Journal of Rare Cardiovascular Diseases
ISSN: 2299-3711 (Print) | e-ISSN: 2300-5505 (Online)
www.jrcd.eu
RESEARCH ARTICLE

Effectiveness Of Home-Based Exergaming On Functional Outcomes In Patients With Parkinsonism - A Case Series

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Article History
Received: 21.07.2025
Revised: 29.07.2025
Accepted: 26.08.2025
Published: 24.09.2025

Abstract: Parkinsonism is a progressive neurological disorder characterized by motor and non-motor symptoms that significantly impact daily activities and quality of life. Current treatments mainly focus on pharmacological interventions, yet non-pharmacological approaches, such as exercise programs, have shown promising improvement in the motor function and overall well-being. This case series aims to investigate the effectiveness of exergaming on functional outcomes, including mobility, balance, activities of daily living, and quality of life, in patients diagnosed with Parkinsonism. This study is a case series involving 10 participants and conducted the interventions at both OPD ward of the Faculty of Physiotherapy at MAHER and at participants' home. A structured exergaming program was implemented utilizing standardized outcome measures to assess changes in functional abilities pre- and post-intervention. A 6-week home-based exergaming program was tailored to focus on balance, coordination and functional movements. Participants demonstrated enhanced engagement and motivation throughout the program, with notable improvements in specific functional domains. This case series shows that Home-Based exergaming may serve as a beneficial supplementary therapy for enhancing physical results in patients with Parkinsonism. Future study with bigger sample numbers is necessary to clarify the long-term advantages and ideal implementation tactics of exergaming within this demographic.

Keywords: Parkinsonism, exergaming, functional outcomes, mobility, balance, quality of life

INTRODUCTION

According to the National Policy for Older People pertaining to India, individuals above 60 years of age are classified as elderly under the. In 2011 Census there was a steady rise in this population, and is believed to increase further in the coming decades (Government of India, 2011). This demographic variation has been associated with an increased prevalence of chronic neurological conditions, including Parkinson's disease. It is the second most common neurodegenerative disease in the world. By 2025 there will be 25.2 million people living with Parkinson's disease. It is a progressive neurodegenerative movement disorder mainly due to the motor disabilities characterized by symptoms like bradykinesia, tremor, rigidity, and postural instability, as well as mood disturbances, constipation, and sleep dysfunction (Jankovic, 2008; Kalia & Lang, 2015). As time these axial motor nerves deteriorates resulting in manifestations often lead to significant functional limitations and reduced quality of life. Exercise has been widely recognised as a successful non-pharmacological treatment for Parkinson's disease symptoms involving, both motor and non-motor. Research indicates that planned exercises can enhance mobility, independence, and overall function, especially those that include balancing and more intense exercise. (Goodwin et al., 2008; Bloem et al., 2015).

Exergaming, which combines interactive digital worlds with workouts, has become a new therapeutic technique in the past decade. Exergames were first created for amusement, but they have demonstrated significant advantages for senior citizens by enhancing their stamina, balance, and cognitive abilities. (Staiano & Calvert, 2011; Skjæret et al., 2016). In Parkinson's illness, exergaming has shown promising benefits, with research emphasizing its contribution to improving functional outcomes and aiding fall-prevention techniques. (Barry et al., 2014). To evaluate these outcomes, reliable assessment tools are essential. The Berg Balance Scale (Berg et al., 1989) remains one of the most widely used measures of balance in neurological populations, while the Montreal Cognitive Assessment (Nasreddine et al., 2005) provides a validated tool for screening cognitive impairment. Despite the growing evidence, limited studies have explored the feasibility of home-based exergaming for patients with Parkinsonism. The present case series aims to examine its effectiveness in improving functional outcomes, with the broader goal of promoting sustainable physical activity and enhancing quality of life in the geriatric population.

MATERIALS AND METHODS

Study Design and Settings

This study was conducted for a total duration of six weeks among the Outpatient of Department of the Physiotherapy, Meenakshi college of Physiotherapy. The treatment was conducted at both hospital and at patients' house when required.

Sampling and Participants

A convenient sampling technique was used to select the patients. The inclusion criteria included the patients were 50 years or above, both gender, clinically diagnosed with parkinsonism and classified under Hoehn and Yahr stages 1, 2, or 3, individuals able to stand independently for at least three minutes, provide written informed consent for the study and who can communicate in Tamil or English.

Exclusion criteria included patient with osteoporotic fractures and under conservative treatment, patients with *severe* mobility or cognitive impairments, patients with major psychiatric illness, patients with significant sensory deficits like visual or auditory impairments.

Instruments and materials used:
Instruments Includes coloured wall charts, rings with small objects, cones, sticks with resistance weights, lightweight balls, sandbags, and a chair with back support. The set-up and arrangement of equipment are illustrated in Figures 1, 2 and 3.

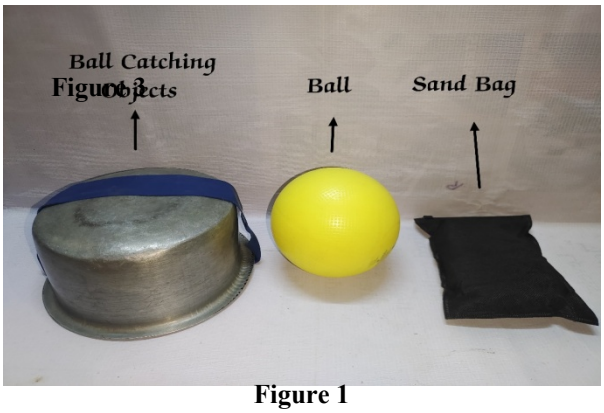


Figure 1

Figure 2

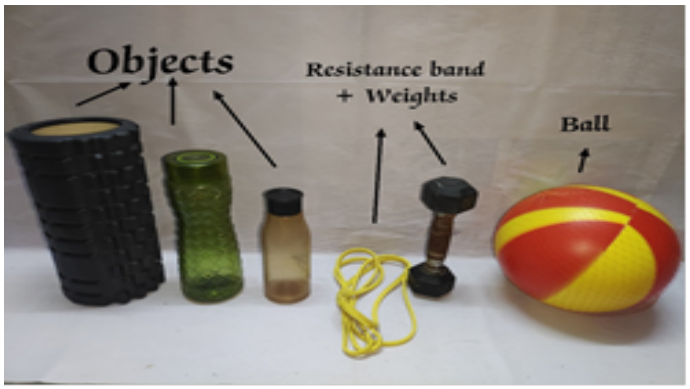


Figure 3

Safety and Monitoring
All exercises were performed under the proper supervision and safety of the patient was ensured by using gait belts during standing tasks. During the home-based sessions, appropriate instructions were given to the caretakers to ensure the guidance to participants as needed. Participants were followed up weekly bases to document any difficulties or adverse effects refer figure 4 and 5.

Outcome Measures and Data Analysis
Baseline and post-intervention assessments were done for Timed Up, Go Test, 10-metre walk test and Berg Balance Scale with subjective measures such as the Activities-specific Balance Confidence scale and a satisfaction questionnaire. Descriptive statistics and paired statistical tests were used for data analyses using, and the level of significance set at $p < 0.05$.

Figure 4: Standing colour taps **Figure 5: Ball stop and kick**

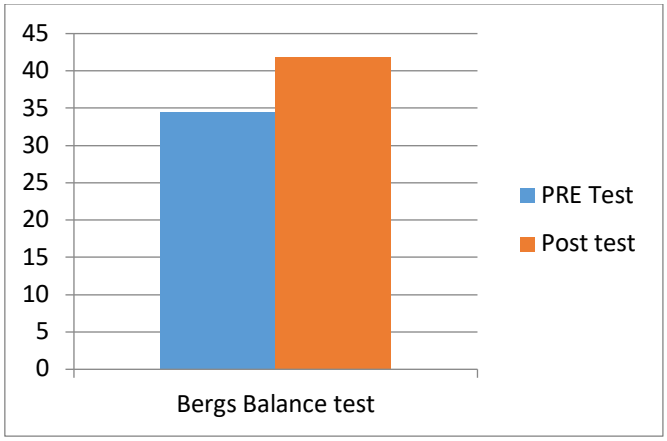
RESULTS AND OBSERVATIONS:

The results shows that in the Balance berg scale the mean values of pre – test is 34.40 and Post-test is 41.80 and high significance was observed when comparing the pre-test and post test values within Group (***- P ≤ 0.001) displayed in Figure 4 and Table 1.

TABLE-1COMPARISON OF BERGS BALANCE TEST (BBT) WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

BBT	PRE TEST		POST TEST		t- TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	34.40	2.83	41.80	2.57	-12.33	.000***

FIGURE - 6



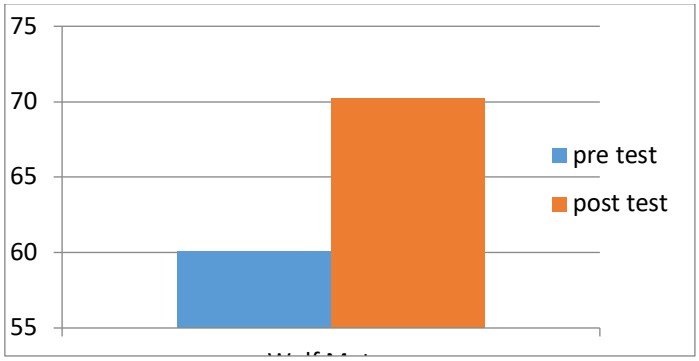
COMPARISON OF BERGS BALANCE TEST WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

Table- 2 shows that the mean values of pre – test (60.1) and Post-test (70.20) of Wolf Motor Scale shows there is a highly significant difference the pre test and post test values within Group (***- P ≤ 0.001).

TABLE-2 COMPARISON OF WOLF MOTOR SCALE (WMS) WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

WMS	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	60.1	2.57	70.2	1.47	-13.43	.000***

FIGURE -7



COMPARISON OF WOLF MOTOR SCALE WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

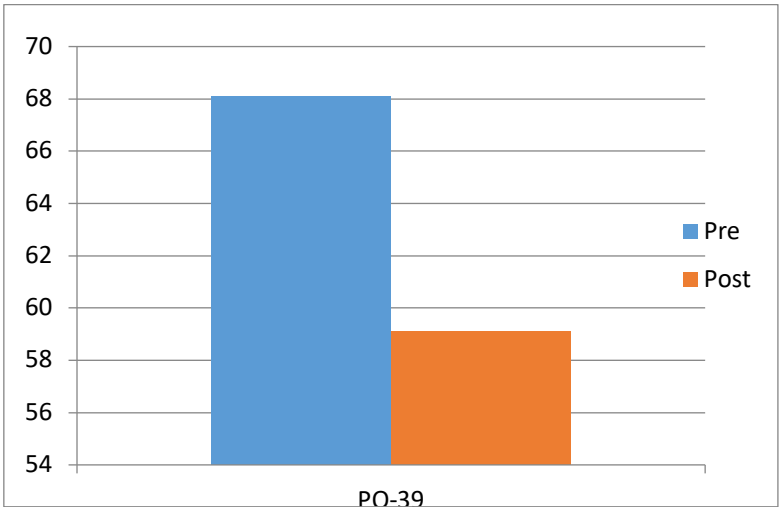
Table- 3 shows that the mean values of pre – test (68.10) and Post-test (58.10) of Parkinsonism Questionarrine-39 shows there is a highly significant difference the pre test and post test values within Group (***- $P \leq 0.001$).

TABLE-3

COMPARISON OF PARKINSONISM QUESTIONARINE (PQ -39) WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

PQ-39	PRE TEST		POST TEST		t - TEST	SIGNIFICANCE
	MEAN	S.D	MEAN	S.D		
GROUP	68.1	5.89	59.1	7.40	7.26	.000***

FIGURE - 8



COMPARISON OF PARKINSONISM QUESTIONARINE -39 WITHIN GROUP BETWEEN PRE AND POST TEST VALUES

DISCUSSION

This study evaluated the effectiveness of home-based exergaming in improving functional outcomes among geriatric patients with Parkinsonism. The Berg Balance Scale, Parkinson's disease Questionnaire (PDQ-39), and Wolf Motor Function Test (WMFT) all showed notable gains in quality of life, balance, and upper limb function. These results corroborate earlier research emphasizing exergaming as a beneficial complement to

traditional therapy for patients with Parkinson's disease (Ribas et al., 2017; Garcia-Agundez et al., 2019).

Barry et al., 2020; Nuic et al., 2023 all has reported in there research that exergaming can not only enhance balance, coordination but also motor dexterity thus promoting cognitive engagement. The present study outcomes suggest that home-based exergaming provides feasible and cost-effective alternative treatment in physiotherapy. The exergames is interactive way and thus enhance motivation and adherence, primarily among elderly persons who opt for exercise in comfortable residences (Staiano & Calvert, 2011).

Despite its encouraging results, this study's main disadvantage is the lack of a control population, which limits comparisons between the traditional or no-intervention procedures. In future research we must incorporate larger samples to perform randomized controlled trials and use of standardized assessment tools to validate these findings and also its long-term effects (Garcia-Agundez et al., 2019). All things considered, home-based exercising is a creative, economical, and successful way to support mental and physical rehabilitation, promoting the independence and standard of life for Parkinsonism patients.

CONCLUSION

Finally, the present research emphasizes the usefulness of home-based exercising as a realistic, inexpensive, and enjoyable alternative to Parkinson's therapy. Exergaming offers a fun, simple to master and interesting approach s that provide overall psychological and intellectual benefits. Unlike with conventional virtual realistic exergames, this approach is cost-effective, easy to use, and has least adverse effects, making it ideal for home-based therapy. As a consequence, exercising may be proposed as a probable and effective rehabilitation technique for improving functional independence and psychological health in elderly Parkinson's patients.

REFERENCES

1. Barry, G., Barry, C., & Finnegan, L. (2020). Exergaming for people with Parkinson's disease: An exploration of usability and patient experience. Disability and Rehabilitation: Assistive Technology, 15(6), 736–743. https://doi.org/10.1080/17483107.2019.1604823
2. Barry, G., Galna, B., & Rochester, L. (2014). The role of exergaming in Parkinson's disease rehabilitation: A systematic review of the evidence. Movement Disorders, 29(8), 1080–1088. https://doi.org/10.1002/mds.25964
3. Berg, K. O., Wood-Dauphinee, S. L., Williams, J. I., & Maki, B. (1989). Measuring balance in the elderly: Validation of an instrument. Canadian Journal of Public Health, 83(Suppl 2), S7–S11.
4. Bloem, B. R., de Vries, N. M., & Ebersbach, G. (2015). Nonpharmacological treatments for patients with Parkinson's disease. Movement Disorders, 30(11), 1504–1520. https://doi.org/10.1002/mds.26363
5. García-Agúndez, A., Folkerts, A. K., Konrad, R., Caserman, P., Tregel, T., Goosses, M., Göbel, S., & Kalbe, E. (2019). Recent advances in rehabilitation for Parkinson's disease with exergames: A systematic review. Journal of NeuroEngineering and Rehabilitation, 16(1), 17. https://doi.org/10.1186/s12984-019-0492-1
6. Goodwin, V. A., Richards, S. H., Taylor, R. S., Taylor, A. H., & Campbell, J. L. (2008). The effectiveness of exercise interventions for people with Parkinson's disease: A systematic review and meta-analysis. Movement Disorders, 23(5), 631–640. https://doi.org/10.1002/mds.21922
7. Government of India. (2011). Census of India 2011: Population enumeration data. Office of the Registrar General & Census Commissioner, India.
8. Jankovic, J. (2008). Parkinson's disease: Clinical features and diagnosis. Journal of Neurology, Neurosurgery & Psychiatry, 79(4), 368–376. https://doi.org/10.1136/jnnp.2007.131045
9. Kalia, L. V., & Lang, A. E. (2015). Parkinson's disease. The Lancet, 386(9996), 896–912. https://doi.org/10.1016/S0140-6736(14)61393-3
10. Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., & Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: A brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society, 53(4), 695–699. https://doi.org/10.1111/j.1532-5415.2005.53221.x
11. Nuic, D., Funken, J., & Bonnechère, B. (2023). The impact of home-based customized exergame training on gait and balance in Parkinson's disease: A randomized controlled trial. Frontiers in Aging Neuroscience, 15, 119–134. https://doi.org/10.3389/fnagi.2023.1162385
12. Ribas, C. G., Alves da Silva, L. A., Corrêa, M. R., Teive, H. A. G., & Valderramas, S. (2017). Effectiveness of exergaming in improving functional balance, fatigue, and quality of life in Parkinson's disease: A pilot randomized controlled trial. NeuroRehabilitation, 40(1), 141–147. https://doi.org/10.3233/NRE-161398
13. Skjæret, N., Nawaz, A., Morat, T., Schoene, D., Helbostad, J. L., & Vereijken, B. (2016). Exercise and rehabilitation delivered through exergames in older adults: An integrative review of technologies, safety, and efficacy. International Journal of Medical Informatics, 85(1), 1–16. https://doi.org/10.1016/j.ijmedinf.2015.10.008
14. Staiano, A. E., & Calvert, S. L. (2011). Exergames for physical education courses: Physical, social, and cognitive benefits. Child Development Perspectives, 5(2), 93–98. https://doi.org/10.1111/j.1750-8606.2011.00162.x