

# Aspiration Pneumonia: A Major Respiratory Complication among Stroke Patients

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**Abstract:** Stroke was called as apoplexy historically, because of the way it strikes people down. Although the mortality rate from stroke is decreasing, the estimated prevalence rate of disability related to stroke is excruciatingly on the higher side. Dysphagia is predominant after stroke and has been associated with an increased risk of pulmonary complications like aspiration pneumonia. The main objective of the study was to assess the occurrence of aspiration pneumonia among acute stroke patients. All patients (n= 96) diagnosed as stroke and admitted during one month in neurology ICU department was included in study after obtaining Informed Consent. The data was collected from the patient relatives and the medical records with the help of a questionnaire. The follow up of patients were done till the time of discharge. Outcomes were assessed using descriptive analysis. Out of 96 patients, 30 patients were identified as a case of aspiration and with risk for developing pneumonia. Among that, 18 patients were diagnosed to have pneumonia during hospitalization and 3 patients were succumbed to death. It is found that Aspiration pneumonia is a debilitating complication among stroke patients.

**Keywords:** Stroke, Dysphagia, Aspiration Pneumonia

## 1. Introduction

Stroke is one of the leading cause of mortality throughout the globe and nearly affects 2000 people per million each year and is the one of the major cause of disability. Although the mortality rate from stroke is decreasing, the estimated prevalence rate of disability related to stroke is increasing (Lavados,etal,2007).

Among 65 percent of stroke patients develops dysphagia and the incidence of aspiration pneumonia ranges from 43 to 58 percent (Daniels et al; 2006).Twenty percentage of stroke patients dies with in the first year itself and approximately 35 percent of death are due to pneumonia (Hinchey et al, 2005).Appropriate aspiration prevention strategies is a priority while caring a patient with stroke.

In 2016, 56.9 million deaths occurred worldwide and among the causes of death,ischemic heart disease and stroke were the world's biggest killers and accounts for 15.2 million deaths. These diseases remained to be the leading causes of death globally in the last 15 years (WHO, 2018). 70 percent of strokes and 87 percent of both stroke-related deaths and disability-adjusted life years occur in low- and middle-income countries. During the last decades, the stroke incidence in low- and middle-income countries is doubled and in developed countries it is decreased by 42 percent (Johnson,Onuma,Owolabi, & Sachdev, 2016).

Dyphagia is common in stroke, even though swallow recovers in greater than 80 percentage of patients with in 2 to 4 weeks of onset of stroke, the assessment for aspiration risk and initiation of oral feeding is important (Ramsey, Smithard, & Kalra, 2003). The incidence of aspiration in stroke patients ranges from 19.5% to 42 % which is associated with serious respiratory complication such as Pneumonia. A systematic use of dysphagia screening and management can result in a significantly decreased risk of pneumonia and an improved outcome among stroke survivors(Trapl,et al.,2007).

The risk of aspiration declines within the first two weeks after stroke (Kidd, Lawson, Nesbitt, & MacMahon, 1995). Therefore, prevention measures should be commenced early and continue over the first two weeks, the period when patients are at greater risk of developing aspiration and pneumonia.

## 2. Need for the Study

Pneumonia remains as an important and a modifiable complication of stroke and measures to prevent such as reducing aspiration could definitely improves the overall outcome (Cohen etal,2016).

Among the non-neurological complication of acute stroke, pneumonia is most common with a reported frequency of 10 to 20 percent (Chen, et al., 2013). The pneumonia risk is 3 fold in patients with dysphagia when compared with other patients without dysphagia, if patients have very severe dysphagia, the chance to get pneumonia due to aspiration is 11 fold (Lakshminarayan et al.,2010).

Nurses are the first members of the health team to observe signs and symptoms of dysphagia and aspiration risk mostly of the reason that they are available at bed side. By recognizing the dysphagia earlier, nurses can help to prevent complications and reduces the number of deaths associated with dysphagia and aspiration (Werner, 2005).

A greater understanding of post stroke pneumonia will hasten the positive clinical outcome in patients. In addition it emphasizes the need for clear policies and practice guidelines to monitor for and manage complications. Nurses should therefore have a thorough knowledge regarding the occurrence of aspiration and pneumonia among stroke patients and should be able to monitor for and manage the complication in their daily practice.

### a) Statement of the Problem

A cross sectional study to assess the occurrence of aspiration pneumonia among stroke patients admitted in selected hospitals.

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### b) Objective

To assess the occurrence of aspiration pneumonia among stroke patients.

### c) Operational Definitions

**Aspiration pneumonia:** Acquired infection of lungs developing as a result of aspiration of food/ fluids/saliva to trachea, occurring after 48hrs of admission to the hospital with the diagnosis of stroke, which is identified on the basis of clinical signs and findings obtained from observations and medical records.

## 3. Literature Review

A study was conducted to determine the cost of pneumonia during hospitalization after stroke and the effect of pneumonia on mortality. The data obtained from 2005 and 2006. A stratified analysis based on quintile of propensity for pneumonia was also undertaken. There were 183, 976 hospitalizations for stroke, the adjusted relative risk of death associated with pneumonia was 2.0 (95% CI 1.9–2.1). The cost of pneumonia on the hospitalization was around \$27,633 (95% CI \$27,078–\$27,988). It was reported that Pneumonia after stroke is associated with higher mortality and hospitalization costs (Wilson,2012).

A descriptive study to examine the severity of post stroke complications in acute stroke patients and to study the effect of complications in hospital mortality among south Indian population was conducted on 486 patients. It was based on the data collected from the Trivandrum Stroke Registry, Government Medical College, Trivandrum. The common complications seen among the study population were dysphagia, hyponatremia and urinary incontinence. Other major complications include aspiration pneumonia, sepsis, seizure, cerebral edema and GI bleed. Among the post stroke complications, cerebral edema, aspiration pneumonia and sepsis were significantly related to mortality. More than 80% of stroke victims in the study had one or more modifiable risk factors for stroke (Sreeja,Iype, Madhavan, & Balan.,2012).

A study to examine the importance of the host resistance to aspiration pneumonia among stroke patients with dysphagia was done in 76 patients (mean age, 74.7±8.4 years) with dysphagia chosen from 175 stroke patients who were newly admitted to four rehabilitation hospitals. The subjects were divided into two groups based on the onset of pneumonia during the period of admission and compared their status. Ten patients (13.2%) developed pneumonia at the hospital, and all of the affected patients were over 65 years old. Significant differences existed between the two groups with respect to the gender, activity level, albumin level, nutrition method and severity of dysphagia ( $p < 0.05$ ). Study revealed that recumbence, malnutrition, tube feeding, severe dysphagia and female sex were risk factors for pneumonia. In particular, dysphagia was closely associated with aspiration pneumonia. Moreover, host resistance factors, such as recumbence and malnutrition, also play important roles in the development of aspiration pneumonia (Matsumura, Mitani, Oki, Fujimoto, & Ishikawa.,2014).

A Study conducted to determine the incidence, risk factors and prognosis of acute stroke associated pneumonia(SAP) by using PubMed was searched using the terms 'pneumonia' and 'neurology intensive unit' and the MeSH terms 'stroke' and 'pneumonia'. Non-English literature, case reports and chronic stroke associated pneumonia studies were excluded. Studies were classified into 5 categories according to the setting they were performed in: neurological intensive care units (NICUs), medical intensive care units (MICUs), stroke units, mixed studies combining more than one setting or when the settings were not specified and rehabilitation studies. Results show that the incidences of SAP in the following settings were: NICUs 4.1-56.6%, MICUs 17-50%, stroke units 3.9-44%, mixed studies 3.9-23.8% and rehabilitation 3.2-11%. The higher incidence in the majority of ICU studies compared to stroke units or acute floor studies is likely explained by the presence of mechanical ventilation, higher stroke severity causing higher rates of aspiration and stroke-induced immunodepression among ICU patients. The short-term mortality of SAP was increased among the mixed and stroke unit studies ranging between 10.1 and 37.3%. SAP was associated with worse functional outcome in the majority of stroke unit and floor studies. The pathophysiology of SAP is likely explained by aspiration combined with stroke-induced immunodepression through complex humoral and neural pathways that include the hypothalamic-pituitary-adrenal axis, parasympathetic and sympathetic systems (Hannawi, Hannawi, Rao, Suarez, & Bershad.,2013)

A systematic review and meta-analysis to estimate the pooled post-stroke infection rate and its effect on outcome were studied. MEDLINE and EMBASE were searched for studies on post-stroke infection. Cohort studies and randomized clinical trials were included when post-stroke infection rate was reported. Rates of infection were pooled after assessment of heterogeneity. Associations between population- and study characteristics and infection rates were quantified. 87 studies were included involving 137817 patients. 8 studies were restricted to patients admitted on the intensive care unit (ICU). There was significant heterogeneity between studies ( $P < 0.001$ ,  $I^2 = 97\%$ ). The overall pooled infection rate was 30% (24-36%); rates of pneumonia and urinary tract infection were 10% each. For ICU studies, these rates were substantially higher with 45% (95% CI 38-52%), 28% (95% CI 18-38%) and 20% (95% CI 0-40%). Rates of pneumonia were higher in studies that specifically evaluated infections and in consecutive studies. Studies including older patients or more females reported higher rates of urinary tract infection. Pneumonia was significantly associated with death (odds ratio 3.62 (95% CI 2.80-4.68) (Westendorp, Nederkoorn, Dijkgraaf, Beek, & Vermeij.,2011).

A study to determine the frequency and rate of complications among Asians after acute stroke was conducted. Consecutive patients with acute stroke among 10 participating Asian countries were included in the study. The frequency and timing of pre-determined complications, and their relation to area of admission were noted. Of the 1,153 patients included in the study, 423 (41.9%) developed complications within the first 2 weeks of stroke. Recurrent stroke, chest infections and urinary tract infections were

most commonly encountered, and were most frequent within the first week of stroke onset. A lower rate of complications was noted among patients admitted at an organized stroke unit. Among the non-neurologic complications, the most commonly encountered were chest infections, constipation, and urinary retention with a rate of 9.0%, 7.9%, and 5.0% respectively (Navarro et al., 2008).

A retrospective study included consecutive patients with acute stroke in stroke care units in 2 hospitals with 105 patients (mean age  $78.2 \pm 5.8$ ) from the National Cerebral and Cardiovascular Center (NCVC) in Osaka, Japan (from July to August 2015), and 105 patients (mean age  $60 \pm 5.8$ ) from the National Brain Centre (NBC) Hospital in Jakarta, Indonesia (from May to September 2015) was conducted. The incidence of SAP in the NBC Hospital was higher than that in the NCVC (22.9% versus 12.4%,  $P = .0466$ ). In NBC Hospital, dysphagia and severe neurological deficits on admission were significantly associated with SAP, whereas in NCVC, dysphagia and diabetes mellitus were the risk factors. When the patients of both hospitals were analyzed together, severe neurological deficits on admission and were significant determinants for developing SAP (Sari et al., 2017).

An observational study was conducted in a cohort of stroke patients admitted consecutively to a tertiary referral center in the east of England, UK from January 2003-April 2015. A total of 9238 patients (mean age [ $\pm$ SD]  $77.61 \pm 11.88$  years) were included. Stroke associated Pneumonia (SAP) was diagnosed in 1083 (11.7%) patients. The majority of these cases ( $n = 658$ ; 60.8%) were aspiration pneumonia. Results revealed that stroke-associated pneumonia was not associated with increased long-term mortality, but it was linked with increased mortality up to 1 year, prolonged length of stay, and poor functional outcome on discharge. Targeted intervention strategies are required to improve outcomes of SAP patients who survive to hospital discharge (Teh et al., 2018).

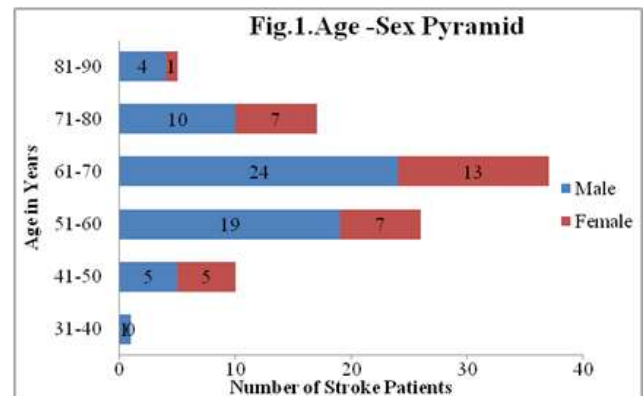
#### 4. Research Methodology

- a) **Research approach:** quantitative approach
- b) **Research Design:** cross sectional study
- c) **Population and sampling:** All patients diagnosed as stroke and admitted in neurology medical ICU from 1<sup>st</sup> April to 30<sup>th</sup> April 2018 was included. Total number of 96 patients admitted during one month was taken.
- d) **Study setting:** Neuro-Medical intensive care unit of one of the hospital at Thrissur district of Kerala was taken as study setting.
- e) **Tool used for data collection:** Tool consist of two parts , a questionnaire regarding demographic data of patient, details of present illness and details of associated risk factors of stroke and a clinical evaluation Chart: for assessment of occurrence of aspiration pneumonia. It includes the particulars used to identify the presence of aspiration and aspiration pneumonia with areas for marking the observations such as temperature, pulse, respiration & SpO<sub>2</sub> and areas to enter the details from medical records such as entry of aspiration query or aspiration pneumonia and report of white blood count and sputum culture.

f) **Method of data collection:** After obtained permission and consent, all stroke patients admitted in critical neuro medical unit in the month of April were taken for the study. The initial data was collected using questionnaire from the patient relative and the medical records. The follow up of patients were done till the discharge of the patient. The occurrence of aspiration and aspiration pneumonia among the patients were obtained from clinical observations and clinical data.

#### The study findings:

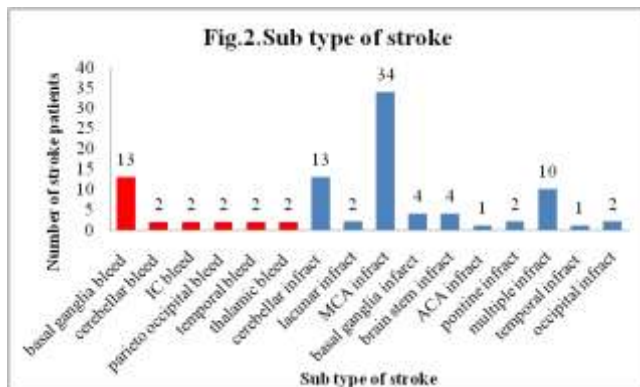
- Total of 96 stroke patients admitted in neuro ICU, out of 96 , 63 were male patients
- 78 patients had history of hypertension and 60 patients with diabetes mellitus
- 73 patient admitted with ischemic stroke, majority was with MCA stroke ( $n=34$ ).among 23 hemorrhagic stroke 13 were with basal ganglia bleed.
- Ryles tube (RT) was inserted in 64 patients, out of this 64, for 54 patients RT inserted on first day itself and in 10 patients on subsequent days.
- 48 patients developed fever episodes during hospitalization, 34 with RT and 14 without RT
- 30 patients was identified as a case of aspiration and with risk for developing pneumonia
- 18 patient were diagnosed to have pneumonia during hospitalization
- The most common organism identified from the culture was Streptococcus pneumonia (7). Others were Klebsilla (4), Staphylococcus (5)and Pseudomonas (2).
- The length of stay in the hospital was from 2 -23 days, among those diagnosed as aspiration pneumonia, the length of stay was 10-23 days.
- Total of 11 patients died, among them 3 patients were diagnosed to have aspiration pneumonia.



**Table 1:** Clinical details of patients with stroke

	Clinical details	Frequency (N=96)	Percentage (%)
1	<b>Type of stroke</b>		
	Ischemic	73	76
	Hemorrhagic	23	24
2.	<b>Associated risk factors</b>		
	Diabetes mellitus	60	62.5
	Hypertension	78	81
	Coronary artery disease	28	29
	Smoking	54	56
	Alcohol	38	39.5
	Prior incidence of stroke	24	25
3	<b>Ryles tube insertion</b>		

	Inserted	64	66.6
	Not inserted	32	33.3
4	Incidence of fever	48	
5	Signs of aspiration	30	31
6	Incidence of aspiration pneumonia	18	19



### Study delimitation

Study was delimited to neuro medical units and for the period of one month. The occurrence of pneumonia after discharge from the hospital not counted.

### 5. Conclusion

Aspiration pneumonia among stroke survivor is common, it leads even to death. Sharp knowledge and perception regarding the incidence and prevention strategies is inevitable. Nurses are the key position to identify the risk individuals and prevent them from aspiration and pneumonia.

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