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Dr. MK Franklin Shaju
Professor in Physiotherapy,
RVS College of Physiotherapy,
Sulur, Coimbatore, India.

Dr. B. Kamaraj,
Professor in Physiotherapy
Institute of paramedical
sciences, Kannur medical
college, Kannur, India.

A study on the effectiveness of endurance exercise training and conventional physiotherapy in the management of economy of movement among Parkinson's Patients

Dr. MK Franklin Shaju and Dr. B. Kamaraj

Abstract

Background: Parkinson's disease is a very common degenerative disease that affects more than 2% of the population older than 65 years of age. The incident increase dramatically with increasing age. Men and women are affects almost equally. The study aims to compare the effectiveness of endurance exercise training and conventional physiotherapy techniques in the management of economy of movement among Parkinson's patients.

Methods: Twenty clinically diagnosed Parkinson's subjects were randomized in to endurance exercise group and conventional physiotherapy group. Intervention lasted for 4 weeks, one hour per day. Oxygen consumption (VO₂ max) was assessed before and after intervention by 1 Mile walk test to rate economy of movement.

Results: Both groups showed significant improvement in amount of oxygen consumption during physical activity. However when comparing both, significant difference was observed in the outcome measure following endurance exercise than conventional physiotherapy techniques.

Conclusion: Endurance exercises were more effective than conventional physiotherapy in improving economy of movement among Parkinson's patients.

Keywords: Endurance exercise, physiotherapy, Parkinson's patients

Introduction

Parkinson's disease is a common degenerative disease that affects more than 2% of the population older than 65 years of age. Average age of Parkinson's disease onset is approximately 50-60 years. The incident increase dramatically with increasing age. Men and women are affects almost equally^[1].

Methods

Study Design: An experimental study was conducted to find the effects of endurance exercise and conventional physiotherapy on economy of movement among Parkinson's patients.

Sampling Design: Twenty clinically diagnosed Parkinson's subjects were randomly divided in two groups, endurance exercise group and conventional physiotherapy group.

Inclusion Criteria

- Clinically diagnosed Parkinson's subjects capable of walking 12 meters distance after which deterioration may be observed.
- Modified Hoehn and Yahr stage III and IV.
- Stable pharmacological treatment.
- Age group between 50-60 years.

Correspondence
Dr. MK Franklin Shaju
Professor in Physiotherapy,
RVS College of Physiotherapy,
Sulur, Coimbatore, India.

Exclusion criteria

- Deep brain stimulation or other stereotactic neurosurgery done patients.
- Conditions interfering with endurance training: Unstable angina, cardiomyopathy, uncontrolled metabolic disease etc.
- Postural hypotension.

Procedure

Twenty Parkinson’s patients were selected for the study and randomly divided in to 2 equal groups endurance exercise group and conventional physiotherapy group. Written consent were obtained from the participants prior to enrolment. Economy of movement was rated by one mile walk test by assessing VO₂ max before and at the end of study [2]. One group received endurance exercises and another group received conventional physiotherapy exercises one hour daily and the same was continued for a period of four weeks.

Measurement tool

One mile walk test to rate economy of movement oxygen consumption (VO₂ max). The test consists of individual walking 1 mile as fast as possible. When a subject completes the distance, his or her time was recorded to the nearest second. Body mass to the nearest 0.01 kg and height to the nearest 0.1 cm were recorded. With the above values VO₂ max was estimated using standard equation [3].

Endurance Exercises

Stair climbing and bicycle ergo meter were used as endurance exercises in the present study. Endurance exercises were given daily one hour and the same was continued for four weeks [4].

Stair climbing: It was carried out with a comfortable level. Initially patients were asked to climb the stairs with their comfortable speed. The speed and number of steps were increased gradually.

Bicycle ergometer: Patients were asked to do cycle and the speed was increased gradually.

Conventional Physiotherapy

Patients performed balance exercises with wobble board, resisted exercises with weight cuffs, breathing exercises and walking program. Walking program includes, forward, side ward and back ward walk. Walk while swinging both arms. Walking with alternating side steps and cross steps. This exercises were given daily one hour and the same was continued for four weeks [5].

General precautions:

When the patients feel short of breathe during exercise or regular activities, they were instructed to,

- Stop the activity
- Reset by sitting down, relax the shoulders, and do pursed-lips breathing until they can catch breathe.
- Continue activity, doing pursed- lips breathing at a slower pace if they need to [6].

Data analysis and Results

The study aims to compare and find the effects of endurance exercises and conventional physiotherapy on economy of movement among Parkinson’s patients.

Table 1: Computation of Statistical values and significance of endurance exercises on economy of movement by VO₂ Max

	Mean	Mean Difference	Standard Deviation	Paired ‘t’ Value
Pre test	32.6	3.8	1.28	9.37*
Post test	36.4			

*0.005 level of significance

The table 1 displays the pre and posttest mean values, mean difference, standard deviation and calculated paired ‘t’ value of VO₂ Max. Since the calculated ‘t’ value9.37 which is more than the ‘t’ table value 3.250 at 0.005 level. The above values shows that there is significant difference in economy of movement following endurance exercises.

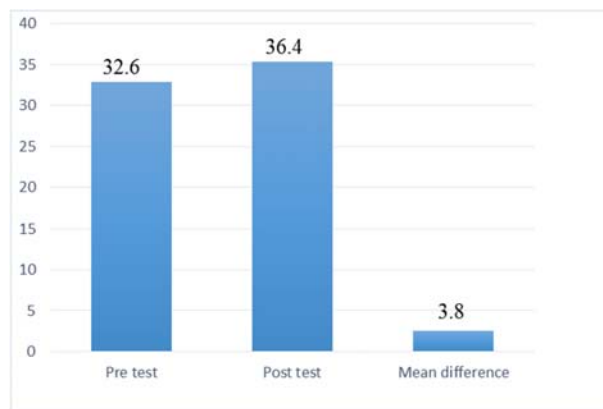


Fig 1: Graphical representation of the pretest posttest mean and mean difference values of economy of movement among endurance exercise group

Table 2: Computation of Statistical values and significance of conventional physiotherapy techniques on economy of movement by VO₂ Max

Measurement	Mean	Mean Difference	Standard Deviation	Paired ‘t’ Value
Pre test	32.9	2.5	0.84	9.31*
Post test	35.4			

*0.005 level of significance

The table 2 displays the pre and posttest mean values, mean difference, standard deviation and calculated paired ‘t’ value of VO₂ Max. Since the calculated ‘t’ value9.31 which is more than the ‘t’ table value 3.250 at 0.005 level. The above values shows that there is significant difference in economy of movement following conventional physiotherapy exercises.

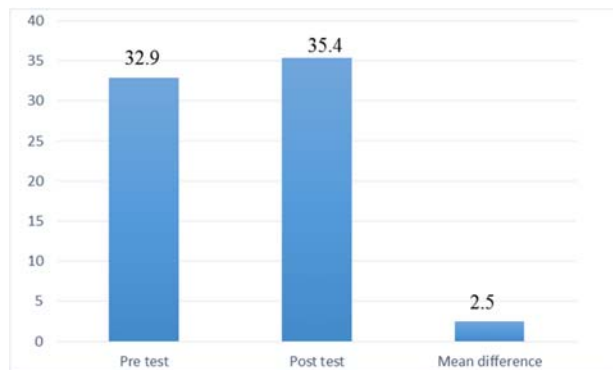


Fig 2: Graphical representation of the pretest posttest mean and mean difference values of economy of movement among conventional physiotherapy group

Table 3: Computation of Statistical values and significance between endurance training exercises and conventional physiotherapy techniques on economy of movement by VO₂ Max

Groups	Improvement		Standard Deviation	Unpaired 't' value
	Mean	Mean Difference		
Group A	3.8	1.3	0.64	3.29*
Group B	2.5			

*0.005 level of significance

The table 3 displays the mean differences, standard deviation and unpaired 't' value of two groups. Since the calculated 't' value 3.29 is more than 't' table value 2.878 at 0.005 level the above values shows that there is significant difference between endurance exercises and conventional physiotherapy exercises in improving economy of movement among Parkinson's patients. When comparing the mean values of both the groups, endurance exercise training group shows more difference in economy of movement scores than conventional physiotherapy group. Hence it is concluded that endurance exercise training is more effective than conventional physiotherapy in improving economy of movement among Parkinson's patients.

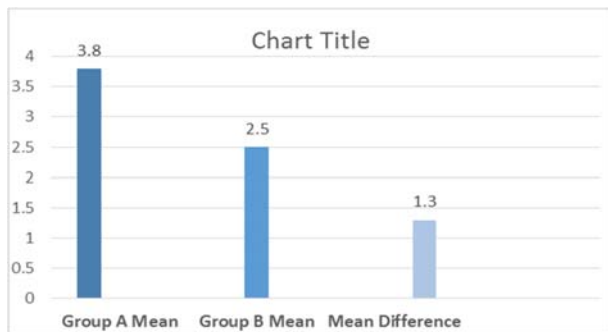


Fig 3: Graphical representation of mean difference score of economy of movement between group A and group B

Discussion

Present study was done to find the effects of endurance exercise and conventional therapy on economy of movement among Parkinson's patients. Both the techniques were effective in improving economy of movement among Parkinson's patients. When comparing both endurance exercises group showed more improvement in economy of movement than conventional exercises group among Parkinson's patients.

The general term "economy of movement" refers to the rate of energy expenditure during any motor task [7]. There is a high prevalence of asymptomatic airway obstructive and restrictive pulmonary dysfunction, as well as weakness of muscles of respiration, among even early Parkinson's patients. Thus endurance exercises may help to improve the strength of respiratory muscles and thereby helps to increase oxygen consumption (VO₂ max) among Parkinson's patients [8].

Conclusion

Endurance exercise training and conventional therapy both are effective in improving economy of movement among Parkinson's patients. Statistical results showed that endurance exercise training has a slight edge over conventional therapy on improving economy of movement among Parkinson's patients.

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