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Post-stroke complications and its association with mortality of patients with stroke: a five-year experience at a tertiary care centre in Nepal

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ABSTRACT

Introduction: Post–stroke complications increase the mortality, delay the recovery, prolong the hospitalization and increase the health care costs. Data regarding the post–stroke complications in Nepal are limited. We aimed to determine post–stroke medical complications and their association with mortality among patients admitted with stroke.

Materials and methods: This study was a five–year retrospective analysis among patients aged 18 years and above, diagnosed with stroke and admitted to the Department of Internal medicine between 2012 and 2016 at B.P. Koirala Institute of Health Sciences (BPKIHS) in Eastern Nepal. Data on patient characteristics and post–stroke medical complications were extracted from medical records and expressed as descriptive statistics. Mortality was considered as a poor outcome and its association with post–stroke medication complications was determined using bivariate analysis.

Results: There were 278 patients with stroke in the five–year period, with the mean±SD age of 65±15 years. Ischemic stroke was most prevalent (82.9%) stroke type. The most common post–stroke complication was aspiration pneumonia (25.9%) followed by raised intracranial pressure (13.3%), pressure sores (8.3%), and urinary tract infections (5.4%). The mortality rate was 18.7%. There was a statistically significant association of aspiration pneumonia and raised intracranial pressure with mortality at P<0.001.

Conclusion: Aspiration pneumonia and raised intracranial pressure were the common post–stroke complications among patients with stroke admitted in BPKIHS and mortality was significantly associated with these complications.

Keywords: aspiration pneumonia; association; Nepal; outcome, post–stroke complication; stroke

INTRODUCTION

Stroke is the most common cause of death after ischemic heart disease and leading cause of adult disability worldwide.[1] The known post–stroke complications are recurrent stroke, seizure, urinary tract infection, aspiration pneumonia, thromboembolism, increased intracranial pressure, depression and pressure sores.[2-8] Post–stroke complications bear a huge clinical and public health implications as it interrupts the rehabilitation process, delay recovery, increase the mortality and prolong the hospital stays.[9]

In Nepal, stroke is among the top five diseases causing mortality.[10] The mortality rate of stroke ranges from 5–29 % in different settings in Nepal.[11,12] This wide range in the mortality rate of stroke within Nepal might be due to a multitude of factors such as delay in hospital enrolment, the extent of available clinical care and the characteristics of the clinical condition itself. Past studies from 104 academic and community hospitals of Germany had shown that post–stroke medical and neurological complications were associated with an increase in mortality.[13] Hence, early detection of the post–stroke complications and management of the complications with utmost care is mandatory to reduce the stroke–related mortality and severity of the disability.

B.P. Koirala Institute of Health Sciences (BPKIHS) was established by Ministry of Health as an autonomous (with a status of a university for health sciences), tertiary care hospital in Eastern Nepal with inpatient admission of about 40000 patients annually.[14] The University stands as a tertiary care centre for the eastern region of Nepal and the neighbouring zones of India. While few studies have reported on post–stroke complications from Nepal, there had been no studies so far reporting the post–stroke complications in Eastern Nepal. This study can guide clinicians and policymakers to allocate resources to minimize the post–stroke complications thereby strengthening the quality of stroke care in Nepal. The main objective of this study was to explore and ascertain the post–stroke complications and association of post–stroke complications with the outcome of patients of stroke admitted in Internal Medicine Department (inpatients) at BPKIHS.

MATERIALS AND METHODS

Study design: This was a retrospective study at BPKIHS, a tertiary care centre in Eastern Nepal. Patients age 18 years and above, diagnosed with stroke, admitted to the Department of Internal Medicine from January 2012 to December 2016 were enrolled for this study.

Study procedure: The clinical details of each patients were retrieved from the medical records. Data was collected using a specifically designed data extraction form that included information on age, sex, location, history, clinical characteristics, and post–stroke medical complications. Clinical characteristics included symptoms, blood pressure, respiratory rate, pulse rate, temperature, and saturation of oxygen during triaging at the emergency room and initial laboratory test reports. Post–stroke medical complication(s) mentioned in record file as per the diagnosis of treating physician was noted. Mortality was considered as the outcome for this study.

Data analysis: Data were analysed using IBM–SPSS version 20 (Armonk, NY, USA). Descriptive statistics were calculated for all variables and the association of post–stroke medical complications with mortality was analysed using chi–square test. In all the analysis, $P<0.05$ was considered statistically significant.

Ethics: The ethical approval for this study was obtained from the Department research committee of Internal medicine of BPKIHS.

RESULTS

During the five–year period 278 patients had stroke. Table 1 depicts the characteristics of the study population. It shows that majority of them were male (61%) with the mean±SD age of 65±15 years. Among the study population, 38.5% were smokers and 40.5% had a history of alcohol intake. Most of the patients (57%) had a history of hypertension followed by diabetes mellitus (25.0%). More than one–fourth of the patients (26.5%) had a previous history of cardiac disease.

Majority of the patients had an ischemic stroke (82.9%). The median(IQR) time of hospital presentation after the onset of symptoms was 24(18) hours.

Table1: Characteristics of study population (n=278).

Characteristics	n (%)
Mean age (years) ±SD	65±15
Male	170 (61)
Ischemic stroke	229(82.9)
Haemorrhagic stroke	49(17.6)
Hypertension	159 (57)
Diabetes mellitus	70 (25)
Smoker	107 (38.5)
Alcohol consumer	113 (40.5)
History of cardiac disease	74 (26.5)
Past history of stroke	40 (14.4)
Mean GCS ±SD	12 ±3
Time to hospital arrival after stroke(hours)	24 (18)
Median Length of hospital stay (Q1-Q3) in days	4 (2-6)

Abbreviations: GCS, Glasgow Coma Scale; SD, Standard Deviation; IQR, Inter Quartile Range

Table 2: Pattern of Post-stroke complications in study population (n=278)

Characteristics	n (%)
Aspiration pneumonia	72(25.9)
Raised intracranial pressure	37(13.3)
Pressure sore	23(8.3)
Urinary tract infection	15(5.4)
Seizure	7(2.5)
Deep vein thrombosis	2(0.2)
Mortality	52(18.7)

Table 2 shows the pattern of post–stroke complications in the study population. It shows that the most common complication developed by patients with stroke during their hospital stay was aspiration pneumonia (25.9%). The raised intracranial tension was diagnosed in 13.3 %, whereas 8.3% had developed a pressure sore. The mortality rate was found to be 18.7%.

Table 3: Association of Post-stroke complications and mortality in stroke

Characteristics		Mortality No	Mortality Yes	P-value
Seizure				
	Yes	5	2	0.61
	No	221	50	
Aspiration Pneumonia				
	Yes	48	24	<0.001**
	No	178	28	
Deep Vein Thrombosis				
	Yes	1	1	0.34
	No	225	51	
Raises Intracranial Pressure				
	Yes	21	16	<0.001**
	No	205	36	
Urinary tract infection				
	Yes	10	5	0.167
	No	216	47	
Pressure Sore				
	Yes	18	5	0.78
	No	208	47	

**Statistically significant. All P-values were derived from Chi-square test.

The association of post–stroke medical complications with mortality has been presented in table 3. It demonstrates that there was statistically significant association of aspiration pneumonia and raised intracranial pressure after stroke with mortality among patients with stroke at P<0.001. However, other complications such as seizure, deep vein thrombosis, urinary tract infection, and pressure sore were not significantly associated with the mortality.

DISCUSSION

Of 278 patients with acute ischemic stroke, 72 (23.3 %) had aspiration pneumonia. The occurrence of aspiration pneumonia in our study corroborates with the finding from Scotland where 22% had a chest infection.[7] From the studies done in Virginia, Scotland, Korea, United Kingdom, Netherlands, Norway, Nigeria; aspiration pneumonia was the commonest post–stroke medical complications during hospital stay.[6–9,15–17] In a study conducted at a university hospital in South

Manchester, United Kingdom and medical teaching hospital in north–eastern Nigeria, the major factors determining the aspiration pneumonia were a depressed level of consciousness and swallowing problems.[16,17] The mean Glasgow coma scale score of the study population in this study was 12 that might be attributed to the high occurrence of aspiration pneumonia. However, the role of dysphagia could not be ascertained due to inadequate data. In this study the aspiration pneumonia after stroke was significantly associated with the mortality of the patients with stroke (P<0.001). Similarly finding has been reported in a study by Wilson et al where the adjusted relative risk of mortality of patients with stroke after pneumonia was 2 (95% CI 1.9–2.1).[19] Our study suggests that patients with stroke could benefit from screening of aspiration pneumonia and subsequent treatment at appropriate time.

The raised intracranial tension was documented in 37/278 (13.3%) of the study population. The cerebral edema usually peaks on 2 to 5 days after onset of stroke.[20] The raised intracranial tension been usually reported in the large hemispheric stroke and cerebellar stroke.[21] In a study conducted in community hospital of Germany, raised intracranial pressure was the most attributable factor for mortality due to stroke.[13]

Among 278 of the patients, 23 (8.3%) of them had a pressure sore. The risk factors of pressure sore in patients with stroke could be older age (≥70 years), current smoking history, dry skin, malnutrition, impaired mobility, altered mental status, physical restraints, urinary and faecal incontinence.[22–24] In a longitudinal study conducted in Scotland, the prevalence of pressure sore in admitted patients with stroke was 21%.[7] The lower prevalence of pressure sore in our study could have been due to shorter duration of hospital stay and inadequate follow up (post discharge from hospital).

The occurrence of seizures after stroke in our study population was 2.5%. Our finding was consistent with the finding from the study conducted in Scotland (3%)[7] and Nigeria (3.1%).[17] The risk factors for seizures after stroke are cortical involvement spread to multiple sites, the large size of stroke, haemorrhagic type of stroke, fever, electrolyte disturbance, advancing age and higher National Institute of Health Stroke Scale (NIHSS) score.[23,24]

Urinary tract infection was observed in 5.4% of 278 patients with stroke. These patients are vulnerable to urinary tract infection because of immune–suppression, bladder dysfunction, and urinary bladder catheterization.[27] In a randomized double–blinded multi–centric study from the University of California, a higher prevalence of urinary tract infection (17.2%) was reported in patients with stroke patients.[28] The predictors of urinary tract infection in were female sex, higher NIHSS score, and advanced age.[27] Urinary tract infection is often associated with the poor neurological outcomes, longer duration of hospital stay, and can increase the cost of care after stroke.[28] The lower prevalence of urinary tract infection in our study could be due to the enrolment of patients from the general medical ward, shorter duration of hospital stay, and the predominance of the male gender.

In this study, deep vein thrombosis was documented in 0.2% of the patients. Patients with stroke have a relatively high risk of deep vein thrombosis because of immobility and increased pro–thrombotic activity.[29] In a longitudinal study conducted in Poland, the prevalence of deep vein thrombosis among stroke patients was reported in 10.7%.[30] The discrepancy of our finding with the Polish study could have been due to shorter duration of hospitalization for patients and lack of follow–up data of deep vein thrombosis in BPKIHS. The determinants of deep vein thrombosis after stroke are reported to be the

length of hospital stay, ambulatory status, admission NIHSS score, and heart failure.[31]

The mortality rate of stroke in this study population was 18%. A study from central Nepal reported 29.5% mortality of patients with stroke admitted to intensive care unit of tertiary care level hospital.[12] The lower mortality in this study could be due to the difference in the setting of patient care (General ward vs. intensive care unit). In a multi-hospital analysis of stroke patients in India, mortality was reported to be 8%.[32] This discrepancy in mortality rate can be explained by the availability of stroke unit care facilities in many hospitals of India. In a retrospective study conducted in University hospital in Malaysia, factors such as age at diagnosis, GCS, admission time blood pressure, blood sugar level and co-morbidities were found to be associated with mortality.[33] The high mortality of stroke in our study population might be due to poor GCS score (due to delay in hospital attendance), advanced age, the high prevalence of aspiration pneumonia and presence of co-morbidities such as hypertension (57%) and diabetes mellitus (25%).

This is probably the first study reporting on post-stroke complications in patients admitted to tertiary care hospital from Nepal. The details such as anatomical location and size of stroke could not be reported in our study due to lack of adequate documentation and computed tomography imaging report. The exploration of other factors was limited due to the retrospective nature of this study. We relied on the physician diagnosis of post-stroke complications, consequently the accuracy could not be confirmed.

CONCLUSION

The findings of our study regarding the pattern of post-stroke complications resemble with the developed countries, however, the prevalence of post-stroke complications was much higher in this study and reflects a resource-limited setting despite BPKIHS being a tertiary care centre. Aspiration pneumonia and raised intracranial pressure were the common post-stroke complications among patients with stroke admitted in BPKIHS and mortality was significantly associated with these complications. This study warrants the urgent need of establishing stroke-unit care in Nepal.

COMPETING INTEREST

The authors declare that there are no competing interests regarding the publication of this paper.

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