects were the patients with low and moderate risk who underwent CABG and/or angioplasty (PCI) surgery and were willing to participate in rehabilitation program from late November 2009 to late February 2010 in Sina Hospital, Isfahan. Due to ethical limitations, all the patients were given a home-based rehabilitation exercise program so that those who were not willing to follow a regular program, considered as the control group, and those who followed the rehabilitation program regularly, considered as the experimental group. Finally, with loss of 25 subjects, 16 patients (8 females and 8 males) remained in the control group (7 in CABG and 9 in PCI) and 17 patients (3 females and 14 males) in experimental group (5 in CABG and 12 in PCI). The procedure was as the following:

- Filling the consent form by the patients
- Familiarization of patients with rehabilitation program and description of advantages and program objectives
- Providing a booklet containing the home-based rehabilitation exercise for the patients
- Training patients about the exercise sessions and how to perform exercises
- Filling the QoL36 item Short Form (SF-36) questionnairethrough interview
- Supervising the eight-week home-based rehabilitation exercise program
- conducting the posttest

In order to assess the QoL of patients, SF-36Questionnaire was used which has been approved by the *American Association of Cardiovascular and Pulmonary Rehabilitation*.[16]Validity and reliability of the Persian version of this questionnaire, whichwas used in many studies to determine the effect of cardiac rehabilitation, were also approved.[16,17]This scale has two general parts as physical and mental health which consists of 8 health indicators of QoL as the following: Physical Component Summary (PCS), comprised of physical functioning (PF), general health (GH), body pain (BP), physical limitations (PL). Mental component summary (MSC), consisted of social function (SF), mental health (MH), vitality (VT) and emotional limitation (EL).Scoring of this questionnaire was 0-100 which 100 indicated the best health status of individual.[18]

The patients of the experimental group carried out the home-based exercise rehabilitation program immediately after discharging, for 8 weeks in 34 sessions (3 sessions in the first fortnight and 5 sessions for the subsequent weeks) which the procedure of the program's progress was followed by the regular phone call, counseling and mental support and encouraging the patients as well as referral to a physician, if necessary. The exercise program included 10 minutes warm up with light exercises, 20 minutes of moderate-intensity walking (based on Borg Scale)[19-21] and 10 minutes cooling with light stretching movements that the duration and intensity of exercises increased with the program progress. All the exercise sessions were recorded in a special form. After eight weeks, the QoL of patients re-assessed. The patients who did not participate for posttest were excluded from the study (25 subjects). Data analysis was done by SPSS version 15 using Student's t-test and ANOVA for repeated measurements.

Results

The withdrawalrate was 43 percent. Out of all the studied patients, 17 and 16 subjects remained tillposttestin the experimental and control groups, respectively. The demographic characteristics of participants are illustrated in table 1.

The patients of the two groups had no significant difference at the beginning of the study in terms of age, height, weight, body mass index and educational level. Mean and standard deviation of the QoL indicators are illustrated in table 2 before and after rehabilitation. Both groups after the rehabilitation had a significant progress in all indicators ($P < 0.05$). In GH, PCS and PL indicators, the progress of the experimental group was greater than the control group. The between group comparison showed that from the beginning to the end of the exercise rehabilitation program, the QoL indicators of experimental group were better than the control group ($P < 0.05$).

Table 1. Demographic characteristics of the study subjects

	Experimental group	Control groups	P
Age (year)	58.9 ± 6.75	60.0 ± 5.92	0.618
Education (year)	10.1 ± 4.89	80.0 ± 50.3	0.243
Height (meter)	1.66 ± 0.09	1.62 ± 0.07	0.150
Weight (kg)	71.8 ± 9.88	72.1 ± 8.45	0.911
BMI (kg/m^2)	25.85 ± 2.05	27.43 ± 2.81	0.072

Table 2. The quality of life indicators before and after the rehabilitation

Variable	Intervention	Experimental Mean ± SD	Control Mean ± SD	P Intragroup	P Interaction	P Intergroup
GH	**Before**	54.66 ± 19.14	45.83 ± 24.34	0.006	0.11	0.04
	After	68.14 ± 15.72	49.74 ± 21.16			
PF	**Before**	74.12 ± 16.69	52.40 ± 27.74	<0.001	0.86	0.001
	After	93.24 ± 7.69	72.81 ± 20.65			
PL	**Before**	25 ± 33.07	7.81 ± 25.36	< 0.001	0.12	0.002
	After	70.59 ± 32.15	29.69 ± 37.88			
EL	**Before**	45.1 ± 48.50	2.08 ± 8.33	< 0.001	0.89	0.001
	After	80.39 ± 31.31	39.58 ± 49.01			
VT	**Before**	68.82 ± 20.04	48.13 ± 17.11	0.006	0.94	0.001
	After	83.53 ± 13.89	62.19 ± 22.13			
MH	**Before**	60.71 ± 22.05	37.75 ± 23.55	< 0.001	0.81	0.003
	After	73.88 ± 15.62	52.50 ± 25.79			
SF	**Before**	68.38 ± 27.64	41.41 ± 34.37	0.001	0.58	0.01
	After	88.68 ± 22.88	68.75 ± 36.51			
BP	**Before**	56.91 ± 27.67	27.66 ± 32.86	< 0.001	0.71	0.001
	After	88.53 ± 14.81	63.91 ± 30.68			
PCS	**Before**	52.67 ± 16.98	33.42 ± 19.30	< 0.001	0.35	0.001
	After	80.12 ± 12.99	54.04 ± 22.65			
MCS	**Before**	60.75 ± 23.35	32.34 ± 14.58	< 0.001	0.77	0.001
	After	81.62 ± 17.15	55.76 ± 26.22			

PCS: Physical Component Summary, PF: Physical functioning, GH: General health, BP: Body pain, PL: Physical limitations, MSC: Mental component summary, SF: Social function, MH: Mental health, VT: Vitality, EL: Emotional limitation

Discussion

All the indicators of quality of life in patients of both groups indicated a progress after 8 weeks. Both before and after the exercise rehabilitation program, the experimental group was better than the control group in each 10 QoL indicators. The progress rate of the two groups was similar in seven indicators; but was better in GH, PL and PCS in the experimental group.

Most of the conducted studies about home-based exercise rehabilitation compared the home-based exercise rehabilitation with hospital-based exercise rehabilitation and very few studies used *control group*. However, the current study also showed the progress of the exercise rehabilitation group and control group in quality of life. Reviewing thirteen studies, Taylor et al. showed that quality of life had improved in both control and exercise rehabilitation groups, which the progress of the exercise rehabilitation group was higher in the control group only in two cases.[22] These findings were in accordance with the results of the present study. The results of another study also showed the QoL progression in physical, mental and social domains in both groups; however, the progress of the exercise group significantly was greater than the control group.[22]Studying on the coronary patients in the third phase of rehabilitation, Salvetti et al. showed the progression of all the QoL indicators in the experimental group after three months of home-based exercises.[10]The mentioned result was in accordance with the results of the present study. However, except for the increase in the MH, EL and SF indicators, the control group experienced a reduction in all the other indicators which this reduction was *not* in accordance with the results of the present study. The difference of the mentioned study with our study was in the time of implementing the rehabilitation program. in their study, the rehabilitation program conducted in the third phase for three months, but the rehabilitation program of our study were conducted in the second phase in combination with the third phase for two months. Charoenkul et al. performed a similar study on 34 CABG patients with age range of 50-75 years. After

six months of home rehabilitation, the experimental group showed a significant increase in SF, VT, GH, PL and PF indicators compared to the control group but there was no significant difference between the groups in MH, EL and BP indicators.[23] This result was in accordance with our study in terms of experimental group's progression in PL and GH indicators compared to the control groups. Reviewing the effect of a 3-month home-based rehabilitation on quality of life of myocardial infarction patients, Mohamadiet al. reported the significant improvement of QoL in the experimental group in physical, mental and general dimensions; but it was not statistically significant in the social dimension.[14]

In the present study, the indicators of the QoL significantly increased in the experimental group; the reduction of all indicators was also reported in the control group, but this reduction was only significant in the social domain. Comparing the quality of life in the two groups after the rehabilitation, it was also significant in mental domain. While in the present study, the control group had no reduction in any of the indicators and had a more improvement in the social function indicator.

In reviewing the above mentioned findings, it should be noted that patients with angina had a lower QoL.[24]CABG and PCI can improve the QoL of patients as invasive treatments for coronary diseases with relief of the symptoms.[7,25]Moreover, there was no difference between the QoL indicators in PCI and CABG group after the treatment.[26]In this study, the subjects in control group were also encouraged to have exercise and the patients of this group did not experience the pure sedentary lifestyle during the rehabilitation period. One of the interesting points in this study was the significant difference of the groups and superiority of the experimental group in the QoL indicators before and during implementation of the rehabilitation program.

Due to ethical considerations, random selection of the subjects was not possible which could deprive the control group from an effective treatment; therefore, all the patients were given the home-based exercise rehabilitation program. The replacement of patients in each group was based on the very patients' tendency and follow-up. Thus, it can be concluded that basically, a group of patients followed the program that had higher level of QoL. The important point that should be taken into account in comparison of the progression in both groups is the difficulty of the progression in high levels; i.e. progression constantly is much easier and faster from lower levels rather than progression from higher levels. Given the above findings, the progression of the experimental group can be attributed to the rehabilitation program. To attain higher progression in PCS, changing the lifestyle using such programs seems necessary.

Another considerable point was the 43% decline rate that mostly was related to females; i.e. women showed lower tendency to implement such programs. The main reasons for non-participation were firstly, the attitude of patient toward rehabilitation and disbelief to its usefulness, which is a cultural issue, and requires the comprehensive emphasis from the treatment and medical team and should be accompanied by patient's families and relatives. Second reason was the problems for implementation of rehabilitation program that is an individual-economical issue. In the individual domain, implementation of the program should be applicable and easy for patient. Furthermore, the program should not interrupt the daily life of patient, particularly for his/her job and working time. In economic domain, there are implementation barriers such as costs of rehabilitation services. The home-based exercise rehabilitation programs can reduce the implementation barriers (individual and economic) and have been suggested to increase the participation rate.[5,11]On the other hands, in many hospitals of Iran, rehabilitation interventions are not given much attention, and there are very few cardiac rehabilitation centers. Therefore, the patients have to follow it in their home by themselves and consequently they should be trained by necessary educations. Considering to the study of Ghalghamash et al., only 10 percent of the hospitals with cardiac surgery provided the rehabilitation programs for patients after the surgery.[15]It is certainly necessary to have such programs because of their positive effects on reduction of mortality and inability as well as improvement of QoL. Considering the absence of such services in many hospitals of Iran and regarding the individual-economic barriers in participation of patients, the exercise rehabilitation program can be followed at home for low-risk patients in combination with phases I & II. Moreover, full achievement of the rehabilitation goals in the community requires developing culture. Guiding patients toward home-based rehabilitation programs as a secondary preventive, accessible and practical program with covering a wide range of patients not only can reduce the costs and expenses, but also it can be a modern approach to reduce the current problems of our country in relation to fulfill patients' needs.

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Conflict of Interests

Authors have no conflict of interests.

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