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ORIGINAL ARTICLE

Prevalence of Stroke Associated Pneumonia in Stroke Patients

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ABSTRACT

Background and Aim: Stroke patients are most commonly susceptible to pulmonary infection that adversely affects the duration of hospitalization and clinical outcomes. Stroke affecting the respiratory system and causing neurological damage contributed to higher morbidity and mortality rate due to complications such as stroke-associated pneumonia (SAP). Early identification of high risk stroke patients and their management are imperative to reduce the prevalence of stroke-associated pneumonia. The present study aim was to determine the prevalence of stroke-associated pneumonia in stroke patients.

Methodology: This cross-sectional descriptive case series was carried out on 226 stroke patients in the Department of Neurology, Fauji Foundation Hospital, Rawalpindi from January 2020 to December 2021. Stroke patients aged 30 to 70 years of either gender diagnosed with stroke were enrolled. Cough, fever and non-homogenous opacities observed on chest X-rays were used for the diagnosis of stroke. Patients with a history of pneumonia were excluded. Detailed history and complete examination was obtained for stroke diagnosis followed up for 1 month. SPSS version 25 was used for data analysis.

Results: Of the total 226 stroke patients, there were 118 (52.2%) males and 108 (47.8%) females. The overall mean age was 48.62±8.45 years. Age-wise distribution of all patients were as follows; 72 (31.9%) 30-40 years, 106 (46.8%) 41-50 years, 32 (14.2%) 51-60 years, and 16 (7.1%) 61-70 years. The prevalence of stroke-associated pneumonia was 46 (20.4%). The incidence of diabetes mellitus, hypertension, ischemic heart disease, atrial fibrillation, congestive cardiac failure, and thrombophilia state was 48 (21.2%), 36 (15.9%), 28 (12.4%), 19 (8.4%), 14 (6.2%), and 8 (3.5%) respectively. Diabetes mellitus patients were more susceptible to stroke-associated pneumonia followed by hypertension and cardiac diseases. The incidence of stroke-associated pneumonia was 33 (14.6%) among patients having 6 to 12 hours stroke length against 13 (5.8%) with shorter duration.

Conclusion: The present study found that the prevalence of stroke-associated pneumonia was 20.4% among stroke patients. Diabetes, hypertension, cardiac diseases, atrial fibrillation among stroke patients are the different risk factors that develop stroke-associated pneumonia. Early identification and better management could prevent the stroke-associated pneumonia in stroke patients.

Keywords: Prevalence, Stroke-associated pneumonia, Stroke

INTRODUCTION

Stroke is a commonly critical cerebrovascular disease contributing to higher rate of morbidity and mortality [1]. Approximately 60% to 80% stroke patients diagnosed with acute ischemic stroke [2]. Stroke patients commonly suffer from different complications that lead to individual inability in performing daily basis activities [3]. Stroke patients are most commonly susceptible to pulmonary infection that adversely affects the duration of hospitalization and clinical outcomes. Stroke affecting the respiratory system and causing neurological damage contributed to higher morbidity and mortality rate due to complications such as stroke-associated pneumonia (SAP) [4, 5]. Diabetes, smoking, dyslipidemia, hypertension and cardiac diseases are the different causes for stroke. Pneumonia like neurological and medical complications are the major reasons for mortality among stroke patients [6].

The prevalence of stroke-associated pneumonia among stroke patients varies from 2.3% to 44% [7, 8]. Stroke-associated pneumonia is a pulmonary infection that progresses in non-ventilated patients within 7 days of stroke [9]. The different risk factors for stroke-associated pneumonia include dysphagia, female gender, acute stroke severity, advanced age, and consciousness disturbance [10]. The higher incidence of SAP is caused by immunosuppression induced by acute stroke along with these risk factors [11]. Stroke-associated pneumonia can be prevented and mostly SAP (43% to 79%) occurs within 72 hours of onset of acute stroke [12, 13]. Therefore, prevalence of SAP could be reduced by high-risk patient's early identification and better management. A poor long-term prognosis and higher mortality rate was found in patients with stroke-associated pneumonia than without SAP. Respiratory infection and pneumonia are the two major reasons for hospitalization after three to five years of stroke onset [14]. Numerous studies explored and assessed the different preventive intervention's effects on stroke associated pneumonia. Respiratory tract management, cluster intervention, feeding management, and dysphagia rehabilitation are all effective interventions for avoiding or reducing the incidence of stroke-associated pneumonia [15]. The present study aimed to determine the prevalence of stroke-associated pneumonia in stroke patients.

METHODOLOGY

This cross-sectional descriptive case series was carried out on 226 stroke patients in the Department of Neurology, Fauji Foundation Hospital, Rawalpindi from January 2020 to December 2021. Stroke patients aged 30 to 70 years of either gender diagnosed with stroke were enrolled. Cough, fever, and non-homogenous opacities observed on chest X-rays were used for the diagnosis of stroke. Patients with a history of pneumonia were excluded. Detailed history and complete examination was obtained for stroke diagnosis followed up for 1 month. Non-probability sampling techniques were used for the collection of data. Sample size was calculated based on prevalence of SAP 17.89% [16], taking 95% confidence interval and 5% margin of error. After the ethical approval from the institute research and ethical committee and enrolling those patients who fulfilled the inclusion criteria, written informed consent was obtained from each patient. Demographic details such as name, gender, age, and stroke duration, previous history of diabetes, hypertension, and smoking were recorded on pre-designed proforma. Patients were shifted to ICU and followed up for 12 hours. In cases where SAP were developed in stroke patients within 12 hours, then data were noted on proforma.

Data analysis was carried out in SPSS version 25. Numerical variables such as age, stroke length or duration were expressed as mean and standard deviation. Continuous variables such as hypertension, gender, pneumonia, smoking, and diabetes were described as frequency and percentage. Stroke-associated pneumonia was stratified for gender, stroke length, age, smoking, diabetes, and hypertension in order to see the effect modifier. Post-stratification chi-square test was used for comparing different factors using 5% level of significance.

RESULTS

Of the total 226 stroke patients, there were 118 (52.2%) males and 108 (47.8%) females. The overall mean age was 48.62±8.45 years. Age-wise distribution of all patients were as follows; 72 (31.9%) 30-40 years, 106 (46.8%) 41-50 years, 32 (14.2%) 51-60 years, and 16 (7.1%) 61-70 years. The prevalence of stroke-associated pneumonia was 46 (20.4%). The incidence of diabetes mellitus, hypertension, ischemic heart disease, atrial fibrillation, congestive cardiac failure, and thrombophilia state was 48 (21.2%), 36 (15.9%), 28 (12.4%), 19 (8.4%), 14 (6.2%), and 8 (3.5%) respectively. Diabetes mellitus patients were more susceptible to stroke-associated pneumonia followed by hypertension and cardiac diseases. The incidence of stroke-associated pneumonia was 33 (14.6%) among patients having 6 to 12 hours stroke length against 13 (5.8%) with shorter duration. Figure-1 illustrates the gender's distribution. Age-wise distribution is depicted in Figure-2. Incidences of different risk factors are shown in Table-I. Table-II represent the stratification of different risk factors. Figure-3 demonstrate the prevalence of SAP and non-SAP cases among stroke patients.

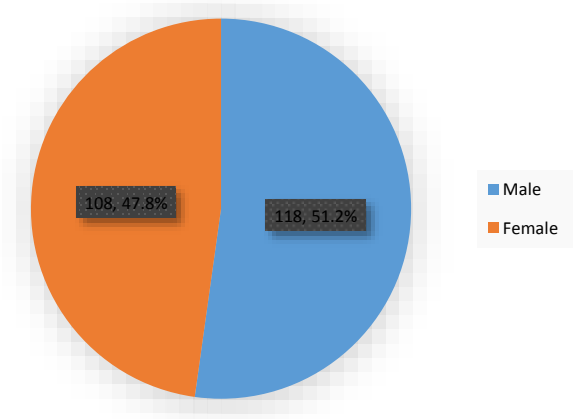

Figure-1: Gender's distribution (n=226)

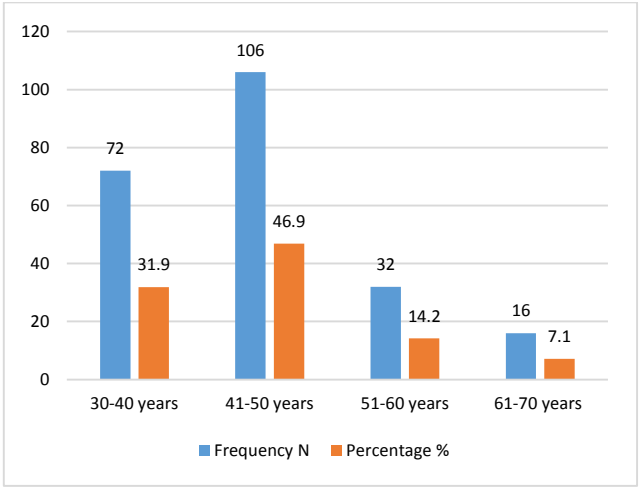

Figure-2: Age-wise distribution (n=226)

Table-1: Incidence of different risk factors for the SAP

Risk factors	Frequency (N)	Percentage (%)
Diabetes mellitus	48	21.2
Hypertension	36	15.9
Ischemic heart disease	28	12.4
Atrial fibrillation	19	8.4
Congestive cardiac failure	14	6.2
Thrombophilia state	8	3.5

Table-2: stratification of different risk factors

Stratification of Risk factors	SAP Yes (N=46)	SAP No (N=180)	P-value
Age (years)			
30-40	6 (8.3%)	66 (91.7%)	0.96
41-50	9 (8.5%)	97 (91.5%)	
51-60	21 (65.6%)	11 (34.4%)	
61-70	10 (62.5%)	6 (37.5%)	
Gender			
Male	28 (23.7%)	90 (76.3%)	0.294
Female	18 (16.7%)	90 (83.3%)	
Diabetes			
Yes	15 (31.3%)	33 (68.7%)	0.412
No	31 (13.7%)	147 (85.8%)	
Hypertension			
Yes	14 (38.9%)	22 (61.1%)	0.431
No	32 (14.2%)	158 (85.8%)	
Ischemic Heart Disease			
Yes	11 (39.3%)	17 (60.7%)	0.32
No	35 (15.5%)	163 (84.5%)	
Atrial fibrillation			
Yes	7 (36.8%)	12 (63.2%)	0.28
No	39 (17.3%)	168 (82.7%)	
Congestive cardiac failure			
Yes	5 (35.7%)	9 (64.3%)	0.29
No	41 (18.1%)	171 (81.9%)	
Thrombophilia state			
Yes	3 (37.5%)	5 (62.5%)	0.22
No	43 (19%)	175 (81%)	

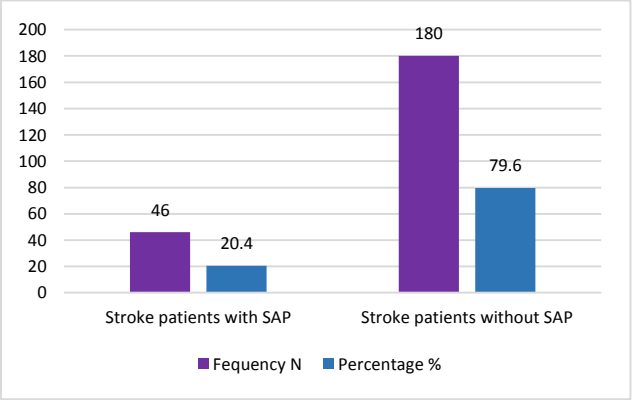

Figure-3: Prevalence of SAP

DISCUSSION

The present study mainly focused on the prevalence of the stroke-associated pneumonia in stroke patients and found that the incidence of SAP was 20.4%. Male stroke patients were more susceptible to stroke-associated pneumonia than females. Diabetes was the most prevalent risk factor for SAP followed by hypertension and ischemic heart diseases. Patients of the age group 50 years to 70 years had higher incidence of stroke associated with pneumonia compared to other age groups. Stroke is a major contributing entity in disability and higher morbidity and mortality rate affecting individual life [17]. In the present study, the incidence of SAP was 20.4% (n=46) that is similar to the findings of a Pakistani based study who reported 21.8% occurrence of SAP in stroke patients [18]. A US-based study reported a stroke-associated mortality rate that ranges from 7% to 20% [19]. About 90% of cases of stroke are unable to perform their daily activities and tasks. Smoking, heart diseases, diabetes, and hypertension are different risk factors for stroke and stroke-associated pneumonia in Western world [20, 21].

Stroke-associated pneumonia after stroke are another major cause for higher mortality rate and different neurological issues [22]. The incidence of SAP was higher in acute ischemic stroke patients who needed tube feeding in a neurological unit. The

varying range of SAP was from 21% to 44%. Post-supratentorial ischemic infarction 30 days, majority of pneumonia cases developed after 48 hours of stroke onset [23]. A Pakistan-based study reported 12.5% prevalence of SAP among 160 stroke patients [24]. In the present study, SAP was present in 46 (20.4%) patients. Previous studies reported the incidence of SAP was 3.9% to 44% among stroke patients referred to the stroke unit [25]. Klein et al [26] found that 11.7% stroke patients had SAP whereas another study reported 18% overall prevalence of SAP [27].

Smith et al [28] found that pneumonia after stroke were present in 7% to 22% patients which is similar to our study findings. Finlayson et al [29] reported that the prevalence of SAP was 7.1% among stroke patients. In numerous studies, the SAP rate varies from 9.5% to 56.6% among stroke patients admitted to NICU [29, 30]. In contrast, one study reported 4.1% prevalence of SAP [31]. The lower incidence of SAP was due to the enrollment of neurovascular cases, younger age population besides stroke patients.

There are various methods through which SAP can be prevented. The occurrence of SAP is significantly associated with the patient's head position, caregiver feeding, oral hygiene, dysphagia, continuous tube feeding, vomiting causing aspiration, post-acute stroke immunosuppression, gastroesophageal reflux, and lesion location. All these factors must be considered while preventing acute stroke infections either pulmonary or respiratory. Numerous studies found and suggested different preventive measures but majority of them were not on evidence basis. They mainly concentrated on single preventive measure [32, 33].

Due to the heterogeneous nature of study especially conducted in critical unit settings, comparing these studies results would be difficult. Majority of the studies involved subarachnoid hemorrhage and intracerebral hemorrhage in addition to acute ischemic stroke [34]. It has been observed that there were differences in the definition of stroke-associated pneumonia. The prevalence of stroke-associated pneumonia was higher in NICUs compared to those admitted in the stroke unit. Although the incidence of SAP in the present study was similar to the reported but additional studies must be conducted to validate our findings.

CONCLUSION

The present study found that the prevalence of stroke-associated pneumonia was 20.4% among stroke patients. Diabetes, hypertension, cardiac diseases, atrial fibrillation among stroke patients are the different risk factors that develop stroke-associated pneumonia. Early identification and better management could prevent the stroke-associated pneumonia in stroke patients.

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