



FUNCTIONAL STATUS AMONG PATIENTS WITH STAGE III PARKINSON'S DISEASE

Rimsha Fatima¹, Nabeela Safdar², Somia Faisal^{3*}, Hafiz Muhammad Asim⁴

¹Student, Physical Therapy Department, Lahore College of Physical Therapy, LM&DC, Lahore, Pakistan 

²Senior Lecturer, Neurosciences Department, Lahore College of Physical Therapy, LM&DC, Lahore, Pakistan 

³Demonstrator, Applied Science Department, Lahore College of Physical Therapy, LM&DC, Lahore, Pakistan 

⁴Professor, Lahore College of Physical Therapy, LM&DC Lahore Pakistan 

ABSTRACT

Aims of Study: The purpose of the study was to assess the functional capabilities of patients with Stage III Parkinson's disease (PD). Functional status of PD patients declines due to impaired postural reflexes and characteristic loss of balance which became evident at Stage III thus activities of daily living (ADLs) are compromised as the severity of the disease increases.

Methodology: Descriptive case series was conducted on stage III PD patients (n=64). Patients with age ranges from 45 to 75 years were recruited and patients with other neurological issues were excluded. They were assessed using a Functional independence measure scale having reliability 0.95.

Results: Out of 64 patients, 75% required minimal assistance and 9.4% required supervision while performing the ADLs. Whereas, 81% of patients need 2 hours of personal care assistance according to burden of care.

Limitations & Future Implications: Only functional status of PD patient is determined no exercise regime or intervention were incorporated to assess their impact on the PD patient functional activities. Thus, future studies should be carried out to find the correlation between aerobic exercises and their impact on PD patient level of functional independence.

Originality: Information added was all taken from databases and reduced to similarity index and was not submitted to any other journal.

Conclusion: Stage III Parkinson's disease patient required minimal level of assistance while performing tasks of daily living. However, majority of these patients required 2 hours of personal care assistance on average per day to compete with daily living.

Keywords: *Functional status, parkinson disease, cognitive dysfunction, disease progression, orthostatic hypotension, tremors.*

Introduction

Parkinson's Disease (PD) is a progressive disease involving central nervous system (CNS) eliciting both motor and non-motor complications¹. It's the second most common degenerative disorder with neurological impairments². It is initiated by loss of nerve cells in substantia nigra due to which brain fails to produce dopamine³. The cardinal features of this disease involve tremors, rigidity, bradykinesia, and postural instability. Secondary motor symptoms include

*Demonstrator, Applied Science Department, Lahore College of Physical Therapy, LM&DC, Lahore, Pakistan

Email: somia.faisal@lmdc.edu.pk

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reduction in muscle strength, muscle performance, and gait impairments⁴. Non-motor signs and symptoms associated are dysphagia, speech disorder, cognitive dysfunction, autonomic dysfunction, orthostatic hypotension, and sleep disorder⁵. It is prevalent in about 7 to 10 million people worldwide¹. While in Pakistan about 450,000 people are affected with Parkinson's disease⁶. It is more prevalent in males than females⁷. On an average 50 to 65 is the age of onset of Parkinson's disease⁸.

Hoehn & Yahr (H&Y) classification scale represents the severity of Parkinson's symptoms and disease progression⁹. It classifies PD into five stages following the characteristics which patient represents. Stage 1 is unilateral minimum disability, stage 2 bilateral minimum disability without impairment of balance, stage 3 impaired righting reflex and impaired balance, stage 4 severe disability and assistance required in standing and walking, stage 5 patient confined to bed/wheelchair bound¹⁰. The lowest stage 0 is asymptomatic and in stage 5 patients became bedridden¹¹. The modified H&Y scale defines PD severity more broadly, with stages 1 to 2 representing mild disease, stages 2.5 to 3 moderate disease, and stages 4 to 5 severe disease¹². Cognitive dysfunction is evident feature at stage III it drastically drags patients toward postural instability and balance impairment and advanced Parkinson's disease with characteristic features of dementia, and memory impairment¹³. Reservation of cognition is essential for mobility and ambulation of patients as the era of disease increases¹⁴. With the progression of the disease, mobility of the patient compromises as step length and gait velocity reduces to an extent that the patient became unable to perform Activities of Daily Livings (ADL)¹⁵. The patient's participation in activities decreases tremendously with the progression of symptoms leaving the patient in a socially isolated state¹⁶.

Most evident changes in functional capabilities occur at stage III owing to loss of balance and decreased reflexes¹⁷. Assessing the Functional status of an individual with Parkinson at an early stage would lead to a better rehabilitation protocol strategy¹⁸. When physical therapy interventions are used early in the course of Parkinson's disease, the disease's progression can be slowed down, which reduces the burden of the disease and its impairments on society¹⁹.

The rationale of the current study is to assess the functional status of patients with stage III Parkinson's disease so that appropriate preventive and rehabilitative measures can be incorporated at this stage which will help to preserve the maximal level of functioning and slow down the advancement of the disease.

Methodology

It was a descriptive case series, n=32 subjects were recruited from the following hospitals of Lahore; Ghurki Trust Teaching Hospital, Jinnah Hospital and Neurology department of Mayo Hospital. The duration of study was from June 2020 to January 2021. The sampling technique used was non-probability convenience sampling. The study was approved by the ethical board of Lahore College of physical therapy LCPT/DPT/16/631. The inclusion criteria were clinically diagnosed subjects of Parkinson Disease at Stage III (Hoehn & Yahr) scale with age ranges from 45 to 75 years that is middle aged and elderly individuals. Patients with other neurological issues were excluded from the study. Written informed consent was taken from each patient prior to study. The patients were assessed using a Functional independence measure (FIM) scale having inter-rater reliability of 0.95²⁰. It contains 18 items composed of 13 motor tasks and 5 cognitive tasks and tasks are rated on 7-point ordinal scale that ranges from total assistance to complete independence. The total score for the FIM motor subscale (the sum of the individual motor subscale items) will be a value between 13 and 91; whereas, cognition subscale (the sum of the individual cognition subscale items) will be a value between 5 and 35. Hence, the total score for the FIM instrument (the sum of the motor and cognition subscale scores) will be a value between 18(lowest) and 126(highest). Thus, FIM is used to assess and grade the functional status of a person based on the level of assistance he or she requires. The inter-rater reliability of FIM ranged from 0.93 to 0.97,

while the intra-rater was 0.99 for the motor, cognitive and total FIM score. Cronbach alpha coefficients were 0.97 and 0.95 respectively for the motor and cognitive scores²¹. Data was analyzed by using SPSS version 21 descriptive statistics were reported and variables are presented in the form of frequencies and percentages.

Results

Out of 64 participants, the minimum age of participants was 45 years; maximum age 78 years with a mean age was of 61.56 and standard deviation (SD) of 9.53 as shown in table 1. Whereas, 75% (n=48) were males and 25% (n=16) were females.

No. of Participant	Minimum	Maximum	Mean	SD
64	45	78	61.56	9.53

Table 1: Descriptive statistics of age

About, 96.9% (n=62) participants were taking medication for Parkinson's disease and 40.7% (n=26) were suffering from Parkinson's disease from last 3-4 years as shown in table 2.

Demographics		Frequency	Percentage
Gender	Male	48	75%
	Female	16	25%
Patients using medication	Yes	62	96.9%
	No	2	3.1%
Duration of PD	1-2 years	10	15.5%
	3-4 years	26	40.7%
	5-6 years	24	37.5%
	7-8 years	4	6.3%

Table 2: Demographics of Patient

Functional status of patient assessed with FIM shows that in motor activities subjects requires assistance or modified dependency in self-care, sphincter control, transfer and locomotion. Eating being the easiest motor task of self-care as 59.4% patients showed moderate independence to complete independence while in stair climbing reported to be a difficult motor task as 84.4% patients required moderate assistance or modified dependency in it. In FIM Cognition subscale the communication task patient need supervision in comprehension and assistance in expression which mean somehow dependency. In social cognition component memory recalling is difficult as 87.4% patients require moderate assistance. Hence, functional status of Parkinson disease at stage Stage III (Hoehn & Yahr) had been shown in table 3.

Functional Independence Measure (FIM)		FIM Levels			
Subscale	Items	Helper-Complete Dependence Frequency (%)	Modified Dependence Frequency (%)	No Helper-Independence Frequency (%)	
Motor Subscale	Self-Care	Eating	0(0%)	26(40.6%)	38(59.4%)
		Grooming	2(3.1%)	56(87.4%)	6(9.5%)
		Bathing	4(6.3%)	58(90.6%)	2(3.1%)
		Dressing (Upper Body)	8(12.5%)	56(87.5%)	0(0%)
		Dressing (Lower Body)	6(9.5%)	58(90.5%)	0(0%)
		Toileting	6(9.5%)	58(90.5%)	0(0%)
	Sphincter Control	Bladder Control	2(3.1%)	52(81.2%)	10(15.7%)
		Bowel Control	2(3.1%)	52(81.2%)	10(15.7%)
	Transfers	Bed, Chair, Wheelchair	2(3.1%)	54(84.4%)	8(12.5%)
		Toilet	4(6.3%)	56(87.4%)	4(6.3%)
		Tub, Shower	8(12.5%)	52(81.2%)	4(6.3%)
		Walk/Wheelchair	6(9.5%)	52(81.2%)	6(9.5%)
	Locomotion	Stairs	8(12.5%)	54(84.4%)	2(3.1%)
		Comprehension	0(0%)	64(100%)	0(0%)
Cognition Subscale	Communication	Expression	0(0%)	64(100%)	0(0%)
		Social Interaction	4(6.3%)	28(43.7%)	32(50%)
	Social Cognition	Problem Solving	4(6.3%)	56(87.4%)	4(6.3%)
		Memory	6(9.5%)	56(87.4%)	2(3.1%)

Table 3: Motor and Cognitive Subscale of Functional Independence Measure of Parkinson’s Patient

FIM motor subscale total score shows a mean value 53.19 and SD 8.14 and FIM cognitive subscale total score mean was 21.19 and SD 3.47 as shown in Table 4.

FIM Subscale	Mean	Std. Deviation
FIM Motor Subscale	53.19	8.14
FIM Cognitive Subscale	21.19	3.47

Table 4: FIM Motor & Cognitive Subscale Descriptive Statistics

According to the frequency analysis, out of 64 patients, 75% (n=48) required minimal assistance in tasks of their daily life and 9.4% (n=6) required supervision. Whereas, 12.5% (n=8) required moderate assistance and 3.1% (n=2) required maximal assistance in ADLs.

Scoring	Frequency	Percentage
36-45(maximal assistance)	2	3.1%
54-63(moderate assistance)	8	12.5%
72-80(minimal assistance)	48	75.0%
90-100(supervision)	6	9.4%
100-126(independence)	0	0%

Table 5: FIM interpretation according to the level of assistance required

However, 2 hours of personal care assistance is needed per day by 81.3% participants with PD to compete with daily living.

Burden of Care	Frequency	Percentage
4 hours of personal care	6	9.4%
2 hours of personal care	52	81.3%
Compatible with family members	6	9.4%

Table 6: FIM rating the burden of care

Discussion

The purpose of the study was to analyze the functional status of patients, hours of care and level of assistance a patient need in stage III of PD by using FIM (functional independence measure) questionnaire so that appropriate preventive and rehabilitative measures can be incorporated by the physical therapist at this stage which will helps to preserve the maximal level of functioning and slow down the advancement of the disease. In 2019, Paul, Chuang, et al. conducted a study to find association between lifestyle factors and Parkinson's disease progression. He concluded that lifestyle elements decrease the rate of progression of disease²². Macchi, Koljack, et al. in 2019 elaborated that patient and caregiver factors lead to caregiver burden in individuals with PD²³. Moreover, in 2019 Feigin et al conducted a systematic analysis and interpreted that neurological burden increases with age and needs to develop prevention and treatment strategies²⁴. Hence, in current study it was found that with the progression of the disease to stage III Burden of care increases.

In 2019, Pelicioni, Menant et al. performed a study on 'Falls in Parkinson's Disease Subtypes' he concluded that patients with Postural Instability and Gait Difficulty are at greater risk of falls owing to functional impairments²⁵. The current study demonstrates that patients with Parkinson's disease suffer postural difficulties with growing age as the disease progress to stage III, balance impairment starts to prevail. Hence, compared to stages 1 and 2 assistance is required by patients at stage III to accomplish their ADLs. Therefore, it elaborates need for preventive measures to slow down the disease progression.

In 2018, Gupta, Fahn, et al. hypothesized that Hoehn and Yahr scale can be used globally for the assessment of posture, balance, stability, and other movement disorders²⁶. Moreover, Ladislav K Valach et al. in 2017 conducted an observational study indicating the usefulness of FIM in monitoring the patients with PD²⁷. However, in current study patient at stage III of Hoehn and Yahr scale were recruited and functional status of patients were assessed with FIM scale. The study revealed that minimal assistance is required in self-care; moderate to minimal assistance is required in sphincter control, minimal assistance in transfers, and moderate to minimal assistance in locomotion tasks.

In 2017, Yumiko Kaseda et al. conducted a study on the Therapeutic effects of intensive inpatient rehabilitation in advanced Parkinson's disease and found FIM motor average value 52-63, FIM cognitive average value 26-27.6, and total FIM score of 78-90²⁸. In the current study, it was concluded that at stage III patients with Parkinson's disease require minimal assistance to accomplish activities of daily living revealing a consistency of results with the previous study. In 2021 Yang Li et al. conducted a systemic review to assess the efficiency of aerobic exercise among Parkinson's disease patients and concluded that moderate aerobic exercise improves balance and gait in PD patients. Exercise of various kinds has diverse effects on PD patients' quality of life. It is imperative to systematize the exercise program additionally²⁹. Whereas, in the current study only the functional status of PD patient and their level of assistance is determined no exercise regime or intervention were incorporated to assess their impact on the PD patient functional activities.

Thus, it is recommended that future studies should carried out to find the correlation between aerobic exercises and their impact on PD patient level of functional independence.

Conclusion

According to the results of this study, it was reported that patients with Stage III Parkinson's disease required minimal level of assistance while performing tasks of daily living. However,

majority of these patients required 2 hours of personal care assistance on average per day to compete with activities of daily living.

AUTHORS' CONTRIBUTION:

The following authors have made substantial contributions to the manuscript as under:

Conception or Design: Rimsha Fatima

Acquisition, Analysis or Interpretation of Data: Somia Faisal

Manuscript Writing: Nabeela Safdar

Approval: Hafiz Muhammad Asim

All authors acknowledge their accountability for all facets of the research, ensuring that any concerns regarding the accuracy or integrity of the work are duly investigated and resolved.

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