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EFFECT OF SUPERVISED MODERATE INTENSITY EXERCISE PROGRAM IN PHASE ONE CARDIAC REHABILITATION OF POST OPERATIVE CABG PATIENTS - A RANDOMIZED CONTROLLED TRAIL

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ABSTRACT

Background: With the increasing number of cases for CABG, the cardiac rehabilitation has gained importance. The trends in rehabilitation of a coronary artery disease patient are changing by incorporating a variety of aerobic exercises and resisted training in to their rehabilitation program. The outcome of any exercise chiefly depends on the training parameters like intensity, frequency and duration. Hence the present study focused to know the effects of supervised moderate intensity exercises on patients during hospital discharge following CABG. The objective of is to study the effectiveness of supervised moderate intensity exercise on distance walked and Quality of Life at hospital discharge following CABG.

Methods: Study recruited randomly 46 patients between age group 40-65 years who were posted for non-emergency CABG for the first time. Pre-operative assessment was done thoroughly and was divided in to two groups, Group A conventional treatment and Group B Moderate intensity exercise group. The patients were treated using different protocols in terms of intensity for 8-10 days immediate post CABG. Then the outcome parameters of 6MWT and sf-36 were compared for analysis.

Results: Both groups individually showed extremely significant results for two outcome measures. 6 MWD difference between two treatment groups showed significant results with unpaired t test ($t = 8.5720, p < 0.001$). Quality of life score difference within group showed very significant results but there is no difference found between both groups.

Conclusion: Moderate intensity exercises can also be included in the immediate post-operative phase of CABG, as they reduce the length of hospital stay and quicken the cardiac rehabilitation process. But there need to be a lot of randomized control trails to confirm the benefits of moderate intensity exercises in phase one rehabilitation program after CABG.

Key words: CABG, Moderate intensity exercise, Quality of life, Rehabilitation, Exercises.

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INTRODUCTION

Calorie rich and high fat diet, sedentary lifestyle are the major contributors to cardio vascular diseases. The disease is considered as an affluent society disease is highly prevalent amongst Indians living abroad, with sharp hospitalization rates for CABG.¹

According to WHO bulletins about 1.2 million Indians died of CAD in 1990 and it is predicted that by 2020 India will be super-ceding the rest of the nations in the prevalence of coronary artery disease. Urbanization of the country is being manifested as increased incidence of coronary artery disease in India², with prevalence rates of 10% and 11% in Northern and Southern parts of India³ respectively. However the doubling of coronary artery disease incidence in rural India should not be overlooked.⁴

The traditional risk factors in Indian population are conflicting with lower rates of obesity, smoking, cholesterol and hypertension⁵ and higher rates of diabetes, low HDL levels and physical inactivity. Emerging risk factors like lipoprotein (a) level, metabolic syndrome, homocysteine fibrinogen, C-reactive protein are more prevalent in Indians.⁶ Likewise Americans, intense forms of coronary artery disease precisely left main coronary artery disease and three vessel diseases are more common in Indians and often confronted by Indian women. Indians suffered higher rates of cardiac arrest while rushing to the hospitals than the patients of other ethnic groups.⁷

The existing treatment options for CAD include medical management, percutaneous coronary intervention (PCI), CABG along with lifestyle modification.⁸ In patients with multivessel CAD, CABG is superior intervention to PCI.^{9,10} 95% of patients undergoing CABG are either completely free from symptoms else greatly improved within a year post surgery. The survival rate is 5 years for 90%, 10 years for 75% and 15 years for 60% of the patient's post-surgery.¹¹

Physical inactivity on par with high cholesterol, hypertension, cigarette smoking is considered to be a significant risk factor for development of CAD.¹² There exists concrete evidence on the beneficial impact of regular aerobic exercises on the risk factors of CAD.¹³ Low to moderate intensity aerobic exercise tends to increase HDL levels as much as 11% to 28%. Walking results in improved physical fitness, aiding the reduction of risk factors for CAD.¹⁴ Chew et.al stated that a tailored exercise prescription on the basis of age and physical fitness improves the patient's general health. Gordon N F et.al found an improvement in the mental

wellbeing with low to moderate level activity in highly compensated and clinically stable patients. The enhancement of psychological status and mental wellbeing with physical activity was reported by Pollock M L et.al. Since exercise has a number of beneficial effects on physical and mental health, the current study aimed to focus on the acute improvements in physical and mental status with moderate intensity aerobic exercises in coronary disease population.

METHODOLOGY

Ethical clearance was obtained from the U.N.Mehta institute of cardiology. All the subjects were evaluated as per assessment format. Those who fulfilled all inclusion criteria were taken up for the study. A total of 46 patients were included and the subjects are divided into two treatment groups. Group - A Conventional exercise group and Group - B moderate intensity exercise group. The procedure was explained to all the subjects. A written informed consent of all participants was taken. The whole study was extended for the period of 4 months. The duration of treatment program for each subject was 8-10 days. Prior to study, all the subjects were examined in detail for weight, height & BMI. Both the male and female Patients who had undergone first time CABG and willing to participate are included in this study.

Pulse oxymeter was used to assess HR and SpO₂ during treatment. Familiarization of pulse oxymeter was given to participants. The patients in group A were exercised at conventional mode (Resting heart rate + 30) and the subjects in group B were exercised at moderate intensity (THR = Resting heart rate + 40-59 % of (MHR-RHR)) heart rate maximum was measured by the formula HRmax = 220 - age. All the patients in both the groups were screened for outcome measures before posted for surgery. Six minutes' walk distance and SF-36 was taken as outcome measures. Before surgery therapists explained the procedure and possible post-operative complications for both groups. All the patients were connected to pulse oxymeter while performing the exercises Patients in group A are given all instructions and explained the conventional phase one rehabilitation program exercises in details. The nursing staffs were asked to support the patients when doing exercises and timely monitor whether they are doing exercises or not. In this group first day after surgery patients were made to sit with assistance. On second day patients were asked to walk 10m for two times in a day. On third day 30m walking was encouraged. On fourth day same intensity of exercises are given

along with ascending and descending the stairs. And later on patients in group A were asked to walk in the room and the ward. All the exercises for group A were designed at a comfortable rate of perceived exertion.

In group B along with conventional pase-1 rehabilitation, exercises with moderate exertion were also merged. On day one patients were asked to walk on spot for 1min for 3 repetitions. On day two they were asked to walk 3 circuit training sessions and covered at least 100m in the morning session and in the evening 5 min walk. Next day a distance of 2.5 is additional included and till discharge a total of 10 min walking program is given. And a rate of perceived exertion of 3to 4 on a10 point scale is maintained for all patients in group B. In this group breathing exercises twice a day were also included in the regimen. All these exercises were given in the presence of a qualified physiotherapist only.

RESULTS

In this study , to do analysis of effect of exercise on outcome measure e.g. 6 MWD, and to compare mean values the “ paired t test “ was used.

Table-1: Comparison of mean values of pre exercise and post exercise 6 MWD in conventional Exercise group (Group A)

Pre Mean \pm SD	Post Mean \pm SD	t value	P value	Results
136.09 \pm 11.01	352.98 \pm 8.44	81.48	<0.0001	Highly significant

At 22 degrees of freedom, the observed't 'value is 81.48 which is suggestive of statistically highly significant (p<0.0001) improvement in 6 MWD at hospital discharge

Graph -1: Graphical presentation of pre exercise and post exercise mean values of 6 MWD in group A.

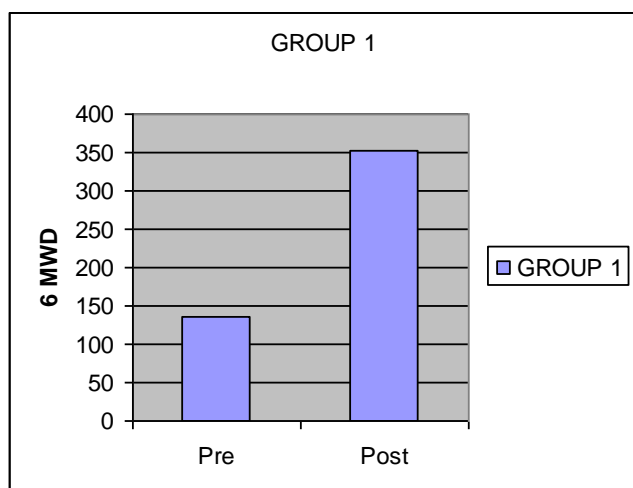
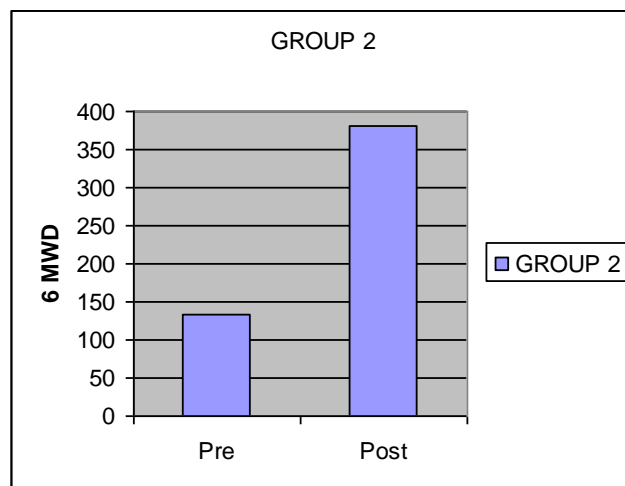


Table- 2: Comparison of mean values of pre exercise and post exercise 6 MWD in moderate intensity exercise group (Group B).

Pre Mean \pm SD	Post Mean \pm SD	t value	P value	Results
133.96 \pm 6.04	379.87 \pm 12.59	70.18	<0.0001	Highly significant

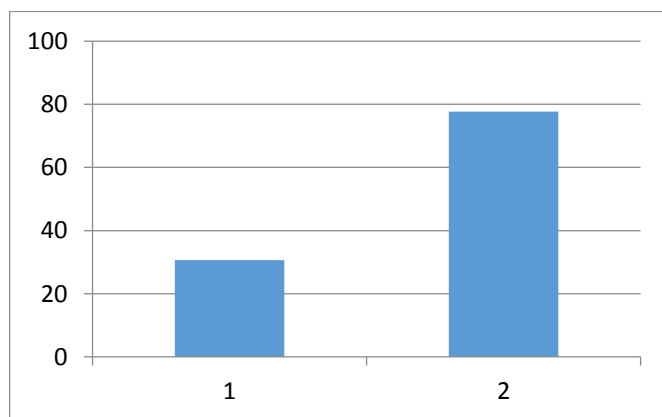
At 22 degrees of freedom, the observed 't' value is 70.18 which is suggestive of statistically highly significant (p<0.0001) improvement in 6 MWD at hospital discharge in Group B.

Graph -2: Graphical presentation of pre exercise and post exercise mean values of 6 MWD in group B.



To compare post exercise 6 MWD in both groups unpaired't' test was used. t value is 8.5720 at 44 degree of freedom. The two tailed p value is less than 0.0001 by conventional criteria, this difference is considered to be extremely statistically significant.

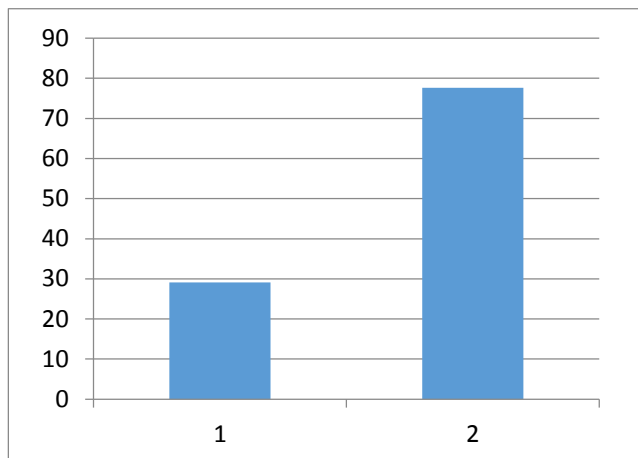
Graph-3: Comparison of pre and post SF36 values in group A



Before treatment with conventional therapy the mean value of SF36 was 30.6 and it improved to 77.65 after treatment.

Graph-4: Comparison of pre and post SF36 values in group B

Before treatment with moderate intensity exercise therapy the mean value of SF36 was 29.08 and it improved to 77.65 after treatment.



DISCUSSION

With the growing number of patients undergoing CABG, the concept of early mobilization has been prioritized. Since cardiac rehabilitation is a phasic procedure, the early mobilization of the patient results in rapid progression to second phase of cardiac rehabilitation, reducing the length of hospital stay. Early mobilization also comparatively reduces the incidence and intensity of post-operative pulmonary complications, which aids faster recovery. Compared to the past two decades the process of cardiac rehabilitation is taking a new shape incorporating a variety of aerobic exercises, and recently the inclusion of resisted training^{15,16} is also to be made a note. The outcome of the exercise intervention hugely depends upon the training parameters like intensity, frequency, duration.

The results of the current study suggested an improvement in the distance walked in both the groups. This improvement in 6MWT can be attributed to the physical exercises undergone by the subjects. A structured inpatient physiotherapy program is considered beneficial in improving the walking capacity, besides other parameters in subjects undergoing CABG.¹⁷ Moderate intensity exercises helps in secondary prevention of the cardiac issues besides managing them¹⁸ when they are practiced under supervision of physiotherapist. The regular endurance physical activity in patients with acute coronary syndrome helps in declining the mortality rate, and also serves in improving the overall physical functioning of the patients.¹⁹ Hence the previous studies also lie in agreement with results of the current study where improvements were noticed in both groups as they

included physical exercise though with varied intensities.

The other parameters like the incidence of post-operative pulmonary complications, length of hospital stay are not included in the study, which might have contributed to the current results where both the groups showed an improvement in distance walked.

The results also suggested an improvement in the quality of life of both the groups. The physical component summary (PCS) of sf-36 questionnaire has been taken in to consideration excluding the mental component summary (MCS). Thompson et.al, in their study on exercise and physical activity in prevention and treatment of cardiovascular diseases concluded that physiological function improves the quality of life in patients with CVD.²⁰ Despite the emotional trauma post surgically, most of the patients tend to be improved in their subjective health even prior to outpatient cardiac rehabilitation. This is because the surgery itself corrects the anatomical disturbances where by the physiological vascular changes are brought about resulting to be symptom free aiding the psychological wellbeing though exercise plays a role in enhancing the psychological status and mental wellbeing.²¹

Because of the absence of statistically significant results, the researchers are unable to comment on the efficacy of moderate intensity exercises in post CABG patients though the findings cannot be discarded as the improvements were noticed in both the groups. However the results cannot be generalized as the sample size of the current study is too small. The study has a time constraint and the long term effects of moderate intensity exercises were not studied which might have given better and concrete results. The omission of MCS is also a short coming of the study, where the researches failed to study the role of moderate intensity exercises in the immediate post-operative scenario on the emotional, behavioral, social changes of the patients.

CONCLUSION

Though the study did not yield statistically significant difference between two types of phase-I cardiac rehabilitation, the incorporation of supervised moderate intensity exercise in the immediate post-operative period of CABG has to be considered so as to reduce the length of hospital stay and fasten up the cardiac rehabilitation process.

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