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Efficacy of dual Task Training to Improve Function Gait Performance In Idiopathic Parkinson's Disease Subject

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Abstract

The primary onset of this study is to determine the short and longer term effects of dual task training gait on walking performance when dual tasking in people with Parkinson's disease.. The aim of the study is to analyze the efficacy of dual task training to improve functional gait performance in idiopathic Parkinson's disease subjects.

Key words: *Parkinson's disease, TUG test, Functional gait performance.*

Introduction

Parkinson's disease (PD) is a degenerative disorder of the central nervous system. It results from the death of dopamine – containing cells in the substantia nigra, a region of the mid brain; the cause of cell death is unknown. Early in the course of the disease, the most obvious symptoms are movement related, including shaking, rigidity, slowness of movement and difficulty with walking and gait. Later, cognitive and behavioral problems may arise, with dementia commonly occurring in the advanced stages of the disease⁸.

Parkinson's disease is the 2nd most common neurodegenerative disorder after Alzheimer's disease. PD leads to disability and affects quality of life. In addition, it puts considerable emotional stress and economic burden on caregivers.

The spectrum of disease comprises of movement disorders and non motor symptoms like dementia, depression, visual hallucination and autonomic dysfunction⁶.

Population of elderly Indians has increased from 5.6% (51 million) in 1961 to 7.1% (71 million) in 2001. This increasing life expectancy of Indians, in the last decade, is likely to result in an increase in age related disease like Parkinson & Alzheimer's diseases.

The elderly population & Alzheimer's diseases. The elderly population in developing countries is predicted to increase by 200-280% compared with a mere 30-40% in the developed nations of the world's 580 million elderly (> 60 yrs), 355 million (61%) live in developing countries and, of these, 77 million (22% of total) live in India caring for this increasing elderly population can be challenging as 80% of elderly Indians live in rural areas, 73% are illiterates 60% are women and 60% live below the poverty line.

A growing body of evidence indicates that physical activity can help to protect dopamine cells from early death. Studies reveal that an exercise – related increase in the production of a specific growth factor, glial cell line derived neurotrophic factor (GDNF), takes place in the basal ganglia⁵.

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Parkinsonism rats (or) monkeys that run on a treadmill avoid motor impairments and maintain dopamine levels in the brain⁹.

Balance activities should promote the dynamic balance needed for functional activities such as reaching and turning in the home environment, pushing or carrying objects, and negotiating unpredictable environments.

Also the time of diagnosis is ideal for clients to begin tai-chi classes. This type of whole body, large scale and purposeful movement can reduce falls in people with Parkinsonism disease¹¹. Over 4 million people worldwide are estimated to be diagnosed with Parkinson disease (PD) more than half of community dwelling adults living with PD experience gait disturbances that are associated with increased disease severity, disability, poor quality of life and care giver strain, falls are a common

complication of PD, with between 50 and 68% of people with PD falling each year, with most falls reported to occur when walking.

Medications such as levodopa, provide the corner stone of treatment of gait disturbances in PD, become less effective over time for some symptoms of PD including gait disturbance. Internal (or) external cues are used to direct a person's attention to normalize their gait deficits, is effective in augmenting drug therapy to improve gait in the short term. Internal cues involve the person directing their attention to consciously think of improving the deficit.

External cues aim to normalize the gait deficit and often include verbal cues, visual cues (on the floor at the desired step length or auditory cues (e.g. metronome to normalize cadence). For gait to be functional in daily life both within the community and home, people need to be able to dual task. This could involve thinking when walking or maintaining balance when holding an object. It is well known that performing an added task interferes with postural stability in older adults (termed dual task interference) particularly in those adults with impaired balance.

The primary aim of this study is to determine the short and longer term effects of dual task training gait on walking performance when dual tasking in people with Parkinson's disease.

Methodology

A sample of 10 patients with idiopathic Parkinson's disease was screened using Timed up and Go Test (TUG Test) and those who scored 24 % less was taken for the study. Both male and female subjects within the age group 50-75 years and medically stable subjects were taken into this study.

Subjects with disorders such as CVA, Dementia, Mood disorders, musculoskeletal and cardiovascular illness and Patients with severe dyskinesia are not included.

Preliminary interview was done with all the subjects. Demographic details and informed consent were obtained. Subjects with score of 24 and less were equally divided into experimental and control groups.

Conventional therapeutic activities were given to control group, where conventional therapeutic activities were given to control group, where conventional plus specific external cueing strategies were given exclusively to the members of experimental group.

Procedure

After initial neurological examination subjects who met study criteria and agreed to participate and to informed consent were taken from the subject prior to the treatment. The subject's was trained in dual task training in a 12 session program administered for 40-60 minutes each sessions typically undertaken 3, times per week for 4 weeks. Optimal 'ON' period, often 1 hour post medication. The dual task gait training programs will aim to improve step length under dual task conditions, when concurrently performing added cognitive (or) motor tasks. Participants will undertake repeated practice of walking aiming to improve step length using external cueing techniques as outlined above, progressing to internal concurrent cueing of appropriate step length. The gait tasks undertaken will be progressed from simple to more complex tasks as outlined for the single tasks.

Variety of added tasks will be progressively integrated into the training Programs Tasks such as listening, speaking, conversing, generation of simple and complex lists, language calculation and motor tasks increasing in complexity.

Progressed to performing increasingly complex cognitive tasks while concurrently walking. Visual spatial planning tasks (eg., tell me how to get from here to reception), response inhibition tasks (e.g. complete the phrase without saying...), or tasks integrating both language and calculation components (e.g. if Saturday is the 8th, what is the date the following Thursday?).

Motor tasks such as carrying and manipulations will also be included as added tasks. As some studies have reported that added cognitive and motor tasks can both impact gait performance in people with PD. These may be combined with cognitive tasks (e.g. getting a certain amount of money out of a wallet when walking).

A weekly guide for progression of task type and difficulty will be used and programs will be individually progressed.

On one walking pass, a participant will be asked to concentrate mainly on taking big steps when also performing a counting task. In the reset pass, they will be asked to concentrate mainly on the added task, trying to count as quickly and accurately as possible.

Result in better balance during dual task gait conditions in older adults with balance impairment than fixed priority training, so this approach will be gradually introduced.

Statistical Analysis

The percentage of improvement in performance calculated by the following formula:

$$\frac{\text{Data before treatment} - \text{data after treatment}}{\text{Data before treatment}} \times 100$$

Timed up and Go test (TUG Test)

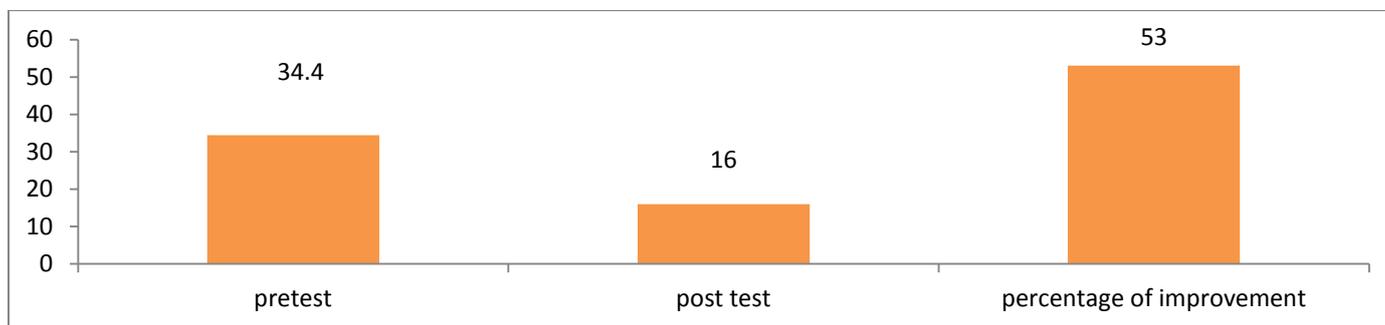
The total average % of improvement in performance is 53%

S.No	Pre-test score	Post-test score	%Improvement
1	35	16	54%
2	34	16	52%

3	33	15	54%
4	36	18	50%
5	34	15	55%
Average Total	34.4	16	53%

Table No -1

Data Analysis of the subjects after dual task training led to a greater improvement in functional walking capacity and step length. The average percentage of improvement in timed up and go test is 53%.



Graph No-1

Conclusion

Data Analysis of the subjects after dual task training led to a greater improvement in functional walking capacity and step length. The average percentage of improvement in timed up and go test is 53%.

This shows that there is a significant improvement in functional walking capacity in Parkinson's subject after dual task training. Dual task training will improve step length and functional walking capacity in idiopathic Parkinson's disease. Thus it can be added in Rehabilitation of Parkinson's subjects for improvement of walking capacity.

Discussion

A training program to improve gait while dual tasking in patients with parkinson's disease impairment in the ability to perform another task while walking (ie, dual tasking [DT]) are associated with an increased risk of falling.

The 4- week programs of one-on-one training including walking while performing several distinct cognitive tasks. Gait speed and gait variability during DT significantly improved. Improvements were also seen in the DT conditions that were not specifically trained and were retained 1 month after training.

Task walking deficits in people with parkinson's disease: Motor and cognitive contributions, mechanisms, and clinical implications.

The treatment of the PD aims to preserve a patient's independence and quality of life. Medication is used to treat motor & non motor symptom relief and also seeks to minimize adverse effects. Medical treatment with levodopa is considered the most effective for the management of motor symptoms. The use of levodopa has been associated with an increased risk of motor fluctuations and the occurrence of involuntary movements or dyskinesia.

Parkinson's disease clinical presentation may vary between individuals. The typical motor symptoms are tremor at rest, rigidity, bradykinesia, and postural instability.

Motor symptoms usually begin on one side of the body and gradually progress to the opposite side. Although these symptoms may be present in other forms of Parkinsonism, symptoms with asymmetric onset, gradual progression and response to treatment based on levodopa are indicative of idiopathic PD diagnosis.

Disorders of gait are one of the most common symptoms of Parkinson's disease. Specifically, patients tend to demonstrate a shuffling gait pattern with a shortened stride length and a reduced over all velocity.

This study Results in better balance during dual task gait conditions in older adults with balance impairment than fixed priority training, so this approach will be gradually introduced.

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