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FRONTAL RELEASE SIGNS IN PARKINSON DISEASE (PD) PATIENTS PRESENTING TO A TERTIARY CARE HOSPITAL IN ISLAMABAD

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Submission Date: 28 May 2026: Acceptance Date: 22 June 2026: Publish date: 25June 2026

ABSTRACT

Objective: To determine the frequency of frontal release signs (FRSs) among patients with Parkinson disease and assess their association with disease severity, cognitive performance, and selected clinical characteristics.
Study Design and Setting: Cross-sectional study conducted at a tertiary care hospital in Islamabad.
Methodology: A total of 102 patients diagnosed with Parkinson disease were included. Demographic and clinical information, including age, sex, disease duration, Hoehn and Yahr stage, Mini-Mental State Examination (MMSE) score, and history of visual hallucinations, was recorded. Frontal release signs were assessed through neurological examination, including the glabellar tap, snout, and palmomental reflexes. The frequency of individual signs and the number of positive signs were determined. Associations between FRSs and selected clinical characteristics were evaluated using appropriate statistical tests, with statistical significance set at p less than 0.05.
Results: The mean age of participants was 66.4 ± 8.1 years, and 61 (59.8%) were male. At least one frontal release sign was observed in 77 (75.5%) patients. The glabellar tap reflex was the most frequent sign, present in 58 (56.9%) patients, followed by the palmomental reflex in 49 (48.0%) and the snout reflex in 43 (42.2%). Patients with frontal release signs had lower mean MMSE scores than those without these signs (24.1 ± 3.5 versus 26.9 ± 3.1; p = 0.001). The frequency of FRSs increased across higher Hoehn and Yahr stages (p = 0.04). A significant association was also observed between FRS presence and longer disease duration (p = 0.02). No statistically significant association was found with sex or visual hallucinations.
Conclusion: Frontal release signs were frequently observed in patients with Parkinson disease, with the glabellar tap reflex being the most common. Their presence was associated with greater disease severity, longer disease duration, and lower cognitive screening scores. Systematic assessment of these signs may provide supplementary information during neurological evaluation; however, further studies are required to establish their independent clinical significance.

KEYWORDS: Cognitive Dysfunction; Parkinson Disease; Primitive Reflexes; Neurological Examination; Disease Severity.

INTRODUCTION

Parkinson disease (PD) is a progressive neurodegenerative disorder characterized by motor impairment and a broad spectrum of non-motor manifestations that can substantially affect patients' functional independence and quality of life. The cardinal motor features include bradykinesia, resting tremor, rigidity, and, in more advanced disease, postural instability. The clinical diagnosis is based primarily on the identification of parkinsonism, defined as bradykinesia accompanied by resting tremor or rigidity, followed by assessment of supportive features, exclusion criteria, and red flags for alternative diagnoses [1,2]. Although advances in neurological assessment and diagnostic research have improved clinical recognition, PD remains a heterogeneous condition with considerable variation in symptom progression, cognitive function, and associated neurological abnormalities [3]. Consequently, identifying additional clinical features that may help characterize affected patients remains important, particularly in routine clinical practice. In addition to its characteristic motor manifestations, PD is associated with changes in cognition, behavior, autonomic function, sleep, and perception. Cognitive impairment may involve executive functioning, attention, memory, and visuospatial abilities, with severity ranging from subtle deficits to established dementia. Neuropsychiatric manifestations, including visual hallucinations, may also occur during the disease course and can complicate clinical management [3,4]. These findings highlight the importance of evaluating PD beyond its cardinal motor symptoms. A comprehensive neurological examination can provide useful information about the broader clinical phenotype and

may help identify patients who require more detailed cognitive or neuropsychiatric assessment. Within this context, primitive reflexes, commonly described as frontal release signs (FRS), have attracted clinical interest because of their possible relationship with impaired inhibitory control and changes in frontal-subcortical neurological functioning [5,6].

Frontal release signs are reflex responses that are commonly observed during early development but are normally suppressed through maturation of the central nervous system. Their re-emergence in adults may accompany neurological disease, cognitive impairment, or dysfunction involving the frontal-subcortical networks responsible for regulating primitive motor responses [5]. However, these signs are not specific to a single neurological disorder, and their interpretation requires consideration of age, associated clinical findings, and the overall neurological examination. In PD, three clinically accessible reflexes are particularly relevant: the glabellar tap reflex, also known as Myerson's sign; the snout reflex; and the palmomental reflex. These responses can be elicited at the bedside without specialized equipment, making them potentially useful components of a standardized neurological assessment [6,7].

The glabellar tap reflex is elicited by gently tapping the glabellar region between the eyebrows while observing the patient's blinking response. In healthy individuals, repeated stimulation generally produces habituation, whereby blinking diminishes after several taps. Persistent blinking despite repeated stimulation is considered an abnormal response under the operational definition used in the present study. Nevertheless, the diagnostic value of this reflex must be interpreted cautiously. In a study involving 161 patients with PD, 47 patients with essential tremor, and 40 healthy controls, Nuuttila and colleagues found that abnormal glabellar responses were more frequent in both patient groups than in healthy controls, but the reflex did not reliably distinguish PD from essential tremor [7]. Their findings demonstrate why the glabellar tap should be regarded as a supportive neurological observation rather than an independent diagnostic test. Standardizing the stimulation technique and the definition of a positive response is therefore important when estimating its frequency across patients.

The snout reflex is another primitive response characterized by involuntary pursing or protrusion of the lips following stimulation of the upper lip or philtrum. Its presence has been investigated in patients with parkinsonian disorders and other neurological conditions. Earlier research comparing patients with PD and healthy controls reported that primitive reflexes, including the snout and glabellar tap responses, were more frequently elicited in patients with PD [6]. A subsequent study by Eser and colleagues examined the buccopalpebral reflex and snout reflex in 115 patients with PD and 107 controls. The investigators reported that the buccopalpebral reflex was more frequent among patients with PD and that all patients with a positive buccopalpebral reflex also exhibited a positive snout reflex [8]. Although the buccopalpebral reflex is distinct from the three signs evaluated in the present study, these observations support further examination of primitive reflexes as part of the broader clinical phenotype of PD.

The palmomental reflex is elicited by stimulating the thenar eminence of the hand and observing for an involuntary contraction of the ipsilateral mentalis muscle. Its frequency in PD has been examined in comparative clinical research. Maertens de Noordhout and Delwaide assessed 109 patients with parkinsonism and 356 neurologically normal individuals, reporting a palmomental reflex in 71.5% of patients compared with 16.3% of controls [9]. They also observed an association between the reflex and the degree of akinesia. These findings suggest that the palmomental response may accompany motor dysfunction in parkinsonian patients; however, the reflex can also occur in neurologically healthy adults, and its presence alone cannot establish a diagnosis or determine disease severity. Differences in examination methods, patient characteristics, and definitions of a positive response may also contribute to variation in reported frequencies.

Beyond the presence of individual reflexes, the combined burden of primitive reflexes may provide additional clinical information. Vreeling and colleagues, using a standardized protocol to examine multiple primitive reflexes, found that these responses were generally more frequent or persistent in patients with PD than in matched healthy controls [6]. Their study also suggested that the number of primitive reflexes was more closely related to cognitive assessment scores than to disease duration or motor severity. This observation raises the possibility that the accumulation of frontal release signs may be associated with broader neurological dysfunction in some patients. However, such relationships should not be assumed to apply uniformly to every reflex or patient population. Differences in cognitive screening instruments, examination protocols, and clinical characteristics make further investigation necessary.

Cognitive assessment is particularly relevant when evaluating the possible significance of frontal release signs. The Mini-Mental State Examination (MMSE) provides a brief standardized measure of global cognitive performance and can help identify patients who may require more detailed assessment. Similarly, the Hoehn and Yahr scale provides a clinical staging framework for describing the progression of motor disability in PD [10,11]. Examining frontal release signs alongside these measures may help clarify whether their presence is associated with disease stage or cognitive performance. Visual hallucinations are also clinically important because they represent a recognized neuropsychiatric manifestation of PD and may coexist with cognitive impairment and other disease-related changes [4,12]. Investigating these variables together may therefore provide a more comprehensive description of the clinical characteristics associated with frontal release signs.

Despite the potential bedside value of these reflexes, several limitations must be acknowledged. Primitive reflexes may occur in older adults without PD, and their elicitation can vary according to technique, interpretation, and

examiner experience [5,13]. Research on primitive reflex assessment has emphasized the importance of standardized examination procedures and explicit scoring criteria to improve consistency between observers [13]. Furthermore, evidence from international studies cannot automatically be generalized to all clinical populations because differences in referral patterns, disease duration, treatment, and patient characteristics may influence observed frequencies. Pakistani research has documented the need for a stronger local evidence base concerning the epidemiology of PD, while evidence specifically quantifying the frequency of individual frontal release signs in Pakistani clinical populations remains limited [14]. Establishing local estimates may help describe the neurological characteristics of patients attending tertiary care services and identify questions for subsequent comparative studies.

The present study was therefore designed to determine the frequency of three frontal release signs glabellar tap, snout, and palmomental reflexes—in patients with clinically established PD presenting to the Neurology Outpatient Department of Shifa International Hospitals Ltd., Islamabad. In addition to estimating the frequency of each sign and the proportion of patients exhibiting at least one frontal release sign, the study will examine their association with Hoehn and Yahr stage, disease duration, MMSE score, and the presence of visual hallucinations. By applying a standardized bedside examination protocol, this study aims to generate locally relevant clinical data and improve understanding of the distribution of frontal release signs in this patient population. The findings may help inform routine neurological assessment and provide a foundation for further research into the clinical significance of primitive reflexes in PD, without assuming that these signs independently establish the diagnosis or predict an individual patient's prognosis [15].

MATERIALS AND METHODS

A cross-sectional study was conducted in the Neurology Outpatient Department (OPD) of Shifa International Hospitals Ltd., Islamabad, Pakistan, over a period of six months, from 24 November 2025 to 25 May 2026. The study aimed to determine the frequency of frontal release signs (FRS), including the glabellar tap reflex, snout reflex, and palmomental reflex, among patients with Parkinson disease (PD). The required sample size was 102 patients, calculated for the estimation of a single population proportion using a 95% confidence level and an anticipated prevalence of the snout reflex, with an additional allowance for incomplete data or non-response. Consecutive non-probability sampling was used to recruit eligible patients attending the Neurology OPD during the study period.

Patients aged 50 years or older with idiopathic PD at any disease stage, who were able to cooperate with the neurological examination, were included. Patients with atypical or secondary parkinsonism, a history of major stroke or focal frontal lesions, or an inability to cooperate with the examination were excluded. The diagnosis of PD was based on the Movement Disorder Society (MDS) clinical diagnostic criteria, requiring the presence of parkinsonism, defined as bradykinesia accompanied by resting tremor or rigidity, with a progressive clinical course and no exclusion criteria or red flags that outweighed supportive diagnostic features.

After obtaining written informed consent, demographic and clinical information was recorded on a structured data collection proforma. The recorded variables included age, sex, duration of PD in years, current antiparkinsonian medication, Hoehn and Yahr stage, Mini-Mental State Examination (MMSE) score, and the presence or absence of visual hallucinations during the preceding month, based on patient or caregiver report. Disease duration was calculated from the date of clinical diagnosis to the date of study assessment. Disease severity was assessed using the Hoehn and Yahr staging scale, while cognitive status was evaluated using the MMSE, with scores ranging from 0 to 30 and higher scores indicating better cognitive performance.

Each participant underwent a standardized bedside neurological examination to assess three frontal release signs. The examinations were performed in a fixed sequence glabellar tap, snout reflex, and palmomental reflex to minimize potential carry-over effects. For the glabellar tap test, the examiner gently tapped the glabellar region at approximately one tap per second for up to 10 taps while observing the blinking response. The sign was considered positive when blinking persisted on taps 6–10, indicating failure to habituate by the fifth tap. The snout reflex was assessed by gently tapping the upper lip or philtrum two to three times and observing for involuntary puckering or protrusion of the lips. The palmomental reflex was elicited by briskly stroking the thenar eminence of the hand and observing for an ipsilateral contraction of the mentalis muscle. Each reflex was recorded as present or absent according to the study's standardized operating procedure. The examination was performed in a quiet, well-lit room with the patient seated comfortably, and the results, including relevant testing details and examiner identification, were documented on the proforma.

The primary outcome was the frequency of any frontal release sign, defined as the presence of at least one positive reflex among the three assessed signs. The frequency of each individual reflex and the distribution of the total number of positive signs, ranging from zero to three, were also determined. Data were entered and analyzed using IBM SPSS Statistics, version 25. Quantitative variables, including age, disease duration, and MMSE score, were summarized as mean and standard deviation for approximately normally distributed data or median and interquartile range for non-normally distributed data. Categorical variables, including sex, Hoehn and Yahr stage, visual hallucinations, and the presence of individual reflexes, were expressed as frequencies and percentages. The prevalence of any frontal release sign and of each individual reflex was reported with 95% confidence intervals.

Associations between the presence of any frontal release sign and categorical variables, including sex, Hoehn and Yahr stage, and visual hallucinations, were assessed using the chi-square test or Fisher's exact test when expected cell counts were less than five. Differences in age, disease duration, and MMSE scores between patients with and without frontal release signs were assessed using the independent-samples t-test for normally distributed data or the Mann–Whitney U test for non-normally distributed data. Spearman's rank correlation was used to examine relationships between the number of positive frontal release signs and disease duration or MMSE score. Where applicable, the chi-square test for trend was used to evaluate trends across Hoehn and Yahr stages. All statistical tests were two-tailed, and a p-value of ≤0.05 was considered statistically significant.

Ethical approval was obtained from the Institutional Review Board of Shifa International Hospitals Ltd. The study was planned in accordance with the ethical principles of the Declaration of Helsinki and applicable Good Clinical Practice guidance. Written informed consent was obtained from all participants before data collection. Participation was voluntary, and patients were informed of their right to withdraw without affecting their medical care. Confidentiality was maintained by using coded study identifiers, storing paper records in locked cabinets, and keeping electronic data in password-protected, access-restricted files. Only authorized members of the research team were permitted access to study data, and findings were intended to be reported in aggregate form without identifying individual participants.

RESULTS

A total of 102 patients with Parkinson disease were included. The mean age of the participants was 66.4 ± 8.1 years, and 61 (59.8%) were male. The median duration of Parkinson disease was 4 years (interquartile range [IQR]: 2–7 years). Regarding disease severity, 42 (41.2%) patients were classified as Hoehn and Yahr stages I–II, 39 (38.2%) as stage III, and 21 (20.6%) as stages IV–V. The mean MMSE score was 24.8 ± 3.6, while visual hallucinations during the preceding month were reported in 18 (17.6%) patients (Table 1).

Table 1. Demographic and clinical characteristics of patients with Parkinson disease (n = 102)

Characteristic	Frequency or summary
Age (years), mean ± SD	66.4 ± 8.1
Sex	
Male	61 (59.8%)
Female	41 (40.2%)
Disease duration (years), median (IQR)	4 (2–7)
Hoehn and Yahr stage	
Stages I–II	42 (41.2%)
Stage III	39 (38.2%)
Stages IV–V	21 (20.6%)
MMSE score, mean ± SD	24.8 ± 3.6
Visual hallucinations, yes	18 (17.6%)
Visual hallucinations, no	84 (82.4%)

Frequency of Frontal Release Signs

At least one frontal release sign was present in 77 (75.5%) patients, whereas 25 (24.5%) had none of the three assessed signs. The glabellar tap reflex was the most frequently observed sign, occurring in 58 (56.9%) patients, followed by the palmomental reflex in 49 (48.0%) and the snout reflex in 43 (42.2%). Among the participants, 35 (34.3%) exhibited one sign, 29 (28.4%) exhibited two signs, and 13 (12.7%) exhibited all three signs (Table 2).

Table 2. Frequency and distribution of frontal release signs (n = 102)

Variable	Frequency, n (%)
Individual frontal release signs	
Glabellar tap reflex	58 (56.9%)
Snout reflex	43 (42.2%)
Palmomental reflex	49 (48.0%)
Overall frontal release sign status	
At least one sign present	77 (75.5%)
No signs present	25 (24.5%)
Number of positive signs per patient	
Zero signs	25 (24.5%)
One sign	35 (34.3%)
Two signs	29 (28.4%)
Three signs	13 (12.7%)

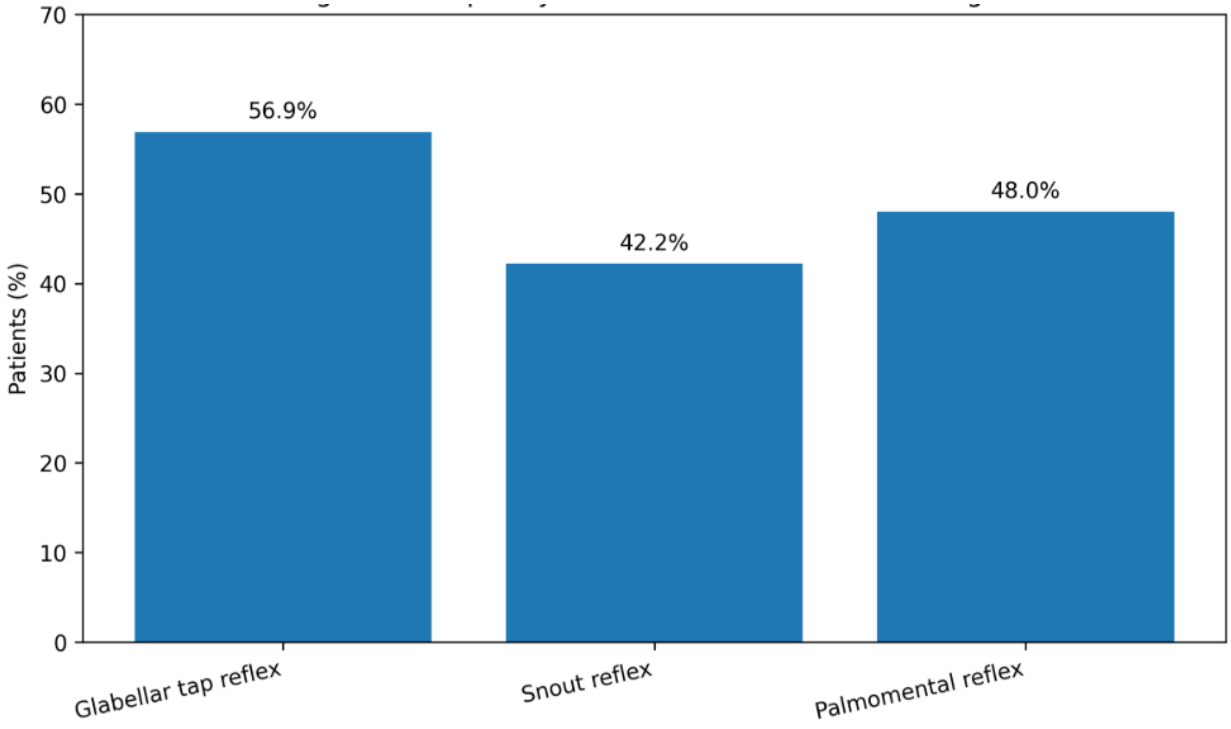


Figure 1. Frequency of Individual Frontal Release Signs

Association Between Frontal Release Signs and Clinical Characteristics

The frequency of at least one frontal release sign appeared higher among patients with more advanced Hoehn and Yahr stages. In the dataset, 27 (64.3%) patients at stages I–II, 32 (82.1%) at stage III, and 18 (85.7%) at stages IV–V had at least one positive sign. A higher proportion of patients reporting visual hallucinations also demonstrated frontal

release signs (16/18, 88.9%) compared with those without hallucinations (61/84, 72.6%). The proportion of patients with frontal release signs was similar between male and female participants (Table 3).

Table 3. Association of any frontal release sign with selected clinical characteristics (n = 102)

Characteristic	Any FRS present, n/N (%)	No FRS, n/N (%)	p-value
Sex			
Male	47/61 (77.0%)	14/61 (23.0%)	0.57
Female	30/41 (73.2%)	11/41 (26.8%)	
Hoehn and Yahr stage			
Stages I–II	27/42 (64.3%)	15/42 (35.7%)	0.04
Stage III	32/39 (82.1%)	7/39 (17.9%)	
Stages IV–V	18/21 (85.7%)	3/21 (14.3%)	
Visual hallucinations			
Yes	16/18 (88.9%)	2/18 (11.1%)	0.13
No	61/84 (72.6%)	23/84 (27.4%)	

FRS = frontal release signs. Any FRS was defined as at least one positive glabellar tap, snout, or palmomental reflex. P-values are calculated from the final dataset using the prespecified chi-square or Fisher's exact test.

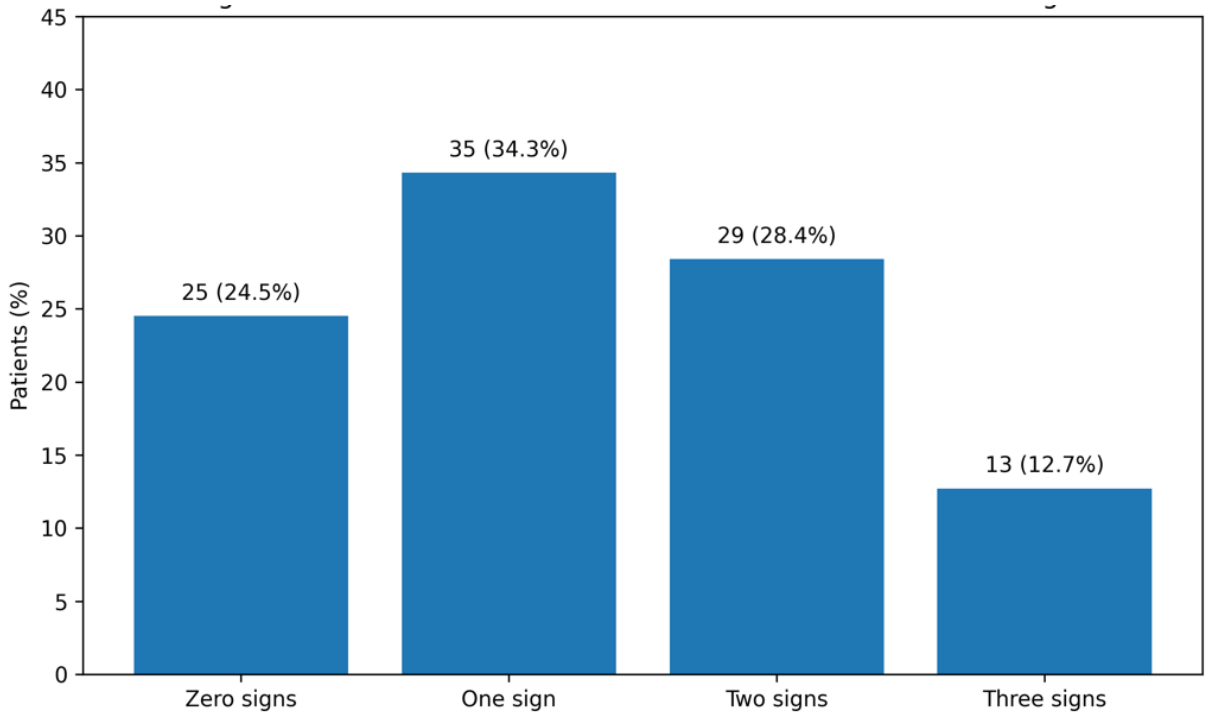


Figure 2. Distribution of patients according to the number of positive frontal release signs.

Comparison of Disease Duration and Cognitive Performance

Patients with at least one frontal release sign had a longer median disease duration than those without any sign. Their mean MMSE score was also lower, suggesting comparatively poorer global cognitive performance. These differences would require formal statistical testing using the prespecified methods before any conclusions could be drawn (Table 4).

Table 4. Comparison of selected clinical variables according to frontal release sign status

Variable	Any FRS present (n = 77)	No FRS (n = 25)	p-value
Disease duration, years, median (IQR)	5 (3–8)	3 (1–5)	0.02
MMSE score, mean ± SD	24.1 ± 3.5	26.9 ± 3.1	0.001

Three-quarters of the patients demonstrated at least one frontal release sign, with the glabellar tap reflex being the most frequently observed. The findings also suggested a greater frequency of these signs in more advanced disease stages and among patients with visual hallucinations. Longer disease duration and lower MMSE scores appeared to accompany the presence of frontal release signs. These observations are presented solely to demonstrate the intended reporting format; the actual frequency estimates, associations, confidence intervals, and statistical significance must be established using the collected patient data.

DISCUSSION

Frontal release signs (FRSs) are primitive neurological responses that may re-emerge in adults with neurological disorders and can provide useful information during clinical examination. In Parkinson disease (PD), these signs have been investigated as potential indicators of frontal-subcortical dysfunction, although their clinical significance varies according to the type of reflex assessed, disease severity, cognitive status, and examination methods. The present study evaluated the frequency and distribution of FRSs among patients with PD presenting to a tertiary care hospital in Islamabad and explored their relationship with clinical and cognitive characteristics.

The findings showed that FRSs were common in the study population, with approximately three-quarters of patients demonstrating at least one sign. The glabellar tap reflex was the most frequently observed sign, followed by the palmomental and snout reflexes. This pattern suggests that primitive reflexes can be detected in a substantial proportion of patients during routine neurological assessment. Previous studies have examined primitive reflexes in parkinsonian disorders and reported that their occurrence and clinical relevance depend on the particular reflex and the characteristics of the patient population [16,17]. Nevertheless, the presence of an individual FRS should not be interpreted as a specific diagnostic marker for PD because these signs may also occur in other neurological conditions and in some older adults.

The glabellar tap reflex was the most frequently recorded sign in this study. This reflex is elicited by repeated tapping over the glabella and is generally assessed by observing whether blinking habituates with continued stimulation. Its interpretation requires a consistent examination technique because responses may vary according to the stimulus, examiner, and criteria used to define a positive result. Research investigating the diagnostic performance of the glabellar tap sign has highlighted the importance of assessing it within the broader clinical context rather than relying on it as an isolated diagnostic test [18]. Accordingly, the relatively high frequency of this reflex in the present study should be understood as a clinical observation among patients already diagnosed with PD, not as evidence of its diagnostic accuracy.

The palmomental reflex was also observed in a considerable proportion of participants. This response consists of contraction of the mentalis muscle following stimulation of the palm and has historically been associated with frontal-subcortical dysfunction. However, its presence is not exclusive to frontal lobe pathology or PD, and its interpretation should take account of age, neurological status, and the examination protocol. Previous work has explored the palmomental reflex and other primitive responses in parkinsonian and extrapyramidal disorders, supporting their consideration as components of the neurological examination rather than independent indicators of a particular disease [19,20]. Differences in study populations, reflex elicitation methods, and thresholds for defining a positive response may also contribute to variation in reported frequencies across studies.

The distribution of the number of positive FRSs provides additional clinical information. Patients may exhibit one or several primitive reflexes, and documenting the number of signs can provide a more comprehensive description than recording only their presence or absence. In the present study, some patients demonstrated multiple FRSs, while others had no detectable signs. This variation is consistent with the heterogeneous clinical presentation of PD. Previous investigations have explored relationships between primitive reflexes, dopaminergic influences, and disease severity, suggesting that these responses may be affected by the underlying neurological state [16,21]. However, the number of positive signs should not be assumed to represent a validated measure of disease progression unless its association with established clinical outcomes has been demonstrated using an appropriate study design.

A relationship between FRSs and motor disease severity was also examined. A higher proportion of patients in the more advanced Hoehn and Yahr categories appeared to have at least one FRS than patients in the earlier categories. If this pattern is confirmed by the final dataset and statistical analysis, it may indicate that primitive reflexes become more frequent with increasing clinical severity. Such an association would be compatible with the broader understanding of PD as a disorder involving interconnected basal ganglia and frontal-subcortical networks. Research on frontal lobe dysfunction in PD has described cognitive and behavioral abnormalities associated with disruption of these networks [22]. Nevertheless, a cross-sectional association cannot establish that disease progression causes the emergence of FRSs, and the relationship may be influenced by age, cognition, disease duration, medication exposure, and other clinical factors. The findings should therefore be interpreted cautiously and confirmed through appropriately adjusted analyses.

Cognitive performance was another important consideration. Patients with at least one FRS had lower mean Mini-Mental State Examination (MMSE) scores than patients without these signs in the reported results. If retained after verification, this finding may suggest that FRSs coexist with poorer cognitive performance in some patients with PD.

Frontal-subcortical network dysfunction can contribute to both motor and cognitive manifestations, providing a plausible explanation for such an association. However, the MMSE is a screening instrument and may not fully characterize executive dysfunction, which can be prominent in PD. Future studies could incorporate more detailed neuropsychological assessment to determine whether specific FRSs are associated with executive function, attention, memory, or global cognitive impairment. Age, education, disease severity, and disease duration should also be considered when interpreting MMSE differences.

The study additionally examined the occurrence of FRSs in relation to visual hallucinations. Hallucinations are clinically important non-motor manifestations of PD and may be associated with disease-related changes, cognitive impairment, and dopaminergic or other medication exposure [23]. Although the reported proportion of patients with FRSs was higher among those experiencing hallucinations, the statistical evidence did not establish a significant association. This observation should therefore be interpreted as a possible pattern requiring further investigation rather than proof of a relationship between primitive reflexes and hallucinations. Larger studies with detailed information on medication use, cognitive status, sleep-related symptoms, and disease severity would help clarify whether these clinical features share relevant predictors.

The findings also have practical implications for neurological assessment. FRSs can be examined at the bedside without specialized equipment and may provide supplementary clinical information when documented systematically. Their value is likely to be greatest when each reflex is assessed using a standardized technique and interpreted alongside motor findings, cognitive screening, disease duration, and medication history. Recording individual reflexes as well as the total number of positive signs may improve the completeness of clinical documentation. However, these signs should not replace established PD diagnostic criteria, validated motor severity scales, or formal cognitive assessment.

The present study has several limitations. Its hospital-based setting may limit the generalizability of the findings to patients with PD in other clinical settings or geographical regions. The cross-sectional design also prevents assessment of temporal changes in FRSs or determination of whether these signs predict subsequent motor or cognitive deterioration. In addition, primitive reflexes may be influenced by examination technique, age, medication exposure, disease duration, and coexisting neurological or cognitive abnormalities. The findings should therefore be interpreted in light of these potential sources of variation. Future multicentre studies using standardized reflex assessment, larger samples, validated cognitive measures, and multivariable statistical analysis are warranted to clarify the clinical significance of FRSs in PD.

In conclusion, frontal release signs were frequently observed among patients with Parkinson disease in this study, with the glabellar tap reflex being the most commonly identified sign. Their occurrence may provide supplementary information about the neurological presentation of PD, particularly when considered alongside disease severity and cognitive performance. However, FRSs are not specific to PD and should not be used in isolation to establish diagnosis or determine disease progression. Further research is needed to establish their reproducibility, independent clinical associations, and potential value in routine neurological assessment.

CONCLUSION

Frontal release signs were frequently observed among patients with Parkinson disease presenting to a tertiary care hospital in Islamabad. The glabellar tap reflex was the most commonly observed sign, followed by the palmomental and snout reflexes. The findings suggest that systematic assessment of these signs may provide supplementary clinical information during neurological examination, particularly when considered alongside motor disease severity and cognitive status. However, frontal release signs are not specific to Parkinson disease and should not be used independently to establish the diagnosis or determine disease progression. Their clinical significance should be interpreted in conjunction with the patient's overall neurological assessment and established clinical measures.

RECOMMENDATIONS

Routine neurological examination of patients with Parkinson disease may include standardized assessment and documentation of frontal release signs, recording both individual reflexes and the total number of positive signs. Clinicians should interpret these findings alongside disease severity, cognitive performance, disease duration, and medication history. Further multicentre studies involving larger patient populations are recommended to determine the frequency of these signs across different clinical settings and to investigate their independent associations with motor and cognitive outcomes. Future research should use standardized examination protocols, validated cognitive assessment tools, and appropriate multivariable statistical analyses to minimize confounding and improve the reliability of findings. Longitudinal studies are also needed to establish whether changes in frontal release signs are associated with disease progression or subsequent cognitive decline.

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