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COMPARING THE EFFECTIVENESS OF HIGH INTENSITY TASK-ORIENTED TRAINING AND CONVENTIONAL PHYSIOTHERAPY TREATMENT ON GAIT, MOBILITY AND STRENGTH IN STROKE PATIENTS

Physiotherapy

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ABSTRACT

Stroke is one of the leading causes of impairments and disability, especially losing the ability of walking. New techniques involve few high intensity depended task- oriented approaches. So, the need was to see whether this technique is better than the conventional physiotherapy techniques. A comparative study including thirty stroke patients divided in two groups of fifteen patients in each group having functional ambulatory score more or equal to 3. Patients were pre-evaluated for gait using Dynamic Gait Index, mobility using Rivermead Mobility Index and strength using Motorocity Index. The complexity was increased with progression involving activities in circuit training pattern. The type and nature of exercise stations in circuit training was to achieve a total lower limb activity. Comparison showed a significant difference ($p<0.05$, $t = 12.34$) between high intensity task-oriented training and conventional physiotherapy treatment on gait, mobility and strength in stroke cases.

KEYWORDS

High intensity, Task-oriented, Gait, Mobility, Strength.

INTRODUCTION:

Stroke is a focal (or at times global) neurological impairment of sudden onset, lasting >24 hours or leading to death, with no apparent causes other than of vascular origin. The activity most affected by stroke is walking with as many as 80% of patients initially losing this ability. With regaining and enhancing walking competency is a major target in stroke rehabilitation. Recently, evidence was found on improved walking ability not being associated with improved motor control of paretic limb (lower) but rather with the development of compensation movement strategies and improved coping with loss of function in enhancing the ability to maintain balance over non-paretic lower extremity. Repetitive training of tasks results in improvement in lower extremity function. In addition, a number of systematic reviews have shown that task specificity and intensity of training, in terms of hours of therapy, are the main determinants of functional improvement after stroke.[5,7,20,21] This is evident from the effectiveness and efficiency of "task-oriented" training, in which gait and gait-related tasks are practiced using a functional approach.

Furthermore, muscle strength as well as cardiovascular capacity are decrease in stroke and are found to be significantly associated with insufficient walking capacity. Traditionally, physiotherapy concepts were focused on restoring reduced motor control of the affected limb as well as postural control. Evidence was found on the beneficial effects of muscle strength training in terms of lower limb muscular strength, but no favourable effects were found of strength training in terms of mobility-related tasks, such as stair walking, turning, making transfers, walking quickly, and walking for specified distances, whereas some evidence was found for cardio-respiratory training on walking capacity in terms of distance. In line with these findings, training should be oriented on those tasks that are meaningful for daily life. A recent meta-analysis demonstrated significant homogeneous summary effect sizes in favour of task-oriented circuit class training for walking distance, gait speed and a timed up-and-go.

NEED OF STUDY

There are only few data available to guide clinical practice at present with regard to the effectiveness of task-oriented fitness training interventions after stroke. By using task-oriented training, patients can practice intensively in a meaningful and progressive way that suit to their individual needs [12,21]. Task-oriented training gives variations in treatment protocol which creates enthusiasm in patient and thereby resulting in progression in gait performance.

Aim & Objectives:

Comparing the effectiveness of high intensity task-oriented training and conventional physiotherapy treatment on gait , mobility and strength in stroke patient.

Methodology :

A comparative study consisting of 30 sampled distributed in 2 groups each having 15 subjects followed comparative study with sub-acute stroke patients around tertiary hospitals in Pune.

Inclusion criteria includes patients within age groups 50-60yrs including both genders, rating of perceived exertion between 10-15 and ability to walk 10min without assistance with functional ambulatory score of more than 3.Patients with cardiovascular instability, acute impairement of lower extremity and any sensory communicative disorders were excluded.

Materials used were pen, pencil, sphygmomanometer, measuring tape, consent and evaluation form. Outcome measures includes Motoricity Index: muscle strength. (ICC: 0.96),[17] Rivermead Mobility : General Mobility (ICC : 0.98)[18] Dynamic Gait Index : (ICC : 0.98)[40]

Procedure:

The study began with a presentation of the synopsis to a ethical committee. The subjects were selected on the basis of their inclusion and exclusion criteria and those not fulfilling were not included in the study. The subjects were explained about the study. Consent was taken from the patients who wished to participate in the study. Baseline measurement (age, body mass index, gender, hemiplegic side, blood pressure, resting heart rate, walking capacity, maximal gait speed, control of standing balance)

Treatment for CTG began with two sessions of pre-test. The pre-test was to familiarize subjects to the exercise stations in the circuit. It involved testing the six exercises used in the circuit training to estimate the level of capacities of the subjects in terms of sets, repetitions and times for the exercises and what they were supposed to do in the course of the training.

(1) **Station 1 - Treadmill walking ……**3minutes with speed of 0.9 km/h
(2) **Station 2 - Push-Ups …..……**1 set of 10 repetitions in a minute
(3) **Station 3 - Squatting exercise ……..**1set of 15 repetitions in a minute
(4) **Station 4 - Straight Leg Raise exercise.…**1 set of 10 repetitions in a minute
(5) **Station 5 - Stairs walking ……**3minutes
(6) **Station 6 - Cycling ……**3minutes

The circuit was performed twice per session. The intensity of the circuit training was targeted between 10 (light) and 15 (hard or heavy) of the Borg's scale of rating of perceived exertion (RPE) (Borg,1982). Thus, subjects performed circuit training at light intensity at the beginning and hard intensity towards the end of the session. The speed of the treadmill was between 0.9 km/h and 3.0 km/h; also, the speed of cycling and resistance as well as squatting, straight leg raise and stairs walking were adjusted to the training intensity. The duration per

training session was 35 minutes including.

Statistical Analysis:

	GROUP A t value	GROUP A p value	GROUP B t value	GROUP B p value
DGI	1.990	0.056	9.103	0.836
Rivermead Mobility	3.690	0.001	7.410	0.092
Motoricity Index	1.353	0.936	7.603	0.550

RESULTS:

The high intensity task-oriented training program carried out in present study implementing a high number of repetition and high cardiorespiratory workload, designed to improve hemiparetic gait was feasible and exceeds the effectiveness of conventional physiotherapy treatment in terms of gait, mobility and strength.

DISCUSSION:

The present study represents potential mechanism associated with response to an intervention that corporate task specificity and strength training to improve walking ability after stroke. High intensity activities target activation of paretic lower extremity muscles. The circuit training provides a dynamic and integrative approach for treatment of gait deviation , to improve peak fitness and enhance functional mobility.

The study was conducted by taking ethical clearance of the committee and institutions. Samples were collected by taking consent from the patient. Whole procedure was explained to the patient. Samples were collected as per the inclusion and exclusion criteria. Baseline score of functional ambulatory scale was taken to check whether patient is able to walk without assistance ,fulfilling the requirement of criteria of the study or not.

The study showed a statistically significant difference in favour of high intensity task-oriented training compare to conventional physiotherapy treatment. Three outcome measures were used, namely; DGI: to assess the changing task demand while walking, Rivermead Mobility Index: to assess general mobility, Motoricity Index: to assess strength.

Paired t test was used to compare the values of DGI , Rivermead Mobility Index and Motoricity Index score before and after treatment in group A and B. Unpaired t test was used to compare values of DGI , Rivermead Mobility and Motoricity Index between group A and B , which was significant (p : <0.05). Thus, the study concluded the effectiveness of high intensity task-oriented training compare to conventional physiotherapy treatment in stroke patients.

The high intensity task-oriented training program in present study implementing a high number of repetition and a high cardiorespiratory workload designed to improve hemiparetic gait was feasible and exceeds the effectiveness of conventional physiotherapy treatment. Since, no adverse events occurred and dropout rates for motivated reasons was less, the high intensity task-oriented training seemed to be feasible as well as safe and acceptable in the sample of present study.

Above findings are in agreement with observation that improvement of walking ability is weakly associated with observed changes in strength and synergism of the paretic lower limb itself and suggest that improvements in gait could be associated with increased cardiorespiratory capacity and adaptation of the non-hemi paretic side rather than restoration of motor impairment on the hemiparetic side , enabling decreased in energy expenditure.

However, the measures in the present study were not feasible as to reveal underlying mechanism in terms of cardiorespiratory capacity or energy expenditure. Therefore, future research should emphasis on clarifying whether increased walking competency is due to a more efficient energy expenditure induced by improved motor control during walking (i.e restitution of function) or rather an increased cardiorespiratory (i.e : compensation) or both.

CONCLUSION:

A high-intensity task-oriented training programme designed to improve hemiplegic gait, and physical fitness was feasible in the present study and the effectiveness exceeds a low intensity physiotherapy-programme in terms of gait speed and walking capacity in patients with sub acute stroke.

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