PNEUMONIA;
FREQUENCY AND FACTORS LEADING TO STROKE ASSOCIATED PNEUMONIA AT A TERTIARY CARE HOSPITAL

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ABSTRACT… Introduction: Stroke is a major cause of death and disability globally, with an expected rise in number of patients with ageing and economic transition of developing countries. Pneumonia is one of the major complications after stroke. Stroke associated pneumonia increases risk of death by three fold and is the major cause of morbidity and mortality after the stroke. **Objective:** To determine the frequency and factors leading to stroke associated pneumonia in all acute stroke patients admitted at a tertiary care hospital. **Study Design:** Case series. **Setting:** Medical Department, Aga Khan University Hospital (AKUH), Karachi. **Period:** six months and extended from 1st July 2015 to 31st December 2015. **Material and methods:** All adult patients (age 14 years and above) admitted through emergency room in the medical ward of Aga khan university hospital Karachi with the diagnosis of acute stroke on the basis of MRI findings were enrolled after taking informed consent through Non purposive consecutive sampling technique. Demographic data like age and sex were recorded. Diagnosis of stroke associated pneumonia was made on basis of CDC criteria for pneumonia. All analyses was conducted by using the Statistical package for social science SPSS (Release 19.0, standard version, copyright © SPSS; 1989-02). **Results:** A total of 157 patients admitted with a mean age of the inducted patients were 61.75 ± 13.91 years. According to this stratification, 23 patients (14.65%) were aged less than 45 years and remaining 134 subjects (85.35%) were above the age of 45 years among them 110 were males (70.1 %) and 47 were females (29.9 %). Stroke associated pneumonia was found in 33 (21%) out of 157 patients. Out of 33 patients having stroke associated pneumonia; 14 (42.4%) patients had Diabetes mellitus. Out of 33 patients having stroke associated pneumonia; 28 (84.8%) patients had hypertension. Out of 33 patients having stroke associated pneumonia; 2 (6%) had COPD. Out of 33 patients having stroke associated pneumonia; 2(6%) had Chronic Atrial Fibrillation. Out of 33 patients having stroke associated pneumonia; 21 (63.6%) patients had impaired swallowing. **Conclusion:** Stroke associated pneumonia is the common and serious complication after stroke. All the efforts should be taken to control various factors leading to stroke associated pneumonia like DM, hypertension, and impaired swallowing to improve stroke outcome.

Key words: Stroke, Stroke complication, Pneumonia.

INTRODUCTION

Stroke is a major cause of death and disability globally, with an expected rise in number of patients with ageing and economic transition of developing countries. There are many complications associated with stroke like impaired swallowing, aspiration, aphasia, urinary tract infection, and pneumonia. Pneumonia is one of the major complications after stroke. Stroke associated pneumonia increases risk of death by three fold and is the major cause of morbidity and mortality after the stroke.[1,2] Various studies done in west have found frequency of stroke associated pneumonia between 10 to 15%. In a retrospective study from Pakistan, Hassan et al found stroke associated pneumonia in 23% of acute stroke patients. Data from previously published scientific studies have shown the vast majority of risk factors are involved or contribute in causing pneumonia in patients with acute onset of stroke. These risk factors are well known and can be modifiable and non-modifiable.[3-5] Older age and

atrial fibrillation were independently associated with greater risk for developing pneumonia in California Acute Stroke Prototype Registry. Other factors include atrial fibrillation and dyslipidemia. Studies reporting on the possible predictors of chest infection after stroke have had limitations, such as inclusion of mixed acute and non-acute stroke populations, non-blinded ascertainment of chest infection as part of an analysis of a stroke database or register, retrospective analysis. In this study, a comprehensive prospective assessment of all acute stroke patients admitted at tertiary care hospital through emergency room was performed. Frequency of pneumonia in stroke patients and factors leading to stroke associated pneumonia were evaluated.[6-9]

This study will allow identifying patients at high risk of developing stroke associated pneumonia in future and will help in devising preventive strategies for stroke associated pneumonia to improve stroke outcome.

PATIENTS AND METHODS
All adults patients (age 14 years and above) admitted through emergency room in the medical ward of Agha khan university hospital Karachi with the diagnosis of acute stroke on the basis of MRI findings were enrolled after taking informed consent.

### Data Collection and Analysis
Non purposive consecutive sampling technique was used to collect data. Pre-defined proforma was used to collect data. Ethical clearance was taken from ethics review committee of the hospital. Informed consent was taken prior to collecting the data. Demographic data like age and sex were recorded. These patients were observed in the ward till their discharge from the hospital or expiry, for possibility of development of stroke associated pneumonia. Diagnosis of stroke associated pneumonia was made on basis of CDC criteria for pneumonia. Various factors like Hypertension (HTN), Diabetes Mellitus (DM), and Chronic Obstructive Pulmonary Disease (COPD) were recorded. All analyses was conducted by using the Statistical package for social science SPSS (Release 19.0, standard version, copyright

© SPSS; 1989-02). A descriptive analysis was done for demographic features and was presented as mean ± standard deviation for quantitative variables i.e. age, frequency and percentage for qualitative variables i.e. gender and factors leading to stroke associated pneumonia. Number and percentages of stroke associated pneumonia and factors leading to stroke associated pneumonia were calculated and data was stratified by age, gender and factors leading to stroke associated pneumonia to control the effect modifier.

RESULTS
A total of 157 patients admitted in medical ward of Aga Khan University Hospital, Karachi were enrolled into the study. The mean age of the inducted patients was 61.75 ± 13.91 years. Patients were divided into two sub-groups on the basis of their age. The first group had patients below the age of 45 years and the second had patients above the age of 45years.

According to this stratification, 23 patients (14.65%) were aged less than 45 years and remaining 134 subjects (85.35%) were above the age of 45 years among them 110 were males (70.1 %) and 47 were females (29.9 %), (Figure-1).
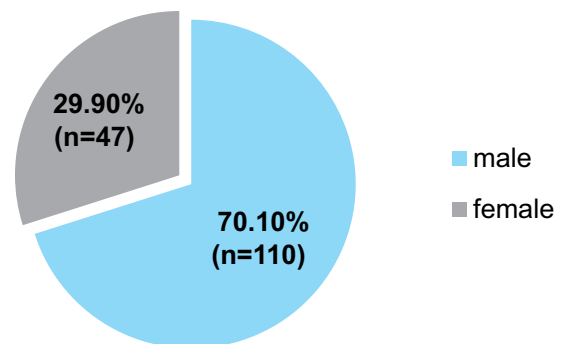
Figure-1. Gender wise distribution of study participants (n = 157)

Stroke associated pneumonia was found in 33 (21%) out of 157 patients (Figure-2). 2(6%) patients were below the age of 45years and 31(94%) were above the age of 45years (Figure-3). Out of 33 patients with stroke, 24(72.7%) were males and 9(27.3%) were females. Out of 33 patients having stroke associated pneumonia; 14(42.4%) patients had Diabetes mellitus. Out of which 10(71.4%)

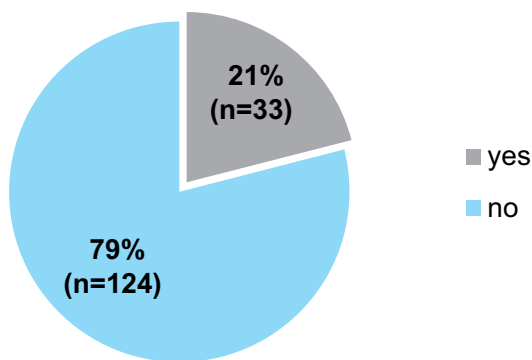were males and 4(28.6%) were females. All the patients were above the age of 45 years.

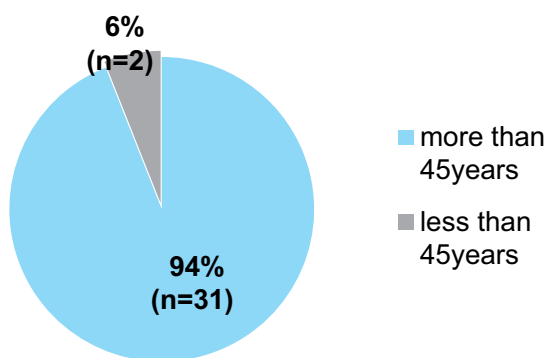**Figure-2. Frequency of stroke associated pneumonia (n = 157)**

Figure-3. Stratification of age in patients with stroke associated pneumonia (n = 157)

Our main objective was to determine the frequency and factors leading to stroke associated pneumonia in all acute stroke patients. The most common risk factor was observed Hypertension (N = 81, 84.81%) while rest of the descriptive analysis shown in Table-I.

Factors	n (%)
Diabetes Mellitus	14(42.4%)
Smoker	6(18.2%)
Hypertension	28(84.81%)
COPD	2(6%)
Dyslipidemia	2(6%)
Chronic Atrial Fibrillation	3(9%)
Impaired Swallowing	21(63.6%)

Table-I. Frequency of factors leading to stroke associated pneumonia (n=33)

Out of 33 patients having stroke associated pneumonia; 28(84.8%) patients had hypertension. Out of which 20(71.5%) were males and 8(28.5%) were females. 1(3.57%) patient was below the age of 45 years and 27(96.42%) were above the age of 45years, Table-II&III.

Out of 33 patients having stroke associated pneumonia; 2(6%) had COPD. All were males and above the age of 45 years. Out of 33 patients having stroke associated pneumonia; 2(6%) had Chronic Atrial Fibrillation: Out of 33 patients having stroke associated pneumonia; 3(9.1%) had chronic atrial fibrillation. Out of which 2(66%) were males and 1(33%) was female. All were above the age of 45 years, Table-II&III.

Factors	Male n (%)	Female n (%)
Diabetes Mellitus (N =14)	10 (72%)	4 (28%)
Smoker (N =6)	6 (100%)	Nil
Hypertension (N =28)	20 (271.5%)	8 (28.5%)
COPD (N =2)	2 (100%)	Nil
Dyslipidemia (N =2)	2 (100%)	Nil
Chronic Atrial Fibrillation (N = 3)	2 (66%)	1 (33%)
Impaired Swallowing (N =21)	15 (71.4%)	6 (28.6%)

Table-II. Frequency of factors leading to stroke associated pneumonia stratified by gender (n=33)

Factors	Age less than 45years N (%)	Age more than 45years N (%)
Diabetes Mellitus (N =14)	nil	14 (100%)
Smoking (N =6)	nil	6 (100%)
Hypertension (N =28)	1 (3.57%)	27 (96.43%)
COPD (N =2)	nil	2 (100%)
Dyslipidemia (N =2)	nil	2 (100%)
Chronic Atrial Fibrillation (N =3)	nil	3 (100%)
Impaired Swallowing (N =21)	1 (4.77%)	20 (95.23%)

Table-III. Frequency of factors leading to stroke associated pneumonia stratified by age (n = 33)

Out of 33 patients having stroke associated pneumonia; 21(63.6%) patients had impaired swallowing. Out of which 15(71.5%) were males

and 6(28.5%) were females. 1(4.76%) patient was below the age of 45 years and remaining 20(95.24%) were above the age of 45 years, Table-II&III.

DISCUSSION

Pneumonia is a common medical complication after acute stroke that complicates the course in 7-23%of the stroke patients. In my study during the study period, 157 patients were admitted with acute stroke. 21% of patients developed pneumonia. This figure is higher than that reported in the western literature, i.e. 10% in the California acute stroke prototype registry(81) and 13.4% in the study of Masiero et al[10], but slightly lower than previous study from Pakistan that was 23%.

Several factors have been implicated in the development of stroke associated pneumonia, which include DM, smoking, Hypertension, COPD, Dyslipidemia, Chronic atrial fibrillation and impaired swallowing.[11-16] In my study hypertension was the most common factors found in patients with stroke associated pneumonia. Frequency of hypertension was 84.8%, this is in contrast to western data in which hypertension was found in only 28.4%.[10] Frequency of DM was also higher in my study that was 42.44% in comparison to study of Maseiro et al in it was found in 29.9% of patients with stroke associated pneumonia.[10] Impaired swallowing was found in 63.6% of patients in my study which is comparable to western data in which it was found in 64.2%.[17-20] Other factors were found in less frequency in my study as well as in western data. We conclude that stroke associated pneumonia is a common and serious complication after stroke and is associated with poor prognosis. It prolongs hospital stay and is also associated with high acute mortality (during initial hospital admission) in stroke patients. Hypertension, impaired swallowing and DM are the most factors leading to stroke associated pneumonia. All the efforts should be taken to control these factors early in the course of acute stroke so that frequency of stroke associated pneumonia can be reduced. This will enable us to improve stroke outcome in future.[21-26]

CONCLUSION

Stroke associated pneumonia is the common and serious complication after stroke. All the efforts should be taken to control various factors leading to stroke associated pneumonia like DM, hypertension, impaired swallowing etc to improve stroke outcome.

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PREVIOUS RELATED STUDY

AUTHORSHIP AND CONTRIBUTION DECLARATION

Sr. #	Author-s Full Name	Contribution to the paper	Author=s Signature
1	Anwar Hussain Abbasi	Paper writing, Concept, Data collection, Data analysis.	
2	Shahab Abid	Help in data analysis, Results compitation, Discussion.	