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SWALLOWING DIFFICULTY IN ADULTS WITH NEURODEGENERATIVE DISORDERS

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Abstract

Background: Comprehensive evaluation of swallowing function through clinical assessments, radiographic studies (e.g., video fluoroscopy, fiberoptic endoscopic evaluation of swallowing), and instrumental techniques is essential for accurate diagnosis and formulation of tailored treatment plans.
Objective: This study aims to evaluate the swallowing difficulty in adults with neurodegenerative disorders used by speech and language pathologists during therapy sessions.
Methodology: Speech and language pathologists from hospitals, rehabilitation centers, educational institutes and private practices participants in Observational cross sectional study design was conducted from March to August 2024. A non-probability purposive sampling technique was used, with a sample size of 89 calculated based on a prevalence rate of 30% to 40% for swallowing issues in adults with neurodegenerative disorders. The sample size was determined using a 90% confidence interval and 8% precision through an online calculator. Responses of Speech and language pathologists were taken through questionnaire.
Result: The results among 89 respondents, 5.6% never experienced this difficulty, and 13.5% rarely faced it. However, 44.9% frequently had trouble chewing, and 36.0% experienced it very frequently. Overall, 80.9% of respondents reported frequent or very frequent difficulty with chewing solid food. and 32.6% never experienced issues with drooling, swallowing saliva, or excessive saliva, while 58.4% seldom had this problem. Only 9.0% frequently encountered these issues. In total, 91.0% of respondents rarely or never faced this issue, while 9.0% did so frequently, and 83.1% of respondents frequently or very frequently experience difficulty swallowing solid food, such as apples or crackers. Out of 89 respondents, 3.4% never had this issue, 13.5% seldom experienced it, 49.4% frequently faced this problem, and 33.7% experienced it very frequently.
Conclusion: Evaluating swallowing difficulties in adults with neurodegenerative disorders is challenging due to the complexity of the swallowing process, the diversity of diseases, unpredictable progression, and cognitive limitations that hinder accurate diagnosis and communication of symptoms. Although objective assessments exist, they are often inaccessible.

INTRODUCTION

Neurodegenerative disorders (NDDs) often lead to dysphagia, or swallowing difficulties, which significantly impact quality of life and health outcomes. Dysphagia progresses through several stages. In the early stage, individuals may experience mild swallowing difficulties, such as occasional choking or coughing while eating or drinking. As the disorder progresses to the moderate stage, these difficulties become more pronounced, with increased frequency of aspiration, prolonged meal times, and weight loss due to reduced food intake. In the advanced stage, dysphagia can severely affect nutritional status and respiratory health, potentially necessitating alternative feeding methods like tube feeding (Ueha et al., 2023).

Multiple sclerosis (MS) and other neurodegenerative diseases such as Huntington's disease, Parkinson's disease, Alzheimer's disease, and amyotrophic lateral sclerosis (ALS) often lead to dysphagia. These conditions progressively impair motor functions, making it difficult for individuals to chew and swallow, thus increasing the risk of malnutrition and respiratory complications. Studies indicate a high prevalence of dysphagia among patients with these diseases, with 45% of individuals with Alzheimer's and up to 80% of those with Parkinson's experiencing swallowing difficulties. Nearly all ALS patients are affected by dysphagia, which contributes to malnutrition, weight loss, and heightened respiratory risks (Tye et al., 2021).

Swallowing involves several stages: the oral preparatory stage, where food is chewed and mixed with saliva; the oral stage, where the bolus is moved to the back of the palate by the tongue; the pharyngeal stage, where the bolus is pushed into the esophagus while the airway is closed to prevent aspiration; and the esophageal stage, where peristaltic contractions move the bolus into the stomach. Comprehensive evaluation and management of dysphagia require clinical assessments, radiographic studies, and multidisciplinary approaches involving speech-language pathologists, neurologists, dietitians, and rehabilitation specialists. Interventions may include dietary modifications, swallowing exercises, assistive devices, and, in some cases, surgical procedures. Effective management strategies are essential to address the complex needs of individuals with neurodegenerative dysphagia (Patel et al., 2020).

In the study in (2024) with 21 participants (76% male, mean age 69.6 years) with mild to moderate Parkinson's disease found that 9% experienced aspiration during trials with thin liquids

and paste. Additionally, 73% scored above 3 on the EAT-10 scale. Significant correlations were observed between standardized PDQ-8 scores and EAT-10 scores ($p < 0.05$). Abnormal UES relaxation and distension were suggested by high UES integrated relaxation pressure and low UES maximum admittance values. Thinner liquid trials showed increased post-swallow UES contractility and abnormal pharyngeal contractility. Bolus timing parameters and UES peak pressure measurements were significantly affected by bolus viscosity (Saleem et al., 2024).

In this 2023 study, 100 patients with swallowing issues (average age 61.6 years; 46 women and 54 men) were assessed. Dysphagia causes and patient complaints were categorized, with underlying diagnoses including neurologic illnesses such as muscular dystrophy, amyotrophic lateral sclerosis, Huntington's disease, and stroke (Sevitz et al., 2023).

In a 2023 study, moderate correlations were found between the stage of Parkinson's disease (PD) and complete laryngeal displacement for 5 ml ($r = -0.54$, $p = 0.008$) and 10 ml ($r = -0.56$, $p = 0.005$) swallow quantities. In the PD group, the correlation between age and total laryngeal displacement was $r = -0.48$ ($p = 0.064$) and $r = -0.35$ ($p = 0.07$). For 5 ml swallows, the Penetration-Aspiration Scale (PAS) results were 1 (1–1) for both control and PD groups ($p = 0.62$). For 10 ml swallows, the PD group had results of 1 (1–2) ($p = 0.06$), while the control group had 1 (1–1). Intrabolus pressure (IBP) was significantly higher in PD patients than controls for both 5 ml and 10 ml swallows ($p = 0.0004$ and $p = 0.001$, respectively) (Marques et al., 2023).

In a 2022 study, there was no statistically significant difference in the AD phases when considering the median age and gender of the patients. However, a significant difference was found in the patients' MMSE mean scores. Participants with mild AD had an average MMSE score of 20.88 ± 3.39, those with moderate AD had a score of 11.50 ± 2.57, and those with advanced AD had a score of 6.55 ± 3.85 (Parlak et al., 2022).

In the 2019 study, 106 individuals with Parkinson's disease (67 men and 39 women, mean age 66.9 years) were analyzed. The comparison of their questionnaire responses with H and Y scores and UPDRS scores showed a high coefficient of variance (145%) and significant P values, indicating a reasonable association between the standard scores and the questionnaire. Group A

questions had the highest mean scores, while Group D questions had the lowest (Radhakrishnan et al., 2019).

In 2019, 16.6% of people worldwide suffered from dysphagia, which affects all age groups and can occur in individuals with neurological conditions like multiple sclerosis and Parkinson's disease. Dysphagia can affect up to 22% of people over 55, though this estimate excludes undiagnosed cases. Routine medical evaluations, such as yearly physicals, typically do not include assessments for dysphagia (Barrera & Wells, 2019).

Materials and Methods

Observational cross sectional study design was conducted from March to August 2024, the study was conducted at the University of Lahore, with data collected from the private and public hospitals. After the approval REC permission of institute were taken. All the process and purpose of research were explained to the patients and caregiver and written concern were obtained. Both male and female patients having swallowing difficulty were included in the study. Patients age between the 49 to 88 were included in this study. Patients unable to repones the commands were excluded from this study A non-probability purposive sampling technique was used, with a sample size of 89 calculated based on a prevalence rate of 30% to 40% (Andrew & Sullivan, 2010) for swallowing issues in adults with neurodegenerative disorders. The sample size was determined using a 90% confidence interval and 8% precision through an online calculator (*Sample Size Calculator*, 2008 - 2024). data was analyzed by using SPSS version23. Mean and standard deviation was calculated were quantitative variables and frequency and percentage was calculated were qualitative.

Results

Table No.1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Age of patients	89	49.00	88.00	66.7191	8.23516

The dataset includes age data for 89 patients, ranging from 49 to 88 years, with an average age of 66.72 years and a standard deviation of 8.24 years, reflecting the variation around the mean.

Disease of Patients	Settlement of patients	Education of Patients
Parkinson:62 (17.3%)	Urban: 43(48.3%)	Educated:47 (52.8)
Dementia:17 (19.1%)	Rural:46 (51.4%)	Uneducated:42 (47.2)
Alzeimer:10 (11.2%)		
Total: 89	Total:89	Total:89

Table NO.2

Out of 89 patients, 69.7% have Parkinson's disease, 19.1% have dementia, and 11.2% have Alzheimer's disease. Most patients have Parkinson's, while fewer have dementia or Alzheimer's. Geographically, 48.3% live in urban areas and 51.7% in rural areas, with a slight rural majority. In terms of education, 52.8% are educated, indicating a small majority with some level of education

Table no.3

Questions	Frequency	Percent
Do you experience difficulty chewing solid food, like an apple, cookie or a cracker?		
Never	5	5.6
Seldom	12	13.5
Frequently	40	44.9
Very Frequently	32	36.0
Do you feel you have too much saliva in your mouth; do you drool or have difficulty swallowing your saliva?		
Never	29	32.6

Questions	Frequency	Percent
Seldom	52	58.4
Frequently	8	9.0
Do you need to swallow chewed-up food several times before it goes down your throat?		
Never	1	1.1
Seldom	17	19.1
Frequently	47	52.8
Very frequently	24	27.0
Do you experience difficulty in swallowing solid food (i.e., do apples or crackers get stuck in your throat)?		
Never	3	3.4
Seldom	12	13.5
Frequently	44	49.4
Very frequently	30	33.7
Do you experience a change in your voice, such as hoarseness or reduced intensity immediately after eating or drinking?		
Never	64	71.9
Seldom	23	25.8
Frequently	2	2.2
Other than during meals, do you experience coughing or difficulty breathing as a result of saliva entering your windpipe?		
Never	7	7.9
Seldom	22	24.7

Questions	Frequency	Percent
Frequently	56	62.9
Very frequently	4	4.5

The survey found that 80.9% of 89 respondents frequently or very frequently had difficulty chewing solid food, with 44.9% experiencing frequent difficulty and 36.0% experiencing it very frequently. A smaller percentage rarely (13.5%) or never (5.6%) had trouble chewing.

The survey results indicate that 91% of respondents rarely or never had issues with drooling, swallowing saliva, or excessive saliva, while 9% frequently experienced these problems.

The survey revealed that 79.8% of respondents often need to swallow chewed food multiple times. Of these, 52.8% experience this frequently, and 27.0% very frequently. Meanwhile, 19.1% seldom encounter this issue, and only 1.1% never had it.

The survey reveals that 83.1% of respondents frequently or very frequently have difficulty swallowing solid food, while 3.4% never experience this issue, and 13.5% seldom face it. Out of 89 respondents, 49.4% frequently and 33.7% very frequently encounter this problem.

The survey found that 71.9% of respondents never experienced voice changes after eating or drinking, 25.8% seldom had this issue, and 2.2% experienced it frequently. In total, 97.8% of respondents reported hardly ever or never perceiving voice changes, while 2.2% experienced them frequently.

The survey results show that among 89 respondents, 62.9% frequently and 4.5% very frequently experience breathing difficulties or coughing from saliva entering the windpipe outside of meals, totaling 67.4%. Meanwhile, 7.9% never experience it, and 24.7% seldom do.

Discussion

In a 2021 study by Radhakrishnan involving 152 participants, 32% (49/152) reported current difficulties with swallowing pills or capsules, while 55% (84/152) had experienced such problems in the past. About half (71/151) had had their prescriptions crushed by someone, like a parent, to ease swallowing. One-third (49/151) had cut or crushed medication themselves. Only 19% (28/151) struggled to learn how to swallow tablets or capsules. Prescription cutting or crushing was notably more common among those who had trouble swallowing pills, with 53% (26/49) of those individuals reporting this practice (Radhakrishnan et al., 2021). and the current study survey results on the difficulty of chewing solid food, such as cookies, crackers, or apples. Out of 89 respondents, 5.6% never had this issue, and 13.5% rarely did. In contrast, 44.9% frequently struggled with chewing, and 36.0% experienced it very frequently. Overall, 80.9% of respondents reported frequent or very frequent difficulty with chewing solid food. The cumulative percentages total 100% across all response categories.

According to Andrés's 2017 findings, 94.7% of the sample had disorders related to the efficiency and safety of swallowing. Efficiency issues included problems with food transportation (89.5%), inadequate labial closure (47.4%), and oral residues (68.4%). Safety concerns were noted in connection with a diagnosis of respiratory disease in the previous year, including pharyngeal residues (52.7%), coughing (47.4%), penetration (31.6%), aspiration, and a drop in SaO2 (5.3%) (Andrés et al., 2017). and the current study the results of a survey question about encountering breathing difficulties or coughing from saliva entering the windpipe, aside from during meals. Of the 89 respondents, 7.9% reported never experiencing this issue, 24.7% seldom had it, 62.9% frequently experienced it, and 4.5% experienced it very frequently. The cumulative percentages add up to 100%, with the majority (67.4%) indicating that they frequently or very frequently experience this issue.

In a 1998 study by Daniels, results showed that out of 55 patients, 21 (38%) experienced aspiration. Of these, 14 (67%) had silent aspiration on VSS, while 7 out of 21 (33%) had obvious

aspiration. Chi-square analyses indicated that dysphonia, dysarthria, an abnormal gag reflex, abnormal volitional cough, coughing after swallowing, and voice changes after swallowing were predictors of silent aspiration and were significantly related to aspiration. Logistic regression found that aspiration could be predicted with 78% accuracy based on aberrant volitional cough and coughing during swallowing (Daniels et al., 1998). The recent study shows the results of a survey question about encountering breathing difficulties or coughing from saliva entering the windpipe, aside from during meals. Of the 89 respondents, 7.9% reported never experiencing this issue, 24.7% seldom had it, 62.9% frequently experienced it, and 4.5% experienced it very frequently. The cumulative percentages add up to 100%, with the majority (67.4%) indicating that they frequently or very frequently experience this issue.

Conclusion:

It is concluded that evaluate the swallowing issues in adults with neurodegenerative disorders is a complex and multifaceted challenge Comprehensive examination and management are made more difficult by the variety of diseases, the unpredictability in illness progression, and the complexity of the swallowing process. Cognitive limitations also make it more difficult to diagnose conditions accurately and communicate symptoms to others. Although there are impartial evaluations available, they are frequently inaccessible.

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