RESEARCH PAPER

Effect of a Nurse-Led Educational Intervention on Knowledge, Functional Mobility, and Quality of Life among Elderly Patients with Parkinson's Disease: A Quasi-Experimental Study

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ABSTRACT

Background: Parkinson's disease (PD) is the second most common age-related neurodegenerative disorder, and its burden is rising as the global population ages. Progressive motor and non-motor symptoms compromise functional mobility and quality of life (QoL) in older adults, yet structured, nurse-led educational interventions for this population remain underused, particularly in low-resource settings.

Aim: To evaluate the effect of an individualized, nurse-led educational intervention on disease-related knowledge, functional mobility, and QoL among elderly patients with PD.

Methods: A quasi-experimental, pretest–posttest design with a non-equivalent control group was used. Sixty elderly patients (aged ≥ 60 years) with PD (Hoehn and Yahr stages 1–3) attending the movement-disorder outpatient clinic of a university hospital in Cairo, Egypt, were assigned to an intervention group (n = 30) or a control group (n = 30). The intervention group received a seven-session, individualized educational program grounded in Orem's self-care model, covering disease knowledge, fall prevention, nutrition, and therapeutic exercise; the control group received routine outpatient care. Outcomes were assessed at baseline, immediately post-intervention, and at 3-month follow-up using a structured knowledge questionnaire, the Modified Hoehn and Yahr Scale, the Short Physical Performance Battery (SPPB), and the 39-item Parkinson's Disease Questionnaire (PDQ-39).

Results: The two groups were comparable at baseline (all $p > .05$). At posttest, the intervention group showed significantly higher total knowledge scores than the control group (12.71 ± 0.87 vs. 3.80 ± 1.95) and significantly higher total SPPB scores (8.93 ± 2.08 vs. 6.83 ± 1.71; both $p < .001$). PDQ-39 scores also changed significantly more in the intervention group across all eight dimensions ($p < .001$–$.01$); the direction and clinical interpretation of this change is discussed below. Gains in knowledge and functional mobility were largely sustained at 3-month follow-up. No significant change over time was observed in the control group.

Conclusion: A structured, individualized nurse-led educational intervention significantly improved disease-related knowledge and functional mobility among elderly patients with PD, with sustained benefit at follow-up.

Implications for practice: Gerontological and neuroscience nurses should consider integrating structured, self-care-based educational programs into the routine outpatient management of elderly patients with PD.

Keywords: Parkinson's disease; older adults; educational intervention; functional mobility; quality of life; gerontological nursing; self-care

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INTRODUCTION

The global population of older adults is increasing rapidly, projected to rise from 524 million in 2010 to about 1.5 billion by 2050, with most of this growth take place in developing countries (World Health Organization, 2017). In Egypt, older adults represented 7.3% of the population in 2011 and are projected to be 11.6% by 2030, and the country is expected to have the largest older-adult population in the Middle East and North Africa region by 2050 (Mehanna, 2022)

Parkinson's disease (PD) is the second most common age-related neurodegenerative disorder after Alzheimer's disease, affecting an estimated 7 to 10 million people worldwide; incidence rises sharply with age, and men are approximately 1.5 times more likely than women to be affected (Carmichael et al., 2021). PD produces progressive motor symptoms — tremor, rigidity, bradykinesia, and gait and balance impairment — alongside non-motor symptoms such as cognitive change, sleep disturbance, and depression, all of which erode functional mobility and health-related quality of life (Kaufman et al., 2022).

Functional mobility, the ability to move independently and safely to perform activities of daily living, is a key determinant of independence in older adults with PD; its loss is associated with falls, dependency, and institutionalization (Kaufman et al., 2022). Quality of life, defined by the World Health Organization as an individual's perception of their position in life relative to their goals and standards, is similarly compromised as PD advances (Jerjes et al., 2022). Patient education is a core, low-cost nursing intervention that can improve disease self-management, treatment adherence, and the therapeutic relationship (Zafar & Yaddanapudi, 2021); however, evidence on structured, individualized educational interventions for elderly patients with PD — particularly in Arab and low-resource healthcare settings — remains limited.

This gap is significant because gerontological nurses are well positioned to deliver structured education that addresses knowledge deficits, promotes safe exercise, and supports self-care behaviors in this population. Building on Orem's self-care deficit theory, which frames nursing action as compensating for or supporting a patient's capacity for self-care, an individualized educational intervention may plausibly improve PD-related knowledge, functional mobility, and quality of life among elderly patients. The present study was designed to test this hypothesis in an outpatient neurology setting in Egypt.

Aim: The aim of this study was to evaluate the effect of a nurse-led educational intervention on PD-related knowledge, functional mobility, and quality of life among elderly patients with Parkinson's disease.

Hypotheses: (1) Elderly patients with PD who receive the educational intervention will show higher knowledge scores post-intervention than at baseline and higher scores than the control group. (2) They will show higher functional mobility scores post-intervention than at baseline and higher scores than the control group. (3) They will show higher quality-of-life scores post-intervention than at baseline and higher scores than the control group.

METHODS

Design

A quasi-experimental, non-equivalent control group design with pretest, posttest, and 3-month follow-up assessments was used.

Setting

The study was conducted in the movement-disorder outpatient clinic of Kasr Al-Ainy Hospital, a university hospital affiliated with Cairo University, Egypt.

Sample

A purposive sample of 60 elderly patients (aged ≥ 60 years) diagnosed with PD at Hoehn and Yahr stages 1–3 was recruited from the outpatient neurology clinic. Patients were alternately assigned to the intervention group (n = 30) or the control group (n = 30) by even/odd allocation number. The intervention group received the educational program in addition to routine care; the control group received routine outpatient care only. Data were collected over 3 months.

INSTRUMENTS

Four tools were used:

(1) A structured interview questionnaire developed by the researcher, comprising a sociodemographic and medical-history section and a 16-item, multiple-choice PD knowledge questionnaire covering risk factors, symptoms, causes, and treatment (score range 0–16; content validity index = 0.90). (2) The Modified Hoehn and Yahr Scale, a widely used and validated staging system for PD-related functional disability (intra-rater ICC 0.85–0.95; Bjornestad et al., 2016; Goetz et al., 2019). (3) The Short Physical Performance Battery (SPPB), developed by the U.S. National Institute on Aging, assessing balance, gait speed, and chair-stand performance (score range 0–12; interrater ICC 0.81–0.91; Olsen & Bergland, 2017; Ronai & Gallo, 2019). (4) The 39-item Parkinson's Disease Questionnaire (PDQ-39), an eight-domain, disease-specific quality-of-life instrument scored on a 0–100 scale per domain (ICC 0.49–0.96; Jesus-Ribeiro et al., 2017; Opara et al., 2018).

Intervention

Following baseline assessment, the intervention group received an individualized, nurse-delivered educational program based on Orem's self-care model, comprising seven weekly sessions of 20–30 minutes each, delivered at the outpatient clinic using group discussion, demonstration, an illustrated booklet, posters, and exercise video content. Session content progressed from orientation and disease education (definition, causes, signs and symptoms) through fall prevention and general exercise, treatment options and nutrition, management of constipation, and management of drooling, concluding

with a review session and immediate posttest. Each patient/caregiver received a take-home educational booklet. The control group continued routine outpatient care. Both groups were reassessed immediately after the intervention period and again at 3-month follow-up.

Ethical Considerations

The study was approved by the Research Ethics Committee, Faculty of Nursing, Cairo University. Written informed consent was obtained from all participants after explanation of the study's purpose, benefits, and risks. Participants were informed of their right to withdraw at any time without penalty, and confidentiality of data was assured.

Statistical Analysis

Data were analyzed using SPSS version 20.0 (SPSS Inc., Chicago, IL). Categorical variables were summarized as frequencies and percentages and compared using the chi-square test; continuous variables were summarized as mean ± SD and compared using the independent-samples t-test (between groups) and repeated-measures ANOVA (within groups, across the three time points). Pearson correlation coefficients were used to examine associations among study variables. Statistical significance was set at $p < .05$, with $p < .001$ considered highly significant.

RESULTS

The two groups were statistically comparable at baseline on all sociodemographic and clinical characteristics, including age, sex, marital status, education, income, chronic illness, stroke history, family history of PD, and disease severity (all $p > .05$; Table 1), supporting the adequacy of group allocation.

Characteristic	Control group (n = 30)	Intervention group (n = 30)	Test value	p
Age, years, mean ± SD	64.20 ± 1.10	64.26 ± 1.11	$\chi^2 = 0.31$	0.86
Sex, male, n (%)	22 (73.3)	26 (86.7)	—	—
Married, n (%)	22 (73.3)	23 (76.6)	—	—
Secondary education or higher, n (%)	21 (70.0)	18 (60.0)	—	—
Sufficient income, n (%)	17 (56.7)	20 (66.7)	$\chi^2 = 0.64$	0.43
At least one chronic illness, n (%)	24 (80.0)	22 (73.3)	$\chi^2 = 17.14$	0.09
History of stroke, n (%)	10 (33.3)	5 (16.7)	$\chi^2 = 2.22$	0.14
Family history of PD, n (%)	2 (6.7)	4 (13.3)	$\chi^2 = 0.74$	0.39
PD severity (Hoehn & Yahr), mean ± SD	1.93 ± 0.68	1.40 ± 0.43	t = 9.92	0.20

At baseline, total knowledge scores did not differ significantly between groups. Over time, the control group showed no significant change (repeated-measures ANOVA, $F = 0.02$, $p = .79$), whereas the intervention group showed a highly significant increase from pretest to posttest that was largely sustained at follow-up ($F = 66.60$, $p < .001$). The between-group difference was highly significant at posttest and follow-up (Table 2).

Outcome	Control Pretest	Control Posttest	Control Follow-up	Interv. Pretest	Interv. Posttest	Interv. Follow-up	Between-group p (posttest)
Total knowledge score (0–16), mean ± SD	3.80 ± 1.95	3.60 ± 1.90	3.70 ± 1.95	4.86 ± 1.04	12.71 ± 0.87	11.68 ± 1.01	< 0.001

Functional mobility, measured by the SPPB, followed a similar pattern. The control group showed no significant within-group change over time (all $p > .05$), while the intervention group improved significantly across all three SPPB domains and the total score, with gains partly sustained at follow-up (Table 3). Between-group differences were significant at posttest for all domains and the total score.

SPPB domain	Control Pretest	Control Posttest	Control Follow-up	Interv. Pretest	Interv. Posttest	Interv. Follow-up	Between-group p (posttest)
Balance (0–4)	3.40 ± 0.72	3.42 ± 0.72	3.32 ± 0.61	2.46 ± 0.81	3.01 ± 0.86	3.00 ± 0.86	0.02*
Gait speed (0–4)	1.70 ± 0.43	1.61 ± 0.47	1.70 ± 0.40	1.31 ± 0.00	3.14 ± 0.37	3.10 ± 0.37	< 0.001**
Chair stand (0–4)	1.70 ± 0.53	1.80 ± 0.52	1.85 ± 0.45	1.23 ± 0.43	2.78 ± 0.85	1.76 ± 0.85	0.02*

Total SPPB score (0–12)	6.80 ± 1.68	6.83 ± 1.71	6.87 ± 1.46	5.00 ± 1.24	8.93 ± 2.08	7.86 ± 2.08	< 0.001**

Total PDQ-39 scores, and all eight PDQ-39 dimension scores, increased significantly more in the intervention group than in the control group between pretest and posttest, and this pattern persisted at follow-up (Table 4). Because higher PDQ-39 scores conventionally indicate poorer perceived quality of life, this directional finding warrants careful interpretation and verification against the original scoring convention before the manuscript is finalized for submission (see Discussion).

PDQ-39 dimension	Control Pretest	Control Posttest	Interv. Pretest	Interv. Posttest	Between-group p (posttest)
Mobility	22.67 ± 1.68	23.90 ± 1.68	23.53 ± 2.50	29.96 ± 1.83	< 0.001**
Activities of daily living	12.50 ± 1.10	12.90 ± 0.90	14.10 ± 1.64	20.40 ± 2.10	< 0.001**
Emotional well-being	13.80 ± 0.81	13.10 ± 0.79	13.28 ± 2.22	19.20 ± 2.10	< 0.001**
Social support	4.20 ± 0.86	4.26 ± 0.98	5.10 ± 0.99	8.83 ± 0.94	< 0.001**
Cognition	6.03 ± 1.30	6.43 ± 1.12	5.90 ± 1.15	10.50 ± 1.25	< 0.001**
Communication	4.30 ± 1.51	4.31 ± 1.49	3.16 ± 1.20	8.03 ± 0.61	< 0.001**
Bodily discomfort	5.06 ± 1.11	5.06 ± 1.11	4.83 ± 1.44	8.10 ± 0.80	0.01*
Total PDQ-39 score	68.56 ± 8.37	69.96 ± 8.07	69.90 ± 11.14	105.02 ± 9.63	< 0.001**

PD severity, measured by the Modified Hoehn and Yahr Scale, did not change significantly over time in either group (control: $F = 0.07$, $p = .54$; intervention: $F = 0.09$, $p = .92$), which is expected given that an educational intervention is not designed to alter underlying disease stage. At baseline, total knowledge correlated positively with total functional mobility ($r = .375–.492$, $p < .05$) and with total PDQ-39 score ($r = .500$, $p < .05$) in both groups, suggesting that knowledge, mobility, and quality of life are interrelated constructs in this population.

DISCUSSION

This study evaluated the effect of a structured, nurse-led educational intervention on knowledge, functional mobility, and quality of life among elderly patients with PD. Consistent with the study hypotheses, the intervention group demonstrated significantly greater improvement in disease-related knowledge and functional mobility than the control group, with benefits largely sustained at 3-month follow-up. These findings support the value of individualized, self-care-oriented patient education as a nursing intervention for this population.

The magnitude of the knowledge gain in the intervention group (from a mean of 4.86 to 12.71 out of 16) suggests that a brief, structured educational program can substantially correct knowledge deficits among elderly patients with PD, consistent with self-management education research in other chronic neurological populations (Hellqvist et al., 2020). The improvement in functional mobility, particularly gait speed and balance, aligns with evidence that structured exercise and self-management education improve physical performance in people with PD (Isernia et al., 2020).

The change in PDQ-39 scores requires cautious interpretation. In the standard PDQ-39 scoring convention, each domain and the total score range from 0 (best quality of life) to 100 (worst quality of life); an increase in score is therefore typically interpreted as worsening, not improvement. The rise in PDQ-39 scores observed in the intervention group in this dataset would, under that convention, suggest greater self-reported symptom burden after the intervention — for example, heightened awareness of mobility or emotional difficulties following disease education, a phenomenon sometimes described as a 'response shift,' in which patients become more attuned to symptoms they previously under-recognized. Alternatively, this pattern may reflect a data entry, coding, or scale-direction discrepancy in the original dataset. Given that this finding runs counter to the study's own hypothesis and conventional PDQ-39 interpretation, we recommend that the corresponding author re-verify the PDQ-39 scoring and raw data before this result is reported in a peer-reviewed submission; a reviewer would very likely raise this same question.

The lack of significant change in Hoehn and Yahr severity scores in either group over the study period is an expected and reassuring finding: it indicates that observed improvements in knowledge and functional performance were not confounded by spontaneous changes in underlying disease stage, and that the intervention's benefits likely reflect genuine gains in self-management capacity rather than disease modification.

The positive baseline correlations between knowledge, functional mobility, and quality of life are consistent with a broader body of evidence linking patient understanding of chronic disease to functional and psychosocial outcomes (Zafar & Yaddanapudi, 2021), and support the theoretical rationale — drawn from Orem's self-care model — that improving knowledge is a plausible mechanism for improving functional self-management in elderly patients with PD.

LIMITATIONS

This study has several limitations. The quasi-experimental, non-randomized design and single-center setting limit causal inference and generalizability. The relatively small sample size (n = 60) constrains statistical power, particularly for subgroup analyses. Outcomes relied partly on self-report (PDQ-39), which is subject to recall and response-shift bias. The 3-month follow-up period may be insufficient to establish long-term sustainability of the observed gains. Future studies should use randomized controlled designs, larger and multi-center samples, and longer follow-up periods.

CONCLUSION

A structured, individualized, nurse-led educational intervention grounded in Orem's self-care model significantly improved PD-related knowledge and functional mobility among elderly patients with Parkinson's disease, with benefits largely sustained at 3-month follow-up. These findings support the integration of structured educational interventions into the routine gerontological nursing care of elderly patients with PD.

Implications for Nursing Practice

Gerontological and neuroscience nurses working in outpatient neurology settings should consider incorporating structured, individualized educational sessions — covering disease knowledge, fall prevention, nutrition, and therapeutic exercise — into routine care for elderly patients with PD. Nursing curricula and continuing-education programs should strengthen nurses' preparation to deliver such interventions, and healthcare policy should support the resourcing of nurse-led self-management education within chronic disease and geriatric care services.

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Conflicts of Interest

[To be completed — e.g., 'The authors declare no conflict of interest.']

Ethical Approval

This study was approved by the Research Ethics Committee, Faculty of Nursing, Cairo University [insert approval number]. All participants provided written informed consent prior to enrollment.

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