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European Journal of Sports and Exercise Science, 2012, 1 (4):113-116
(http://scholarsresearchlibrary.com/archive.html)

Scholars Research Library
ISSN: 2278 – 005X

Impact of Aerobic and Resistance Training in CABG`s Patients

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ABSTRACT

Cardiac Rehabilitation is one of the most important activities who performed by patients with coronary artery disease in cardiac rehabilitation centers. The aim of this investigation is investigate and compare between aerobic training and resistance training on CABG`s patients. 32 patients after coronary artery bypass grafting (CABG) have participated in this study in two groups (aerobic and resistance groups). Resistance training group performed: bench press, arm curls, lateral raise, leg curl, leg extensions and triceps kickback, three times a week for two months. Results showed that the arm and leg strength increased after resistance training. After intervention left ventricular area and ejection fraction for both groups have changed. Result also showed that there was a significant increase in peak VO_2 from baseline averaged 16% ($P < 0.05$) for aerobic group and 9% ($P<0.05$) for resistance group, this changes was statistical significance. Findings of current study clearly show the advantage of resistance training for patients during cardiac rehabilitation.

Key words: Cardiac rehabilitation, Resistance training, Aerobic training, CABG

INTRODUCTION

Cardiac rehabilitation (CR) is a medically supervised that helps improve the health of people who have different heart problems. CR programs include diet counseling, education on heart healthy living, exercise therapy, modification of risk factors, psychological support, and improve their health and quality of life [1 and 2].

These programs are helpful for men and women of who are recovering from a heart attack, heart failure, heart transplantation bypass surgery, and angioplasty. Together with surgical and medical treatments, CR has recommended a program for patients to help them feel better and lead healthier lives. CR is prescribed to increase exercise tolerance, control symptoms, and improve the overall quality of life for patients. One of the most important components of cardiac rehabilitation is exercise therapy [3].

Verrill et al.(1994), investigated effect of 12-week resistance training program on lowered heart rate, systolic blood pressure and rate of perceived exertion during 3 activities of daily living. They showed that no such changes in a control group participating in a walk-jog-cycle program. Resistance training, particularly circuit weight training, also improves various measures of aerobic capacity among cardiac rehabilitation patients [4].

There are very rare and limited investigations that are available regarding the impact of cardiac rehabilitation with resistance training on the physical status, particularly functional capacity in patients after coronary artery bypass

grafting (CABG). Most of the literature of this field focused on effects of aerobic training on some physiological parameters. So the aim of current study is to examine and compare the impact of resistance and aerobic training on muscle strength, functional capacity, and left ventricular systolic function, in CABG`s patients.

MATERIALS AND METHODS

Participants

Participants of this study were 32 patients after (CABG) who participated in two different groups. In current study 16 subjects (58.037±1.125 years old) as an experimental group and 16 persons (58.425±.987 years old), were selected as a control group randomly. All subjects completed the history questionnaire and consent form before participated in this study. Characteristics of participants have shown in the table 1.

Table 1: Characteristics of participants in both groups (Resistance and Aerobic Training)

Group	Variable	Mean	SD
Experimental Group (Resistance Training)	Age (year)	58.0375	1.12598
	Weight (kg)	55.0050	2.40884
	Cholesterol (mg/dl)	112.0319	1.93715
Control Group (Aerobic Training)	Age (year)	58.4250	.98759
	Weight (kg)	55.4506	2.01907
	Cholesterol (mg/dl)	111.4494	2.17514

Exercise protocol

Experimental group participated in resistance training as a schedule. They performed resistance training three times a week for 8 weeks. The resistance training program was established on the basis of baseline 1-RM lifts. Subjects performed 1-RM testing for six tasks, at the first day of training. Experimental performance included: Leg curl, Leg extension, Lateral raise, Triceps kickback, arm curls and bench press. The control group (aerobic training) performed cardiac rehabilitation as a schedule of cardiac rehabilitation center. Subjects also performed three times a week for 8 weeks. Aerobic training included 15 min warm-up (respiratory and stretching exercise), 15 min cycle ergometer, and last 15 min running on the treadmill. Cardiac rehabilitation program was monitored and controlled by a computer system that connected with the training ergocycles and treadmill. Arm and leg strength, body weight and BMI, total exercise time, left ventricular area ejection fraction, Vo2, were measured before and after cardiac rehabilitation. For analysis of data the Repeated Measures Analysis of variance (ANOVA) was applied for determine the effect of treatment. A Tukey post-hoc test was used to examine where the differences exist within groups, if statistical significance was found between conditions. Probability p-values less than 0.05 were considered significant.

RESULTS AND DISCUSSION

In this study patient randomly assigned in two groups. 32 of the patients who completed this protocol were divided in experimental and control group. All patients in this study had not any orthopedic problems. There weren't significant baseline differences between two groups (resistance and aerobic training) for age, gender, weight, peak of Vo2, and BMI. After cardiac rehabilitation, compare between experimental group and control group showed the increase in the arm strength (59 vs. 4% $P < 0.0001$ between groups) and leg strength (50 vs. 12% $P < 0.001$ between groups. After intervention, neither group experienced a significant change in body weight and BMI. Total exercise time was significantly improved in both resistance and aerobic groups from baseline. There was no significant change in left ventricular area ejection fraction between two groups. The MetS score was significantly decreased after resistance training from 3.5±0.8 to 2.3±1.0 and from 3.7±0.6 to 2.4±0.7 after aerobic training ($p < 0.001$). The peak of VO2 ($ml.kg^{-1}min^{-1}$) also increased significantly for both groups (16% for resistance training, 9% for aerobic training). (Table2, Figure 1 and 2).

Table 2: Clinical characteristics of resistance and aerobic training groups before and after cardiac rehabilitation

	Experimental Group (N=16)		Control Group (N=16)		
	Pre test	Post test	Pre test	Post test	P value
BMI (kg/m^2)	28.9±4.3jj	27.3±3.4	28.7±4.5	28.1±3.4	.67
VO2 (ml.kg $^{-1}$min $^{-1}$)	14.8±2.51	17.6±3.42	15.8±2.34	16.5±2.35	.65
Left ventricular area ejection fraction (%)	30.1±2.35	30.9±2.34	29.8±2.36	30.2±2.34	.09
1- RM leg (kg)	29.7±8.7	45.3±11.3	31.3±12.4	32.4±11.4	.001
1-RM arm (kg)	20.9±9.8	32.5±10.3	19.4±6.5	20.5±12.3	.0001
Exercise time (min)	11.3±4.1	13.2±3.2	11.1±4.2	13.1±4.4	.005

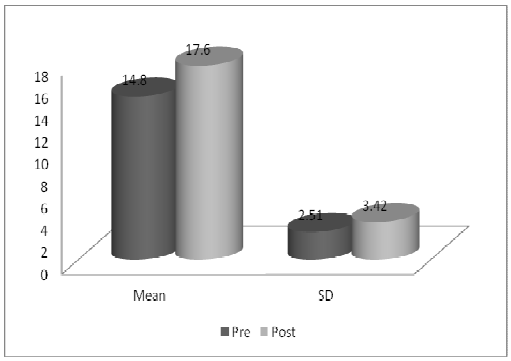

Figure 1: Vo2 peak (ml/kg per min) before and after Cardiac Rehabilitation in Resistance Training Group

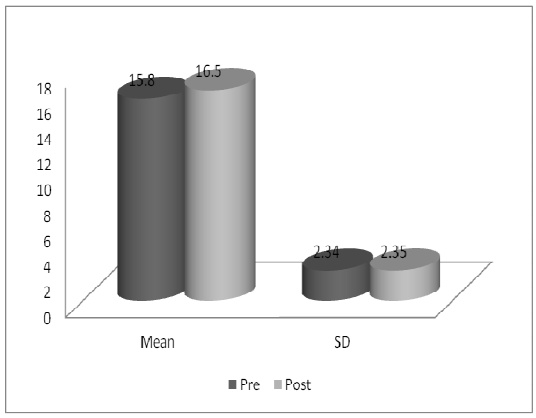

Figure 2: Vo2 peak (ml/kg per min) before and after Cardiac Rehabilitation in Aerobic Training Group

The results of current study indicated that improved metabolic parameters, and also the exercise capacity, muscle strength, in MetS patients after CABG. Finding of this study was supported by some of the researches [5-8].

Shubair et al. (2004) showed that cardiac rehabilitation was significantly improvement in the body weight, exercise capacity and other cardiovascular parameters [9,10 and 11]. It has been manifestly established that exercise tolerance is a good predictor of the prognosis in patients with cardiovascular diseases [12,13 and 14]. The WHO suggested that increased muscle strength can cause an improvement long term prognosis [15].

According to finding of this investigation can be suggested that both resistance and aerobic training significantly improving exercise tolerance in CABG`s patients. However, combined aerobic and resistance training may be a preferable intervention to aerobic training only in CABG`s patients. From a clinical perspective, regular exercise may be beneficial in CABG`s patients even if it does not significantly improve Vo2peak but prevents the decline in

peak of Vo2 that is exacerbated by sedentary lifestyle. Based on limitations of this study future study requires comparing clinical and physiological benefits of and aerobic and resistance training in CABG`s patients in prospective, large, randomized controlled studies of longer duration.

Acknowledgment
The researchers would like to thank all staffs and employers from the Center of Cardiac Rehabilitation In Emam Ali`s Hospital of Kermanshah. The research supported by grant from Islamic Azad University Kermanshah Branch.

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