International Journal of Aging

Int J Agin. 2025;3:e8
10.34172/ija.2025.e8
http://ijage.com

Original Article

Evaluation of Systemic Disorders in Patients with Parkinson's Disease Referred to the Emergency Department

Samad Shams Vahdati[1], Alireza Ala[1], Fatemeh Shohratifar[1], Zahra Karimi Aghdam[1], Mohadeseh Rajabpour[1*]

[1]Emergency and Trauma Care Research Center, Tabriz University of Medical Sciences, Tabriz, Iran

Article History:
Received: January 28, 2025
Revised: August 6, 2025
Accepted: August 6, 2025
ePublished: August 28, 2025

***Corresponding Author:**
Mohadeseh Rajabpour,
Email: rpmohad96@gmail.com

Abstract

Objectives: To investigate the prevalence and characteristics of systemic disorders among patients with Parkinson's disease (PD) presenting to the emergency department (ED), with a focus on major comorbidities and their impact on patient outcomes.

Design: A cross-sectional study.

Setting(s): The study was conducted in the ED of Imam Reza Medical Center, a tertiary care hospital in Tabriz, Iran.

Participants: A total of 110 PD patients who presented to the ED between March 2017 and March 2022 were included. The inclusion criteria included a confirmed diagnosis of PD and documented systemic complications. Patients with incomplete medical records were excluded.

Outcome Measures: The primary outcomes were the prevalence of systemic disorders (neurological, cardiovascular, gastrointestinal, and urinary complications) and treatment adherence.

Results: The mean age of participants was 72.42 ± 11.14 years. The most common systemic complications included sleep disturbances (85.5%), cardiovascular disorders (78.2%), gastrointestinal issues (67.3%), and urinary dysfunction (34.5%). Furthermore, 45.5% of patients exhibited non-adherence to treatment. Statistical significance was established for key findings, with 95% confidence intervals reported.

Conclusion: Systemic complications are highly prevalent in PD patients presenting to the ED, necessitating early recognition and management to improve patient outcomes. Further prospective studies are needed to assess long-term effects and optimize treatment strategies.

Keywords: Parkinson's disease, Systemic disorders, Emergency department, Cardiovascular complications, Gastrointestinal disorders

Please cite this article as follows: Shams Vahdati S, Ala A, Shohratifar F, Karimi Aghdam Z, Rajabpour M. Evaluation of systemic disorders in patients with parkinson's disease referred to the emergency department. Int J Aging. 2025;3:e8. doi: 10.34172/ija.2025.e8

Introduction

Parkinson's disease (PD) is a common neurodegenerative disorder that primarily affects older adults, with its incidence rising sharply after the age of 60.[1,2] The global burden of PD continues to grow, driven by aging populations, higher life expectancy, and environmental factors such as industrialization and pesticide exposure.[3,4] By 2030, PD is estimated to impact over 10 million people worldwide.[5] PD is characterized by both motor and nonmotor symptoms, with progressive neuronal loss that leads to disabling motor dysfunction, cognitive decline, and autonomic dysfunction.[6,7] Although the precise etiology remains unclear, aging, genetic susceptibility, and environmental risk factors are known to contribute to disease development.[6]

Although PD is typically diagnosed based on classical motor symptoms such as bradykinesia, rigidity, and tremor, its diagnosis remains challenging, particularly in the early stages. Up to 30% of patients may initially be misdiagnosed, making the importance of accurate and timely diagnosis.[8] As PD progresses, patients frequently experience a variety of systemic disorders, complicating management and necessitating careful evaluation in the emergency department (ED). Nonmotor symptoms, including gastrointestinal disturbances, urinary issues, and autonomic dysfunction, are common and may present acutely in these patients, sometimes masking other underlying conditions.[9-14]

This study aimed to evaluate systemic disorders in PD patients referred to the ED, with particular emphasis on distinguishing Parkinson's-related symptoms from those caused by other comorbidities. A clearer understanding of the multifaceted nature of PD and its systemic impacts can improve diagnostic accuracy, optimize treatment strategies, and enhance the overall patient care of PD patients in emergency settings.

Materials and Methods

This retrospective, cross-sectional, analytical study included all patients with PD who were referred to the ED of Imam Reza Hospital, Tabriz, between March 2017 and March 2022. Patient lists were obtained from the hospital records department. The sampling method was purposeful and a census, with patients included in the order of their records. Patients with incomplete files or insufficient information were excluded.

After obtaining the relevant permits, approval of the ethical committee, and the ethics code (IR.TBZMED.REC.1402.193), in coordination with the archives of Imam Reza Hospital Tabriz Medical Education Center, the records of all patients with PD who referred to the ED of Imam Reza Hospital between March 2017 and February 2022 were retrieved from the hospital documents department.

In this study, patient data, including names, file numbers, date of admission, age and sex, duration of illness, accompanying underlying illness, cognitive and sleep disorders, cardiovascular, digestive, and urinary disorders, blood pressure at admission, height, weight, illness duration, and smoking status, were obtained from the records department of Imam Rezai Hospital, Tabriz, and then entered into a pre-designed questionnaire (Appendix 1).

The obtained data were statistically analyzed using SPSS version 21. The linear regression statistical method was used to check the relationship between the data. Normality of data was assessed using the Kolmogorov–Smirnov test. Depending on the distribution, appropriate parametric tests (e.g., t-test) or non-parametric tests (e.g., Mann–Whitney U) were used. Confidence intervals and effect sizes, such as odds ratios (ORs), were calculated for major comparisons. Records with more than 25% missing data were excluded from the analysis, as they lacked sufficient information for reliable interpretation. Graphs were generated using SPSS version 21. No additional costs were imposed on patients during the course of this project, and all information obtained was kept confidential.

Results

A total of 110 patients were included in the study. The Kolmogorov-Smirnov test indicated that the data did not follow a normal distribution ($P<0.001$). The mean age of the patients was 72.42 ± 11.14 (95% CI: 70.31-74.52), while the median age of the patients was 73 years (IQR: 69-79). Of the patients, 72 (44.4%) were male, and 38 (55.6%) were female. The patients' median body mass index (BMI) was 24 kg/m2 (IQR: 21-26), and the median duration of the disease was 5 years (IQR: 2-8).

Approximately 45.5% of patients did not adhere to treatment, either due to skipped doses or irregular use of medications. The prevalence of systemic disorders is summarized in Table 1.

Sleep disorders were the most common neurological manifestation, affecting 85.5% of patients, followed by balance disturbances (61.8%) and behavioral disorders (50.9%). Depression was observed in 25.5% of the cohort. Among cardiovascular disorders, blood pressure fluctuations were most prevalent, affecting 78.2% of patients, while hypertension was observed in 54.5%. Gastrointestinal disorders, primarily related to motility issues, were present in 67.3% of patients. A significant difference was found in the prevalence of cardiovascular disorders between men and women ($P=0.021$; 95% CI: 1.12–2.85; OR = 1.78). Moreover, a significant association was observed between treatment adherence and the presence of gastrointestinal disorders ($P=0.034$).

Discussion

This study provides a comprehensive evaluation of systemic disorders in patients with PD presenting to the ED. As the first study of its kind in Iran, it highlights the significant burden of systemic complications in this population, underscoring the importance of a multidisciplinary approach to management.

Neurological and psychiatric disorders were highly prevalent, with sleep disturbances (85.5%), balance issues (61.8%), and depression (25.5%) being the most common. These findings align with those of Macht et al, who reported high rates of freezing of gait and postural instability in PD patients.[15] Balance disorders in PD result from impaired basal ganglia dysfunction, which disrupts postural control and increases the risk of falls.[16] Similarly, depression was observed in 25.5% of patients, which aligns with the previous studies, which have demonstrated that depression is a common symptom of PD. This association likely reflects both the neurodegenerative process itself and the psychological burden of living with a progressive chronic illness.[17]

Cardiovascular complications were also prominent in this cohort, with 78.2% of patients experiencing blood pressure fluctuations, likely related to autonomic dysfunction in PD. This observation is consistent with prior studies by Senard et al and Sommer et al, which reported high rates of orthostatic hypotension and hypertension in PD patients.[18,19] Such fluctuations necessitate regular cardiovascular monitoring to prevent complications such as syncope and falls. This finding may be explained by the autonomic dysfunction commonly observed in PD, characterized by impaired blood pressure regulation, reduced heart rate variability, and orthostatic hypotension due to degenerative changes in the nervous system. Furthermore, the high prevalence of hypertension and ischemic heart disease further suggests a compounded effect of age-related cardiovascular comorbidities, as the median age of 73 years is consistent with an increased cardiovascular risk in the elderly.

Additionally, medications used to manage PD, including levodopa and dopamine agonists, may influence cardiovascular function, aggravating autonomic instability and contributing to blood pressure dysregulation and arrhythmias. The retrospective design

Table 1. Prevalence of Systemic Disorders in PD Patients

System	Disorder	Prevalence (%)
Psychoneurological System	Behavioral disorder	56 (50.9%)
	Depressive disorder	28 (25.5%)
	Bipolar mood disorder	2 (1.8%)
	Balance disorder	68 (61.8%)
	Sleep disorder	94 (85.5%)
	Dementia	8 (7.3%)
	Epilepsy	4 (3.6%)
	Subdural hematoma	2 (1.8%)
	Cerebrovascular accident	8 (7.3%)
	Nicotine dependence	14 (12.7%)
Cardiovascular System	Blood pressure fluctuation	86 (78.2%)
	Hypertension	60 (54.5%)
	Ischemic heart disease	14 (12.7%)
	Heart failure	2 (1.8%)
	Arrhythmia	2 (1.8%)
	Other (valvopathies, cardiomyopathy, etc.)	40 (36.4%)
Urinary System	Urinary tract disorders	38 (34.5%)
	Bladder cancer	2 (1.8%)
	Benign prostatic hyperplasia	14 (12.7%)
	Chronic renal failure	10 (9.1%)
	Acute renal failure	2 (1.8%)
	End-stage renal disease	2 (1.8%)
Rheumatologic and Autoimmune Disorders	Arthritis	4 (3.6%)
	Lichen planus	2 (1.8%)
	Rheumatoid arthritis	2 (1.8%)
	Myopathy	2 (1.8%)
Respiratory and Infectious Diseases	COVID-19	4 (3.6%)
	Chronic obstructive pulmonary disease	12 (10.9%)
	Other lung diseases	2 (1.8%)
Gastrointestinal and Liver System	Gastrointestinal disease (gastritis, GERD, gastric and intestinal ulcer, IBD, etc.)	74 (67.3%)
	Common bile duct disease	2 (1.8%)
	Cholangiocarcinoma	2 (1.8%)
	Hepatitis B	2 (1.8%)
	Hemorrhoid	2 (1.8%)
Others	Diabetes	60 (54.5%)
	Discopathy	2 (1.8%)
	Breast cancer	2 (1.8%)
	Hypothyroidism	2 (1.8%)
	Hyperlipidemia	8 (7.3%)
	Non-specific abdominal pain	26 (23.6%)

Note. COVID-19: Coronavirus Disease 2019; GERD: Gastroesophageal reflux disease; IBD: Inflammatory bowel disease.

of this study may also have amplified the observed prevalence due to potential documentation biases and the higher likelihood of ED visits to involve patients with more acute cardiovascular presentations.

Incorporating prospective designs would allow a clearer differentiation of causal factors underlying these observations. Gastrointestinal disorders were present in 67.3% of patients, reflecting the well-established association between PD and delayed gastric emptying, reduced intestinal motility, and microbial dysbiosis. Similar findings have been reported by Goetze et al and Kaye et al, who reported significant delays in solid and liquid food transit in PD patients.[20,21] Constipation was also frequent in this study, likely exacerbated by reduced physical activity and the use of medications such as anticholinergics and dopaminergic agents.

The potential contribution of PD medications to gastrointestinal complications requires thorough evaluation. Commonly used medications in PD management, including levodopa and dopamine agonists, have been associated with gastrointestinal motility disorders, which may influence the clinical presentation of these patients in emergency settings.

Urinary system dysfunction, observed in 34.5% of patients, manifested incomplete bladder emptying and nocturia. These findings align with research by Campos-Sousa et al, which highlighted detrusor hyperreflexia and obstructive symptoms as common urinary complications in PD.[22]

Interestingly, only 12.7% of the patients were smokers, supporting the hypothesis of a protective effect of nicotine in PD, as documented in meta-analyses by Hernán et al, where smoking reduced PD risk by 60%.[23] Similar protective effects were observed for caffeine consumption, as demonstrated in studies by Tanaka et al.[24]

The high rate of non-adherence to treatment observed in this study (45.5%) represents a critical challenge in the management of PD. Adherence to prescribed treatments is essential for maintaining both motor and non-motor symptom control, preventing systemic complications, and improving quality of life. Non-adherence may aggravate cardiovascular dysfunction, gastrointestinal motility disorders, and urinary complications, some of which were highly prevalent in this cohort. Patient-related factors such as depression (25.5%), cognitive decline (7.3%), and behavioral disorders (50.9%) likely contributed to difficulties in sustaining regular medication use. Additionally, treatment complexity, adverse effects of dopaminergic therapies, and the financial burden of chronic disease management may further increase non-adherence rates. Although the retrospective nature of this study limits the ability to fully analyze causative factors underlying non-adherence, the clinical implications are clear: addressing barriers to treatment adherence is vital for improving patient outcomes and reducing emergency department visits. Future research should prioritize targeted interventions such as patient education

programs, caregiver support systems, and simplified medication regimens to minimize this problem.

The findings of this study underscore the need for a comprehensive approach to PD management, particularly in emergency settings. Early identification and targeted treatment of systemic complications, such as cardiovascular and gastrointestinal disorders, are essential for improving patient outcomes. In addition, the use of pain-relief agents, such as paracetamol, can help reduce pain and manage exacerbation of symptoms such as tremor.[25] Effective pain control should be considered for all patients.[26]

This study has several limitations that should be considered when interpreting the findings. First, its retrospective design makes it prone to biases related to incomplete medical records and inconsistencies in data documentation. The unavailability of certain critical variables may have affected the reliability of the results. Second, the study was conducted in a single tertiary care hospital, which limits the generalizability of the findings to the broader population of patients with PD. Additionally, confounding factors, such as variations in treatment regimens, were not fully explored, which may further affect the outcomes presented here.

Conclusions

In conclusion, this study underscores the significant systemic burden in PD patients, with a high prevalence of neurological, psychiatric, cardiovascular, and gastrointestinal complications. The findings emphasize the importance of early detection and appropriate management of these conditions, particularly in emergency settings, to improve patient outcomes. Given the study's limitations, future research with larger and more diverse cohorts is needed to better understand the long-term effects and interactions of these systemic manifestations in PD. A multidisciplinary approach is crucial for optimizing care and treatment.

Acknowledgments

This manuscript is based on the medical doctoral thesis of Zahra Karimi Aghdam (Thesis No. 68308). The authors would also like to thank the Clinical Research Development Unit of Imam Reza General Hospital, Tabriz, Iran, for their cooperation in conducting this study.

Authors' Contribution

Conceptualization: Samad Shams Vahdati.
Data curation: Zahra Karimi Aghdam.
Formal analysis: Fatemeh Shohratifar.
Investigation: Alireza Ala.
Methodology: Samad Shams Vahdati.
Project administration: Alireza Ala.
Resources: Zahra Karimi Aghdam.
Software: Mohadeseh Rajabpour.
Supervision: Samad Shams Vahdati.
Validation: Alireza Ala.
Visualization: Fatemeh Shohratifar.
Writing–original draft: Mohadeseh Rajabpour.

Competing Interests

The authors declare no competing interests.

Data Availability Statement

The datasets used and/or analyzed during the current study are available from the corresponding author upon reasonable request.

Ethical Approval

The study was approved by the Tabriz University of Medical Science Research Ethics Committee (Approval Code: IR.TBZMED.REC.1402.193). No additional costs were incurred by patients, and no harm was caused during the study. Patient information was kept confidential and extracted solely from medical records for analysis.

Funding

This study did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

References

1. Van Den Eeden SK, Tanner CM, Bernstein AL, Fross RD, Leimpeter A, Bloch DA, et al. Incidence of Parkinson's disease: variation by age, gender, and race/ethnicity. Am J Epidemiol. 2003;157(11):1015-22. doi: 10.1093/aje/kwg068.
2. Bower JH, Maraganore DM, McDonnell SK, Rocca WA. Incidence and distribution of parkinsonism in Olmsted county, Minnesota, 1976-1990. Neurology. 1999;52(6):1214-20. doi: 10.1212/wnl.52.6.1214.
3. GBD 2015 Neurological Disorders Collaborator Group. Global, regional, and national burden of neurological disorders during 1990-2015: a systematic analysis for the Global Burden of Disease Study 2015. Lancet Neurol. 2017;16(11):877-97. doi: 10.1016/s1474-4422(17)30299-5.
4. Semchuk KM, Love EJ, Lee RG. Parkinson's disease and exposure to agricultural work and pesticide chemicals. Neurology. 1992;42(7):1328-35. doi: 10.1212/wnl.42.7.1328.
5. Dorsey ER, Constantinescu R, Thompson JP, Biglan KM, Holloway RG, Kieburtz K, et al. Projected number of people with Parkinson disease in the most populous nations, 2005 through 2030. Neurology. 2007;68(5):384-6. doi: 10.1212/01.wnl.0000247740.47667.03.
6. Dexter DT, Jenner P. Parkinson disease: from pathology to molecular disease mechanisms. Free Radic Biol Med. 2013;62:132-44. doi: 10.1016/j.freeradbiomed.2013.01.018.
7. Jankovic J, Stacy M. Medical management of levodopa-associated motor complications in patients with Parkinson's disease. CNS Drugs. 2007;21(8):677-92. doi: 10.2165/00023210-200721080-00005.
8. Schrag A, Ben-Shlomo Y, Quinn N. How valid is the clinical diagnosis of Parkinson's disease in the community? J Neurol Neurosurg Psychiatry. 2002;73(5):529-34. doi: 10.1136/jnnp.73.5.529.
9. Greenberg M, Gordon HL, McCutchen JJ. Neurogenic bladder in Parkinson's disease. South Med J. 1972;65(4):446-8. doi: 10.1097/00007611-197204000-00016.
10. Andersen JT, Hebjorn S, Frimodt-Moller C, Walter S, Worm-Petersen J. Disturbances of micturition in Parkinson's disease. Acta Neurol Scand. 1976;53(3):161-70. doi: 10.1111/j.1600-0404.1976.tb04334.x.
11. Andersen JT, Bradley WE. Cystometric, sphincter and electromyelographic abnormalities in Parkinson's disease. J Urol. 1976;116(1):75-8. doi: 10.1016/s0022-5347(17)58685-1.
12. Campeau L, Soler R, Andersson KE. Bladder dysfunction and parkinsonism: current pathophysiological understanding and management strategies. Curr Urol Rep. 2011;12(6):396-403. doi: 10.1007/s11934-011-0219-8.
13. Berger Y, Blaivas JG, DeLaRocha ER, Salinas JM. Urodynamic findings in Parkinson's disease. J Urol. 1987;138(4):836-8. doi: 10.1016/s0022-5347(17)43390-8.

14. Hiseman JP, Fackrell R. Caregiver burden and the nonmotor symptoms of Parkinson's disease. Int Rev Neurobiol. 2017;133:479-97. doi: 10.1016/bs.irn.2017.05.035.
15. Macht M, Kaussner Y, Möller JC, Stiasny-Kolster K, Eggert KM, Krüger HP, et al. Predictors of freezing in Parkinson's disease: a survey of 6,620 patients. Mov Disord. 2007;22(7):953-6. doi: 10.1002/mds.21458.
16. Rinalduzzi S, Trompetto C, Marinelli L, Alibardi A, Missori P, Fattapposta F, et al. Balance dysfunction in Parkinson's disease. Biomed Res Int. 2015;2015:434683. doi: 10.1155/2015/434683.
17. Usnich T, Hauptmann B, Hanssen H, Prasuhn J, Balck A, Borsche M, et al. Depressive symptoms in Parkinson's disease are insufficiently but more often treated than in other chronic conditions. NPJ Parkinsons Dis. 2023;9(1):113. doi: 10.1038/s41531-023-00551-8.
18. Senard JM, Raï S, Lapeyre-Mestre M, Brefel C, Rascol O, Rascol A, et al. Prevalence of orthostatic hypotension in Parkinson's disease. J Neurol Neurosurg Psychiatry. 1997;63(5):584-9. doi: 10.1136/jnnp.63.5.584.
19. Sommer S, Aral-Becher B, Jost W. Nondipping in Parkinson's disease. Parkinsons Dis. 2011;2011:897586. doi: 10.4061/2011/897586.
20. Goetze O, Nikodem AB, Wiezcorek J, Banasch M, Przuntek H, Mueller T, et al. Predictors of gastric emptying in Parkinson's disease. Neurogastroenterol Motil. 2006;18(5):369-75. doi: 10.1111/j.1365-2982.2006.00780.x.
21. Kaye J, Gage H, Kimber A, Storey L, Trend P. Excess burden of constipation in Parkinson's disease: a pilot study. Mov Disord. 2006;21(8):1270-3. doi: 10.1002/mds.20942.
22. Campos-Sousa RN, Quagliato E, da Silva BB, de Carvalho RM Jr, Ribeiro SC, de Carvalho DF. Urinary symptoms in Parkinson's disease: prevalence and associated factors. Arq Neuropsiquiatr. 2003;61(2b):359-63. doi: 10.1590/s0004-282x2003000300007.
23. Hernán MA, Takkouche B, Caamaño-Isorna F, Gestal-Otero JJ. A meta-analysis of coffee drinking, cigarette smoking, and the risk of Parkinson's disease. Ann Neurol. 2002;52(3):276-84. doi: 10.1002/ana.10277.
24. Tanaka K, Miyake Y, Fukushima W, Sasaki S, Kiyohara C, Tsuboi Y, et al. Intake of Japanese and Chinese teas reduces risk of Parkinson's disease. Parkinsonism Relat Disord. 2011;17(6):446-50. doi: 10.1016/j.parkreldis.2011.02.016.
25. Shams Vahdati S, Morteza Baghi HR, Ghobadi J, Rajaei Ghafouri R, Habibollahi P. Comparison of paracetamol (Apotel®) and morphine in reducing post pure head trauma headache. Anesth Pain Med. 2014;4(3):e14903. doi: 10.5812/aapm.14903.
26. Amiri H, Ghodrati N, Nikuyeh M, Shams Vahdati S, Jalilzadeh-Binazar M. Comparison of granisetron and metoclopramide in the treatment of pain and emesis in migraine patients: a randomized controlled trial study. Turk J Emerg Med. 2017;17(2):61-4. doi: 10.1016/j.tjem.2016.12.004.

Appendix 1. Information Collection Form

1.	**Case Number:----------**		
2.	Age:----------		
3.	Gender:	Male○	Female○
4.	Body Mass Index (BMI):----------		
5.	Duration of Illness:----------		
6.	Other Underlying Diseases:----------		
7.	Behavioral Disorders:----------	Yes○	No○
8.	Depression:----------	Yes○	No○
9.	Imbalance:----------	Yes○	No○
10.	Sleep Disorders:---------	Yes○	No○
11.	Drop or Increase Blood Pressure:----------	Yes○	No○
12.	Treatment Adherence:----------	Yes○	No○
13.	Disorders Digestive System:----------	Yes○	No○
14.	Urinary System Disorders:----------	Yes○	No○
15.	Disorders Cardiac System-Vascular:----------	Yes○	No○
16.	Smoking:----------	Yes○	No○
17.	Abdominal Pain:----------	Yes○	No○