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Original Research Article

Clinical and Demographic Patterns of Acute Stroke in the Emergency Department of a Tertiary Care Center in Western Nepal

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ABSTRACT:

Introduction: Acute stroke is an important cause of morbidity and mortality, with an increasing trend in emergency department presentations. Blockage of blood flow to the brain, even for a short period, can be disastrous, causing permanent brain damage and even death. In this study, we reviewed the initial examination findings, clinical characteristics, and demographic profile of acute stroke patients presenting to the emergency department of a tertiary care center in western Nepal. **Methods**: All stroke patients presenting to the emergency department within 24 hours of symptom onset during the six-month study period (November 2022 to April 2023) were included. Data regarding age, sex, type of stroke, medical history, and clinical presentation were recorded, analyzed, and presented. **Results**: More than half of the stroke cases were between 40–80 years of age, with the youngest patient being 22 years old. Ischemic stroke was more common (70.36%) than hemorrhagic stroke (29.64%). Gender-wise distribution showed 161 (57.50%) males and 119 (42.50%) females. The most common modifiable risk factor was hypertension (45%), followed by smoking and tobacco chewing (27.14%). The commonest presenting complaint among ischemic stroke patients was hemiparesis/hemiplegia (48.22%), while hemorrhagic stroke patients most commonly presented with impairment or loss of consciousness (48.19%). **Conclusions**: The majority of stroke patients presented with various neurological signs and symptoms related to the extent and site of brain involvement and underlying causes. Early recognition, prompt neuroimaging, and targeted risk factor modification are essential to improve stroke outcomes in resource-limited settings.

Keywords: Acute stroke; Hemorrhagic; Hypertension; Ischemic.

INTRODUCTION

Stroke is a worldwide health problem. It contributes significantly to morbidity, mortality, and disability in low- and middle-income countries, as well as in high-income countries. Infarction is usually the most frequent form of stroke encountered in clinical studies, followed by hemorrhage.[1] However, hemorrhagic strokes have been found to be more common in Japan than elsewhere.[2] Stroke is responsible for approximately 10% of all deaths in industrialized societies.[3] Stroke patients constitute a large proportion of emergency department attendances and contribute substantially to healthcare costs.

Computed tomography (CT) is the modality of choice as the initial investigation in patients with stroke. It helps to differentiate ischemic stroke from hemorrhagic stroke and rules out other pathological processes, such as tumors, which may present as stroke.[4]

The major neurological symptoms observed during or after stroke are sensory and motor disorders, cognitive impairment, tonus disorders, coordination problems, and swallowing difficulties.[5-6] The increased development of thrombolytic therapies and neuroprotective drugs for acute ischemic stroke

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in recent years suggests that the rates of death and disability caused by stroke may decrease in the future.[5-7] Besides treatment, the rapid evaluation of clinical clues and interpretation of results in stroke patients is equally important for emergency stroke management.[7,8]

In Nepal, where the burden of non-communicable diseases is rising, data on the clinical and demographic profile of acute stroke patients in emergency settings remain limited, especially in the hilly region of western Nepal. Understanding the local patterns of presentation, including the distribution of stroke subtypes and patient characteristics, is essential for optimizing emergency triage, resource allocation, and the development of context-specific management protocols in tertiary care centers.

This study aimed to review the clinical and demographic patterns of acute stroke patients presenting to the emergency department of Lumbini Medical College, a tertiary care center in the hilly region of western Nepal.

METHODS

This was an observational, prospective, cross-sectional study conducted over a period of six months, from November 2022 to April 2023, in the Department of Emergency Medicine at Lumbini Medical College and Teaching Hospital, Palpa, Nepal.

The study was approved by the Institutional Review Committee (IRC) of Lumbini Medical College – Teaching Hospital (LMCTH) prior to the commencement of the study (Reference no. IRC-LMC-101/J-022). Written informed consent was obtained from legal guardian of each participant.

All patients presenting during the study period with acute stroke, defined as onset of symptoms within 24 hours, were included in the study. Patients who did not undergo brain imaging for any reason were excluded from the study. Additionally, those diagnosed with Transient Ischemic Attack (TIA) were also excluded.

Socio-demographic parameters, including age and sex, were recorded. Clinical parameters were collected using a structured proforma, which included detailed medical history, clinical presentation, vital signs, laboratory values, and CT scan findings.

Data were entered into PSPP software and double-checked for any errors. Numerical data were presented as mean with standard deviations, while categorical data were expressed as frequencies and percentages.

RESULTS

A total of 280 acute stroke patients presented to our emergency department during the study period. Among them, 161 (57.50%) were male and 119 (42.50%) were female. The age of the patients ranged from 22 years to a maximum of 97 years, with a mean age of 63.56 ± 16.78 years. The mean age of males was 59.06 ± 17.26 years, while that of females was 69.66 ± 13.96 years.

Age-group-wise distribution of gender is presented in **Table 1**. The 61–80 years age-group was the most frequently involved group overall (41.79%) and among females (56.30%). However, among males, stroke was most common in the younger age-group of 41–60 years (44.10%).

Table 1. *Age and sex wise distribution of the study population (N=280).*

	Age group (years)				
	20-40	**41-60**	**61-80**	**>80**	**Total**
Male	19 (11.80%)	71 (44.10%)	50 (31.06%)	21 (13.04%)	161 (100%)
Female	2 (1.68%)	24 (20.17%)	67 (56.30%)	26 (21.85%)	119 (100%)
Overall	21 (7.50%)	95 (33.93%)	117 (41.79%)	47 (16.79%)	280 (100%)

CT scan findings revealed that the majority of strokes were of the ischemic type (n = 197, 70.36%), while hemorrhagic strokes accounted for 83 (29.64%) cases.

The distribution of presenting complaints overall and by stroke type is presented in **Table 2**. Overall, hemiparesis or hemiplegia was the most common presenting complaint (46.07%), followed by impairment or loss of consciousness (35.71%). In the ischemic stroke population, hemiparesis or hemiplegia was the most common complaint (48.22%), whereas in the hemorrhagic population, impairment or loss of consciousness was the most common presenting complaint (48.19%).

The commonest non-modifiable risk factor was male gender, which comprised 57.50% of the participants. Similarly, age was another non-modifiable risk factor; stroke was most common in the 61–80-year age-group overall and among females, whereas it was more common in the younger age-group (41–60 years) among males.

The common modifiable risk factors in our study were hypertension, smoking and tobacco chewing, alcohol consumption, and diabetes

Table 2. *Distribution of presenting complaints in the study population (N=280).*

Stroke type	Presenting complaints					
	Speech disorder	Impairment or loss of consciousness	Hemiparesis/ Hemiplegia	Seizures	Vertigo/ headache	Pure sensory findings
Ischemic	24 (12.19%)	60 (30.46%)	95 (48.23%)	2 (1.02%)	14 (7.11%)	2 (1.02%)
Hemorrhagic	7 (8.44%)	40 (48.20%)	34 (40.97%)	0 (0%)	0 (0%)	2(2.41%)
Overall	31 (11.07%)	100 (35.71%)	129 (46.07%)	2 (0.71%)	14 (5%)	4 (1.43%)

mellitus. The details of modifiable risk factors are presented in **Table 3**. Hypertension was the most prevalent modifiable risk factor overall. It was more common in hemorrhagic stroke patients (51.81%) compared to ischemic stroke patients (42.57%). Smoking and tobacco chewing was the second commonest modifiable risk factor, present in 76 (27.14%) patients overall, and was more prevalent in ischemic stroke (28.94%) than in hemorrhagic stroke (22.89%). Alcohol consumption was observed in 33 (11.79%) patients overall, with a higher proportion in ischemic stroke (13.20%) compared to hemorrhagic stroke (8.43%). Diabetes mellitus was present in 12 (4.29%) patients overall, with seven (3.55%) in the ischemic group and five (6.02%) in the hemorrhagic group.

Table 3. *Common modifiable risk factors in the study population (N=280).*

Risk Factors	Ischemic	Hemorrhage	Overall
HTN	83 (42.57%)	43 (51.81%)	126 (45%)
Smoking/Tobacco Chewing	57 (28.94%)	19 (22.90%)	76 (27.14%)
Alcoholism	26 (13.20%)	7 (8.44%)	33 (11.79%)
HTN+DM	10 (5.08%)	5 (6.03%)	15 (5.36%)
DM	7 (3.55%)	5 (6.03%)	12 (4.29%)
HTN+DM+ Alcoholism+Smoking	7 (3.55%)	2 (2.41%)	9 (3.21%)
HTN+DM+ Alcoholism	5 (2.54)	2 (2.41%)	7 (2.5%)
Atrial fibrillation	2 (1.02%)	0	2 (0.71%)
Total	**197 (100%)**	**83 (100%)**	**280 (100%)**

DISCUSSION

Stroke is a frequent cause of death and disability, and is a major problem in most parts of the world.[1,2] Stroke results in serious deficits and brings about social and economic problems.[3,5] It is known that age is the most important risk factor for stroke. After age 55 years, stroke incidence doubles every 10 years.[9] In addition, strokes are observed more frequently in males compared to females.[7,8] In this study, stroke in male patients was slightly higher (**Table 1**).

The mean age of patients experiencing their first stroke was 63.56 years. In our study, 164 (58.57%) patients were above 60 years of age, and there was a steep rise in incidence with age, with three-quarters of all first strokes occurring after the age of 60 years. A hospital-based study reported the mean age for first stroke as 57 years, which is comparable and reflects Asian demographics.[9]

Hypertension is one of the strongest risk factors for both ischemic and hemorrhagic strokes, and effective measures should be applied for the prevention of modifiable risk factors.[10,11] Observational studies have shown that blood pressure levels are directly and continuously associated with the occurrence of ischemic stroke and cerebral hemorrhage.[12] Therefore, blood pressure is recognized as an important determinant of the risk of initial stroke in non-hypertensive individuals as well as in those with hypertension. A meta-analysis of 61 prospective studies showed that the relationship of stroke mortality with hypertension is strong and direct. A drop of 20 mmHg in systolic blood pressure or 10 mmHg in diastolic blood pressure was associated with a two-fold decrease in the risk of stroke death.[11]

Ischemic strokes are by far the most common type, accounting for approximately 87% of all strokes. An embolic stroke is caused by a dislodged blood clot that has traveled through the blood vessels (an embolus) until it becomes wedged in an artery.[13]

Cardioembolic strokes originate from clots in the heart, and in many cases, the blood clots form as a result of a heart rhythm disorder known as atrial fibrillation.[14]

Heart disease and stroke are leading causes of death in people with diabetes. Diabetes is a particularly strong risk factor for ischemic stroke, perhaps because of accompanying risk factors such as obesity and hypertension. Diabetes does not appear to increase the risk for hemorrhagic stroke.[15] Approximately 10% of strokes occur from hemorrhage into or around the brain. While hemorrhagic strokes are less common than ischemic strokes, they tend to be more deadly. Patients with intracerebral bleeds are more likely to have headache, seizures, and altered sensorium. An altered level of consciousness or coma is more common in hemorrhagic stroke than in ischemic stroke, mostly due to an increase in intracranial pressure.[6-8] In our study too, patients with hemorrhagic stroke had no seizures, while one case of seizure was found in ischemic stroke.

People who smoke a pack a day have more than twice the risk for stroke as non-smokers. Smoking increases both hemorrhagic and ischemic stroke risk.[16] The risk for stroke may remain elevated for as long as 14 years after quitting, so the earlier one quits, the better.[14] Compared to non-smokers, cigarette smokers have a 2–3-fold risk of either type of stroke.[17] In our study, 76 (27.14%) of the stroke patients had a history of smoking. It was our second most common modifiable risk factor, and smoking was most prevalent in patients with ischemic stroke. Both smoking duration and amount were higher in ischemic stroke patients. Colditz and colleagues found a strong causal relationship between cigarette smoking and stroke in young and middle-aged women.[18] They also found that with an increase in the number of cigarettes smoked per day (from 1–14 cigarettes per day to 25 or more cigarettes per day), there was an increase in the relative risk of stroke. Stopping smoking has significant benefit.

Alcohol abuse is a more or less universal problem that has become a matter of serious concern in many countries. Alcohol consumption is a modifiable behavior, and low doses of alcohol have some health benefits against stroke.[19] Most studies show a positive correlation between drinking and the risk of hemorrhagic stroke.[20,21] In our study, alcohol use was observed in 33 (11.79%) patients. However, we could not quantify the amount of alcohol consumption, so our study has some limitation over this issue. The regular intake of more than three standard drinks per day enhances the risk of vascular disease and cancer. Heavy drinking is a risk factor for both hemorrhagic and ischemic stroke.[19-21]

Atrial fibrillation is a known risk factor for thromboembolic phenomena.[14] In our stroke patients, we found atrial fibrillation in two (0.71%) cases. In a study, atrial fibrillation was found in 4.5% of patients as a risk factor.[17] Non-valvular atrial fibrillation increases the risk of ischemic stroke by a factor of five through an atrioembolic mechanism.[22] Cardioembolic strokes are more severe than other types of ischemic stroke. Numerous population-based studies have shown that mortality risk is higher in strokes associated with atrial fibrillation.[14,17,22]

Diabetes mellitus was also a common risk factor in our study, present in 12 (4.29%) patients. It was more common in ischemic stroke patients. In a study, diabetes mellitus was present in 42% of their population. High blood sugar is a known risk factor for stroke and also a poor prognostic factor for recovery, as evidenced by poor functional recovery.[15]There are some limitations in this study. Some parameters, such as lipid profile, were not available, which could be due to the non-fasting status of patients, potentially yielding inaccurate reports.

CONCLUSIONS

This study demonstrates that ischemic stroke predominates among acute stroke patients presenting to a tertiary care center in Nepal, with hypertension and smoking being the most common modifiable risk factors. The findings emphasize the need for early diagnosis, prompt neuroimaging, and robust risk factor modification strategies. Future prospective studies with comprehensive biochemical and radiological data are warranted to better understand the stroke burden in Nepal and guide effective public health policies.

Conflict of Interest:
The authors declare that no competing interests exist

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