

A COMPARATIVE STUDY BETWEEN TASK ORIENTED INTERVEL TRAINING VERSUS CIRCUIT TRAINING ON UNEVEN SURFACE FOR IMPROVING FUNCTIONL BALANCE & GAIT PARAMETER IN STROKE REHABILITATION

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Abstract. [Purpose] The purpose of this study was to analyze the effects of task-oriented circuit training on the balance ability and gait endurance of chronic stroke inpatients.

[Subjects and Methods]

30 patients who had stroke >6 months previously, resulting in a disability such as hemiparesis. The participants were randomly divided into the group task-oriented circuit training group and the individual task-oriented circuit training group. They performed eight types of modified task-oriented training. Balance ability and gait endurance were measured by using the Berg balance scale questionnaire and the 6-min walk test, respectively, before and after the experiment.

[Results] Significant differences were observed between before and after the intervention in all variables. There was a significant difference between groups in Berg balance scale scores; however, no significant differences were seen in the timed up and go test and the 6-min walk test.

[Conclusion] The results of this study indicated that group exercise can better improve the balance ability of chronic stroke inpatients after stroke than can individualized exercise intervention.

Key words: Stroke inpatients, Task-oriented circuit training, Balance ability, Gait endurance

INTRODUCTION

Stroke is defined as abrupt onset of a focal neurological deficit lasting more than 24 hours. It is also called cerebrovascular accident (CVA) or apoplexy. An acute stroke refers to the first 24-hour-period of a stroke. Focal neurological deficit lasting less than 24 hours (usually 5–20 minutes) known as transient ischaemic attack (TIA) .

The world health organization(WHO)definition of stroke is rapidly developing Clinical sign of focal (or global) disturbance of cerebral function with symptoms lasting 24 hours or longer or leading to death , with no apparent cause other than of vascular origin.

Stroke is classified on the basis of its aetiology as either ischaemic (87%) or haemorrhagic (13%).

Ischaemic stroke is produced by occlusion of a cerebral artery [thrombotic or atherosclerotic (50%), embolic (25%) and microartery occlusion, “lacunar stroke”, (25%)].

Haemorrhagic stroke is caused mainly by spontaneous rupture of blood vessels or aneurysms or secondary to trauma.

1.1 Ischaemic stroke

Neurological symptoms and signs of an ischaemic stroke usually appear suddenly, but less frequently, they occur in a progressive manner (stroke-in-progress). **Atherosclerotic ischaemic stroke** is more common in the elderly, and occurs without warning in more than 80% of cases. A TIA a few months before the stroke is considered an important warning sign.

In hypertension-induced arteriosclerosis, small penetrating arteries of the deep white matter of the brain are affected producing small infarctions known as “lacunar infarcts” In around 40% of elderly stroke patients no clear origin of the infarction can be found.

Embolic ischaemic stroke is more frequent in patients with atrial fibrillation (80%), myocardial infarction, prosthetic valves, rheumatic heart disease and larger artery atheroma (artery-artery embolus). Embolisms tend to be multifocal and may produce small haemorrhages around the obstruction.

Surgical decompression has been suggested for these cases. The extent of functional disability will depend on the extent and the localization of ischaemia and complications experienced by the patient.

Seizures at the time of stroke occur in 3–5% of infarctions, more often after embolism than thrombosis. The same proportion of patients will develop epilepsy from 6 to 18 months after a stroke. Idiopathic epilepsy in the elderly, therefore, may be the result of silent cortical infarction.

1.2 Haemorrhagic stroke

There are two types: one resulting from intracerebral haemorrhage secondary to hypertension, cerebral amyloid angiopathy, or degenerative arterial disease; and the other secondary to subarachnoid haemorrhages caused by rupture of an aneurysm. In the United States, 8–10 million people (3% prevalence) might have an aneurysm, and bleeding occurs in only 30 000 people per year. Other causes are uncommon, and sometimes, no source for the haemorrhage can be found. The main risk factors are advanced age, heavy alcohol consumption and hypertension. Cocaine abuse is an important cause of cerebral haemorrhage in young people.

Prevalence Rate Of Stroke:

Stroke remains the second leading cause of death at the global level and in the European region. Of the 56 million deaths that occur every year worldwide, 10.8% are due to stroke.

one in five women (20% - 21%) and one in six men (14% - 17%) will suffer a stroke in their lifetime, according to a 2006 study.

Overall stroke mortality has been declining worldwide despite the increased percentage of people aged over 65 years (75% of stroke victims are above 65 years old).

Stroke prevalence is increasing at an ever-growing rate and, in the period from 2000 to 2008, estimated stroke incidence in low- and middle-income countries surpassed stroke incidence in high-income countries for the first time, by 20%.²²

Despite improvement in stroke care and survival, sequelae of stroke remain a major problem.

In 2005, the global prevalence of stroke survivors was estimated to be 62 million, with projections to reach 77 million by 2030. However, with the increasing prevalence of stroke survivors comes a consequent increase of people who suffer from stroke-related disabilities.

OBJECTIVES OF STUDY

To evaluate the effect of task oriented interval training and circuit training on uneven surface for improve functional balance and gait parameter in stroke patients.

METHODOLOGY

Comparative study

SAMPLE SIZE: 40 patients diagnosed with chronic stroke will be randomly selected according to inclusion and exclusion criteria and will be divide into two groups – Group A: **TASK ORIENTED PROGRAM** , **GROUP B:** Circuit training program.

All patients will be participating in the study after voluntarily signing the consent form.

STUDY CENTRE: various OPDs of department of physiotherapy, Janardan Rai Nagar Rajasthan Vidyapeeth (Deemed-to-Be)University.

DURATION OF STUDY: 8 weeks (30 minutes per day)

INCLUSION CRIERIA

1. Both male and female patients between 30 and 70 years old with a 1st and 2nd episodes.
2. NMSE score more than 24.
3. NAS for upper limb & lower limb.
4. Patient can walk 10 min without assisted device.
5. Patient diagnosed with cerebral haemorrhage or cerebral infraction less than 6 month prior to the training with residual deficit.

EXCLUSION CRITERIA

1. Atrial fibrillation.
2. Diabetes
3. Cancer
4. Uncontrolled hypertension.
5. Symptoms of unstable cardiac disease
6. Recent pulmonary.
7. Subacute systemic illness or infection

8. Aphasia
9. Musculoskeletal disorder of the lower extremity affecting walking capacity.
10. Visual impairment
11. Cognitive impairment.

OUTCOME MEASURES

1. Berg balance score
2. FAC (functional ambulatory scale)

PROCEDURE:

40 patients with chronic stroke who fulfilled inclusion and exclusion criteria were selected and all the subjects were divided into 2 groups, 20 subjects in each group. A clear explanation about the study was given to the selected patients who agreed to participate. Balance, ambulation measures were taken at the beginning of the first day and at the end of the second week of treatment.

Group A: TASK ORIENTED INTERVAL TRAINING PROGRAM

In the task oriented interval training program 5 tasks were selected such as

1. indoor walking
2. Outdoor walking
3. Staircase climbing
4. Wearing clothes
5. Picking up objects

The selected task comprised four stages. If the patient was unable to complete the task in one week, they were repeated the following week.

The participants practiced the following tasks five times a week for 8 weeks. In each 30-min session, the tasks were performed three times for 10 min, with a 2min break between each task.

Indoor walking

Step 1: weight support training on parallel bars

Step 2: weight support training outside the parallel bars

Step 3: walking 10 min with the help of therapist



Step 4: walking 10 min without the help of therapist

Outdoor walking

Step 1: walking on paved, level with a cane

Step 2: walking on unpaved ground with a cane

Step 3: walking on a slope (20 degree) while holding a cane and railing

Step 4: jumping over an obstacle using a cane (irregular paving)

Climbing the stair

Step 1: going up and down 3 low steps (15cm) while holding a handrail

Step 2: going up and down 5 low steps (15cm) while holding a handrail

Step 3: going up and down 5 low steps (15cm) while holding a handrail
Step 4: going up and down 3 high steps (25cm) while holding a handrail

Wearing clothes

Step 1: monitoring the order and methods of dressing, with maximum assistance of therapist
Step 2: monitoring the order and methods of dressing, with moderate assistance of therapist
Step 3: monitoring the order and methods of dressing, with minimum assistance of therapist
Step 4: dressing by oneself

Catching things

Step 1: catching a tennis ball with maximum assistance of a therapist (diameter 6.35 cm, weight 58.5 g)
Step 2: catching a tennis ball with minimum assistance of a therapist (diameter 6.35 cm, weight 58.5 g)
Step 3: catching an empty can
Step 4: catching an empty can and putting it on a 10 cm shelf

Group B: circuit training program The circuit training exercises were treadmill walking, push-ups, squatting, straight leg raise (SLR), stairs walking and cycling exercises. The circuit comprised six (6) exercise stations:

Station 1 - **Treadmill walking**- 3 minutes with speed of 0.9 km/h

Station 2 - **Push-Ups** -1 set of 10 repetitions in a minute

Station 3 - **Squatting exercise**-1 set of 15 repetitions in a minute

Station 4 - **Straight Leg Raise exercise**-1 set of 10 repetitions in a minute

Station 5 - **Stairs walking**-3 minutes

Station 6 - **Cycling** -3 minutes

The frequency of the circuit training was three times per week, for eight weeks. The circuit was performed twice per 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: warm-up (5 minutes), first circuit training (12 minutes), rest interval (5 minutes) and the second or repeat circuit training (12 minutes). Thus, subjects performed 105 minutes of circuit training per week for 8 weeks. The type and nature of exercise stations was to achieve a total lower limb as well as total body work-out



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