

ORIGINAL RESEARCH

The epidemiology of stroke in Northern Sri Lanka: A population-based descriptive cross-sectional study

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Abstract

Introduction: Stroke is a significant health concern in Sri Lanka, leading to high rates of mortality and morbidity. Healthcare must prioritize prevention and early detection to address this issue. While research on stroke treatment in Sri Lanka is limited, local studies highlight changing trends and risk factors. This study aimed to assess the prevalence of stroke and its risk factors in the Northern Province of Sri Lanka.

Methodology: This population-based cross-sectional study conducted by the NIHR Global Health Research Group on Atrial Fibrillation focused on individuals aged 50 and above in the Northern Province. Using a multi-stage sampling approach, the study recruited a sample size of 10,000 Tamil-speaking participants representing all five northern districts. Data were collected with an interviewer-administered questionnaire. Descriptive statistics was used to determine the prevalence and risk factors.

Results: Out of 10,000 individuals, 231 had a stroke, resulting in a 2.3% prevalence rate. Among the 231 patients with stroke, mean age was 68.6 (SD 8.6) years, with 54.1% and 45.9% being males and females, respectively. Educational status varied, with most having primary education or less (40.2%). Retirees comprised 47.6% of the group. Common risk factors included hypertension (71.0%), diabetes mellitus (34.6%) and palpitations (30.7%).

Conclusion: Our study revealed a higher stroke prevalence rate (2.3%) in the Northern Province compared to the national rate (1.0%). Patients with stroke had a high prevalence of risk factors such as hypertension, diabetes and heart diseases. These insights highlight the need for tailored primary prevention and management strategies, considering socio-economic factors and specific regional risks, particularly screening programs and rehabilitation services.

KEYWORDS

Stroke, Sri Lanka, elders, risk factors, Northern Province

INTRODUCTION

Stroke is a major health issue in Sri Lanka, with a significant effect on death and illness rates. It is the fifth highest cause of death in Sri Lanka according to Ministry of Health statistics.¹ The impact of stroke goes beyond just deaths – it also results in decreased work capacity and notably raises the expenses related to hospitalization. Additionally, the

economic impact of stroke places considerable strain on families and society overall. It is therefore crucial for the healthcare system to prioritize preventive actions and early detection to manage this problem effectively.

While local studies on the epidemiology of stroke are scarce, recent research highlights the increasing prevalence of stroke among young adults in Sri Lanka, shedding light on



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the changing demographics of stroke occurrence in the country.² Another study that explored the association between dietary habits and stroke risk in the Asian region, including in Sri Lanka, revealed changes in the contribution of unhealthy diet to the disease burden of stroke by time and place.³ The 2021 Risk Factor Survey conducted by the Ministry of Health revealed that the prevalence of several risk factors for stroke, including obesity, physical inactivity, alcohol consumption, hypertension, had increased between 2015 and 2021.⁴ Moreover, research on the genetic susceptibility to stroke has contributed significantly to understanding the hereditary factors influencing stroke in the Sri Lankan population.⁵

The Northern Province of Sri Lanka is located just 22 miles (35km) southeast of India and has approximately 1.3 million permanent residents. It is made up of five districts: Jaffna, Kilinochchi, Mannar, Mullaitivu and Vavuniya. Each district is divided into administrative units called Divisional Secretariats (DS). Each DS is further divided into many Grama Niladhari (GN) divisions. Publicly available healthcare, including medical appointments, medications and medical procedures, are free to all Sri Lankan citizens, including in the Northern Province.

Little is known about the epidemiology of stroke in northern Sri Lanka. Considering the global burden of stroke, the rising prevalence of risk factors and the healthcare system challenges faced by the country, it is imperative to conduct research on the epidemiology of stroke. Therefore, this study aimed to assess the prevalence of stroke and its risk factors in the Northern Province of Sri Lanka.

METHODS

Data were obtained from the 'Prevalence of atrial fibrillation (AF) in Northern Sri Lanka' study carried out by the NIHR Global Health Research Group on Atrial Fibrillation.⁶ This cross-sectional study commenced in June 2020 and was completed in March 2022. Ethics approval was attained from the Ethics Review Committee of the Faculty of Medicine, University of Jaffna.

The study was conducted across all five districts in the Northern Province. In line with similar studies conducted in lower-middle-income countries and considering the growing body of literature on disease prevalence in South Asia, we set the screening inclusion age at 50 years and above, which is below the current recommended practice of 65 years. Therefore, individuals aged 50 years or older who are proficient in Tamil were eligible for screening. As per established methods published elsewhere, individuals with terminal illnesses, those requiring immediate hospitalization, or currently admitted as hospital inpatients, were not

included. The team of data collectors comprised a qualified medical doctor and two nursing graduates.

This research employed a sampling methodology that involves multiple stages. The process commenced at the district level, then proceeded to the DS level, and finally reached the GN level. Subsequently, GN divisions were grouped into clusters based on population size, from which one cluster was chosen randomly. Each cluster encompassed 20 households with one participant per household. Initially, an index house within each cluster was selected randomly followed by picking 20 households located on its right side. In cases where there were multiple eligible individuals in a household, the individual whose birthday is closest to the date of visitation was chosen. Census data from 2012 were utilized for selecting both the clusters and index houses within each cluster.

Based on previous evidence, the prevalence of AF in Sri Lanka was estimated to be 1%. A design effect of 2 was applied to account for cluster sampling, with an alpha level set at 5% and a beta level at 20%. To accommodate non-participation, the sample size was increased by 10%, resulting in a minimum requirement of 10,000 participants. Previously conducted research has indicated that the prevalence of stroke is also approximately 1%.⁷ Therefore, this sample size was deemed suitable for determining the occurrence rate of stroke in the Northern Province. Descriptive analysis was performed to identify the prevalence of the stroke and AF.

RESULTS

Out of a total sample size of 10,000 individuals, 231 had experienced a stroke, resulting in a prevalence rate of 2.3%. Prevalence of stroke varied by district (Table 1). The highest prevalence was in the Mannar district (3.1%) and lowest in Kilinochchi district (1.8%) but this variation was not significant ($X^2=3.2$, $df=4$, $p=0.5$).

TABLE 1 Prevalence of stroke across the Northern Province (n=231)

District	n (%)
Mannar	26 (3.1%)
Jaffna	144 (2.3%)
Vavuniya	31 (2.2%)
Mullaitivu	14 (2.1%)
Kilinochchi	16 (1.8%)

The average age was 68.6 (SD $\pm$ 8.6) years. In terms of gender distribution, there were 125 males (54.1%) and 106 females (45.9%). Among participants, 135 (58.4%) were living with their partner. Evaluation of educational status revealed that 87 (37.7%) had only primary education with 6 (2.6%) having no formal education at all. In the sample, 110 (47.62%) were retired, 91 (39.39%) were homemakers, while 23 (9.95%) were employed full time (Table 2).

TABLE 2 Socio-demographic characteristics of stroke patients (n=231)

	n (%)
Gender	
Male	125 (54.1)
Female	106 (45.9)
Marital status	
Living with partner	135 (58.4)
Not living with partner	96 (41.6)
Educational level	
University degree and above	5 (2.3)
Diploma	3 (1.3)
GCEA/L	10 (4.3)
GCEO/L	43 (18.6)
Middle school	77 (33.3)
Primary and less	93 (40.2)
Occupation	
Employed	23 (9.9)
Retired	110 (47.6)
Homemakers	92 (39.3)
Other	7 (3.2)

Of the risk factors, 164 (71.0%) had hypertension, 80 (34.6%) had diabetes mellitus, 71 (30.7%) had palpitations, 30 (13.0%) had chronic kidney disease, and 43 (18.6%) had ischaemic heart disease (Table 3).

TABLE 3 Risk factors of stroke (n=231)

Variables	n (%)
Symptoms	
Palpitations	71 (30.7)
Comorbidities	
Hypertension	164 (71.0)
Diabetes	80 (34.6)
Ischemic heart disease	43 (18.6)
Chronic kidney disease	30 (13.0)
Valvular heart disease	9 (3.9)
Heart failure	1 (0.4)

DISCUSSION

The results of our study in the Northern Province of Sri Lanka have provided significant insights into the prevalence and risk factors associated with stroke in this specific region. The prevalence of stroke was found to be notably higher at 2.3% compared to the 1% occurrence rate observed in other national research studies.⁸ A study done in India also showed a prevalence of 1.5%.⁸ This disparity could be attributed to regional variations in stroke occurrence, or it may be a result of the difference in methodology and the substantial sample size employed in our study. Further studies are needed to understand the unique characteristics and challenges associated with stroke in the Northern Province to guide the development of more precise and impactful prevention strategies.

One significant aspect is to consider is the distribution of risk factors in the subsample of patients with stroke. A substantial portion of the participants had hypertension, with 71% of the sample affected. Additionally, the prevalence of diabetes mellitus, at 34.6%, and the presence of ischemic heart disease, at 18.6%, further emphasize the need for strengthening screening programmes to identify these risk factors early. It is worrying that recent risk factor surveys reveal a rising prevalence of obesity, physical inactivity, hypertension, and other risk factors of stroke.⁴

Furthermore, the average age of participants who experienced a stroke was found to be 68.6 years. This finding highlights the vulnerability of the elderly population to stroke in the Northern Province and emphasizes the importance of age as a risk factor.⁹ The educational status of those with stroke also reveal interesting patterns, with a substantial proportion having only received primary education or lower, indicating the potential influence of socio-economic factors on stroke risk.¹⁰

These findings underscore the importance of tailored prevention and management strategies for stroke in the Northern Province. It is evident that interventions focusing on controlling hypertension, managing diabetes, and addressing cardiovascular risk factors can play a crucial role in reducing the burden of stroke in this region. Integrating these insights into healthcare policies and clinical practice can lead to more effective interventions and better outcomes for the population of the Northern Province. In addition, healthy public policies are urgently needed to control the exposure to risk factors, especially among young people.¹¹

While our study found a high prevalence of hypertension, diabetes mellitus, and cardiovascular conditions in patients experiencing a stroke, future research could focus on

evaluating the effectiveness of tailored prevention and management strategies targeting these risk factors specifically within the context of the Northern Province. This could involve conducting longitudinal studies to track the impact of targeted interventions on the prevalence of stroke in the region, as well as assessing the feasibility and acceptability of these strategies within the local healthcare infrastructure.

Another important aspect that warrants further investigation is the influence of socio-economic factors on stroke risk within the Northern Province. Exploring the socioeconomic determinants of health, such as income level, access to education, and employment status, could provide valuable insights into the underlying social disparities that contribute to the burden of stroke in this region. Conducting epidemiological studies that integrate socio-economic indicators into the analysis of stroke prevalence and risk factors could inform the development of more equitable and inclusive public health interventions.

CONCLUSION

This study revealed a higher stroke prevalence rate (2.3%) in the Northern Province compared to the national rate (1.0%). Patients with stroke had a high prevalence of risk factors such as hypertension, diabetes and heart diseases. These insights highlight the need for tailored primary prevention and management strategies, considering socio-economic factors and specific regional risks, particularly screening programs and rehabilitation services.

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Conflict of interests

The authors have no conflict of interests to declare.

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