RESEARCH ARTICLE
DOI: 10.26650/Tr-ENT.2024.1491389
The Turkish Journal of Ear Nose and Throat 2024;34(3):84-91

Impact of Parkinson's Disease-Related Dysphagia Severity on Quality of Life: Comparison Between Self-Reports and Videofluoroscopic Swallowing Study Results

Serkan Bengisu[1], Merve Savaş[1], Demet Aygün[2], Senanur Kahraman Beğen[1], Tutku Altıntaş[1], Burak Manay[1]

[1]İstanbul Atlas University, Faculty of Health Sciences, Department of Speech and Language Therapy, İstanbul, Türkiye
[2]İstanbul Atlas University, Faculty of Medicine, Department of Neurology, İstanbul, Türkiye

ORCID ID: S.B. 0000-0002-6580-1189; M.S. 0000-0002-7138-2603; D.A. 0000-0002-1828-1811; S.K.B. 0000-0001-6938-301X; T.A. 0009-0001-2729-741X; B.M. 0009-0000-9509-4633

Citation: Bengisu S, Savaş M, Aygün D, Kahraman Beğen S, Altıntaş T, Manay B. Impact of Parkinson's disease-related dysphagia severity on quality of life: Comparison between self-reports and videofluoroscopic swallowing study results. Tr-ENT 2024;34(3):84-91. https://doi.org/10.26650/Tr-ENT.2024.1491389

ABSTRACT

Objective: The aim of this study was to evaluate the impact of dysphagia due to Parkinson's disease (PD) on quality of life and to compare the results of the objective assessment with those of patient self-reports.
Materials and Methods: The study included 28 participants with PD. Patients were assessed clinically using the Eating Assessment Tool (EAT-10) and objectively via video-fluoroscopy (VFSS). The data obtained with VFSS were scored using the Penetration Aspiration Scale (PAS) and Functional Oral Intake Scale (FOIS) by an SLP blinded to patient information and clinical assessment methods. Swallowing disorder-related quality of life was assessed using the Swallowing Quality of Life Questionnaire (SWAL-QOL).
Results: It was found that as PD severity and duration increase, the severity of swallowing impairment also increases, leading to a negative effect on quality of life being affected negatively accordingly ($p<0.05$). According to the SWAL-QOL questionnaire results, dysphagic patients had lower SWAL-QOL scores, particularly in terms of burden, eating desire, duration, symptom frequency, food selection, and mental health domains. In addition, a statistically significant difference was found between the groups with and without dysphagia in all EAT-10, PAS, and FOIS scores ($p=0.000$, $p=0.20$, $p= 011$). There was no statistically significant difference between self-reports on the presence of swallowing disorders and the results of the objective assessment using the VFSS ($p=0.298$).
Conclusion: In patients with PD, swallowing impairment becomes more pronounced as the duration and severity of the disease increase, and quality of life is negatively affected. The results of this study suggest that the results between objective assessments and patient reports are inconsistent and therefore emphasise the importance of objective measurement methods in dysphagia assessment.
Keywords: Parkinson disease, dysphagia, quality of life, videofluoroscopy, self reports

INTRODUCTION

Parkinson's Disease (PD) is one of the most common neurodegenerative diseases, affecting the nervous system and causing motor and non-motor symptoms due to extrapyramidal involvement (1). More than 80% of patients develop dysphagia during the disease (2). The prevalence of PD in individuals older than 80 years is 1903 per 100,000 people worldwide and increases with age (3). In Turkey, a study reported a prevalence of 202 per 100,000 individuals with PD (4, 5). Severe dysphagia is subjectively reported to occur approximately 10 years after the onset of motor symptoms, often in the advanced stages of PD (5-7). The reported prevalence of dysphagia in patients undergoing PD varies widely, from 18.5% to 100%, due to differences in methods of assessing swallowing function.

Dysphagia, which is defined as difficulty swallowing, is a disorder of the sensorimotor system required for swallowing. It is estimated that approximately 600,000 individuals develop neurogenic dysphagia annually. Accurate and early diagnosis can improve quality of life and prevent death (8). Dysphagia is strongly associated with aspiration pneumonia in elderly

Corresponding Author: Serkan Bengisu **E-mail:** serkan.bengisu@atlas.edu.tr
Submitted: 28.05.2024 • **Revision Requested:** 31.05.2024 • **Last Revision Received:** 28.06.2024 • **Accepted:** 28.06.2024 • **Published Online:** 15.08.2024

individuals, leading to hospitalisation, morbidity, and death. Therefore, understanding the prevalence of dysphagia in fragile individuals can facilitate early diagnosis and treatment (9).

Assessment techniques used in swallowing examinations are both objective and subjective. Physical examination, instrumental examination, and medical history are all part of the neurogenic dysphagia assessment process. In our country, subjective evaluation tools, such as the Swallowing Quality of Life Questionnaire (SWAL-QOL), Gugging Swallowing Screening Test (GUSS), and Eating Assessment Tool (EAT-10), have completed reliability and validity studies. In objective evaluation, instrumental imaging methods, such as the Fiberoptic Endoscopic Swallowing Study (FEES) and Videofluoroscopic Swallowing Study (VFSS), are used (10-13). These tools have various advantages over one another (14). In evaluating patients with swallowing disorders, an integrated clinical assessment should include as many elements as possible from both non-instrumental and instrumental assessments (15). Despite the effectiveness of subjective tools in identifying patients at risk for swallowing disorders, objective assessment tools should also be used to evaluate swallowing dysfunction in detail and to detect silent aspiration (16). Differences in the severity of dysphagia based on subjective patient reports and instrumental assessments may be observed in patients with dysphagic complaints. The use of both objective and subjective assessments provides a clear and comprehensive presentation of the nature of the problem (17).

Studies employing instrumental assessments, such as FEES or VFSS, have shown that more than 50% of patients with PD who do not self-report dysphagia actually have it. This discrepancy underscores the necessity of utilising objective evaluations like FEES or VFSS to accurately diagnose dysphagia in PD (5, 18, 19). There was a substantial disparity between the prevalence of dysphagia reported by patients themselves (35%) and the cases confirmed through objective assessments (82%) (20). Pneumonia is the primary cause of death in PD, affecting 4%–30% of patients (6). Surprisingly, a significant proportion of individuals with PD (20-40%) are unaware of their swallowing issues, with less than 10% acknowledging dysphagia symptoms (5,21,22). In the advanced stages of PD, many patients experience severe dysphagia, which is often accompanied by weight loss, hypersalivation, and cognitive decline. Clinical indicators of dysphagia in PD include Hoehn and Yahr stages 4 and 5, body mass index below 20 kg/m2, and symptoms like hypersalivation, sialorrhea, and dementia. Weight loss and the presence of silent aspiration may cause dysphagia-related complications, such as aspiration pneumonia (23). Moreover, impaired cough reflexes among patients undergoing PD contribute to an increased risk of aspiration pneumonia (24). Therefore, it is crucial for patients to recognise and report symptoms indicating swallowing difficulties, including silent aspiration, especially in the early and mid-early stages of the disease to facilitate timely intervention and management by healthcare professionals.

Research indicates that dysphagia considerably affects the quality of life of individuals with PD (25). Using a questionnaire to assess the effect of dysphagia on quality of life has become a standard procedure. Integrating patient perception with traditional instrumental assessment is crucial for comprehensive swallowing evaluation. This approach can identify specific symptoms of swallowing difficulties that patients may struggle to identify, such as challenges in chewing and retention of certain food textures (26). Limited time during clinical or instrumental assessments may overlook these observations. Early detection of dysphagia using a dedicated questionnaire can decrease the risk of complications like aspiration, malnutrition, and pneumonia. Among dysphagia-specific questionnaires, the SWAL-QOL questionnaire developed by McHorney et al. is one of the most frequently preferred questionnaires (27). Because of its generic structure, SWAL-QOL is adaptable to a range of dysphagia reasons. It makes it possible to distinguish between patients who have dysphagia and those who do not, as well as to grade the condition according to a patient's tolerance for various food textures and liquid consistencies (26). By assessing self-reported symptoms and their influence on quality of life related to swallowing, the SWAL-QOL is a useful tool for assessing therapy effectiveness from the patient's perspective. Clinicians who address dysphagia in patients with PD can benefit from an understanding of how the condition affects swallowing-related quality of life (28).

Although dysphagia is prevalent among patients undergoing PD, recognition of swallowing difficulties is often lacking. Given that certain swallowing disorders in PD may not present symptoms and awareness of this issue is limited, both clinical and instrumental assessments along with dedicated questionnaires should be utilised in clinical settings (29). Factors influencing awareness levels regarding dysphagic symptoms in patients undergoing PD have not been fully elucidated. Potential causes of this condition include disruptions in airway somatosensory function. It has been suggested that disease severity may lead to impairments in swallowing and airway sensory function, preventing the basal ganglia and related nervous system structures from integrating sensory inputs for controlling swallowing-related motor functions (30).

In this study, subjective and objective evaluations of swallowing disorders in Parkinson's patients were made, and the level of disease and awareness levels were examined. This was a descriptive study to determine the effect of dysphagia on quality of life in patients undergoing PD. This study aimed to evaluate the effect of dysphagia due to Parkinson's disease on quality of life and to compare the self-reports of patients with the results of objective evaluation using video-fluoroscopy.

MATERIAL and METHODS

Subjects

This research involved 28 patients diagnosed with PD at Atlas University Medicine Hospital between June 1, 2023 and March 1, 2024. Among the participants, 15 (53.6%) were male and 13

(46.4%) were female, with a mean age of 68.6 years (range: 48–92, SD: 10.11). The inclusion criteria required patients to have: (i) no barium allergy; (ii) no tracheotomy or mechanical ventilation; (iii) no diaphragmatic pacer; (iv) no significant concurrent respiratory disease; and (v) no other neurological disorder. Disease staging was performed using the Hoehn–Yahr scale (31). Throughout the study period, all patients continued their anti-Parkinsonian medication. The study was approved by the Ethics Boards and Commissions of İstanbul Atlas University and was conducted in accordance with the Declaration of Helsinki (Date:22.05.2023, No: 27225). All patients met the specified inclusion criteria.

Assessment procedure

Eating status assessment

Following the VFSS examination, the patients' current food habits were categorised using the Functional Oral Intake Scale (FOIS). FOIS, which has a 7-point ordinal scale, is the most frequently used scale for evaluating functional oral intake in dysphagia patients (32). Levels 1 to 3 correspond to differing degrees of non-oral feeding, whereas levels 4 to 7 correspond to varying degrees of oral feeding without a feeding tube (33).

Swallowing function assessment

a. Clinical assessment

The clinical evaluation of the patients for dysphagia was determined by The Eating Assessment Tool 10 (EAT-10). The EAT-10 is a symptom-specific dysphagia outcome tool that is self-administered, validated, and validated in Turkey (34). The EAT-10 measures the severity of swallowing disorder, quality of life, and treatment effectiveness. The scale consists of 10 questions that are scored between 0 and 4 (0=no problem, 4=severe problem). A total score of 3 or above indicates a risk of swallowing disorder.

b. Instrumental assessment

Videofluoroscopic Swallowing Study (VFSS) was used to objectively analyse the swallowing process (35). The VFSS assessment was performed using a General Electric Precision RXi fluoroscopy device. Patients were positioned in the X-ray tube in a straight standing position with their head in a lateral position. The VFSS images were recorded at 30 frames per second. Patient positioning ensured the visibility of specific imaging boundaries, including the anterior lips, posterior pharyngeal wall, inferior cervical oesophagus, and superior nasopharynx.

Standardised VFSS protocols were followed, with each patient undergoing three swallowing trials for liquid and semisolid consistency. Liquid trials began with controlled volumes (3 x 5 ml teaspoons) followed by self-modulated sips in a free-volume setting. Semi-solid consistencies were administered in three portions, each consisting of a controlled single teaspoon with 5 ml per mouthful. Additionally, patients were instructed to take a single bite of solid bread. For statistical analysis, liquid consistencies adhered to IDDSI Level 0; semi-solid consistencies adhered to IDDSI Level 4; and solid consistencies adhered to IDDSI Level 7 per the International Dysphagia Diet Standardisation Initiative.

Recorded VFSS image was assessed by a Speech-Language Pathologist (SLP) blinded to clinical assessments and patient details using the Functional Oral Intake Scale (FOIS) and Penetration Aspiration Scale (PAS). The PAS assesses the degree of penetration and aspiration and whether the substance entering the airway has been removed using an 8-point clinical scale. A score of 8 represents the worst airway protection (36). The validity and reliability of the PAS scale in the Turkish population was assessed by Karaduman et al. (37).

c. Quality of life assessment

The SWAL-QOL was developed to measure patient-reported dysphagia-specific parameters. SWAL-QOL is composed of 44 questions that evaluate 11 sub-domains of QOL, including general burden, eating duration, eating desire, frequency of symptoms, food selection, communication, fear, mental health, social functioning, sleep, and fatigue (27). A 5-point Likert scale was used to provide scores for each parameter. Higher scores on any subscale, ranging from 0 to 100, suggest better quality of life in terms of dysphagia (38). Each domain can have a score ranging from 0 (worst) to 100 (highest). Research on the Turkish population has demonstrated the validity and reliability of SWAL-QOL (38). The questionnaire was given out in an examination room, and each participant took 20 minutes on average. The investigator read aloud the questionnaire items and answer options to each patient to guarantee accurate replies and reduce the possibility of misinterpretations resulting from poor education levels or visual impairments. The objective of this methodology was to enhance comprehension of the survey and minimise the probability of deceptive answers. By administering questionnaires in the same manner to each participant, consistency was preserved, and biases in the data collection process were avoided.

Statistical analysis

All analyses were conducted using the SPSS programme (version 26.0 for Windows; IBM Corp., Armonk, NY, USA). Descriptive statistics were used to present patient demographic information and clinical characteristics. All demographic data were analysed and presented as numbers (N) or percentages (%). The analysis's main goal was to determine the relationship between disease stage, disease duration, swallowing function, and quality of life of patients undergoing PD. To assess the distribution of scores across all scales, the Shapiro-Wilk test was utilised. Because the scores were not normally distributed, Spearman's correlation analysis was used for relationship analysis. Correlation coefficients were interpreted as follows: 0.0 to 0.3 indicated low correlation, 0.3 to 0.5 indicated low to moderate correlation, 0.5 to 0.7 indicated moderate correlation, 0.7 to 0.9 indicated high correlation, and 0.9 to 1.0 indicated excellent correlation (49). For comparisons between groups, the Mann–Whitney U test was applied. The fact that the $p<0.05$ being accepted as statistically significant.

RESULTS

Participants

The study included 28 participants. Participants were categorised into two groups according to their EAT-10 scores: those with and without dysphagia. Sixteen (57.2%) patients had dysphagia, whereas 12 (42.8%) did not. The mean age of patients in the dysphagic group was 69.25±10.38 years with a disease duration of 6.87±4.84 years, and the mean age of patients in the non-dysphagic group was 67.75±10.13 years with a disease duration of 3.45±2.6 years. Among the patients with dysphagia, 5 (31.3%) were in the early stage, 5 (31.3%) in the intermediate stage, and 6 (37.5%) in the advanced stage. In the non-dysphagic group, 8 (66.7%) patients were in the early stage and 4 (33.3%) were in the intermediate stage. No patient in this group was in the advanced stage. There were no statistically significant differences between the two groups in terms of gender, education level, H&Y stage, MMSE score, or disease duration. The demographic and clinical characteristics of the participants are presented in Table 1.

The study involved an analysis of disease duration, disease stage, swallowing-related quality of life, and swallowing scores in patients diagnosed with Parkinson's disease. The findings (Table 2) revealed a noteworthy moderate negative correlation between disease duration and swallowing-related quality of life in all patients with Parkinson's disease. It was observed that swallowing-related quality of life decreased with an increase in the duration of the disease (r=-0.504; p=0.006). Additionally, a negative correlation between disease stage and swallowing-related quality of life was identified, although this relationship did not reach statistical significance (r=-0.342; p=0.75). Moreover, a significant correlation was noted between disease duration, disease stage, and swallowing impairment in all patients with Parkinson's disease. The EAT-10 scores of the patients increased with both the duration and stage of the disease (r=0.556; p=0.001, r=0.533; p=0.004). Furthermore, the results obtained through videofluoroscopy indicated a positive association between disease duration and disease stage, and the patients' scores on the PAS scale (r=0.720; p=0.000, r=0.564; p=0.002), along with a negative correlation with the FOIS scores (r=-0.699; p=0.000, r=-0.508; p=0.006) as both disease duration and disease stage increased (Table 2).

Swallowing-specific quality of life was compared among three groups: general, dysphagic, and nondysphagic. The SWAL-QOL data are presented in Table 3.

Overall, the swallowing-specific quality of life was significantly impacted. The mean SWAL-QOL domain scores ranged from 57.4 to 100. The findings revealed that swallowing dysfunction had a negative impact on patient-reported quality of life. There was a significant difference in the total SWAL-QOL score between the non-dysphagic group (94.58±4.44) and the dysphagic group (84.14±13.41) (p=0.029). All SWAL-QOL domains had lower scores in the dysphagic group. Significant differences were found between the dysphagic and non-dysphagic groups in the sub-domains of general complaints, food desire, eating duration, frequency of symptoms, food choice, and mental health (Table 3).

The scores for swallowing disorders obtained through clinical and instrumental assessments were analysed for general,

Table 1: Comparison of demographic and clinical characteristics between PD patients with and without dysphagia.

	Overall (n=28) x̄ ±SD	Dysphagic (n=16) x̄ ±SD	Non-Dysphagic (n=12) x̄ ±SD	p
Age	68.6±10.11	69.25±10.38	67.75±10.13	0.871
Gender (F/M)	13 (46.4%) / 15 (53.6%)	7 (43.8%) / 9 (56.3%)	8 (55.6%) of 4 (44.4%)	0.237
Disease duration (years)	5.41±4.44	6.87±4.84	3.45±2.6	
⩽ 1	2/ (7.1%)	1/ (6.3%)	1/ (%8.3)	0.081
2–4	15/ (53.6%)	6/ (37.5%)	9/ (75%)	
⩾ 5	11/ (39.3%)	9/ (56.4%)	2/ (16.6%)	
Education				
Primary school	23/ (82.1%)	12/ (75%)	11/ (91.7%)	0.227
High school	3/ (10.7%)	2/ (12.5%)	1/ (8.3%)	
University	2/ (7.1%)	2/ (12.5%)	0	
Hoehn-Yahr stage	1.21±0.56	2.06±0.85	1.33±0.49	
H-Y Mild (1-2)	13/ (46.4%)	5/ (31.3%)	8/ (66.7%)	0.067
H-Y Moderate (2.5-3)	9/ (32.1%)	5/ (31.3%)	4/ (33.3%)	
H-Y Advanced (4-5)	6/ (21.4%)	6/ (37.5%)	0	
MMSE	21.76±6.95	20.62±7.5	23.3±6.09	0.294

MMSE: Mini-Mental State Examination, x̄: Mean, SD: Standard Deviation.

Table 2: Relationship between Swallowing Impairment and SWAL QOL according to Disease Duration and H-Y Stage in Patients undergoing PD

		EAT-10	PAS (IDDSI-0)	FOIS	Total SWAL-QOL
H&Y Stage	r	.533	.564	-.508	-0.342
	p	**0.004****	**0.002****	**0.006****	0.075
Disease Duration	r	.596	.720	-.699	-.504
	p	**0.001****	**0.000****	**0.000****	**0.006****

H&Y: Hoehn and Yahr, EAT-10: Eating Assessment Tool, PAS: Penetration Aspiration Scale, IDDSI: International Dysphagia Diet Standardisation Initiative, FOIS: Functional Oral Intake Scale, SWAL-QOL: Swallowing Quality of Life Questionnaire. *p<0.05, **p<0.01 is considered statistically significant.

Table 3: Comparison of SWAL-QOL Scores between PD patients with and without dysphagia.

	Overall				Dysphagic				Non-Dysphagic				
SWAL-QOL	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**p**
Burden	62.50	100.00	93.30	12.95	62.50	100.00	88.28	15.46	100.00	100.00	100.00	0.00	**0.010****
Eating duration	50.00	100.00	92.98	12.28	50.00	100.00	88.77	14.82	91.60	100.00	98.60	3.27	**0.012***
Eating desire	62.50	100.00	92.65	10.36	62.50	100.00	88.70	11.70	87.50	100.00	97.92	4.87	**0.015***
Symptom freq	59.60	100.00	89.26	12.21	65.30	100.00	86.49	11.27	59.60	100.00	92.96	12.92	**0.027***
Food selection	0.00	100.00	90.63	20.87	0.00	100.00	83.59	25.71	100.00	100.00	100.00	0.00	**0.005****
Communication	0.00	100.00	87.50	23.57	0.00	100.00	83.59	28.77	62.50	100.00	92.71	13.55	0.449
Fear	25.00	100.00	92.18	15.93	25.00	100.00	88.66	19.93	81.25	100.00	96.87	6.25	0.178
Mental health	40.00	100.00	94.46	15.30	40.00	100.00	90.31	19.45	100.00	100.00	100.00	0.00	**0.020***
Social	35.00	100.00	95.71	14.12	35.00	100.00	92.81	18.35	95.00	100.00	99.58	1.44	0.237
Fatigue	25.00	100.00	72.89	22.06	25.00	100.00	67.16	23.85	58.30	100.00	80.53	17.54	0.181
Sleep	0.00	100.00	73.21	25.39	0.00	100.00	67.19	27.34	50.00	100.00	81.25	20.98	0.164
Total	57.40	100.00	84.14	13.41	57.40	96.90	84.14	13.41	87.90	100.00	94.58	4.44	**0.026***

Min: Minimum, Max: Maximum, SD: Standard Deviation, *p<0.05, **p<0.01 is considered statistically significant.

dysphagic, and non-dysphagic groups, and the results are shown in Table 4. The data from the groups indicated a statistically significant difference between the dysphagic and non-dysphagic groups in terms of patient-reported swallowing disorders and the results obtained from instrumental assessments (Table 4).

The scores for swallowing disorders obtained from clinical and instrumental evaluations, and the swallowing-related quality of life scores of patients with Parkinson's disease, were analysed. The results are presented in Table 5.

In the conducted study, a statistically significant, negative, and moderate correlation was found between the EAT-10 and PAS IDDSI 0 scores, as well as the SWAL-QOL scores of all participants (r=-0.685; p=0.000, r=-0.579; p=0.001). These results suggest that as the EAT-10 and PAS IDDSI 0 scores of the participants decreased, their SWAL-QOL scores increased. Additionally, a statistically significant, positive, moderate correlation was established between the FOIS and SWAL-QOL total scores of the participants (r=0.546; p=0.03), indicating that as the FOIS total scores increased, the SWAL-QOL scores also increased.

Table 4: Comparison of Swallowing Impairment Scores between PD patients with and without dysphagia.

	Overall				Dysphagic				Non-Dysphagic				
	Min	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**Min**	**Max**	**Mean**	**SD**	**p**
EAT-10	0.00	18.00	4.60	4.90	2.00	18.00	7.18	5.10	0.00	2.00	1.16	0.93	**0.000***
PAS-IDDSI 0	1.00	8.00	2.25	2.04	1.00	8.00	3.00	2.42	1.00	3.00	1.25	0.62	**0.020***
FOIS	5.00	7.00	6.03	0.83	5.00	7.00	5.68	0.79	5.00	7.00	6.50	0.67	**0.011***

Min: Minimum, Max: Maximum, SD: Standard Deviation, *p<0.05, **p<0.01 is considered statistically significant.

Table 5: Relationship between Swallowing Disorders and SWAL QOL among patients undergoing PD.

		EAT-10	PAS IDDSI 0	FOIS
Total SWAL-QOL	r	-.685	-.579	.546
	p	**0.000****	**0.001****	**0,003****

*p<0.05, **p<0.01 is considered statistically significant.

Table 6: Comparison between self-reported swallowing and videofluoroscopic studies

	Negative	Positive	Total	χ^2	p
Self-Reported	12 (42.9%)	16 (57.1%)	28 (100%)	6.082	0.298
VFSS	19 (67.9%)	9 (32.1%)	28 (100%)		

*p<0.05, **p<0.01 is considered statistically significant.

Furthermore, a comparison was made between Parkinson's self-reports's patients regarding swallowing disorders obtained using the EAT-10 and the results of objective evaluation using videofluoroscopy. The analysis revealed no statistically significant difference between self-reports and VFSS results (p=0.298). The results are presented in Table 6.

DISCUSSION

The aim of this study was to evaluate the effect of dysphagia due to Parkinson's disease on quality of life and to compare the self-reports of patients with the results of objective assessments using video-fluoroscopy. According to the results of our study, as the duration and severity of the disease increase, swallowing disorders among patients increase, and their quality of life is affected more accordingly. In addition, when the results of the evaluation via video-fluoroscopy were examined, it was observed that the aspiration risks of patients increased with increasing disease duration and severity, negatively affecting their oral food intake processes. These results are generally consistent with the literature.

Based on their EAT-10 scores, the participants were classified into two groups: dysphagic and non-dysphagic. Dividing the subjects into groups according to whether they had dysphagia or not, the different effects of dysphagia on swallowing-related quality of life domains became more obvious. As a result of our study, statistically significant differences were found between the dysphagic and non-dysphagic groups in the sub-domains of general burden, eating desire, eating duration, symptom frequency, food choice, and mental health. The most affected areas were general burden, fatigue, eating time, and sleep, according to the literature on quality of life in individuals with dysphagia caused by PD (39-41). The general burden and eating time sub-domain were also affected in our study.

According to research examining the psychological and social effects of dysphagia, around one-third of patients avoided eating with others, resulting in the loss of socialisation-related function (42). In their study of individuals with dysphagic and non-dysphagic Parkinson's disease, Ploughman-Prine et al. found that the dysphagic group had lower SWAL-QOL scores in all areas; however, the differences were statistically significant only for the subdomains of mental health, social functioning, and general complaints (43). This implies that dysphagia has an adverse effect on the swallowing quality of life of patients undergoing PD, but only in specific domains.

In our study, a significant difference was found between the dysphagic and non-dysphagic groups in the sub-domains of eating time and eating desire. Prolonged eating time is a common and significant complaint in patients with PD. Consistent with this finding, Coriolano et al. reported that patients with PD required more time than age-matched normal controls to consume a given volume of water. It has been stated that the general bradykinesia seen in PD may be a possible reason for this (44).

The SWAL-QOL, which was originally designed to assess quality of life, has been utilised in some studies to evaluate swallowing function. To identify individuals with swallowing dysfunction, Rinkel et al. (45) proposed a clinical cut-off score of 14 from a total score of 100 on the SWAL-QOL. In this study, only 6 (21.4%) patients with Parkinson's disease exhibited a total score 86, indicating clinically significant dysphagia. Based on the results of this study, the SWAL-QOL score may not be an adequate screening tool for identifying patients with Parkinson's disease who require further evaluation of swallowing according to this cut-off score.

Discrepancies may arise between subjective patient reports and instrumental evaluations in individuals with dysphagic complaints. A previous study noted that PD participants tended to downplay swallowing difficulties in subjective questioning (20). Some elderly patients with Parkinson's disease might overlook that dysphagic symptoms could stem from impaired cognitive function, leading to underreporting or lack of awareness in subjective assessments like the SWAL-QOL. This emphasises the value of using instrumental assessments, such as the VFSS and FEES, and proactive education for patients undergoing PD. Alongside patient-rated questionnaires, clinician-rated measures are recommended to accurately define dysphagia in patients undergoing PD (46). Employing both objective and subjective assessments provides a comprehensive understanding of the issue (2).

In this study, in addition to the patients' self-reports regarding swallowing and swallowing-related QOL, instrumental evaluations using the VFSS were conducted, and the relationship between these two conditions was compared. The VFSS is accepted as the gold standard for the evaluation of dysphagia (47). The VFSS can be used to measure the degree of dysphagia, evaluate the effectiveness of treatment, and assess swallowing function. Penetration or aspiration is one possible dysphagia problem. In particular, when diagnosing

occult aspiration, VFSS can precisely identify both the aetiology and existence of aspiration. 9 (32.1%) patients in our study were diagnosed with dysphagia based on VFSS penetration/aspiration findings, despite not having overt symptoms. Kalf et al. reported large differences in the prevalence of dysphagia between subjectively reported and objectively confirmed cases in their meta-analysis published in 2012 (20). The results of our study are consistent with those of this previous study.

Although dysphagia is observed in most patients with Parkinson's disease, it has been demonstrated that these patients have low awareness of swallowing difficulties (29). Factors affecting the level of awareness of dysphagic findings in patients with Parkinson's disease have not yet been sufficiently elucidated. Possible causes include impairment of laryngeal structure and somatosensory function of the airway. It has been suggested that the structures involved in the oral and pharyngeal swallowing processes and the somatosensory function of the airway may be impaired because of disease severity. Therefore, the basal ganglia and related nervous system structures cannot integrate sensory inputs for swallowing-related motor control (30).

Our study has several limitations. Primarily, patients with PD in our sample were predominantly in the early stages of the disease and exhibited mild dysphagia symptoms. The limited representation of patients with advanced-stage PD might have restricted the comprehensiveness of our findings regarding severe dysphagia symptoms and advanced PD stages. Furthermore, only some patients with PD were included in our study. These limitations should be considered in future research.

CONCLUSION

This study revealed a significant negative correlation between dysphagia symptom severity and swallowing-related quality of life. Increasing disease duration and severity increases the severity of swallowing disorders, and quality of life is negatively affected. Another finding of the study was that inconsistency was observed between the results obtained from scales including self-assessment of swallowing disorders and objective assessment methods. These results emphasise the need for clinicians to use objective measurements and patient-reported questionnaires when evaluating dysphagia in patients with Parkinson's disease.

Ethics Committee Approval: This study was approved by the Ethics Committee of the İstanbul Atlas University (Date: 22.05.2023, No: 27225).

Informed Consent: Written informed consent was obtained from all participants who participated in this study.

Peer Review: Externally peer-reviewed.

Author Contributions: Conception/Design of Study- S.B., M.S., S.K.B.; Data Acquisition- T.A., B.M., S.B. D.A.; Data Analysis/Interpretation- S.B., S.K.B. T.A., B.M.; Drafting Manuscript- S.B., M.S., S.K.B.; Critical Revision of Manuscript- S.B., M.S., S.K.B.; Final Approval and Accountability- S.B., M.S., S.K.B.; Material or Technical Support- T.A., B.M., S.B. D.A. Supervision- S.B., M.S.

Conflict of Interest: The authors have no conflict of interest to declare.

Financial Disclosure: The authors declared that this study has received no financial support.

REFERENCES

1. Burke RE, O'Malley K. Axon degeneration in Parkinson's disease. Experimental Neurology 2013;246:72-83.
2. Suttrup I, Warnecke T. Dysphagia in Parkinson's Disease. Dysphagia 2016;31(1):24-32.
3. Pringsheim T, Jette N, Frolkis A, Steeves TD. The prevalence of Parkinson's disease: a systematic review and meta-analysis. Mov Disord 2014;29(13):1583-90.
4. Durmus H, Gokalp MA, Hanagasi HA. Prevalence of Parkinson's disease in Baskale, Turkey: a population based study. Neurol Sci 2015;3 (3):411-3.
5. Atalar MS, Genç G. Approach to swallowing disorders in Parkinson's disease. Mugla Sitki Kocman Univ Med J 2022;9(2):189-203.
6. Umemoto G, Furuya H. Management of Dysphagia in Patients with Parkinson's Disease and Related Disorders. Intern Med 2020;59(1):7-14.
7. Müller J, Wenning GK, Verny M, McKee A, Chaudhuri KR, Jellinger K, et al. Progression of dysarthria and dysphagia in postmortem-confirmed parkinsonian disorders. Arch Neurol 2001;58(2):259-64.
8. Panebianco M, Marchese-Ragona R, Masiero S, Restivo DA. Dysphagia in neurological diseases: a literature review. Neurol Sci 2020;41(11):3067-73.
9. van der Maarel-Wierink CD, Meijers JM, De Visschere LM, de Baat C, Halfens RJ, Schols JM. Subjective dysphagia in older care home residents: a cross-sectional, multi-centre point prevalence measurement. Int J Nurs Stud 2014;51(6):875-81.
10. Nacci A, Ursino F, La Vela R, Matteucci F, Mallardi V, Fattori B. Fiberoptic endoscopic evaluation of swallowing (FEES): proposal for informed consent. Acta Otorhinolaryngol Ital 2008;28(4):206-11.
11. Fukuoka T, Ono T, Hori K, Wada Y, Uchiyama Y, Kasama S, et al. Tongue pressure measurement and videofluoroscopic study of swallowing in patients with Parkinson's disease. Dysphagia 2019;34(1):80-8.
12. Restivo DA, Marchese-Ragona R, Lauria G, Squatrito S, Gullo D, Vigneri R. Botulinum toxin treatment for oropharyngeal dysphagia associated with diabetic neuropathy. Diabetes Care 2006;29(12):2650-3.
13. Bengisu S, Gündüz İ. Evaluation of aspiration-penetration presence in patients with unilateral vocal cord paralysis. Dil Konuşma ve Yutma Araştırmaları Derg 2020;3(1):91-108.
14. Hassan HE, Aboloyoun AI. The value of bedside tests in dysphagia evaluation. Egypt J Ear Nose Throat Allied Sci 2014;15(3):197-203.
15. Farneti D, Genovese E. Correlations between bedside and instrumental endoscopic parameters in determining severity of dysphagia: an integrated clinical evaluation of safety and efficiency. Acta Otorhinolaryngol Ital 2020;40(4):277-81.

16. Heckert KD, Konnaroff E, Adler U, Barrett AM. Post acute reevaluation may prevent dysphagia-associated morbidity. Stroke 2009;40:1381-5.
17. Liou HH, Tsai SW, Hsieh MH, Chen YJ, Hsiao JR, Huang CC, et al. Evaluation of objective and subjective swallowing outcomes in patients with dysphagia treated for head and neck cancer. J Clin Med 2022;11(3):692.
18. Fuh JL, Lee RC, Wang SJ, Lin CH, Wang PN, Chiang JH, et al. Swallowing difficulty in Parkinson's disease. Clin Neurol Neurosurg 1997;99(2):106-12.
19. Pflug C, Bihler M, Emich K, Niessen A, Nienstedt JC, Flügel T, et al. Critical dysphagia is common in Parkinson disease and occurs even in early stages: a prospective cohort study. Dysphagia 2018;33(1):41-50.
20. Kalf J, de Swart B, Bloem B, Munneke M. Prevalence of oropharyngeal dysphagia in Parkinson's disease: a meta-analysis. Parkinsonism Relat Disord 2012;18:311-5.
21. Bird MR, Woodward MC, Gibson EM, Phyland DJ, Fonda D. Asymptomatic swallowing disorders in elderly patients with Parkinson's disease: a description of findings on clinical examination and videofluoroscopy in sixteen patients. Age Ageing 1994;23(3):251-4.
22. Bushmann M, Dobmeyer SM, Leeker L, Perlmutter JS. Swallowing abnormalities and their response to treatment in Parkinson's disease. Neurology 1989;39(10):1309.
23. Ali GN, Wallace KL, Schwartz R, Decarle DJ, Zagami AS, Cook IJ. Mechanisms of oral-pharyngeal dysphagia in patients with Parkinson's disease. Gastroenterology 1996;110:383-92.
24. Ebihara S, Saito H, Kanda A, Nakajoh M, Takahashi H, Arai H, et al. Impaired efficacy of cough in patients with Parkinson disease. Chest 2003;124(3):1009-15.
25. Carneiro D, das Graças Wanderley de Sales Coriolano M, Belo LR, de Marcos Rabelo AR, Asano AG, Lins OG. Quality of life related to swallowing in Parkinson's disease. Dysphagia 2014;29(5):578-82.
26. Tsai C-f. Quality-of-life of Chinese older adults with poststroke dysphagia [master's thesis]. University of Hong Kong 2013.
27. McHorney CA, Robbins J, Lomax K, Rosenbek JC, Chignell K, Kramer AE, et al. The SWAL-QOL and SWAL-CARE outcomes tool for oropharyngeal dysphagia in adults: III. Documentation of reliability and validity. Dysphagia 2002;17(2):97-114.
28. Chan HF, Ng ML, Kim H, Kim DY. Swallowing-related quality of life among oral-feeding Chinese patients with Parkinson's disease - a preliminary study using Chinese SWAL-QOL. Disabil Rehabil 2022;44(7):1077-83.
29. Bayés-Rusiñol À, Forjaz MJ, Ayala A, Crespo Mde L, Prats A, Valles E, et al. Consciencia de disfagia en la enfermedad de Parkinson [Awareness of dysphagia in Parkinson's disease]. Rev Neurol 2011;53(11):664-72.
30. Hammer MJ, Murphy CA, Abrams TM. Airway somatosensory deficits and dysphagia in Parkinson's disease. J Parkinsons Dis 2013;3(1):39-44.
31. Hoehn MM, Yahr MD. Parkinsonism: onset, progression and mortality. Neurology 1967; 17:427-42.
32. Crary MA, Mann GD, Groher ME. Initial psychometric assessment of a functional oral intake scale for dysphagia in stroke patients. Arch Phys Med Rehabil 2005;86(8):1516-20.
33. Belafsky PC, Kuhn MA. The Clinician's Guide to Swallowing Fluoroscopy. New York: Springer; 2014:59-69.
34. Demir N, Serel Arslan S, İnal Ö, Karaduman AA. Reliability and validity of the Turkish Eating Assessment Tool (T-EAT-10). Dysphagia 2016;31:644-9.
35. Rugiu M. Role of videofluoroscopy in the evaluation of neurologic dysphagia. Acta Otorhinolaryngol Ital 2007;27(6):306.
36. Rosenbek JC, Robbins JA, Roecker EB, Coyle JL, Wood JL. A penetration-aspiration scale. Dysphagia 1996;11:93-8.
37. Karaduman A, Serel S, Ünlüer Ö, Demir N. Penetrasyon Aspirasyon Skalası: kişiler arası güvenirlik çalışması. Fizyoter Rehabil 2012;23(3):151-5.
38. Demir N, Arslan SS, İnal Ö, Ünlüer NÖ, Karaduman AA. Reliability and validity of the Turkish version of the swallow quality of life questionnaire. Türk Fizyoterapi ve Rehabilitasyon Dergisi 2016;27(1):19-24.
39. Tabor L, Gaziano J, Watts S, Robison R, Plowman EK. Defining swallowing-related quality of life profiles in individuals with Amyotrophic Lateral Sclerosis. Dysphagia 2006;31:376-82.
40. Leow LP, Huckabee ML, Anderson T, Beckert L. The Impact of dysphagia on quality of life in ageing and Parkinson's disease as measured by the Swallowing Quality of Life (SWAL-QOL) Questionnaire. Dysphagia 2010;25:216-20.
41. Gaspar M, Pinto GS, Gomes RHS, Santos RS, Leonor VD. Evaluation of quality of life in patients with neurogenic dysphagia. Revista CEFAC 2015;17:1939-45.
42. Ekberg O, Hamdy S, Woisard V, Wuttge-Hannig A, Ortega P. Social and psychological burden of dysphagia: Its impact on diagnosis and treatment. Dysphagia 2002;17:139-46.
43. Plowman-Prine EK, Sapienza CM, Okun MS, Pollock SL, Jacobson C, Wu SS, et al. The relationship between quality of life and swallowing in Parkinson's disease. Mov Disord 2009;24:1352-8.
44. Coriolano MGSW. Surface electromyography of muscles involved in swallowing in patients with Parkinson's disease. [Master's thesis]. Universidade Federal de Pernambuco; 2009.
45. Rinkel RN, Verdonck-de Leeuw IM, Langendijk JA, van Reij EJ, Aaronson NK, Leemans CR. The psychometric and clinical validity of the SWAL-QOL questionnaire in evaluating swallowing problems experienced by patients with oral and oropharyngeal cancer. Oral Oncol 2009;45(8):67-71.
46. Chan HF, Ng ML, Kim H, Kim DY. Swallowing-related quality of life among oral-feeding Chinese patients with Parkinson's disease - a preliminary study using Chinese SWAL-QOL. Disabil Rehabil 2022;44(7):1077-83.
47. Costa MM. Videofluoroscopy:the gold standard exam for studying swallowing and its dysfunction. Arq Gastroenterol 2010;47:327-8.
48. Logemann JA. Manual for the Videofluorographic Study of Swallowing, 2nd edition. Pro-ed: Austin, TX, USA 1993;115-7.
49. Mukaka MM. Statistics Corner: A guide to appropriate use of Correlation coeficient in medical research. Malawi Med J 2012;24:69-71.