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Analyze The Effect of Dual Task Hand Activities In Parkinsons Patients.

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Abstract: *Parkinson's disease (PD) is a Neurodegenerative disease, the prevalence of which in India is estimated at around 1.3-1.5% for the population aged 60 years or above. In a ranking that listed the top 10 of the most disabling chronic diseases, Parkinson's disease was ranked second, both in the list of physical disorder and the list of mental disorder. Parkinson's disease is also known as Shaking Palsy, Idiopathic Parkinsonism, Primary Parkinsonism, or Paralysis Agitans. It is a progressive degenerative disorder of the Central Nervous System. Movements are mainly affected early in the course of the disease.1It is characterized by motor impairments, including Bradykinesia, Tremor, Postural Instability and Rigidity. These motor abnormalities may also be accompanied by changes in cognition for a significant proportion of patients. While a minority of Parkinson's patients will develop frank dementia, most patients with Parkinson's disease patients will experience changes in cognitive function, frequently early in the course of their illness.2*

Design & Methodology: *Patients who fulfilled the inclusion criteria were taken up for the study purpose. Written consent regarding their voluntary participation in the study was taken. The purpose of the study and procedure was explained to the subjects. Initially all the patients were given 2-3 trial sessions for practice for Purdue peg board test. All the patients first performed the motor task and there score was taken, according to the number of pegs placed in a peg board in 30 sec and documented as a motor task. Next all the patients performed two motor tasks simultaneously. In these patients were given a ball squeezing activity along with a Purdue pegboard test for a period of 30 sec and documented as motor and motor task. Finally all the patients performed a cognitive task along with a motor task .In these patients were given a verbal cognitive task based on a questionnaire along with a Purdue pegboard test for a period of 30sec and documented as cognitive and motor task.*

Result: *The present study shows that both Motor + Motor task and Motor + Cognitive task both shows interference on hand dexterity in Parkinson's patients. Clinically there was a significant difference in Motor, Motor + Motor And Motor + Cognitive Task when compared in all the stages of Parkinson's patients.*

Conclusion: *This study concludes that Parkinson's disease patients have more difficulty in performing motor and cognitive task than motor and motor task*

I. Introduction

Parkinson's disease (PD) is a Neurodegenerative disease, the prevalence of which in India is estimated at around 1.3-1.5% for the population aged 60 years or above. In a ranking that listed the top 10 of the most disabling chronic diseases, Parkinson's disease was ranked second, both in the list of physical disorder and the list of mental disorder. Parkinson's disease is also known as Shaking Palsy, Idiopathic Parkinsonism, Primary Parkinsonism, or Paralysis Agitans. It is a progressive degenerative disorder of the Central Nervous System. Movements are mainly affected early in the course of the disease.[1]It is characterized by motor impairments, including Bradykinesia, Tremor, Postural Instability and Rigidity. These motor abnormalities may also be accompanied by changes in cognition for a significant proportion of patients. While a minority of Parkinson's patients will develop frank dementia, most patients with Parkinson's disease patients will experience changes in cognitive function, frequently early in the course of their illness.

Parkinson's disease is a chronic disease of nervous system. The four cardinal features of the disease upon which the diagnosis is currently based include Akinesia, Resting Tremor, Rigidity and Postural instability. Other later developing motor symptoms include falls and freezing gait.[2]. Besides these in addition, the disease may cause a variety of other symptoms including movement and gait disturbances, sensory changes, speech voice and swallowing disorder, cognitive and behavioral changes, autonomic system dysfunction, gastrointestinal changes and cardiopulmonary changes. The mean age at onset for most patients is between the end 50s and mid 60s. The disease course is slowly but invariably progressive, and the life expectancy is almost normal. Particularly the late motor and non-motor symptoms have a high impact on the quality of life.

Motor Task In Parkinsons

Motor planning deficits are present with this disease. Movement preparation is significantly prolonged. This start hesitation is especially evident as the disease progresses. Movement times are also prolonged but not to the same degree. Patients experience difficulties performing complex, sequential or simultaneous movements. These are linked to deficit in response programming. The patient is slow and hesitant or unable to initiate movement during a transfer sequence. Overall control is also impaired in routine actions on an representative of ingrained motor programs. Patients with Parkinson's disease typically demonstrate micrographia. An abnormally small handwriting that is difficult to read. Freezing episodes occurs and can be triggered by confrontation of competing stimuli.' For example the patient slows or stops walking when exposed to a narrowed space or an obstacle. These linked to bradykinesia and decreased circulating level of neurotransmitters.External cuesstress can exacerbate freezing episodes that are short lived and usually can be overcome by attentional strategies or behavioral tricks.

Motor skill acquisition and motor adaptation may be distinctive aspects of motor learning. The acquisition of motor skills is a process, usually acquired through practice that leads, to improvement in the speed and accuracy of voluntary movement. In contrast, motor adaptation can be described as an exchange of one process for another, as in, for example, increases in speed accompanied by decreases in accuracy and compensation for visually displaced images. In attempting to understand motor learning, it is helpful to keep these distinctions in mind, although the full understanding of their physiological bases is not known. Clinical and physiological studies of Parkinson's patients have clearly shown the importance of the basal ganglia in voluntary movement control. Parkinson's disease patients are slower than normal in starting and executing movements. In addition, rapid single-joint or multi-joint, simultaneous, and sequential movements are executed abnormally in Parkinson's disease and impairments in executing movements of differing complexity may be task dependent.

Dual Task

In several activities of daily living more than one task are executed at the same time. The ability to execute dual tasks is highly advantageous and is a pre-requisite to normal life. A stroll, for example, allows for communicating with someone else, transporting of objects from one place to another and monitoring of the environment to avoid accidents, In normal circumstances, the concomitant execution of motor and cognitive tasks is common, and in such situations, motor activities are performed "automatically", that is, no effort of conscious attention are required Such autonomous stage of performance of a motor ability is achieved through a process of motor learning in which practice and its variability bring about the formation of action programs. Action programs are controlled by open circuit, with little interference of feedback. Therefore, demands on attention mechanisms necessary to efficient performance are very low, facilitating attention to focus on other items relevant to task performance. From this point on, it is possible for an individual to execute a second task simultaneously with the first, without any interference in performance. Performance in dual tasks is also known as simultaneous performance, and involves the execution of a primary task, which is the main focus of attention, and a secondary task, performed simultaneously.

The execution of two tasks at the same time demands a high level of information processing and thus performance of one or both tasks is deteriorated. Decreased performance in the primary task is regarded as a consequence of the dual task and indicates lack of automatism. The negative influence on the primary and secondary task occurs because both tasks compete with similar processing demands. The influence of cognition or motor control alterations or both in the performance of dual tasks can be an important indicator of the functional status of a patient during illness or during rehabilitation. In the literature, such alteration is usually regarded as motor-cognitive interference. After a cerebral lesion, motor-cognitive interference can occur, causing activities which were previously automatic to require a controlled process, with increased attention demands. This in turn deteriorates performance in dual tasks.

Patients with Parkinson's disease can generate normal motor patterns when they focus their attention on performance, that is, when they think on the execution of movements. This way they activate the intact pre-motor cortex area and avoid relying on the impaired circuitry of the basal nuclei to and assist in the production of movements. In dual task situations, the use of these cortical resources to execute motor tasks can restrict performance in both tasks.

The execution of fine manipulative hand activities such as writing, tying shoelaces, and buttoning clothes can be difficult for people with Parkinson's disease, and some leisure activities that require dexterity may no longer be possible. Although the exact mechanisms for the loss in dexterity are not known, people with Parkinson's disease have manual deficits, including reduced finger torque control and decreased interdigit individuation compared with age-matched unimpaired people. Upper-limb deficits in patients with Parkinson's disease typically present with bilateral yet asymmetric motor impairments. Dexterity in Parkinson's disease with timed complex manual tasks such as buttoning and the coin rotation test and found that dexterity was reduced in people with Parkinson's disease during many activities of daily living. The capacity to do a dual task is highly advantageous during walking because it allows for communication between people, transportation of objects from one location to another and monitoring of the environment so that threats to balance can be avoided.[27]

Dual task performance is also known as "concurrent performance" and involves the execution of a primary task, which is the major focus of attention, and a secondary task performed at the same time. Gait disturbance has previously been shown to increase in people with Parkinson disease during the performance of a second motor task. Multitasking is impaired in Parkinson's disease. Activities such as writing while talking on the phone and removing money from a wallet while talking to a shop attendant are examples of common multitasking activities requiring hand dexterity which are commonly affected in Parkinsonism Disease.

Most of the evidence for impaired dual task performance in people with Parkinson's disease has come from studies of upper-extremity performance. People with Parkinson's disease during tasks showed reduced movement speed in the dual task condition, those with Parkinson's disease showed a much greater performance decrement. Similarly, there is an effects of adding a cognitive task when subjected to performed an upper-extremity tracking task.

Aim & Objective

- To find out the interference of cognitive and motor function on hand function in Parkinson's patient.

Objectives

- To observe the interference of motor component on hand dexterity as per the stages of Hoehn and Yahr scale in Parkinson's patients.
- To observe the interference of cognitive component on hand dexterity as per the stages of Hoehn and Yahr scale in Parkinson's patients.
- To analyze the interference of motor component v/s cognitive component on hand dexterity as per the stages of Hoehn and Yahr scale in Parkinson's patient.

II. Materials & Methodology

Study Design : Experimental.
Sample Size : 30
Sample Population : Parkinson's Disease Patients In Stage I-Iii According To Hoehn And Yahr Scale
Target Population : Parkinson's Disease Patients.
Sampling Method : Simple Random Sampling

Inclusion Criteria:

- Clinically diagnosed patients with Idiopathic Parkinsonism at stage I-III on Hoehn and Yahr scale.
- Both males and females.
- Patients of age group between 40 to 60 years.

Exclusion Criteria:

- Patients diagnosed with Visual and Auditory impairment.
- Patients having history of any other Neurological disease that could impair the Hand functions.
- Patients having history of Musculoskeletal injuries that could impair the Hand functions.

Materials Used

- Hoehn & Yahr scale assessment sheet.
- Purdue Peg board
- Stop watch
- Squeeze ball

Procedure

- Patients who fulfilled the inclusion criteria were taken up for the study purpose. Written consent regarding their voluntary participation in the study was taken. The purpose of the study and procedure was explained to the subjects.
- Initially all the patients were given 2-3 trial sessions for practice for Purdue peg board test. All the patients first performed the motor task and there score was taken, according to the number of pegs placed in a peg board in 30 sec and documented as a motor task.
- Next all the patients performed two motor tasks simultaneously. In these patients were given a ball squeezing activity along with a Purdue pegboard test for a period of 30 sec and documented as motor and motor task.

- Finally all the patients performed a cognitive task along with a motor task .In these patients were given a verbal cognitive task based on a questionnaire along with a Purdue pegboard test for a period of 30sec and documented as cognitive and motor task.

Outcome Measures
Purdue Peg Board Test

- The Purdue Pegboard is dexterity test. It measures dexterity for two types of activity: one involving gross movements of hands, fingers, and arms, and the other involving primarily what might be called "fingertip" dexterity.
- Separate scores can be obtained with the Purdue Pegboard: (1) right hand; (2) left hand;(3) both hands; (4) right plus left plus both hands (R+L+B); and (5) assembly.
- The Purdue Pegboard was standardized after extensive experimentation in numerous subjects. The pegboard is equipped with pins, collars, and washers, which are located in four cups at the top of the board.
- It can be administered to individuals or groups. It is timed as follows: right hand 30 seconds; left hand 30 seconds; both hands 30 seconds; and assembly 1 minute. The entire testing period is about 10 minutes. It is hand scored.

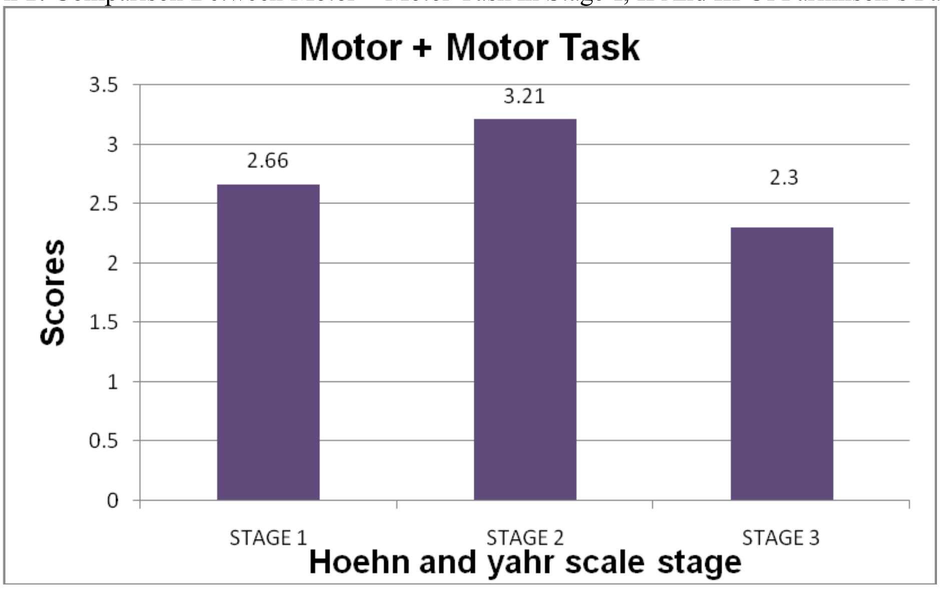
III. Data Analysis And Interpretation

Data analysis was done for dual task and function among Parkinson's patients of different stage which were recorded.
Statistical analysis was done using ANOVA "Analysis of Variance" test.

Table 1: Comparison Between Motor + Motor Task In Stage-I, II And III Of Parkinson's Patients

Task	Stages	Mean Scores	Sd	Sem
Motor+Motor	Stage 1	2.66	1.03	0.42
	Stage 2	3.21	0.42	0.11
	Stage 3	2.3	0.82	0.26

Graph 1: Comparison Between Motor + Motor Task In Stage-I, II And III Of Parkinson's Patients

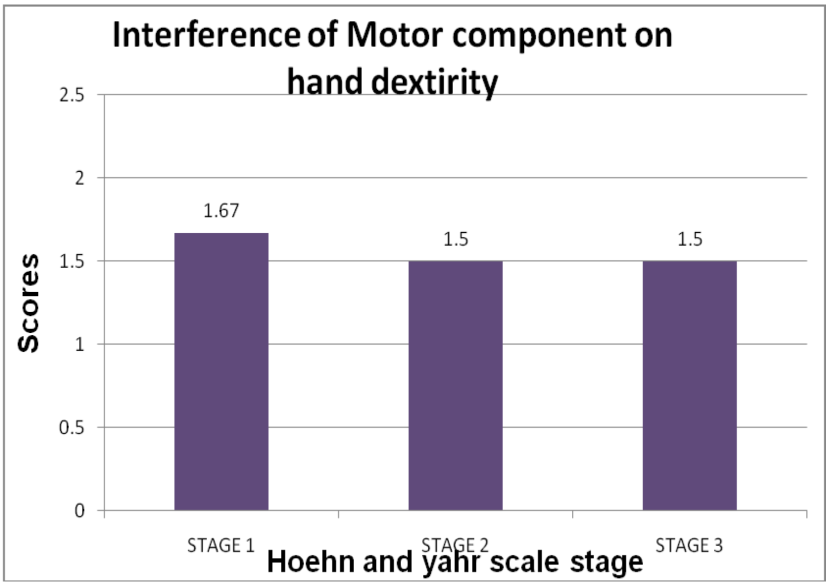


Inf: Stage II shows an increase of 0.55 when compared with Stage I and 0.91 when compared with Stage III.

Table 2: The Interference Of Motor Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients

Stages	Motor	Motor+Motor	Difference
Stage 1	4.33	2.66	1.67
Stage 2	4.48	3.21	1.5
Stage 3	3.8	2.30	1.5

Graph2: The Interference Of Motor Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients

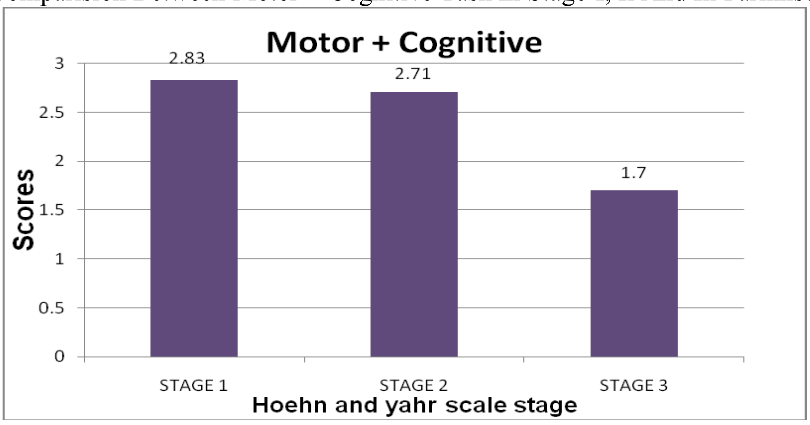


Inf: Stage I shows more interference with motor component compared to stage II and stage III

Table 3: Comparision Between Motor + Cognitive Task In Stage-I, Ii And Iii Parkinsons Patients

Task	Stages	Mean Scores	Sd	Sem
Motor +Cognitive	Stage 1	2.83	0.98	0.40
	Stage 2	2.71	0.72	0.19
	Stage 3	1.7	0.82	0.26

Graph 3: Comparision Between Motor + Cognitive Task In Stage-I, Ii And Iii Parkinsons Patients

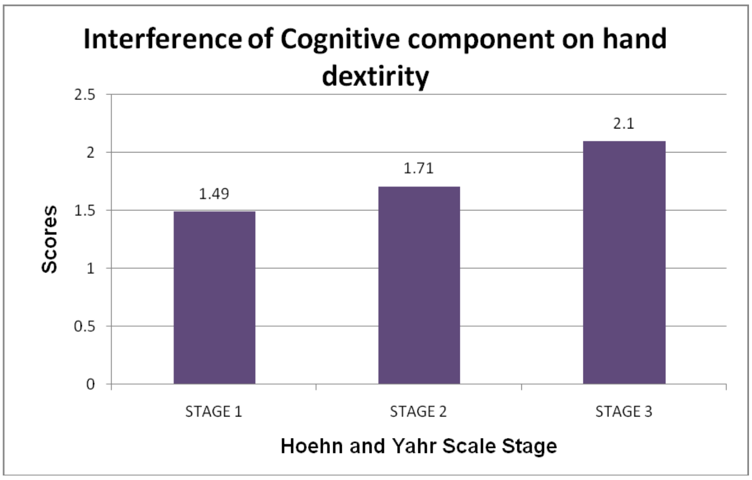


Inf:-Stage I shows and increase of 0.12 when compared with Stage II and 1.13 when compared with stage III

Table 4: The Interference Of Cognitive Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients

Stages	Motor	Motor+Cognitive	Difference
Stage 1	4.33	2.83	1.49
Stage 2	4.48	2.71	1.71
Stage 3	3.8	1.70	2.1

Graph4: The Interference Of Cognitive Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients

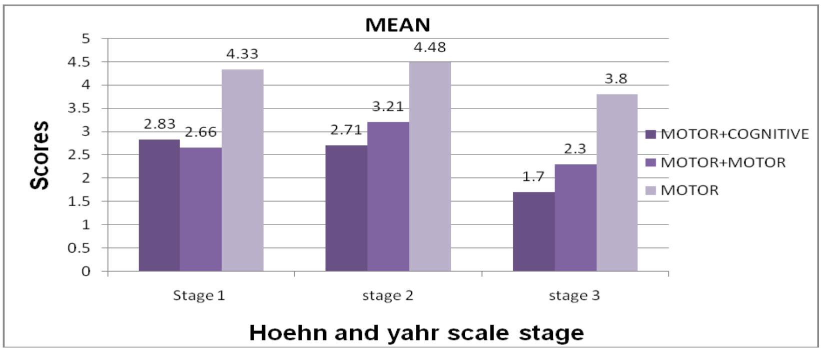


Inf :-Stage III shows more interference of cognitive component when compared with stage II and Stage I

Table 5:-Comparison Of Motor + Cognitive, Motor + Motor And Motor Task Of Stage-I, II, III Of Parkinson's Disease

Task	Stage 1	Stage 2	Stage 3
Motor+Cognitive	2.83	2.71	1.7
Motor+Motor	2.66	3.21	2.3
Motor	4.33	4.48	3.8

Graph 5:- Comparison Of Motor + Cognitive, Motor + Motor And Motor Task Of Stage-I, II, III Of Parkinson's Disease

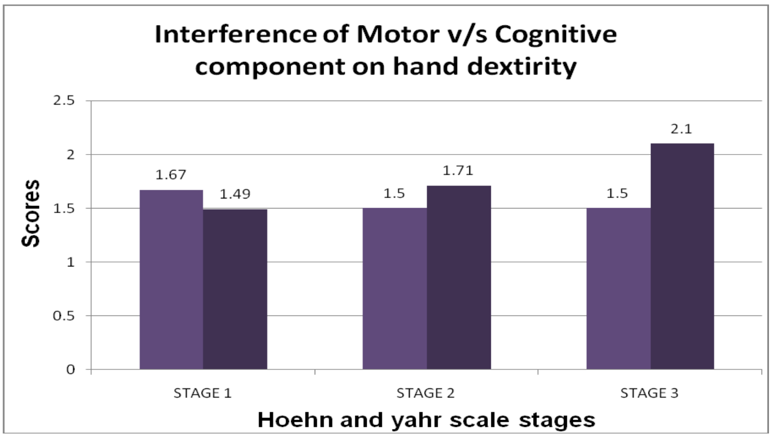


Inf:- Stage III shows an increase of 0.15 when compared with Stage I and 0.68 when compared with Stage III of Motor task and Stage II shows an increase of 2.66 when compared with Stage I and 0.91 when compared with Stage III of Motor + Motor task and Stage I shows an increase of 0.12 when compared with Stage II and 1.13 when compared with Stage III of Motor + Cognitive task.

Table 6: The Interference Of Motor V/S Cognitive Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients

Stages	Motor Difference	Motor +Cognitive Difference
Stage 1	1.67	1.49
Stage 2	1.5	1.71
Stage 3	1.5	2.1

Graph 6: The Interference Of Motor V/S Cognitive Component On Hand Dexterity As Per The Stages Of Hoehn And Yahr Scale In Parkinson's Patients



Inf: Stage I shows more interference of motor than cognitive component, stage II shows more interference of cognitive component than motor, Stage III shows more interference of cognitive component than motor.

IV. Result

The total no of subjects selected for the study were 30, Each subject were given 3 task like motor, motor + motor and motor + cognitive.

Statistical intergroup significance was calculated by using ANOVA (analysis of variance).

Graph 1 shows the comparison of motor component as a part of dual task along with a motor task. In graph 1 it shows a statistical significant change in Purdue peg board test score with p=0.000. It also shows that mean of stage 1 is 2.66, stage 2 is 3.21 and stage 3 is 2.3 which indicates an increase in Purdue peg board score of 0.55 and 0.91 as compared to stage 1 and 3 respectively with stage 2.

Graph 2 shows the interference of motor component as a part of dual task along with a motor task. In graph 2 it shows a statistical significant change in Purdue peg board test score with p=0.001.It shows that stage 1 shows more interference with 1.67 when compared with stage 2 interference of 1.5 and stage 3 interference of 1.5 which indicated that stage 1 patient have more interference than stage 2 and stage 3 in motor component on hand dexterity in Parkinson's patient.

Graph 3 shows the comparison of cognitive component as a part of dual task along with a motor task. In graph 3 it shows a statistical significant change in Purdue peg board test score with p=0.002.it shows that mean of stage 1 is 2.83, stage 2 is 2.71 and stage 1 is 1.7 which indicates an increase in Purdue peg board score of 0.12 and 1.13 as compared to stage 2 and stage 3 with stage 1.

Graph 4 it shows a interference of cognitive component as a part of dual task along with a motor task. In Graph 4 it shows a nonsignificant difference with the p value of 0.007. It shows that stage 3 shows more interference with 2.1 when compared with stage 2 interference 1.71 and stage 1 interference 1.49 which indicates that stage 3 patient have more interference more than stage 2 and stage 1 in cognitive component on hand dexterity in Parkinson's patients.

Graph 5 shows the comparison of Motor+ Cognitive, Motor + Motor and Motor task as a part of dual task along with a motor task. In graph 5 of stage 1, It shows a significant difference with the p=0.002. In the motor task with the mean of 4.33 and motor + cognitive task with the mean of 2.83, and motor + motor task with the mean of 2.66. In stage 2 of motor task with the mean of 4.48 and motor + cognitive task with the mean of 2.71 and motor + motor with the mean of 3.21.It shows a significant difference with the p=0.001. In stage 3 mean of motor task in 3.8 and mean of motor + cognitive task is 1.7 and motor + motor is 2.3with the p value of 0.002 which is significant..

Graph 6 shows the interference of motor v/s cognitive component, as a part of dual task along with a motor task. In graph 6 stage I shows more interference of motor component than cognitive component with 1.67 and 1.49 and p=0.500, Stage II shows more interference of cognitive component than motor with 1.71 and 1.5 and p=0.500, Stage III shows more interference of cognitive component than motor with 2.1 and 1.5 and p=0.500.Thus it shows that cognitive task interferes more in stage 2 and stage 3 patients and motor task interfere more in stage 1 patients.

V. Discussion

Parkinson's disease is a progressive neurodegenerative disorder whose cause remains unknown. The pathological hallmark of Parkinson's disease is the loss of pigmented, dopaminergic neurons of the substantia nigra pars compacta, coupled with the presence of intraneuclear inclusion bodies known as lewy bodies.

Diagnosis is clinical and is based on the presence of Slowness of movement, Poverty of movement, Rigidity, Resting Tremor, and Postural Instability. Other symptoms, such as shuffling gait, muffled speech, expressionless stare, and drooling are derived from these cardinal symptoms. Patients with PD may also have cognitive dysfunction, psychiatric symptoms (eg, endogenus anxious) depression, autonomic dysfunction, musculoskeletal deformities, sensory symptoms, sleep disturbances, and dermatological problems.

The present study shows that both Motor + Motor task and Motor + Cognitive task both shows interference on hand dexterity in Parkinson's patients.Clinically there was a significant difference in Motor, Motor + Motor And Motor + Cognitive Task when compared in all the stages of Parkinson's patients.

When motor component was compared as a part of dual task along, it shows a statistical significant change in Purdue peg board test score with p=0.001.This can be due to the reason that Parkinson's disease has been shown to affect upper-limb movement and impairs the reach-to-grasp movement and individual finger control. Although dopamine replacement medication can improve reaching, it has less influence on grasp or fine finger Movements. The diminished ability to multitask in people with Parkinson's disease has been reported previously for upper-limb movements and the combination of upper-limb motor tasks. People with Parkinson's Disease rely more heavily on visual input for upper-limb tasks and may require greater attentional resources to perform complex dexterity tasks. When the capacity of those available resources is exceeded, dual-task interference occurs.

When the motor task was combined with a cognitive task, it shows a statistical significant change in Purdue peg board test score with p=0.002. This may be due to the effect of dual-task interference caused both groups to reduce their performance on the hand dexterity. Both groups showed a comparable reduction in dexterity performance, yet greater dual-task interference occurred in the cognitive component in Parkinson's disease patients.

Patients with tremor at disease onset are more likely to suffer cognitive impairment in the more advanced stages of the disease than patients with akinesia or rigidity at onset. Post-hoc analyses indicate that this impairment is restricted to the memory/attention component, with visuospatial and executive/motor variables showing minimal to absent differences, respectively. The reasons for this variable response are unclear, but pathological involvement of nondopaminergic areas of the brain is held responsible

G Vingerhoets, S Verleden (2003) in their study found a similar effect with regard to cognitive dysfunction in Parkinson's disease. The restoration of central dopaminergic transmission with levodopa treatment does not improve the cognitive changes to the same extent as the dopamine dependent motor signs. In addition, their prospective research showed that the decline in cognitive performance on retesting after three years was significantly greater in patients with a low percentage of motor improvement on levodopa. Nondopaminergic pathology is certainly an explanation for many of the non-motor Parkinson's disease symptoms, including cognitive decline and dementia. Significant predictors of cognitive dysfunction in the group overall were age and type of onset symptom. Older patients (> 60 years) performed worse on almost every cognitive measure, especially on the variables that constitute the memory/attention component. Because the impairment scores are already age corrected, this implies that the observed cognitive impairment in older patients with Parkinson's disease is significantly greater than can be expected from a normal aging process. The detrimental effect of age on cognitive impairment and especially memory dysfunction in Parkinson's disease.

Lansek and coworkers (1998) did the study and concluded that when two tasks are performed at the same time one usually runs at a subconscious level through the basal ganglia while the person attends to the other, which is controlled by frontal cortex. If the basal ganglia are defective than the automatic task becomes slow, reduced in amplitude or ceases altogether. There are few explanations why people with PD experience troublesome dual task interference. First, central processing resources become depleted because of degeneration of neurons of substantia nigra compacta in the brainstem and consequent dopamine insufficiency. Because dopamine is one of the main neurotransmitter used by the basal ganglia in the control of well-learned, sequential actions, the ability to perform these goals directed task without undue attention is compromised. Second there is no evidence to suggest that the basal ganglia-frontal cortex-basal ganglia feedback loop play an critical role in regulating movement automaticity.

Jaqueline M.Bond et al (2000) stated that the basal ganglia play a key role in controlling well-learned skilled movements, when these movements is practiced to the stage where they can be executed "automatically" with the little thought or attention. Positron Emission tomography studies have shown that during the early stage of motor skill acquisition, and for novel or ballistic movement, the motor cortical region predominates in the motor control. With the repeated practice the control of skilled movement is relegated to the cortical basal ganglia-control feedback loop, which leaves the cortical regions free for higher order information processing. This means that a person does not need to closely attend to the movement as it is executed and can divert attentional resources to other motor or cognitive activities. In Parkinson's disease the neurotransmitter imbalance the arise of in the basal ganglia. As a result of the reduction in dopaminergic neurons it disrupts the motor function of the basal ganglia. It can be suggested that as a compensation, patients rely more heavily on frontal cortical and "on-line" visual, proprioceptive and auditory input to consciously control and guide movements, and bypass the defective basal ganglia .The shortcoming of this type of compensation is that it is resource-demanding and leaves patients with little in reserve when they need to perform an additional task at the same time as they are attending to the primary task.

Teixeira NB and Alouche SR (2007) mentioned that the patients with Parkinson's disease can generate normal motor patterns when they focus their attention on performance that is when they think on executation of movement .This way they activate the intact pre-motor cortex area and avoid relying on the circuitry of the basal nuclei and assist in the production of movement in dual task situations. The use of these cortical resources to execute motor task can restrict performance in both task.

A number of model have been proposed to explain observed dual tasking decrement (1) capacity or resourse sharing model (2) the bottleneck model (3) cross-talk models.

1. The capacity-sharing model are based on the assumption that attention resources are limited .Therefore when the people perform two task simultaneously, attention must be divided between the 2 task ,It also relies on several factors including task complexity, familiarity and importance. The capacity-sharing model allows for the concept of parallel processing (as opposed to serial processing) of information. It can be argued that in subjects with Parkinson's disease the central resource mechanism remains intact yet cannot allocate movements to the basal ganglia using habitual mechanisms because of neurotransmitter imbalance. As a result, complex movements are internally directed; thus, when dual tasks are performed, conscious attention is needed for both.

According to the single-channel (bottleneck) theory of attention, the execution of motor skills involves a mechanism that has limited capacity to process concurrent tasks. The basic construct is that tasks are processed in series rather than in parallel. Therefore, when a person attempts to consciously control two movements at the same time the execution of one is compromised[34].

VI. Conclusion

This study concludes that Parkinson's disease patients have more difficulty in performing motor and cognitive task than motor and motor task.

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