

Effect of Aerobic Exercises on Patients with early Coronary Artery Disease

Mazumdar¹, S. & Verma², S. K.

¹Adesh Institute of Physiotherapy, Muktsar, Punjab

²Department of Physiotherapy & Sports Science, Punjabi University, Patiala-147002, Punjab

Abstract

The purpose of the study was to examine the effects of aerobic exercises on patients of early coronary artery disease. The study was conducted on thirty male adult patients of stable angina, ranging in age from 40 to 60 years (mean 53.2 years). Six weeks cardiac rehabilitation program (CRP) consisting of light aerobic exercises was administered to the subjects' with intermittent monitoring of their cardiovascular fitness. Intensity of exercise programme (CRP) was increased every two weeks. The results revealed that there was a gradual increase in cardiovascular fitness but the exercise tolerance had decreased during this period.

Key word: Coronary artery disease, Cardiac Rehabilitation, Exercise tolerance, Cardiovascular fitness

Introduction

Cardiac rehabilitation is a medically supervised programme to help heart patients recover quickly and improve their overall physical and mental functioning. *Wenger (1991)* states that coronary patients should not exercise at a level higher than that documented to produce an appropriate cardiovascular response during testing. He states further that aerobic exercises should be preferred, as isometric exercises increases heart rate, cardiac output and systolic blood pressure that can provoke angina.

In cardiac rehabilitation, a wider choice of intensities is left to the patient for aerobic exercise without giving up the potential to reduce cardiac risk factors (*Mertesdorf and Schmitz, 2005*). *Smith et al, (2004)* quoted that low risk patients whose cardiac rehabilitation is initiated in the home environment may be more likely to sustain positive physical & psychological changes overtime than the patient whose programme is initially institution based. The goal of Cardiac rehabilitation is to reduce the risk of another cardiac event or to keep an already present heart condition from

getting worse. Evidences suggest that improving the plasma lipid and lipoprotein profile with diet, exercise and drug therapy benefits patients. An attempt was given in this study to start the cardiac rehabilitation programme to the patients with chief complaint of stable angina from the first day onwards for six weeks.

Materials and Methods

Thirty male patients of coronary artery disease of age between 40-60 years were studied. All the patients were recruited from the Northern India. Those subjects were included in the study who had stable angina and were diagnosed by the physicians of Adesh Hospital Muktsar, Punjab. All the subjects had at least one common associated disease which was diabetes mellitus and were on the medication of beta-blockers which had blunted their heart rates. Only those subjects were taken into account who sincerely continued the CRP for six weeks period.

Following CRP was administered for a period of six weeks to the subjects' and their cardiovascular fitness was evaluated after every two weeks.

A set of exercises which consisted of lower limb and trunk exercises alongwith stretching exercises were taught to the patients on the very first day. The resting heart rate was measured by the sports tester and a target heart rate calculated as per Karvonen's formula was set for each subject for exercise. For the first two weeks the intensity of up to 10% increase in the heart rate was recommended to be achieved for CRP by the patients. Thereafter the target heart rate was incremented by further 5% every two weeks to 15% and 20%.

Crompton's Test was administered to the subjects' to assess their cardiovascular fitness. For this test the patient was made to lie down supine for at least three minutes. Then the pulse rate of the right radial artery was measured. Later on the patient was asked to stand up and the pulse rate was measured again immediately. The difference between the two pulse rates gave the value for cardio vascular fitness. Crompton's Test was repeated after every two weeks till the end of sixth week.

The rate of perceived exertion was asked verbally to the patients according to the tolerance of the exercises and was rated in accordance with the Borg's Scale on the first day. This was repeated after every two weeks till the end of six weeks.

Data was analyzed with the help of Macmed Software Win 98. Mean, standard deviation and standard error were calculated to interpret the results statistically. Paired t-test was utilized to evaluate the impact of CRP on cardiovascular fitness and exercise tolerance.

Results and Discussion:

Table 1: Mean Scores

CRP Phase	RHR	THR	CT	BS
First Day	63.2	73.2	9.9	12.3
End of 2 nd week	66.1	81.0	8.2	13.7
End of 4 th week	67.8	87.2	7.5	14.2
End of 6 th week	67.5	Not Adv	5.7	12.6

RHR-Resting heart rate in beats/min., THR-Target heart rate in beats/min.
CT-Crompton test score, BS-Borg Score

Table -1 compares the mean scores of resting heart rate (RHR), target heart rate (THR), Crompton's test Score (CT) and Borg's Scale Score (BT) in patients' with early coronary artery disease at different stages of CRP. Results show that despite the fact that patients' are on regular intake of beta blockers which are known to blunt the heart rate, the resting heart rate increases after the second week till the end of the fourth week but at the end of the sixth week exhibit a tendency to stabilize. The results of the Crompton's test showed that in comparison from the first day the cardiovascular fitness increased as the values of the Crompton's test decreased at the end of sixth week steadily. The results of the RPE initially had risen from the first day to the end of the second week, also to the end of fourth week, but dipped down at the end of sixth week.

Tables 2 and 3 show the mean, standard deviation, standard error and paired t-test for CT & BS. Significant differences were found between the scores of Crompton's test before and after the cardiac rehabilitation which refer to increase in the cardiovascular fitness of the patients' after CRP. A similar comparison of RPE as assessed through Borg's Scale before and after the cardiac rehabilitation was made in the patients'. Results reveal non-significant differences between the scores of Borg's Scale before

and after the cardiac rehabilitation programme.

Table 2: Computation of analysis of 't' ratio of before and after cardiac rehabilitation on Crompton's test:

Period	Mean	SD	SEM	t-ratio
Before CRP	9.93	2.98	0.54	11.79*
After CRP	5.66	2.21	0.44	

* t value significant at $p < 0.001$

Table 3: Computation of analysis of 't' ratio of before and after cardiac rehabilitation on Borg's Scale:

Period	Mean	SD	SEM	t-ratio
Before CRP	12.3	1.39	0.25	1.20
After CRP	12.6	1.71	0.31	

* t value significant at $p < 0.001$

The study support the findings of many investigators who have reported positive effects of CRP comprising of aerobic exercises on the common pathway of coagulation reducing thrombosis formation and hypercoagulability at rest which suggest a reduced risk of atherosclerotic disease progression (Gopinathannair & Lockhard, 2005), LDL-Cholesterol (Konig et al, 2005). According to American Heart Association (1965) a balance of low level activity and rest is essential to the healing myocardium, especially during phase I rehabilitation.

The American Heart Association and American College of Sports Medicine proposes physical activity using dynamic exercises for the prevention of cardiovascular diseases as the secondary prevention. Shiutt et al (2005) states that exercise induces improvement of the cardiovascular risk factors e.g. dyslipidaemia, insulin resistance and inflammation, normalization of endothelial function and retardation of atherosclerosis.

In the present investigation the improvement in cardiovascular fitness with six weeks' of CRP provide evidence

of benefit of light aerobic exercises in cardiovascular rehabilitation. Based on the observations of the present study and indicative findings of many investigators of positive impact of aerobic exercises in early cardiac rehabilitation, it is suggested that this should be included in the complex therapy in cardiac patients.

Conclusion:

The study provides an indication for starting cardiac rehabilitation from the first day. Though the resting heart rate during the initial phase of CRP increase in the patients' but with continuous endurance training to the heart muscle for six weeks it tends to stabilize with further progression of CRP. The Cardiovascular fitness increases steadily with the training programme.

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