



Effects of aerobic exercise on physical and physiological variables among coronary artery disease patients

KEYWORDS

Aerobic exercise, Coronary artery disease, Cooper Test, Rate Perceived Dyspnea

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ABSTRACT

Aims: To prove the effect of aerobic exercise on physiological factors to improve the Cardiovascular endurance and and prevent cardiac events among coronary artery patients.

Methods: Thirty patients A total of 30 subjects with angiographically documented coronary artery disease patients were selected. Of the 60 invitees, 30 CAD patients, 35 -72 years, with chronic CAD fulfilled all criteria and were registered for the study. Training program for 7 days in a week followed by 2 month follow-up. After 2 month of their training program again the subjects were tested on the same criterion variables as such in the pre-test and considered this as the post-test.

Results: In this subjects, the obtained value of 't' test were 13,491 for angina pain, 27,167 or Rate perceived Dyspnea, 5.614 for Body mass index, -32,351 for Cooper test, 3.282 for Systolic Blood pressure and 9.825 for Diastolic Blood pressure. The obtained results of post score shown significant effect on physiological variables among coronary artery patients. The Aerobic exercise practice has produced significant improvement on cardiovascular endurance

Conclusion: Overall healthy changes in cardiovascular endurance and decline in cardiac events in patients of CAD were closely related to aerobic adherence.

INTRODUCTION

Coronary artery disease is the most common type of heart disease and cause of heart attacks. The disease is caused by plaque building up along the inner walls of the arteries of the heart, which narrows the arteries and restricts blood flow to the heart. It is the leading cause of death worldwide. While the symptoms and signs of coronary artery disease are noted in the advanced state of disease, most individuals with coronary artery disease show no evidence of disease for decades as the disease progresses before the first onset of symptoms, often a "sudden" heart attack, finally arises. After decades of progression, some of these atheromatous plaques may rupture and (along with the activation of the blood clotting system) start limiting blood flow to the heart muscle. The disease is the most common cause of sudden death, and is also the most common reason for death of men and women over 20 years of age. According to present trends in the United States, half of healthy 40-year-old males will develop CAD in the future, and one in three healthy 40-year-old women. According to the Guinness Book of Records, Northern Ireland is the country with the most occurrences of CAD. By contrast, the Maasai of Africa have almost no heart disease.

STATEMENT OF THE PROBLEM

The purpose of the study is to assess the effectiveness of Aerobic exercise on physiological factors in preventing cardiac events among stable angina patients.

AIMS & OBJECTIVES OF THE STUDY

The objectives of the study are as follows.

- To prove the effect of aerobic exercise on physical and physiological factors to improve the Cardiovascular endurance and prevent cardiac events among coronary artery disease patients.
- The objective focuses on healthy life style through reg-

ular aerobic exercise with vegetarian diet to reduce risk of coronary artery blockages.

HYPOTHESIS

The hypotheses formulated in the present study are as follows:

- It was hypothesized that the Aerobic exercise would have significant effects on physical and physiological factors in preventing cardiac events among physical and physiological instead of only physiological stable angina patients.

Materials and Methods

The sample selection is made on using Non probability, convenient sampling method. A total of 30 subjects with angiographically documented coronary artery diseased patients were selected. Of the 60 invitees, 30 CAD patients, 35 -72 years, with chronic CAD fulfilled all criteria and were registered for the study.

This study was approved by Human ethical committee of the Brahma Kumaris, Global Hospital, Mount Abu, Rajasthan and all the subjects will be signed written consents before participating in the study.

The Inclusion criteria were angiographically documented stable CAD with more than 50% stenosis and Major epicardial vessel with 50% stenosis. Patients for whom CABG or PCI are not considered due to poor anatomy. Those unwilling to undergo CABG/PCI and left ventricular ejection fraction > 20% and without LVF.

The Exclusion criteria were: Another co-existent life threatening illness. Acute coronary syndrome or Significant left main disease (>50%). Red flags like tumor, metabolic diseases, rheumatoid arthritis, and osteoporosis.

STUDY DESIGN

Subjects limited to 30 patients as an interventional group and their spouses, stayed in-house for seven days, assessments were made on baseline symptom score, exercise tolerance, angina pain score, Blood pressure, Body mass Index and Rate perceived Dyspnea.

Patients were motivated to achieve at least 75% adherence to open their coronary blockages. The study protocol was approved by the Institute's ethical committee, and written informed consent was obtained from every patient. An opinion for an angioplasty or bypass surgery was offered to all patients when required. The study was conducted as Medication and aerobic training for cardiovascular endurance also were assessed by the same method.

The selected subjects were initially tested on criteria variables used in this study and this is considered as the pre-test. After assessing the pre-test, the subjects were treated with Aerobic exercise. Training program for 7 days in a week followed by 2 month follow-up. After 2 month of their training program again the subjects were tested on the same criterion variables as such in the pre-test and considered this as the post-test.

Physical variable

1. Body mass index (BMI)

Physiological Variables

1. Systolic Blood Pressure (SBP)
2. Diastolic Blood Pressure (DBP)
3. Angina Score
4. Rate of Perceived Dyspnea (RPD)
5. Cooper 12 minute walk test

ADMINISTRATION OF TRAINING PROGRAMS

The procedures adopted in the training program for the present study is described below:

1. During the training period, subjects underwent their respective training program on seven days per week for 2 months.
2. walk for 30-45 min in the morning after the sun rise and 30 min of stroll during the evening tolerance. Since the patients were average in their level of fitness the intensity and load was fixed on the basis of results of the pilot study. They were trained to reach a target heart rate of 60-70% of their maximum predicted heart rate (MPHR) based on their level physical conditioning. Initially all patients were made to walk to achieve 50% of MPHR and then gradually build up over period of one month or so to 60% and then to 70% of MPHR, according to their physical status. The exercise routine include warming-up period of 5 min, walking for 20-35 min, and cooling down period of 5 min. They were advised to walk in silence (inner self conscious state) and avoid walk after meals or during extreme cold or hot climate condition.

Follow-up

Patients participated daily support sessions, of 30-45 minutes, at their place. To ensure proper adherence, weekly group support sessions facilitated by Regional co-ordinators addressed their day-to-day challenges. Every month the CAD team visited three tertiary medical centers in

Ahmedabad, Delhi, and Mumbai for follow-up, assessment of clinical status and program adherence. At 60th day patients and their spouses were invited for follow-up and re-assessment.

TABLE-1 AEROBIC INTERVENTIONAL TRAINING PROGRAM

S.No	Name of the group	Duration	Frequency	Sessions
1	Aerobic exercise group	8 weeks	Daily	Two session – Morning after sun rise and Evening stroll before sun set

TABLE-2 PROGRESSION OF LOAD FOR AEROBIC EXERCISE

MONTHS	AEROBIC EXERCISE INTENSITY	
	MORNING AFTER SUN RISE	35-45 minutes
1 st to 3 rd Weeks	Patients were trained to reach 50-60% of maximum predicted heart rate	
3 rd to 6 th Weeks	Patients were trained to reach 60-70% of maximum predicted heart rate	
6 th to 8 th Weeks	Patients were trained to reach 70-75% of maximum predicted heart rate	

Table-2 reveals the total duration of aerobic exercise and intensity as per the maximum predicted heart rate. Patients were evaluated by the physiological variables before taken into the interventional method. During training period the subjects were made to walk with slow progressive speed. Subjects were trained daily evening stroll session or 30 minutes duration to keep better cardio vascular endurance. During 1st to 3rd weeks patients were trained to reach 50-60% of maximum predicted heart rate. During 3rd -6th weeks patients were trained to reach 60-70% of maximum predicted heart rate. During 6th – 8th weeks patients were trained to reach 70-75% of maximum predicted heart rate. They were advised to walk in silence and avoid walk after the meals or during extreme cold or hot climate conditions.

STATISTICAL ANALYSIS OF DATA

The study mainly focused on testing the mean differences of thirty patients and secondarily it was decided to find out the increase of mean differences in each group from baseline to post treatment for various measures. Further, to find the significance of study parameters on continuous scale within this group were tested by applying student's 't'-test and t-ratio.

TABLE-3
Pre test and Post test standard error mean values on Physiological variables among coronary artery disease patients

Paired Samples Test									
VARIABLES OF PRE AND POST TEST		Paired Differences					T	Diff	Sig. (2-tailed) ratio
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Angina score Pair-1	Day-1	1.5333	.7849	.1433	1.6402	2.2264	33.491	29	.000
	Day-60								
RPD Pair-2	Day-1	5.7000	3.1492	.2098	5.2709	6.3291	27.167	29	.000
	Day-60								
BMI Pair-3	Day-1	2.2386	2.1836	.3987	1.4226	3.0534	5.614	29	.000
	Day-60								
Cooper Test Pair-4	Day-1	-406.5000	68.8220	12.5451	-432.1986	-380.8014	-32.351	29	.000
	Day-60								
Systolic BP Pair-5	Day-1	9.4825	15.5578	2.8890	3.5649	15.4006	3.282	28	.003
	Day-60								
Diastolic BP Pair-6	Day-1	13.5333	7.7679	1.4182	11.8328	16.8339	9.825	29	.000
	Day-60								

RESULT

Table -3 shows that the obtained't' test value and t-ratio of physical and physiological variables in preventing cardiac event among stable angina patients (CAD).

In this subjects, the obtained value of 't' test were 13,491 for angina pain, 27,167 or Rate perceived Dyspnea, 5,614 for Body mass index , -32,351 for Cooper test, 3,282 for Systolic Blood pressure and 9.825 for Diastolic Blood pressure. The obtained results of post score shown significant effect on physiological variables among coronary artery patients. The Aerobic exercise practice has produced significant improvement on cardiovascular endurance, Angina, Rate perceived Dyspnea, Body mass index (BMI) and Blood Pressure. Therefore the above mentioned hypothesis was accepted.

The obtained value shown the greater improvement due to the progressive exercise practice during 1st to 3rd weeks patients were trained to reach 50-60% of maximum predicted heart rate. During 3rd -6th weeks patients were trained to reach 60-70% of maximum predicted heart rate. During 6th – 8th weeks patients were trained to reach 70-

75% of maximum predicted heart rate.

DISCUSSION

The present study of the CAD patients can be motivated to adopt the aerobic program for a fairly long period of follow –up, while performing their routine activities outside the hospital framework. This program was found to be user – friendly, safe, flexible, and compatible with other treatments in the setting of advanced CAD, with a high degree of compliance.

The primary ending of this study was change shown improvement on the physical and physiological variables. The aerobic program could modify physical and physiological factors by significantly reducing angina, dyspnea and normalizing the Blood pressure, improvement in cardiovascular endurance and overall sense of well-being. The modification of physical and physiological factors was reflected in better adherence to healthy lifestyle behavior like cessation of smoking, adherence to prescribed diet and exercise schedules.

CONCLUSION

The Aerobic program is feasible, safe and compatible with other treatments in the setting of advanced coronary atherosclerosis with high degree of compliance. The results from the study support the hypothesis that adaptation and maintenance of this unique user-friendly healthy lifestyle exercise program, which motivates patients to take up responsibility of their own health, on the basis of practicing exercise can lead to a significant reduction in cardiac events, coronary atherosclerosis and effective control of symptoms like angina and breathlessness, a reduction of requirement for anti-anginal drugs, better control of hypertension and an improvement in exercise tolerance. A highly significant reduction in hospitalization for cardiovascular events was observed over a follow-up period of two months.

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