RISK FACTORS ASSOCIATED WITH CEREBROVASCULAR ACCIDENTS: A CROSS-SECTIONAL STUDY FROM WESTERN NEPAL

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ABSTRACT

Cerebrovascular accident (CVA) is a leading cause of mortality and disability worldwide, with a particularly high burden in South Asia due to increasing prevalence of traditional cardiovascular risk factors. This study aimed to assess the association of risk factors and clinical profiles of ischemic and hemorrhagic CVA in a tertiary care center in Western Nepal. A cross-sectional observational study was conducted in the emergency department of Nepalgunj Medical College Teaching Hospital from August 2021 to July 2022. A total of 478 CVA patients were included through convenience sampling. Data on risk factors, clinical presentation, and outcomes were collected and analyzed using appropriate statistical methods. Among 478 patients, 238 (49.8%) had ischemic CVA and 240 (50.2%) had hemorrhagic CVA. Hypertension (68.0% vs. 76.0%; p=0.047) and alcohol consumption (33.0% vs. 58.0%; p<0.001) were significantly associated with hemorrhagic CVA, while smoking (73.0% vs. 51.0%; p<0.001) and dyslipidemia (51.0% vs. 40.0%; p=0.017) were more common in ischemic CVA. Common clinical features included arm weakness (70.3%), slurred speech (23.6%), and facial drooping (23.0%). Hemorrhagic CVA was significantly associated with loss of consciousness (p<0.001), higher median systolic blood pressure (160 vs. 140 mmHg; p<0.001), and lower mean GCS (10 vs. 13; p<0.001). Mortality was higher in hemorrhagic CVA (N=59; p<0.001), while 97.0% of ischemic stroke patients were discharged. Significant associations between specific risk factors and stroke subtypes were observed. Early identification and management of modifiable risk factors are crucial to reducing the burden and severity of CVA in Nepal.

KEYWORDS

Cerebrovascular accident, dyslipidemias, hypertension, intracranial hemorrhage, smoking

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INTRODUCTION

Stroke or cerebrovascular accident (CVA) is an acute focal injury of the central nervous system leading to neurological deficits, which is attributable to vascular etiologies, either ischemia or hemorrhage.[1] A majority of stroke-related deaths and disabilities (87.0%) affect people residing in lower- and lower-middle-income countries (LMICs).[2] The published data show that the stroke deaths in Nepal reached 12,909 or 8.04% of total deaths.[3]

Early detection and management of modifiable stroke risk factors remain limited due to inadequate primary care infrastructure, poor public awareness, and under-resourced prevention programs.[4] As a result, the rising prevalence of hypertension, dyslipidemia, obesity, physical inactivity, diabetes mellitus, smoking, and alcohol consumption has led to an increasing incidence of stroke.[5]

This hospital-based cross-sectional observational study was conducted to evaluate the burden of CVA, and assess the clinic-demographic profiles and associated risk factors in patients presenting to emergency ward of Nepalgunj Medical College Teaching Hospital, a tertiary healthcare center in Western Region of Nepal.

MATERIALS AND METHODS

A hospital-based cross-sectional observational study was conducted for twelve months from August 2021 to July 2022. The ethical approval from the Institutional Review Committee of Nepalgunj Medical College Teaching Hospital (NGMCTH) (Ref. No.: 74/078-079) was obtained.

The CVA patients were clinically identified using the Balance-Eyes-Face-Arms-Speech-Time (BEFAST) scale.[6] The presence of more than one BEFAST symptoms after the stroke onset was defined as stroke. Non-contrast computed tomography scan of head was performed at the time of presentation to differentiate between ischemic and hemorrhagic CVA, and establish appropriate management. A convenient method of sampling was used to include 478 stroke patients of age fifteen years and above, presenting to the emergency department of NGMCTH. Those who did not consent to participate in the study were excluded. Data were collected using the semi-structured proforma and were entered in SPSS-17. Descriptive statistics were presented in the form of frequency, percentage, median and standard deviation. Level of significance was set at p value <0.05.

RESULTS

A total of 478 patients of CVA were included in this study. The number of patients with ischemic and hemorrhagic CVA were 238 and 240 respectively. The epidemiological profiles of patients along with the risk factors is presented in Table 1. There were significant associations between hypertension and alcohol with hemorrhagic CVA, and smoking and dyslipidemia with ischemic CVA.

Majority of the CVA patients presented with arm weakness (n=336), followed by slurring of speech (n=113) and facial drooping (n=110), as shown in Fig. 1. There was significant association between loss of consciousness

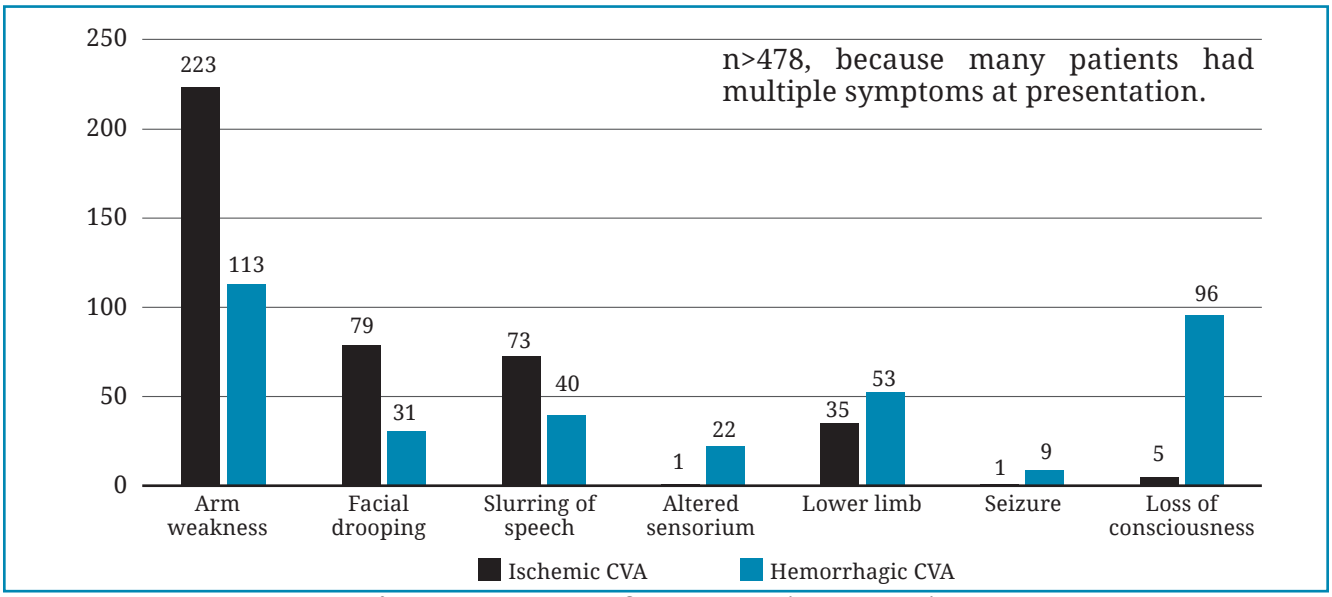

Fig. 1: Frequency of symptoms in CVA patients

Table 1: Clinicoepidemiological profile of CVA patients			
Characteristics	**Ischemic CVA (n=238)**	**Hemorrhagic CVA (n=240)**	**Remarks**
Age in years ± SD			
Mean ± SD	66±12.2	63±13.5	
Median	67	65	
Sex	**n (%)**	**n (%)**	
Males	129 (54)	151 (63)	P=0.053
Females	109 (46)	89 (37)	
Literacy	**n (%)**	**n (%)**	
Formal education	116 (49)	109 (45)	
No formal education	122 (51)	131 (55)	
Geographical region	**n (%)**	**n (%)**	
Terai	165 (69)	176 (73)	
Hilly	73 (31)	64 (27)	
Religion	**n (%)**	**n (%)**	
Hindu	165 (69)	155 (65)	
Islam	51 (21)	59 (25)	
Christian	11 (5)	13 (5)	
Buddhist	11 (5)	13 (5)	
Basal metabolic index	**n (%)**	**n (%)**	
Mean ± SD	24.1±2.4	24.6±2.0	P=0.7
Median	24.8	24.9	
Physical activity	**n (%)**	**n (%)**	
Active*	123 (52)	144 (60)	P=0.067
Sedentary lifestyle	115 (48)	96 (40)	
Hypertension	161 (68)	182 (76)	P=0.047
Dyslipidemia	121 (51)	96 (40)	P=0.017
Diabetes Mellitus	97 (41)	94 (39)	P=0.7
Smoking ‖	173 (73)	122 (51)	P<0.001
Alcohol Consumption ┼	78 (33)	140 (58)	P<0.001

CVA= Cerebrovascular accident, SD= Standard deviation, *Patients with at least 30 minutes of aerobic activity three to five days a week were considered physically active. The current or past smoking history was considered during the data collection compared to never-smokers. ┼Alcohol consumption above the recommended level: >2 drinks for men and >1 for women per day[5,28]

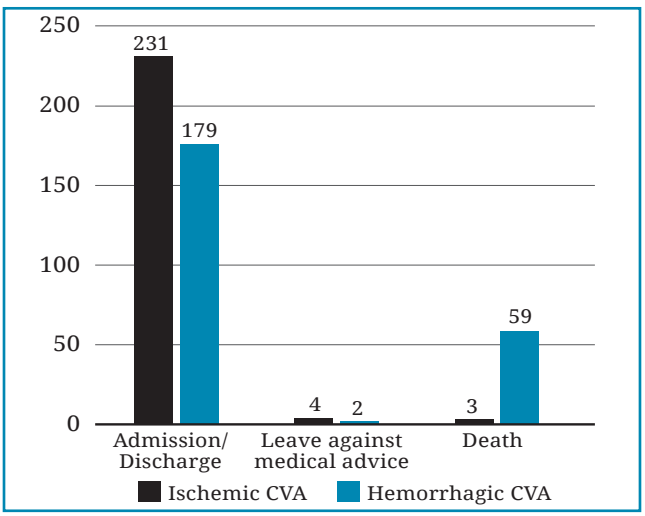

Fig. 2: Outcome of patients

and hemorrhagic CVA (p<0.001). The median values for systolic blood pressure in patients with ischemic and hemorrhagic CVA were 140 and 160 mmHg respectively. This 20 mmHg difference in blood pressure was clinically significant (p<0.001). The mean Glasgow Coma Scale (GCS) was 13 and 10 for ischemic and hemorrhagic CVA patients; such difference was statistically significant (p<0.001).

The outcome of the patients is exhibited in Fig. 2. About 97% of ischemic stroke patients were discharged after institution of appropriate therapy (n=231). The hemorrhagic CVA was significantly associated with deaths (n=59; p<0.001).

DISCUSSION

Stroke is defined as an abrupt neurological outburst caused by impaired perfusion through the blood vessels to the brain, either blood clots or vessel rupture.[7] The global lifetime risk of stroke from the age of 25 years onward is expected to be approximately 25.0% among both men and women. The mean global lifetime risk of stroke increased from 22.8% in 1990 to 24.9% in 2016, a relative increase of 8.9%.[8] Asian patients constitute more than two-thirds of the overall incidence of stroke worldwide, with a higher mortality rate than Caucasians.[9]

In Nepal, stroke has become one of the major concerns as approximately 15,000 deaths and 330,000 disability-adjusted life-years has been reported to be associated with it.[10] According to the latest World Health Organization (WHO) data published in 2021, approximately 47 deaths per 100,000 population in Nepal are associated with stroke.[11]

Age is one of the recognized non-modifiable risk factors for CVA.[12,13] The age of CVA patients in this study was consistent with similar studies. This study did not show a significant sex difference in stroke prevalence, unlike the observations of some other notable studies.[14,15] The established modifiable risk factors for CVA are hypertension, smoking, diabetes mellitus, dyslipidemia, alcohol consumption, obesity and sedentary lifestyle.[16,17] Similar reports have come from studies conducted in Nepal.[18,19] Unlike those studies, this study did not show the association of diabetes, basal metabolic index and physical activity with CVA. The association of hemorrhagic CVA with systemic hypertension, alcohol consumption, lower GCS score, loss of consciousness and deaths in this study was concordant with contemporary studies.[20-23]

The increasing prevalence of stroke patients has overwhelmed the existing facilities, and the country lacks dedicated stroke teams.[18,24] Rauniyar *et al.*[25] reported that poor access to healthcare centers in rural areas, few neurologists in Nepal and poor patient compliance towards treatment had made the stroke management strenuous. One of the approaches is screening programs at primary level health facilities for early diagnosis and treatment of intermediate risk factors such as high blood pressure, raised blood glucose levels, and dyslipidemia could prevent the progression to cardiovascular diseases (CVD) and, thus, prevent the associated complications and deaths.[26] The HEARTS strategy, launched by the World Health Organization and Centers for Disease Control, includes six modules: healthy lifestyle counselling, evidence-based treatment protocols, access to essential medicines and technology, risk-based CVD management, team-based care, and a system for monitoring to strengthen CVD management in primary health care settings.[27]

There are many limitations to our study. This study was conducted in the western part of Nepal and thus may not represent the general population of the country. The sample size was not sufficient to show association of diabetes mellitus and obesity with CVA. The study lacks external validity due to homogeneity of study population. Despite these limitations, the study provides valuable insights into the prevalence of CVA and its risk factors.

In conclusion, there is a high burden of CVA in western part of Nepal, owing to the rise in CVD risk factors. Hence, it has become a major public health issue. As the next decade is likely to witness a considerable rise in CVA-related morbidity and mortality, there is an immense need to address the risk factors in order to prevent future CVA events.

Conflict of Interest: None

Source of reseach fund: None

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