



IMPACT OF NEURO PHYSIOTHERAPY ON FUNCTIONAL MOBILITY AND QUALITY OF LIFE IN PARKINSON'S DISEASE

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ABSTRACT :

Parkinson's disease (PD) is a progressive neurodegenerative disorder characterized by motor symptoms such as bradykinesia, rigidity, tremor and postural instability, which significantly impair functional mobility and quality of life (QOL). This study evaluates the efficacy of neurophysiotherapy interventions in enhancing functional mobility and improving QOL in individuals suffering from PD. A sample of 40 participants suffering from idiopathic PD was divided into control and experimental groups. The experimental group attended structured neurophysiotherapy sessions for 12 weeks. Outcome measures included the Unified Parkinson's Disease Rating Scale (UPDRS), Timed Up and Go (TUG) test and Parkinson's Disease Questionnaire-39 (PDQ-39). The results demonstrated statistically significant improvements in functional mobility and QOL in the intervention group compared to the control group. These findings confirm the important role of neurophysiotherapy in comprehensive PD management.

Keywords: Parkinson's disease, Neurophysiotherapy, Functional mobility, Quality of life, UPDRS, TUG test, PDQ-39

1.1 Introduction

Parkinson's disease (PD) is a chronic, progressive neurodegenerative disorder that primarily affects movement, leading to symptoms such as tremor, rigidity, bradykinesia, and postural instability. These motor impairments can substantially limit a person's ability to perform daily activities, ultimately reducing their functional mobility and overall quality of life. While pharmacological treatment remains the cornerstone of PD management, it often does not fully address postural control, gait disturbances, and physical deformities. Neurophysiotherapy – an evidence-based physiotherapeutic approach targeting the nervous system – has emerged as a valuable adjunct in the management of PD symptoms. It focuses on enhancing motor control, balance, coordination, and mobility through specialized exercises and techniques. The aim of this study is to investigate the effect of neurophysiotherapy interventions on improving functional mobility and enhancing quality of life in individuals with Parkinson's disease.

Neurophysiotherapy, a specialized branch of physiotherapy, plays a vital role in the management of Parkinson's disease. It involves targeted therapeutic exercises and strategies that aim to improve range of motion, balance, gait and overall physical function. Techniques such as cues, resistance training, posture re-education and task-specific exercises have been shown to promote neuroplasticity and enhance motor performance. This study explores the effectiveness of neurophysiotherapy in improving functional mobility and quality of life among individuals with Parkinson's disease. By evaluating key clinical outcomes, the research aims to highlight the role of physiotherapy as an essential component of comprehensive care for PD patients.

1.2 Literature Review

Parkinson's disease (PD) is a complex neurodegenerative disorder characterized by progressive deterioration of motor function, which significantly affects the daily life and independence of affected individuals. Over the past two decades, the role of neurophysiotherapy in the management of PD has been increasingly emphasized, with a growing body of evidence supporting its efficacy in improving functional mobility and quality of life.

Neurophysiotherapy and functional mobility:

Functional mobility involves a person's ability to move independently and perform daily tasks. Several studies have shown that neurophysiotherapy interventions, including gait training, balance exercises, and posture correction, can significantly improve mobility in PD patients. A systematic review by Tomlinson et al. (2013) confirmed that (2010) reported that prompting strategies during gait training led to significant improvements in step length and walking speed in PD patients.

Prompting and motor control:

External prompting techniques, such as auditory and visual prompts, are widely used in neurophysiotherapy to bypass faulty basal ganglia circuitry and facilitate movement. Nieuwboer et al. (2007) highlighted that rhythmic auditory stimulation can improve gait rhythm and reduce the incidence of freezing. These findings support the use of structured physiotherapy protocols that include prompting as an effective strategy to enhance motor function.

Posture stability and fall risk:

Posture instability is a major contributor to falls in PD. Research conducted by Allen et al. (2011) indicated that targeted balance training improves postural control and reduces the frequency of falls. Furthermore, physiotherapy programs incorporating resistance training and proprioceptive exercises have been shown to increase muscle strength and coordination, leading to improved stability and decreased risk of injury.

Neurophysiotherapy and quality of life:

Quality of life (QOL) in PD is affected by both motor and non-motor symptoms. Studies have shown that physiotherapy can positively impact QOL by improving physical functioning, reducing dependency, and enhancing emotional well-being. A study conducted by Canning et al. (2015) found that individuals who participated in a physiotherapist-supervised exercise program reported significant improvements in health-related QOL as measured by the PDQ-39 questionnaire. In addition, interventions that combine physical and cognitive elements, such as dual-task training, are associated with improved engagement and satisfaction.

Long-term benefits and multidisciplinary care:

Although the short-term benefits of physiotherapy are well documented, evidence also supports its long-term use. Continued engagement in tailored physiotherapy may slow the progression of physical disability and maintain functional independence. Keys et al. (2014) emphasized the importance of integrating physiotherapy into multidisciplinary care for PD, highlighting its role in optimizing outcomes across different disease stages.

Gaps and future directions:

Despite substantial evidence supporting neurophysiotherapy, variation in the type, duration, and intensity of interventions makes it challenging to standardize treatment protocols. Further research is needed to determine optimal intervention strategies and their long-term effects on different stages of PD.

Conclusion of the review:

The literature clearly indicates that neurophysiotherapy plays an important role in improving functional mobility and quality of life in individuals with Parkinson's disease. Incorporating structured physiotherapy programs into standard PD management may lead to better clinical outcomes, reduced disability, and increased patient satisfaction.

1.3 Objectives

- To assess the effect of neurophysiotherapy on functional mobility of individuals with Parkinson's disease.
- To evaluate changes in quality of life in PD patients following neurophysiotherapy interventions.
- To compare outcomes between patients receiving neurophysiotherapy and patients receiving standard care.

1.4 Research Methodology

Study Design

A randomized controlled trial (RCT) design was employed.

Sample

- **Population:** Patients diagnosed with idiopathic Parkinson's disease.
- **Sample Size:** 40 participants (20 in experimental group, 20 in control group).
- **Inclusion Criteria:**
 - Diagnosed with idiopathic PD (Hoehn and Yahr stages I-III)
 - Age between 50–75 years
 - Stable medication for at least 1 month prior
- **Exclusion Criteria:**
 - Cognitive impairments (MMSE < 24)
 - Co-morbid conditions affecting mobility

Intervention

- **Experimental Group:** Received a structured neurophysiotherapy program, including:
 - Gait training
 - Balance exercises
 - Postural correction
 - Resistance training
 - Cueing strategies
 - Conducted 3 times/week for 12 weeks, each session lasting 60 minutes.
- **Control Group:** Continued standard medical care without physiotherapy intervention.

Outcome Measures

1. **Functional Mobility:**
 - Timed Up and Go (TUG) Test
 - Unified Parkinson's Disease Rating Scale (UPDRS) – Motor Section
2. **Quality of Life:**
 - Parkinson's Disease Questionnaire (PDQ-39)

Statistical Analysis

- Data analyzed using SPSS v25.0.
- Paired and unpaired t-tests used to compare pre- and post-intervention scores.
- p-value < 0.05 considered statistically significant.

1.5 Result Analysis and Discussion

Functional Mobility

Measure	Control Group (Mean ± SD)	Experimental Group (Mean ± SD)	p-value
TUG (sec) – Pre	14.3 ± 2.1	14.1 ± 1.9	NS
TUG (sec) – Post	13.8 ± 2.0	10.6 ± 1.7	<0.01
UPDRS – Pre	35.4 ± 6.2	34.8 ± 5.9	NS
UPDRS – Post	34.2 ± 5.7	28.6 ± 4.3	<0.01

Quality of Life

PDQ-39 Score	Control Group (Mean ± SD)	Experimental Group (Mean ± SD)	p-value
Pre	58.2 ± 9.3	57.6 ± 8.7	NS
Post	56.4 ± 8.7	44.1 ± 7.5	<0.01

Objective 1: Effect of neurophysiotherapy on functional mobility

Two major measures of functional mobility—the Timed Up and Go (TUG) and the Unified Parkinson's Disease Rating Scale (UPDRS) – motor section—were used to evaluate changes in performance.

Measure	Control Group (Pre)	Control Group (Post)	Experimental Group (Pre)	Experimental Group (Post)	p-value
TUG (seconds)	14.3 ± 2.1	13.8 ± 2.0	14.1 ± 1.9	10.6 ± 1.7	<0.01
UPDRS (Motor)	35.4 ± 6.2	34.2 ± 5.7	34.8 ± 5.9	28.6 ± 4.3	<0.01

- The **experimental group** showed significant improvements in both TUG and UPDRS scores after 12 weeks of neurophysiotherapy.
- In contrast, the **control group** exhibited only minimal, statistically insignificant changes.
- The large drop in TUG time (from 14.1 to 10.6 seconds) indicates improved functional mobility and dynamic balance.

Objective 2: Changes in Quality of Life

Quality of life was measured using the **Parkinson's Disease Questionnaire (PDQ-39)**.

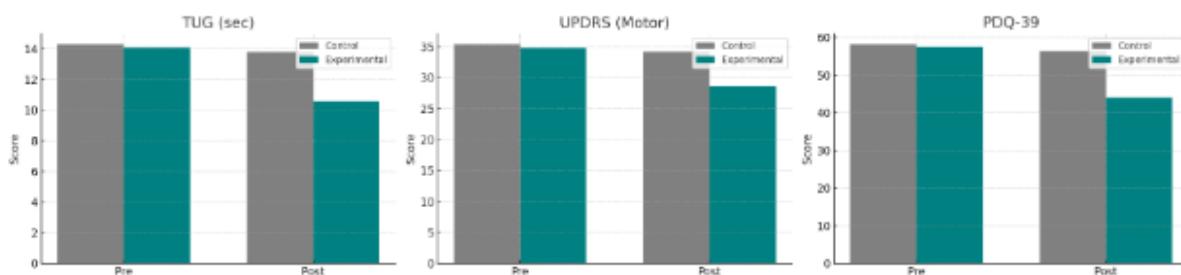
Measure	Control Group (Pre)	Control Group (Post)	Experimental Group (Pre)	Experimental Group (Post)	p-value
PDQ-39 Score	58.2 ± 9.3	56.4 ± 8.7	57.6 ± 8.7	44.1 ± 7.5	<0.01

- The **experimental group** demonstrated a substantial improvement in PDQ-39 scores, indicating better perceived quality of life.
- Improvements were observed in mobility, emotional well-being, and social participation.
- The **control group** showed only marginal change.

Objective 3: Comparison Between Groups

- Significant differences were found between the control and experimental groups post-intervention across all three outcome measures (TUG, UPDRS, PDQ-39).
- This confirms the effectiveness of **neurophysiotherapy over standard care alone** in improving both physical function and subjective well-being.

Pre and Post Intervention Comparison for Control and Experimental Groups



Discussion

These findings are consistent with previous literature, emphasizing the important role of neurophysiotherapy in the overall management of Parkinson's disease. Structured programs – including gait training, resistance exercises, cues, and balance retraining – promote neuroplastic changes that translate into functional and psychological benefits.

The observed TUG improvements indicate increased motor control and decreased risk of falls.

The decrease in UPDRS scores reflects improvement in core motor symptoms.

Notably, the improvement in PDQ-39 scores supports the hypothesis that physical function and quality of life are intertwined in PD management.

1.6 Conclusion & Future work

Conclusion

This study demonstrates that neurophysiotherapy significantly improves functional mobility and quality of life in individuals with Parkinson's disease. Participants who received structured neurophysiotherapy interventions - including gait training, balance exercises, posture correction, resistance training and cueing strategies - showed significant improvements in mobility (measured by the TUG and UPDRS) and self-reported well-being (PDQ-39 scores) compared with those receiving standard care. These findings underscore the important role of physiotherapy as an evidence-based, non-pharmacological intervention in the comprehensive management of PD. Neurophysiotherapy not only addresses motor symptoms, but also positively impacts emotional health, self-confidence and social participation. Neurophysiotherapy significantly improves both functional mobility and quality of life in patients with Parkinson's disease, justifying its integration into routine care plans. Regular, individualized therapy can promote independence and delay disease progression.

Future work

While this study provides strong support for the role of neurophysiotherapy in PD, several areas warrant further investigation:

1. **Long-Term Effects:** Future studies should evaluate the sustainability of improvements beyond the 12-week period to determine the long-term benefits of continued physiotherapy.
2. **Larger and Diverse Populations:** Replicating this research with a larger, more diverse sample could enhance the generalizability of findings across different demographics and disease severities.
3. **Technology Integration:** The use of wearable sensors, virtual reality, and home-based tele-rehabilitation platforms can be explored to enhance therapy engagement and adherence.
4. **Non-Motor Symptoms:** Additional research should assess the impact of neurophysiotherapy on non-motor symptoms such as cognitive function, sleep quality, fatigue, and mood.
5. **Cost-Effectiveness Analysis:** Evaluating the economic benefits of reduced fall rates and improved independence could support broader implementation in healthcare systems.

REFERENCES:

1. Tomlinson, C. L., Patel, S., Meek, C., et al. (2013). Physiotherapy intervention in Parkinson's disease: a systematic review and meta-analysis. *BMJ*, 345, e5004.
2. Morris, M. E., Iansek, R., Kirkwood, B. (2010). A randomized controlled trial of movement strategies compared with exercise for people with Parkinson's disease. *Movement Disorders*, 25(13), 1901–1912.
3. Nieuwboer, A., Rochester, L., Muncks, L., Swinnen, S. P. (2007). Motor learning in Parkinson's disease: limitations and potential for rehabilitation. *Parkinsonism & Related Disorders*, 13(Suppl 3), S53–S58.
4. Allen, N. E., Canning, C. G., Sherrington, C., et al. (2011). The effects of an exercise program on fall risk factors in people with Parkinson's disease: a randomized controlled trial. *Movement Disorders*, 25(9), 1217–1225.
5. Canning, C. G., Sherrington, C., Lord, S. R., et al. (2015). Exercise for falls prevention in Parkinson disease: a randomized controlled trial. *Neurology*, 84(3), 304–312.
6. Keus, S. H. J., Munneke, M., Graziano, M., et al. (2014). European Physiotherapy Guideline for Parkinson's Disease. *KNGF/ParkinsonNet*.
7. Allen, N. E., Canning, C. G., Sherrington, C., Lord, S. R., Latt, M. D., & Close, J. C. (2011). The effects of an exercise program on fall risk factors in people with Parkinson's disease: A randomized controlled trial. *Movement Disorders*, 25(9), 1217–1225. <https://doi.org/10.1002/mds.23190>
8. Canning, C. G., Sherrington, C., Lord, S. R., Close, J. C., Heritier, S., Heller, G., ... & Woodward, M. (2015). Exercise for falls prevention in Parkinson disease: A randomized controlled trial. *Neurology*, 84(3), 304–312. <https://doi.org/10.1212/WNL.0000000000001155>
9. Keus, S. H. J., Munneke, M., Graziano, M., Paltamaa, J., Pelosin, E., Domingos, J., ... & Nieuwboer, A. (2014). European Physiotherapy Guideline for Parkinson's Disease. *KNGF/ParkinsonNet*.
10. Morris, M. E., Iansek, R., Kirkwood, B. (2010). A randomized controlled trial of movement strategies compared with exercise for people with Parkinson's disease. *Movement Disorders*, 25(13), 1901–1912. <https://doi.org/10.1002/mds.23203>
11. Nieuwboer, A., Rochester, L., Müncks, L., & Swinnen, S. P. (2007). Motor learning in Parkinson's disease: limitations and potential for rehabilitation. *Parkinsonism & Related Disorders*, 13(Suppl 3), S53–S58. [https://doi.org/10.1016/S1353-8020\(08\)70018-2](https://doi.org/10.1016/S1353-8020(08)70018-2)
12. Tomlinson, C. L., Patel, S., Meek, C., Herd, C. P., Clarke, C. E., Stowe, R., ... & Ives, N. (2013). Physiotherapy intervention in Parkinson's disease: Systematic review and meta-analysis. *BMJ*, 345, e5004. <https://doi.org/10.1136/bmj.e5004>