THE PREVALENCE OF STROKE-ACQUIRED PNEUMONIA IN ICU PATIENTS FOLLOWING A CEREBROVASCULAR ACCIDENT (CVA)

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Abstract: Acute ischemic stroke often has a poor clinical prognosis due to its serious complications, including serious pulmonary and neurological problems. Stroke-acquired pneumonia (SAP) refers to any respiratory tract infection developing within 7 days following a stroke. Objective: To determine the actual incidence of SAP in ICU patients. Methods: A descriptive analysis was conducted on stroke patients hospitalized at DHQ City and South City Okara hospitals. Personal data such as name, age, sex, and duration of stroke were collected and recorded on a prepared proforma, along with previous histories of hypertension, diabetes, and smoking. Patients were then transferred to the intensive care unit and observed for three consecutive days. Data were collected if pneumonia associated with a stroke was diagnosed within 72 hours, according to the operating criteria, and recorded on the proforma. Results: Among the 80 stroke patients included in the study, 38 (47.5%) were female and 42 (52.5%) were male. The participants’ average age was 53.75±7.5 years, and the mean duration since stroke onset was 7.42±6.63 hours. SAP was observed in 11 (13.75%) patients. SAP occurred in 6 (15.78%) female patients compared to 5 (11.90%) male patients (p=0.35). SAP was present in 5 (26.3%) diabetic patients versus 6 (9.83%) non-diabetic patients (p=0.14). SAP was detected in 4 (25%) hypertensive patients and 2 (11.7%) patients with a history of smoking, with p-values of 0.41 and 0.37, respectively. SAP was identified in 9 (17.3%) patients with a stroke duration of 6-12 hours. Conclusion: Stroke-associated pneumonia affects more than one in ten patients. Females, individuals with a history of hypertension, and diabetes, and those with a stroke duration of 6 to 12 hours are more likely to develop this condition. However, none of these factors reached statistical significance.

Keywords: Acute Ischemic Stroke, Pneumonia, Stroke-Acquired Pneumonia, Intensive Care Units, Risk Factors

Introduction

Acute ischemic stroke has a poor clinical outcome due to its serious complications. Complications can be prevented by recognizing their prevalence and using appropriate treatment techniques. Pneumonia is a common pulmonary complication after a stroke, affecting 4-9% of patients (1). This kind of pneumonia is more common among those suffering from acute ischemic stroke in the neuro intensive care unit (21%) (2), as well as those on tube feeding (44%) (3). Stroke-related pneumonia was associated with higher death rates and a poorer prognosis compared to those without pneumonia (4). Pneumonia typically manifests as a high fever within 48 hours following an acute stroke. In the first 5 years after an ischemic stroke, pneumonia and respiratory diseases are the most prevalent causes of re-hospitalization in survivors (5). A prospective research included 124 individuals with acute stroke managed in the medical ICU. This study identified mechanical ventilation, abnormal chest X-rays at admission, and dysphagia as contributing factors (6). Patients having facial palsy and low GCS were susceptible to pneumonia, requiring nasogastric feeding (7). Stroke-related impairment of sensory and motor systems involved in deglutition, as well as a lower level consciousness that limits expectoration and epiglottis closing, are the main contributors to aspiration pneumonia after an acute stroke. Nosocomial pneumonia is now referred to as ventilator-associated pneumonia (VAP) or hospital-acquired pneumonia (HAP). Despite changes in terminology, the phrase “nosocomial pneumonia” remains widely used worldwide. Stroke is the most common illness. Stroke-associated pneumonia (SAP) is a common consequence in our nation, leading to high mortality and morbidity. The current study was designed to assess the actual incidence of SAP in ICU patients and predicted some of the patient parameters that are more linked with the development of SAP.

Methodology

A descriptive analysis was conducted on individuals with stroke hospitalized at DHQ City and South City Okara hospitals between July 30, 2023, and January 10, 2024. The study received approval from the hospital ethical committee and the institutional review board. This prospective, descriptive study was carried out at DHQ City and South City Okara hospitals. The sample size was computed to include 80 patients, based on a 95% confidence level, a 5% margin of error, and an anticipated SAP incidence of 11.7% among stroke patients. The study comprised 80 patients, both male and female, aged 30 to 70 years, who were admitted to the intensive care unit (ICU) within twelve hours of stroke onset. Patients with comorbid conditions such as hepatic issues (AST > 40 IU), nephritic issues (serum creatinine > 1.2 mg/dL), asthma (documented), prior acute coronary syndrome

Eligible patients were identified in the emergency department and provided written informed consent. Personal data, including name, age, sex, and stroke duration, were collected and recorded on a pre-prepared proforma, alongside histories of hypertension, diabetes, and smoking. Patients were then transferred to the ICU and observed for three consecutive days. Data on pneumonia associated with stroke, if diagnosed within 72 hours according to established criteria, were recorded.

Patients were monitored for signs of SAP during their ICU stay. SAP was defined and diagnosed based on clinical criteria, including fever, leukocytosis, new or progressive pulmonary infiltrates on chest radiography, and respiratory symptoms such as cough or dyspnea within 72 hours of stroke onset.

The study was conducted following ethical guidelines, and all participants provided informed consent. Data confidentiality and patient anonymity were maintained throughout the study.

Data were entered and analyzed using SPSS version 21.0. Means and standard deviations were calculated for quantitative variables such as age and stroke duration. Frequencies and percentages were computed for categorical variables, including the outcome variable SAP, as well as sex, hypertension, diabetes, and smoking status. Data were stratified by age, sex, stroke duration, diabetes, hypertension, and smoking to examine their influence on SAP occurrence. The chi-square test was used to assess the statistical significance of differences, with a p-value of less than 0.05 considered significant.

Results

Among the 80 stroke patients included in the present study, 38 (47.5%) were female and 42 (52.5%) were male (Figure 1). The participants’ average age was 53.75±8.75 years (Table 1), and the mean duration of the stroke turned out 7.42 ±3.63 hours.

<table>
<thead>
<tr>
<th>Variable</th>
<th>Age in years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>53.75</td>
</tr>
<tr>
<td>Std. Deviation</td>
<td>8.75</td>
</tr>
<tr>
<td>Minimum</td>
<td>33</td>
</tr>
<tr>
<td>Maximum</td>
<td>70</td>
</tr>
</tbody>
</table>

Figure 1 shows the gender distribution of the study population

Figure 2 shows the comorbidity status of the study population

Table 1  Age of the study population

Table 2: Risk variables related to Stroke Acquired pneumonia (SAP)

<table>
<thead>
<tr>
<th>Variable</th>
<th>Stroke acquired pneumonia</th>
<th>Total</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30-49</td>
<td>2(9.52)</td>
<td>19(90.47)</td>
<td>21(100)</td>
</tr>
<tr>
<td>50-70</td>
<td>9(15.25)</td>
<td>50(84.74)</td>
<td>59(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>5(11.90)</td>
<td>37(88.09)</td>
<td>42(100)</td>
</tr>
<tr>
<td>Female</td>
<td>6(15.78)</td>
<td>32(84.21)</td>
<td>38(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
<tr>
<td>Hypertension</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>4 (25)</td>
<td>12(75)</td>
<td>16(100)</td>
</tr>
<tr>
<td>No</td>
<td>7(10.9)</td>
<td>57(89.06)</td>
<td>64(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
<tr>
<td>Diabetes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5 (26.3)</td>
<td>14(73.68)</td>
<td>19(100)</td>
</tr>
<tr>
<td>No</td>
<td>6(9.83)</td>
<td>55(90.1)</td>
<td>61(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
<tr>
<td>Smoking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2 (11.7)</td>
<td>15(88.2)</td>
<td>17(100)</td>
</tr>
<tr>
<td>No</td>
<td>9(14.28)</td>
<td>54(85.71)</td>
<td>63(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
<tr>
<td>Duration of SAP</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;6 hr.</td>
<td>2 (7.14)</td>
<td>26(92.8)</td>
<td>28(100)</td>
</tr>
<tr>
<td>6-12 hr.</td>
<td>9 (17.3)</td>
<td>43(82.6)</td>
<td>52(100)</td>
</tr>
<tr>
<td>Total</td>
<td>11(13.75)</td>
<td>69(86.25)</td>
<td>80(100)</td>
</tr>
</tbody>
</table>

There were 19 (23.75%) patients with DM, 16 (20%) cases with HTN, and 17 (21.2%) cases with a history of cigarette smoking. SAP was observed in 11 (13.75%) of the patients. SAP occurred in 6 (15.78%) female patients versus 5 (11.90%) male patients, having p=0.35. The results showed no statistically significant difference in SAP across different age groups (p = 1.2)(Table 2). SAP occurred in 5 (26.3%) of DM patients compared to 6 (9.83%) of non-DM cases (p= 0.14). SAP was detected in 4 (25%) people who had HTN and 2 (11.7%) patients who had a smoking history, having p-values of 0.41 and 0.37, respectively. SAP was detected in 9 (17.3%) patients having a stroke duration of 6-12 hours.

Discussion

Stroke is a leading cause of disability and death, affecting a variety of entities and negatively impacting their standard of life (8). A recent survey conducted in Pakistan found that 21.8% of the population had experienced a stroke or transient ischemic episode (9). Stroke mortality rates in our nation range from 7-20%, according to various research (10). Approximately 60% of stroke victims face serious complications, and 89% require assistance with everyday tasks (11). In Western nations, where many people have predisposing diseases like heart disorders, hypertension, diabetes, obesity, and lipid disorders, the leading causes of strokes are similar to those in our nation (12). Pneumonia, among other medical and neural problems, is a primary cause of death following a stroke (13).

Stroke-associated pneumonia is more prevalent in patients treated in a medical ICU, with twenty-one per cent to forty-four per cent needing tube feeding (14). Pneumonia is the primary cause of fever in the initial 48 hours following an acute stroke. It is also commonly associated with frequent health complications within 30 days of stroke episode (15). Stroke-acquired pneumonia was observed in 11 (13.75%) of 80 individuals hospitalized with a stroke. These results of our research were similar to previous research (16). Previous research on stroke patients found that SAP occurred in 3.9% to 44% of individuals hospitalized due to stroke (17). Research by Badve et al found that pneumonia was identified in 44 per cent of acute stroke victims hospitalized in the ICU (18). Another research by Patel et al found this in 3.53% of patients (19). Research found that SAP occurred in 18 (18%) of 100 stroke patients, with no significant gender differences (20). In that research, 51% of patients were male and 49% comprised female. These findings are in line with the findings of our study. A previous study found that older individuals were more likely to experience SAP (21). These results are similar to the findings of our study.

Studies suggest that the prevalence of SAP may vary depending on regional guidelines and admission places. Patients admitted to the ICU were more likely to get early ventilation to preserve their airways, relative to those not admitted to ICU. Additionally, the timing and manner of feeding might influence the risk of developing SAP. Other factors, such as care level, head position, aspiration periodic checks, and ionotropic support, have been linked to a higher risk of SAP development (19). SAP occurred in 5 (26.3%) of DM patients compared to 6 (9.83%) of non DM cases (p= 0.14). SAP was detected in 4 (25%) people who had HTN and 2 (11.7%) patients who had a smoking history, having p-values of 0.41 and 0.37, respectively. Previous research provided limited data on these factors. Research indicates that individuals with co-morbid diseases such as heart failure, hypertension, diabetes, or immune-compromised status are more likely to develop SAP (16). A research by Lin et al. found that having

a history of fever, regardless of the etiology, increased the likelihood of developing SAP (22).

Invasive mechanical ventilation was related to a greater incidence of SAP, possibly due to a greater likelihood of ventilator-associated pneumonia (22). These findings were equally validated by the earlier investigations. SAP was found in 9 (17.3%) patients having stroke duration of 6-12 hours at admission, compared to 2 (7.14%) in patients having stroke duration of under six hours at admission (p=0.48). There is no information regarding the relationship between stroke duration and SAP. However, unsupervised or referred cases from small treatment centers are more likely to acquire SAP in comparison to those cases presented to ICU earlier.

Our study includes limitations that should be considered. The study is limited by its descriptive nature. Second, the limited sample size reduces the research's statistical significance. The research has another limitation, including a lack of consideration for different types of stroke, like hemorrhagic or ischemic, and a previous history of temperature and eating habits.

Conclusion

The nurses in Pakistan have good knowledge but a comparably less favourable attitude toward pain management.

Declarations

Data Availability statement
All data generated or analyzed during the study are included in the manuscript.

Ethics approval and consent to participate.
Approved by the department concerned. (IRBEC-7724 letter issued dated 05-03-23)

Consent for publication
Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

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Drafting

**HAFIZA SEMAAB SALAHUDDIN**
Review of literature and drafting

**MUHAMMAD ARIF**
Revision and proofreading

References


