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Clinical Profile of Young-Onset Ischemic Stroke: An Observational Study from a Tertiary-Level Hospital in Kathmandu, Nepal

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ABSTRACT

Background: Stroke is the second leading cause of mortality and the third leading cause of disability worldwide. The incidence of stroke among young adults is on the rise. However, data on young stroke patients in the Nepalese population remain limited. This hospital-based study aimed to evaluate the clinical profile and risk factors in young adults presenting with ischaemic stroke.

Methods: We retrospectively analysed all available records of patients with ischaemic stroke admitted to the National Academy of Medical Sciences, Bir Hospital, between 1 July 2022 and 30 June 2023. A diagnosis of ischaemic stroke was established when neurological deficits were accompanied by corresponding abnormalities on brain computed tomography (CT) and/or magnetic resonance imaging (MRI). Clinical characteristics and associated risk factors were assessed.

Results: Of the 297 patients with ischaemic stroke, 158 (53.2%) were male and 139 (46.8%) were female. The mean age was 64.23 years (SD 15.90), ranging from 25 to 99 years. Fifty-one patients (17.2%) were aged ≤45 years. The most common risk factor was smoking (76.4%), followed by hypertension (72.1%), dyslipidaemia (14.1%), diabetes mellitus (11.1%), atrial fibrillation (8.4%), rheumatic heart disease (5.1%), and dilated cardiomyopathy (1.3%).

Conclusion: Conventional risk factors-such as hypertension, dyslipidaemia, smoking, and diabetes mellitus-were prevalent in both young and older stroke patients. Rheumatic heart disease and dyslipidaemia were more common in younger patients, whereas atrial fibrillation and significant carotid stenosis predominated among older patients. Greater emphasis on the prevention and management of modifiable risk factors is essential to reduce the burden of stroke.

Keywords: ischaemic stroke; cerebrovascular disease; young stroke.

INTRODUCTION

Stroke is the second most common cause of mortality and the third most common cause of disability worldwide. Though the incidence of stroke is decreasing in high-income countries, the incidence is increasing in low-income countries. Two-thirds of all stroke deaths occur in low- and middle-income countries. It is an important global health issue and the risk factor profile may vary with ethnicity, geographic region, age, gender and stroke subtype. Stroke incidence rises steeply with age; therefore, stroke in younger people is less common; however, stroke in a young person can be devastating in terms of loss of productive years and impact on a young person's life. More than two-thirds of the global burden of stroke is borne by developing countries, where the average age of patients with stroke is 15 years younger than that in developed countries. Some causes of stroke are more frequent in adults under 45 years of age compared to more aged populations. Incidence of young stroke is more common in South Asian countries than developed western countries. Uncontrolled stroke risk factors, inadequate treatment facilities and high population are responsible for high incidence of stroke in South Asia. Till now there are no remarkable curative treatment of stroke and stroke

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related physical disabilities. Current treatments for patients with established stroke are relatively ineffective and risk factor interventions are the real hope of reducing stroke morbidity and mortality in populations.

Risk factors of stroke in Nepalese population may differ from that of other countries. Such data are lacking in Nepalese population. But the gravity of the situation can easily be assessed by the high incidence of hospital admission.There is no definite cure in management of stroke but prevention is possible by early detection and reducing the modifiable risk factors for stroke. To reduce the stroke burden preventive strategies are important. So, this hospital-based study was aimed to analyze clinical profile and the risk factors for stroke in young in Nepalese patients so that appropriate measures can be focused to address the problem.

METHODS

This hospital based retrospective study was carried out in the Neurology Unit, Department of Medicine, Bir hospital. Total 297 patients who were admitted in Neurology Unit, National Academy of Medical Sciences, Bir Hospital with acute ischemic stroke were included from 1st July 2022 to 30th June 2023. Ischemic stroke was diagnosed when neurological deficits were accompanied by corresponding abnormal findings depicted on brain computed tomography (CT) and/or magnetic resonance imaging (MRI). Hemorrhagic stroke was excluded from the study. The risk factors of stroke were defined in terms of hypertension, diabetes mellitus (DM), dyslipidaemia, ischemic heart diseases, valvular heart disease, atrial fibrillation (AF), history of transient ischemic attack (TIA), smoking and other risk factors. Detailed history and clinical examinations finding were obtained from medical records. The investigation workups included complete blood count, ESR, Fasting Blood Sugar, post prandial blood sugar, Serum urea and Creatinine, Fasting Lipid profile, Serum Electrolytes, Urine routine examination, ECG, chest x-ray, Echocardiography, CT scan of Brain in all cases. In Some selected cases MRI of brain, Duplex study of neck vessels, ANA and other relevant investigations were done. The data included; age, sex, hypertension, diabetes mellitus, heart disease, previous stroke, smoking, alcohol consumption, obesity, serum cholesterol, low density lipoprotein (LDL), high density lipoprotein (HDL) and triglyceride (TG) level. Patients were considered to be hypertensive if patients fulfilled JNC-7 criteria, or if the patients were taking antihypertensive medication. Diabetes mellitus was defined according to American Diabetes Association (ADA) criteria or if patient was under medication. Cholesterol, LDL, HDL and TG were done during hospitalization after fasting for at least 8 hours. Dyslipidemia was defined according to National Cholesterol Education Program (NCEP III). heart diseases included atrial fibrillation, rheumatic heart disease (RHD), nonrheumatic valvular heart disease, patent foramen ovale, congestive heart failure, infective endocarditis, sick sinus syndrome and ischemic heart disease. Previous stroke history was defined by previous diagnosis by a physician. While a specific definition of “young stroke” is lacking, the vast majority of authors consider “young stroke” to pertain to individuals under 45 years of age. In contrast to South Asian countries, young stroke was comparatively less in frequency in most of the developed countries.[7] In this study, young stroke was defined as stroke in a patient of 45 years old or less.

RESULTS

A total of 297 patients with ischaemic stroke were included in the analysis. Among these, 51 patients (17.2%) were aged ≤45 years (young group) and 246 patients (82.8%) were aged >45 years (older group). The overall mean age was 63.89 years (SD=15.76), ranging from 25 to 99 years. The young group had a mean age of 38.05 years (SD=5.59), while the older group had a mean age of 69.32 years (SD=11.12). Age distribution details are presented in Table 1.

The overall male-to-female ratio was 1.14:1. Males constituted 53.2% of the total cohort, with

Table 1. Age distribution of study population.			
Parameter	**Total (n=297)**	**Young ≤45 years (n=51)**	**Older >45 years (n=246)**
Minimum Age (years)	25	25	46
Maximum Age (years)	99	45	99
Mean Age (years)	63.89	38.05	69.32
Median Age (years)	65	40	68
Standard Deviation	15.759	5.594	11.12

proportions being similar in both young (52.9%) and older (53.3%) groups (Table 2).

The most common risk factor in the overall cohort was cigarette smoking (76.4%), followed by hypertension (72.1%), dyslipidaemia (14.1%), diabetes mellitus (11.1%), atrial fibrillation (8.4%), rheumatic heart disease (5.1%), and dilated cardiomyopathy (1.3%). Rheumatic heart disease was significantly more prevalent in the young group (23.5% vs. 1.2%), whereas atrial fibrillation and significant carotid stenosis were more common in the older group.

Table 2. Gender distribution according to age group.			
Gender	**Young ≤45 years n(%)**	**Older >45 years n(%)**	**Total n(%)**
Male	27 (52.9)	131 (53.3)	158 (53.2)
Female	24 (47.1)	115 (46.7)	139 (46.8)

At hospital discharge: Improved–242 patients (81.3%), Died–28 patients (9.4%), Unchanged–14 patients (4.7%), and left against medical advice (LAMA)–13 patients (4.4%). The distribution of outcomes is illustrated in Figure 1.

DISCUSSION

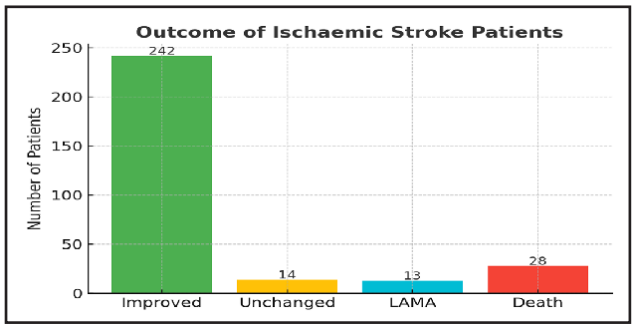

Figure 1. Outcome of ischaemic stroke patients.

Stroke in young adults differs from that in older patients in terms of aetiology, risk factors, and long-term impact[1]. These patients face extended survival with neurological deficits, affecting employment, education, and family life.[2] In this study, 51(17.4%) of 297 ischaemic stroke patients were aged ≤45 years, higher than the <5% reported in Western countries[3] but within the 19–30% range observed in developing nations[4]. Males predominated (53.2%), similar to Basharat et al.[5] and Heuschmann et al.[6], though sex-specific risks vary with age.[7] The overall mean age (63.89±15.76 years) was lower than in Western cohorts (76–80 years)[11] but consistent with other South Asian studies.[8–10]

Hypertension (72.1%) was the most prevalent risk

Table 3. Distribution of risk factors by age group.			
Risk Factor	**Young ≤45 years, n(%)**	**Older >45 years, n(%)**	**Total (%)**
Hypertension	23 (45.1)	191 (77.6)	72.1
Diabetes Mellitus	3 (5.9)	30 (12.2)	11.1
Dyslipidaemia	11 (21.6)	31 (12.6)	14.1
Rheumatic Heart Disease (RHD)	12 (23.5)	3 (1.2)	5.1
Atrial Fibrillation (AF)	2 (3.9)	23 (9.3)	8.4
Significant Carotid Stenosis	0 (0.0)	9 (3.7)	3
Cigarette Smoking	33 (64.7)	194 (78.9)	76.4
Alcohol Use	16 (31.4)	61 (24.8)	25.9
Dilated Cardiomyopathy (DCM)	1 (2.0)	3 (1.2)	1.3

factor, significantly more frequent in older patients (77.6% vs. 45.1%, p-value<0.001). Smoking (76.4%) was also common, especially in older adults (78.9% vs. 64.7%). Dyslipidaemia (14.1%) was more frequent in the young group (21.6% vs. 12.6%), while diabetes (11.1%) and atrial fibrillation (8.4%) were more common in older patients. Similar prevalence patterns have been reported in Western young stroke studies[12–16] and previous Nepalese data[22]. Rheumatic heart disease (RHD) was markedly higher in young patients (23.5% vs. 1.2%), aligning with Asian prevalence estimates of 3.4–23.2%[17] and findings by Wang et al. in China[18]. In-hospital mortality was 9.4%, lower than the 20% reported by Hasan et al.[19] but higher than developed country rates (5–6.9%).[20] Global 30-day case fatality after first ischaemic stroke is estimated at 16–23%[21]; delays in hospital presentation may contribute to higher mortality in our setting.

In summary, conventional risk factors-hypertension, smoking, dyslipidaemia, and diabetes-are common in both young and older patients. Atrial fibrillation predominates in older adults, whereas RHD and dyslipidaemia are more frequent in younger patients, underscoring the need for targeted prevention strategies.

CONCLUSIONS

This study identified smoking, hypertension, dyslipidaemia, diabetes mellitus, atrial fibrillation, and rheumatic heart disease as the most common risk factors for ischaemic stroke. Conventional risk factors-hypertension, dyslipidaemia, smoking, and diabetes mellitus-were prevalent in both younger and older patients. However, rheumatic heart disease and dyslipidaemia were more frequent in younger patients, whereas atrial fibrillation and significant carotid stenosis were more common in older individuals. Given that many of these risks are modifiable, targeted preventive measures-particularly primary prevention-are crucial, especially for younger populations. Large, multicentre, and community-based studies are warranted to better define risk factors in young stroke patients and guide timely interventions to reduce the burden of ischaemic stroke.

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