Effect of Structured Exercise Programme on Functional Mobility in Parkinson's Disease

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Abstract

Background: Parkinson's disease is common movement disorder seen in neurological practices but the management and diagnosis is quite challenging. Physical rehabilitation is commonly used to improve the health condition and relieve the symptoms along with the pharmacological treatment.

Aim and Objectives: 1.To find the effect of structured exercise programme on functional mobility in Parkinson's disease. 2. To evaluate the motor and non-motor symptoms present in Parkinson's disease. 3. To find the effect of structured exercises on functional mobility in Parkinson's disease.

Material and Method: Study was carried out in Department of Neuro physiotherapy, KIMSDU, Karad. Assessments include Unified Parkinson's Disease Rating Scale [UPDRS] and Hoehn and yahr scale for Parkinson's disease. Subjects participated in their respective interventions for 6 weeks. Statistical analysis was done using instat software. Paired t test was used to calculate the response.

Result: The study included twenty patients were recruited for the study. Out of which 14 were male (70%) and remaining 6 subjects were female (30%). This is analyzed that outcomes which are clinically significant were Hoehn and yahr scale of functional mobility in Parkinson's disease (P value: < 0.0001 and t test: 8.904) and Unified Parkinson's Disease Rating Scale II and III (P value: < 0.0001 and t test: 10.282). Significant improvement was observed with the outcome measures used for the study.

Conclusion: Physical exercises can contribute effectively in improving the functional mobility in Parkinson's disease and can help to maintain the physical fitness.

Keywords: *Parkinson's disease, physical exercises, structured exercises, functional mobility*

Introduction

Definition:

Parkinson's disease (PD), a progressive neurodegenerative disorder, is manifested by a loss of dopaminergic neurons from the substantia nigra pars compacta there by disrupting the basal ganglia circuitry.[1] It was first described in 1817 by a physician named James Parkinson as shaking palsy[2], it is one of the chronic diseases associated with aging, as well as risk factors such as exposure to drugs, head trauma, pesticides and drugs (cocaine, heroin)[3]

Prevalence:

The incidence and prevalence of PD increases with advancing age, present in 1% of people all over the age of 65 years.[4] PD is twice as common in men than in women in most populations.[4] The clinical hallmarks of the disease include rigidity, bradykinesia, tremor, and loss of postural control.[5] It is a complex disorder with wide reaching implications for patients and their families.[6] The management of Parkinson's disease is traditionally centered on drug therapy, but even with optimal medical

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management, patients still experience a deterioration of body function, daily activities, participation, and decline in mobility.[6] The motor impairment in PD patients caused by bradykinesia, rigidity, tremor, and postural instability accelerates the decline in functional capacity, especially when associated with decreased activity and with a sedentary lifestyle.[7]

Along with postural instability gait alterations, with consequent impairment in balance increase the risk of falls. Moreover, another 2 typical features are also present: Festinating gait or festination is referred to the patient's sudden acceleration as an attempt to keep their center of gravity between their feet in order to compensate for their flexed posture.8 Freezing of gait (FOG) is defined as a sudden stop in the patient's gait, often with legs trembling in place and the sensation of being "glued" to the floor.[8]

This symptom manifests more frequently while turning, when the path gets changed or more narrow, in a diagonal direction, when dealing with obstacles and other stressful situations or just before reaching the destination.[8]

Subjects affected by PD also experience several non-motor symptoms, such as autonomic dysfunctions (dysphagia, constipation, urinary incontinence, sexual dysfunction, orthostatic hypotension) cognitive impairment, dementia, depression (which affects 30 - 40% of patients), anxiety, sleep disorders and decreased olfactory sense. More immediate effects include improved motor performance, cognitive and functional ability.[1]

An estimate of the stage and severity of the disease can be made using a staging scale. The most widely used in clinical practice and research trials is the Hoehn-Yahr classification of disability Scale.[9]

Physical rehabilitation plays important role in the maintenance and improvement of mobility, transfers6, posture, and balance in PD patients.[7] These mobility deficits are difficult to treat with drugs or neurosurgery.10,11Different modalities of non-pharmacological treatment such as physiotherapy (P), walking, running, strength training (ST), functional exercises, and whole body vibration significantly reduced the risk of falls and improved motor performance, balance and gait,[10] and executive functions.[7]

Available data in the literature indicate that any rehabilitation protocol has to focus on: cognitive movement strategies, cueing strategies, and improved physical capacity and balance.[8] Different training programs for PD patients have been designed and evaluated but only specific training strategies tailored and individualized for each patient, may produce improvements in gait speed and stride length, decrease motor and balance symptoms and improve quality of life.[8]

Community-based strength and fitness programs, auditory cueing from metronomes, and visual cues, combined therapy programs that incorporate cues, stretches, functional training, gait and balance training, and relaxation exercises have all been found to be effective for improving movement.[12]

Improving physical capacity with aerobic training, strength and flexibility exercises may reduce symptoms as well as improve the patient's general well-being and quality of life.8 Resistance training can produce functional improvement in gait and may, therefore be useful as part of physical rehabilitation.13 Progression of PD generates socioeconomic and occupational hazards.14 Physical exercise has demonstrated a reduction in mortality rate in individuals with PD and, albeit modestly, a protective effect for PD risk.

Till date there are many neurophysiological techniques devised for body functioning but there is no fixed protocol for recovery so we can try to device a particular protocol as it is required for functional independence and better quality of life.

This could be the baseline source for different treatment pattern in Parkinson's disease. And improvement in the clinical characteristics can be seen.

Aims and Objectives

Aims:

- To find the effect of structured exercise programme on functional mobility in Parkinson's disease.

Objectives:

- To evaluate the motor and non-motor symptoms present in Parkinson's disease.
- To find the effect of structured exercises on

functional mobility on various stages of Parkinson's disease.

Material and Methods

1. Type of study : experimental study

2. Study design : pre and post

3. Place of study : KIMSDU

4. Sample size : supposed to be 30

N= 4sd2 /(x×£)2

N= Sample size

SD= Standard deviation

x= Mean

N= 4(3)2

(3*0.4)2

= 36

1.44

= 25

Calculating the error, minimum 20 sample size.

5. Study duration : 6 months

6. Inclusion Criteria:

1. Subject diagnosed with Parkinson's disease

2. Subjects have impairments in functional mobility following Parkinson disease

3. Both sex

7. Exclusion Criteria:

1. Neurological ill patients other than Parkinson's disease

8. Material required:

1. Assessment chart

2. Writing material

3. Computers and online accessing

9. Outcome measures :

Hoehn and yahr scale for Parkinson's disease

Unified Parkinson's disease rating scale II and III

Procedure:

Subjects taken for my study were those who were diagnosed with Parkinson's disease.

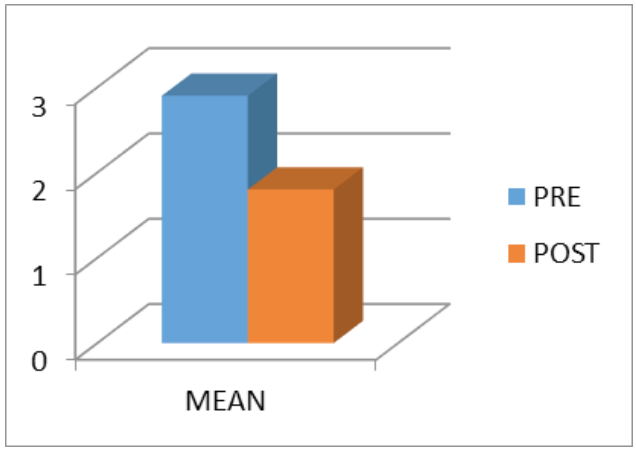
Subjects underwent detail assessment to fulfill the inclusion and exclusion criteria. Once the subject fulfilled criteria, they were explained about the study and detail information was given to them and consent was taken. Assessment was taken with the appropriate outcome major and pre-test will be done. 6 week exercise protocol will be given and follow-up for progression will be done. Later, again post-test will be done and result will be taken.

Findings

Out of 20 patients, there is a more no. of male survivors than female. (Table1). Pre and post assessments done with Hoehn and yahr scale for disability and UPDRS (Table 2 and 3 respectively).

Table1: Gender distribution

GENDER	TOTAL
MALE	14(60%)
FEMALE	6(30%)
Total	20



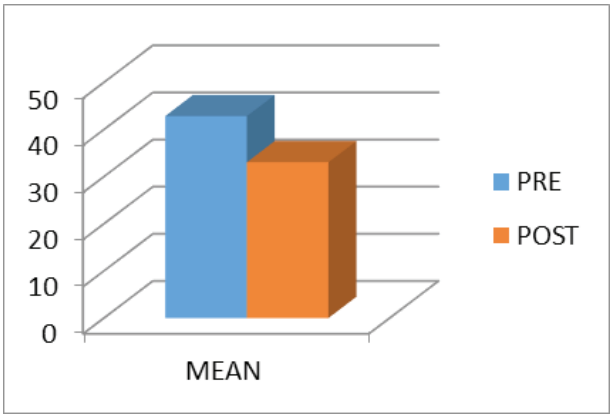
GRAPH 1: PRE AND POST TEST WITH HOEHN AND YAHR SCALE

Table 2: HOEHN AND YAHR SCALE (FOR FUNCTIONAL MOBILITY)

	PRE TEST	POST TEST
Mean ± SD	2.9±0.9679	1.8±1.005
t test	8.904	
P value	< 0.0001	
Significance	Extremely significant	

Interpretation:

The above table and graph shows post training there was extremely significant improvement noted according to the p values.



GRAPH 2: PRE AND POST TEST WITH UPDRS

Table 3: UPDRS SCALE (FOR FUNCTIONAL MOBILITY)

	PRE TEST	POST TEST
Mean ± SD	42.85±24.11	33.05±22.46
t test	10.282	
P value	< 0.0001	
Significance	Extremely significant	

Interpretation:

The above table and graph shows post training there was extremely significant improvement noted according to the p values.

Table 2 and 3 shows that extremely significant improvement is observed according to the p values.

Discussion

This study "Effect of structured exercise programme on functional mobility in Parkinson's disease" was conducted to find the effect of structured exercise programme on functional mobility in Parkinson's disease. The clinical hallmarks of include rigidity, bradykinesia, tremor, and loss of postural control. It is a complex disorder with wide reaching implications for patients and their families. It increases the dependency of the patient, reduces efficiency and social participation and also affects the self-esteem.

The objectives of the study were to evaluate the motor and non-motor symptoms present in Parkinson's disease and to find the effect of structured exercises on functional mobility in Parkinson's disease.

The study was conducted with 20 subjects. Out of which 14 were male and remaining 6 were female subjects. Prior consent was taken from them. The interventions were carried out for 5 days per week for 6 weeks. The outcome measures for this study were Hoehn and yahr scale for Parkinson's disease, Unified Parkinson's disease rating scale

Pre and post tests were done using the outcome measures for assessing functional mobility in Parkinson's disease. The progression of PD leads to an increasing inability to perform daily activities, loss of independence, and a decreased quality of life, and it generates socioeconomic and occupational hazards. Progress of Parkinson's disease is multidimensional as many systems of body gets involved step by step. This mainly includes musculoskeletal, neurological systems. With every stage, clinical signs go on changing which makes rehabilitation challenging. Every feature needs to be addressed as they are closely associated with one another. Therefore physiotherapy treatment also needs to be reevaluated and changed every now and then.

The study, Comparison of strength training, aerobic training, and additional physical therapy as supplementary treatments for Parkinson's disease: pilot study conducted by Carvalho A et al, showed that strength training and aerobic exercise training in patients with PD are associated with improved outcomes in disease symptoms and functional capacity.

Structured programmes have been shown very effective results on various disoders like stroke. Different components like gait training,15 hand training 16with structured exercises have been shown to have better outcomes.

Also, previous study, Parkinson's Disease and Resistive Exercise: Rationale, Review, and Recommendations done by Michael J. Falvo, MS et al (2007) was aimed to establish the rationale for efficacy of resistive exercise in individuals with PD and concluded that available resistive exercise intervention have increased the muscle strength. Exercise program aimed at improving range of motion combined with activity-related (e.g., gait or balance) exercises, improves ADL functioning. Furthermore, it is plausible that, in PD, a strength-training program increases muscle power. Structured exercise programme given to subjects received range of motion exercises, strengthening exercises, stretching, balance training, gait training, exercises to improve functional capacity and activities of daily living. This study shows that these structured exercises showed significant improvement in the outcome variables concluding that it improves quality of subjects with Parkinson's disease. This was confirmed using statistical analysis by using 'Paired t- test.

Hoehn and yahr rating scale of Parkinson's disease: Mean ± SD score for pre and post test was, 2.9± 0.9679 and 1.8 ± 1.005 respectively. Post training, extremely significant improvement was noted with functional mobility. P value: < 0.0001 t test: 8.904

Unified Parkinson's disease rating scale II and III: Mean ± SD score for pre and post test was, 42.85±24.11and 33.05±22.46 respectively. Post training, extremely significant improvement was noted with functional mobility. P value: < 0.0001 t test: 10.282

These results demonstrate that pharmacological treatments along with physical exercises may promote better results for symptoms such as rigidity and bradykinesia. Repetitive exercises and training can help in improving functional mobility. The task was made more complex by setting a time limit and increasing the intensity of exercises.

And so, this study showed significant clinical improvement in functional mobility, indicating that prescribing exercise with controlled intensity, duration, and frequency may improve the physical health of patients with PD.

Conclusion

Structured exercises on basis of recovery pattern and stages plays an effective role in improving functional mobility in Parkinson's disease thereby improving quality of life.

Conflict of Interest: There was no conflict of interest in this study.

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Ethical Clearance: Ethical clearance was taken from institutional committee of Krishna institute of medical sciences.

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