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Frequency of Aspiration Pneumonia in Admitted Stroke Patients in Medical Wards of a Tertiary Care Hospital

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ABSTRACT

Background: Stroke is a leading cause of morbidity and mortality worldwide, often complicated by post-stroke medical conditions. Among these, aspiration pneumonia is one of the most serious and preventable complications, significantly worsening outcomes and increasing healthcare costs. **Objective:** To determine the frequency of aspiration pneumonia in stroke patients age more than 35 years. **Methods:** A descriptive cross-sectional study was conducted in the medical wards of Ayub Teaching Hospital, Abbottabad, over a period of three months, from February 2025 to May 2025. A total of 103 patients aged 35 years and above with ischemic or hemorrhagic stroke were enrolled through non-probability consecutive sampling. Patients with chronic pulmonary conditions or pneumonia due to causes other than stroke were excluded. Data were collected using a structured proforma, including demographic details, clinical features, comorbidities, and risk factors. The diagnosis of aspiration pneumonia was based on predefined clinical and radiological criteria. Data were analyzed in SPSS version 16.0, applying Chi-square and Fisher's exact tests where appropriate. **Results:** Out of 103 patients, 18 developed aspiration pneumonia, giving a frequency of 17.5%. The risk was significantly higher among older patients (>65 years), those with dysphagia, nasogastric tube feeding, and reduced levels of consciousness ($p<0.05$). Hypertension and diabetes were common comorbidities but were not significantly associated with pneumonia. **Conclusion:** Aspiration pneumonia remains a frequent complication of stroke, particularly among elderly patients with swallowing difficulties, impaired consciousness, or those requiring nasogastric feeding. Early recognition and preventive measures are essential to reduce its burden and improve outcomes in stroke care.

INTRODUCTION

Stroke is one of the most important public health challenges, ranking among the leading causes of death and long-term disability worldwide. It results from either a vascular obstruction causing cerebral ischemia or rupture of cerebral vessels leading to hemorrhage [1]. While ischemic stroke is more common, hemorrhagic stroke is associated with higher mortality. The overall burden of stroke extends beyond the initial neurological insult, as many patients develop complications that adversely affect recovery and prognosis [2, 3].

One of the most serious and potentially preventable complications following stroke is aspiration pneumonia. It develops when oropharyngeal or gastric contents enter the lower respiratory tract due to impaired swallowing, diminished protective reflexes, or altered consciousness [4, 5]. Aspiration pneumonia significantly prolongs hospital stay, increases treatment costs, and contributes to mortality rates as high as 30–70% in severe cases. The risk is further heightened in patients with comorbidities such as diabetes, hypertension, and ischemic heart disease, which are frequently seen in stroke populations [6, 7].

Although international data suggest that the incidence of aspiration pneumonia after stroke is around 14–20%, studies from South Asia, including Pakistan, have reported slightly higher figures, with one local study noting a prevalence of 15.56% [8, 9]. Despite its clinical significance, limited regional data are available on the magnitude of this complication and the factors associated with its development. Understanding the frequency of aspiration pneumonia in local stroke patients is crucial for developing targeted preventive and management strategies. The objective was to determine the frequency of aspiration pneumonia in stroke patients age more than 35 years.

METHODOLOGY

This study was designed as a descriptive cross-sectional survey to estimate the frequency of aspiration pneumonia among patients admitted with stroke. A cross-sectional design was selected as it allowed the researchers to measure both the occurrence of aspiration pneumonia and

the associated risk factors at a single point in time. The research was carried out in the medical wards of Ayub Teaching Hospital, Abbottabad, which is a tertiary care center that receives patients from across northern Pakistan. The study was conducted over a period of three months, from February 2025 to May 2025.

Ethical approval for the study was obtained from the Ethical Committee of Ayub Teaching Hospital, with Ref No: CPSP/REU/MED-2022-010-19922, date: February 7, 2025 and permission to collect data was taken from the hospital administration. Informed consent was obtained from all conscious patients before enrollment, while attendants provided consent for patients who were unconscious at the time of admission. Confidentiality of all participants was strictly maintained, and identifying information was excluded from analysis to protect patient privacy.

The sample size was calculated using the World Health Organization software for sample size determination in health studies, employing the formula for estimating a proportion with specified absolute precision. A confidence level of 95% was assumed, with a margin of error set at 7%, and the anticipated prevalence of aspiration pneumonia was taken as 15.56% based on previous regional data. On this basis, a sample of 103 patients was required to provide reliable estimates of prevalence. Patients were recruited using a non-probability consecutive sampling technique, whereby all eligible patients admitted during the study period and fulfilling the inclusion criteria were enrolled until the target sample was reached.

Eligibility criteria were clearly defined. Patients were included if they were aged 30 years or older and had a diagnosis of ischemic or hemorrhagic stroke confirmed clinically and supported by imaging such as CT or MRI. Patients were excluded if they had aspiration pneumonia due to causes other than stroke or if they had chronic pulmonary diseases such as asthma, chronic obstructive pulmonary disease, pulmonary tuberculosis, or lung malignancy, as these conditions could confound the diagnosis of pneumonia.

Data were collected using a structured proforma developed for the study. Each patient underwent a detailed history, physical examination, and necessary investigations. Information recorded included demographic characteristics such as age, gender, residence, ethnicity, socioeconomic status, and educational level. Clinical features including cough, fever, shortness of breath, dysphagia, oxygen saturation, and GCS score were also documented. Risk factors such as smoking history, alcohol consumption, nasogastric tube feeding, comorbidities, and previous history of stroke were assessed. The presence or absence of aspiration pneumonia was established through a combination of clinical features and confirmatory findings on chest X-ray or CT scan.

Reliability was maintained by ensuring that all data were collected by the principal investigator using standardized definitions and consistent methods of assessment. Validity was supported by adhering to strict operational definitions; stroke was confirmed by neuroimaging, while aspiration pneumonia was diagnosed when at least two major clinical features were present along with hypoxemia, abnormal auscultatory findings, or radiological evidence of lung infiltrates. This uniform application of diagnostic criteria minimized observer bias. After data collection, the information was entered and analyzed using SPSS version 16.0. Continuous variables such as age, hospital stay, and GCS were summarized as mean ± standard deviation or median with interquartile range depending on data distribution. Categorical variables such as gender, type of stroke, comorbidities, and occurrence of aspiration pneumonia were expressed as frequencies and percentages. Stratification was performed to control for potential effect modifiers such as age, gender, type of stroke, and level of consciousness. The Chi-square test or Fisher's exact test was applied to determine associations between risk factors and aspiration pneumonia, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

The study enrolled 103 stroke patients. The age distribution revealed that most patients were above 50 years, with the largest group being older than 65 years (41.7%). Patients aged 51–65 years accounted for 40.8%, while only 17.5% were 50 years or younger. Males slightly outnumbered females (56.3% vs. 43.7%). A majority of participants resided in rural areas (60.2%) and nearly half belonged to the middle socioeconomic class (47.6%).

Table 1

Demographic Characteristics of Stroke Patients (n=103)

Variable		Frequency	Percentage (%)
Age group (years)	≤50	18	17.5
	51–65	42	40.8
	>65	43	41.7
Gender	Male	58	56.3
	Female	45	43.7
Residence	Rural	62	60.2
	Urban	41	39.8
Socioeconomic status	Low	36	35.0
	Middle	49	47.6
	High	18	17.4

Among the admitted patients, ischemic stroke was more common (69.9%) than hemorrhagic stroke (30.1%). The mean hospital stay was approximately seven days (7.1 ± 3.2). When assessed by Glasgow Coma Scale (GCS), just over half of the patients presented with mild impairment (52.4%), while 27.2% had moderate and 20.4% had severe neurological impairment.

Table 2

Clinical Features of Stroke Patients (n=103)

Clinical Variable		Frequency	Percentage (%)
Type of Stroke	Ischemic	72	69.9
	Hemorrhagic	31	30.1
Hospital stay (days)		Mean ± SD = 7.1 ± 3.2	—
GCS at admission	Mild (13–15)	54	52.4
	Moderate (9–12)	28	27.2
	Severe (<9)	21	20.4

A significant proportion of patients had clinical risk factors that could predispose them to aspiration. Dysphagia was documented in 37.9% of cases, while 27.2% required nasogastric tube feeding. Nearly one-third (30.1%) had a history of smoking, and a small fraction (6.8%) reported alcohol consumption. Hypertension (62.1%) and diabetes

mellitus (44.7%) were the most common comorbidities, followed by ischemic heart disease (18.4%). About one-fifth (21.4%) had a previous history of stroke.

Table 3

Risk Factors and Comorbidities (n=103)

Risk Factors / Comorbidities	Frequency	Percentage (%)
Dysphagia	39	37.9
NG tube feeding	28	27.2
Smoking history	31	30.1
Alcohol use	7	6.8
Hypertension	64	62.1
Diabetes mellitus	46	44.7
Ischemic heart disease	19	18.4
Previous stroke	22	21.4

Out of 103 patients, 18 (17.5%) developed aspiration pneumonia. Stratified analysis revealed that aspiration pneumonia was significantly more frequent among older patients (>65 years, p=0.048). Dysphagia (p<0.001), nasogastric tube feeding (p=0.003), and low GCS (<9, p<0.001) were strong predictors. Hypertension and diabetes, while common, did not show significant associations.

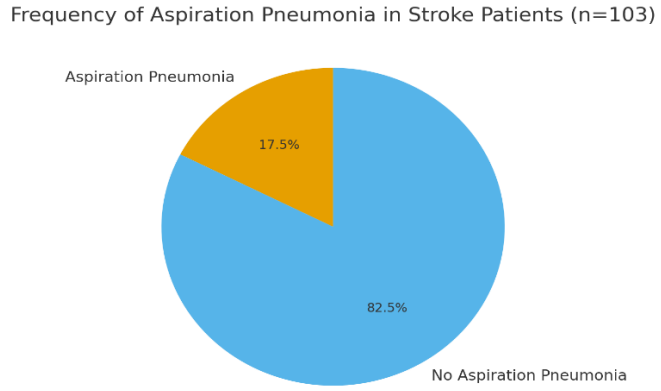
Table 4

Association of Risk Factors with Aspiration Pneumonia (n=103)

Variables	Aspiration Pneumonia Present (n=18)	Absent (n=85)	p-value
Age >65 years	11 (61.1%)	32 (37.6%)	0.048*
Male gender	10 (55.6%)	48 (56.5%)	0.92
Ischemic stroke	13 (72.2%)	59 (69.4%)	0.81
Hemorrhagic stroke	5 (27.8%)	26 (30.6%)	—
Dysphagia	14 (77.8%)	25 (29.4%)	<0.001*
NG tube feeding	10 (55.6%)	18 (21.2%)	0.003*
Severe GCS (<9)	9 (50.0%)	12 (14.1%)	<0.001*
Hypertension	12 (66.7%)	52 (61.2%)	0.67
Diabetes	10 (55.6%)	36 (42.4%)	0.29

*Significant at p < 0.05

Figure 1



Pie chart showing the frequency of aspiration pneumonia among your stroke patients (n=103). It visually highlights that around 17.5% of patients developed aspiration pneumonia, while the majority (82.5%) did not.

DISCUSSION

The present research demonstrated that aspiration pneumonia occurred in a considerable proportion of stroke patients admitted to a tertiary care hospital. The observed frequency of 17.5% aligns with previously published figures in both regional and international literature. Studies reported a prevalence of 15.56% in stroke patients in Pakistan, which is comparable to these findings, suggesting that aspiration pneumonia remains a persistent complication despite advances in acute stroke care [10, 11]. Similarly, international estimates vary between 14% and 20%, highlighting the global relevance of this problem [12].

Advanced age emerged as an important factor, with a higher proportion of aspiration pneumonia among patients above 65 years. This finding was consistent with studies where elderly patients were more susceptible due to impaired swallowing reflexes, poor cough clearance, and increased comorbid burden [13, 14]. The association between dysphagia and aspiration pneumonia was particularly strong, in agreement with study who identified swallowing difficulty as one of the principal risk factors for aspiration events in hospitalized populations [15].

Nasogastric tube feeding also demonstrated a significant relationship with pneumonia, reinforcing the findings of studies reported that improper positioning and prolonged tube use predispose patients to reflux and aspiration. Similarly, impaired consciousness, as measured by low GCS, was a key determinant of pneumonia risk [8, 16]. These results are supported by study who emphasized that reduced protective airway reflexes in patients with low neurological scores substantially increase vulnerability [17].

Hypertension and diabetes were the most common comorbidities among stroke patients, but neither showed a significant association with aspiration pneumonia. This finding is similar to observations by studies noted that while comorbidities increase overall morbidity in stroke patients, their direct relationship with aspiration pneumonia is less consistent. Instead, functional impairment and airway protection deficits appear to play a more dominant role in determining risk [18, 19].

The clinical implications of these findings are considerable. Aspiration pneumonia not only prolongs hospital stay but also contributes to increased mortality, as highlighted by Mandell and studies who reported mortality rates exceeding 30% in severe cases. Preventive strategies should therefore focus on early screening for dysphagia, careful monitoring of patients requiring nasogastric feeding, and aggressive management of those with reduced levels of consciousness [20]. Head-of-bed elevation, swallowing rehabilitation, and regular reassessment of feeding strategies have been proposed as effective interventions to minimize risk.

CONCLUSION

Aspiration pneumonia remains a significant complication among patients admitted with stroke, with an observed frequency consistent with global and regional estimates. Older age, dysphagia, nasogastric tube feeding, and reduced levels of consciousness were identified as important predictors, while comorbidities such as hypertension and diabetes showed no significant effect. The findings highlight the importance of targeted preventive measures, including early recognition of

swallowing difficulties, judicious use of nasogastric feeding, and vigilant care of patients with impaired neurological status. Addressing these modifiable risk factors has the potential to reduce the burden of post-stroke pneumonia, improve patient outcomes, and decrease healthcare costs.

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