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A prospective observational study of risk factors predisposing to cerebrovascular stroke at a tertiary care centre

Dr. Sk. Shakeela[1], Naga Sneha[2], Venkata Srilekha[3], Renuka Sai Priya[4], Glory Nissy[5]

[1]Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
Shailu.shailu77@gmail.com

[2] 6th Year Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
nagasneha13@gmail.com

[3]6th Year Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
gunturvenkatasrilekha@gmail.com

[4] 6th Year Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
renukasaipriya07@gmail.com

[5] 6th Year Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
vinjamuri20062@gmail.com

Corresponding Author: Dr. Sk. Shakeela
Pharm.D, Department Of Pharmacy Practice, Hindu College Of Pharmacy,
Shailu.shailu77@gmail.com

Abstract

Background: Stroke is one of the leading causes of death and long-term disability worldwide. It occurs mainly in two forms, ischemic and hemorrhagic stroke, and is often associated with several medical and lifestyle-related risk factors. Understanding the distribution of stroke types and associated risk factors can help in better prevention and management.

Methods: A prospective observational study was conducted in the Department of Neurology at Government General Hospital, Guntur, over a period of five months (January 2025 to May 2025). A total of 180 patients diagnosed with stroke were included in the study. Data regarding demographic characteristics, stroke type, comorbidities such as hypertension, diabetes, hyperlipidemia, obesity, coronary artery disease, and social habits including smoking, alcohol consumption, and tobacco use were collected using a structured data collection form and analyzed using descriptive statistics.

Results: Among 180 patients, ischemic stroke was more common (142 cases, 78.9%) compared to hemorrhagic stroke (38 cases, 21.1%). The majority of patients belonged to the 60–80 years age group, and males were more commonly affected than females. Hypertension (128 patients) and diabetes (93 patients) were the most common comorbidities observed. Smoking (79 patients) and alcohol consumption (77 patients) were the most frequently reported lifestyle risk factors.

Conclusion: The study findings indicate that ischemic stroke is more prevalent than hemorrhagic stroke, particularly among older adults and males. Major comorbid conditions such as hypertension and diabetes along with modifiable lifestyle factors like smoking and alcohol consumption play a significant role in stroke occurrence. Early identification and proper management of these risk factors may help reduce the burden of stroke and improve patient outcomes.

Keywords: Stroke, Ischemic Stroke, Hemorrhagic Stroke, Hypertension, Diabetes Mellitus, Smoking, Alcohol Consumption, Risk Factors, Cerebrovascular Disease, Lifestyle Factors

Introduction

Stroke stands as a primary cause for both deaths and permanent disabilities throughout the world which establishes it as a significant public health issue. The condition develops when blood flow to specific brain areas experiences complete stoppage or partial decrease, which results in brain cell destruction because of oxygen and nutrient deprivation. The two main types of stroke that exist are ischemic stroke and hemorrhagic stroke. The brain suffers from ischemic stroke when blood vessels that deliver oxygen to the brain become blocked, whereas hemorrhagic stroke occurs when blood vessels in the brain burst and lead to internal bleeding. The global distribution of stroke cases shows that ischemic stroke represents the most common type of stroke. Developing nations experience rising stroke rates because their populations age and people adopt unhealthy habits and chronic diseases become more common.[1,2,3]

Multiple risk factors lead to stroke development through their dual existence as both controllable and uncontrollable risk factors. The group of non-modifiable risk factors includes increasing age, gender, genetic predisposition, and family history of cardiovascular diseases. The controllable risk factors for stroke development create a major impact because they can be managed through proper medical treatment and lifestyle changes. The most significant risk factor for stroke development is hypertension which doubles the chances of people experiencing both types of stroke: ischemic and hemorrhagic. Stroke development strongly correlates with several medical conditions which include diabetes mellitus, hyperlipidemia, obesity, and coronary artery disease. The effective management of these medical conditions leads to substantial stroke risk reduction, which also enhances overall cardiovascular health.[4,5]

Lifestyle habits also play an important role in increasing the risk of stroke. The combination of smoking and excessive alcohol consumption and tobacco use creates established risk factors which lead to vascular deterioration and result in increased chances of cerebrovascular incidents. Smoking creates blood clots which combine with blood vessel contraction to increase the probability of ischemic stroke. Alcohol consumption creates hypertension which leads to cardiovascular diseases that result in increased stroke risk. The combination of sedentary behavior and unhealthy eating patterns and insufficient exercise creates higher stroke risk for multiple people. Healthy lifestyle development should serve as the fundamental strategy for reducing worldwide stroke incidence.[6,7,8]

Understanding the distribution of stroke types and identifying the associated risk factors are essential for developing effective prevention and management strategies. Hospital-based observational studies provide valuable information regarding the clinical characteristics and risk profiles of stroke patients. Such studies help healthcare professionals identify high-risk

individuals and implement early interventions to prevent complications and improve patient outcomes. Therefore, the present study was conducted to assess the distribution of ischemic and hemorrhagic stroke and to evaluate the associated comorbidities and lifestyle-related risk factors among stroke patients admitted to a tertiary care hospital. The findings of this study may contribute to better understanding of stroke patterns and assist in planning preventive healthcare strategies.[9,10]

Methodology

Study Design: The present study was conducted as a prospective observational study to evaluate the distribution of stroke types and associated risk factors among hospitalized patients diagnosed with stroke.

Study Site: The study was carried out at the Department of Neurology, Government General Hospital, Guntur, which is a tertiary care teaching hospital providing specialized neurological services.

Study Duration: The study was conducted over a period of five months from January 2025 to May 2025.

Study Population and Sample Size: A total of 180 patients diagnosed with stroke and admitted to the neurology department during the study period were included in the study.

Inclusion Criteria

- Adults aged 18 years and older
- Willing and able to provide informed consent and participate in regular follow ups.
- Presence of one or more potential risk factors for stroke (e.g., hypertension, diabetes, smoking, obesity or sedentary lifestyle.)
- Past history of TIA or stroke

Exclusion Criteria

- Severe comorbidities or terminal illness that may limit follow up (e.g., advanced cancer, end stage organ failure).
- Severe cognitive impairment or psychiatric conditions affecting participation
- Pregnant women
- Trauma

Data Collection Procedure: Data were collected using a structured data collection form designed for the study. Information was obtained from patient medical records, laboratory reports, and patient interviews. The collected data included demographic details such as age and gender, type of stroke (ischemic or hemorrhagic), comorbid conditions including hypertension, diabetes mellitus, hyperlipidemia, obesity, and coronary artery disease, as well as social habits such as smoking, alcohol consumption, and tobacco use.

Data Analysis: The collected data were organized, tabulated, and analyzed using descriptive statistical methods. Frequencies and percentages were calculated to determine the distribution of stroke types and associated risk factors among the study population. The results were presented in the form of tables and graphs for better interpretation and understanding.

Results

Table 1: Demographic Characteristics and Stroke Type Distribution (n = 180)

Variable	Category	Hemorrhagic Stroke (n=38)	Ischemic Stroke (n=142)	Total (n=180)
Age Group (Years)	18–20	1	0	1
	20–40	7	11	18
	40–60	14	55	69
	60–80	16	76	92
Gender	Male	30	85	115
	Female	8	57	65
Total		38	142	180

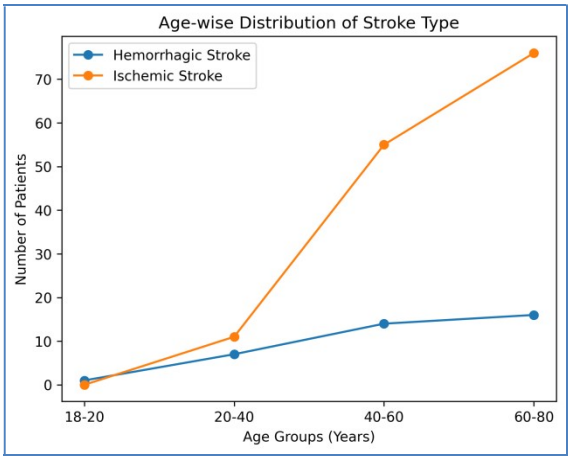

Figure 1: Demographic Characteristics and Stroke Type Distribution

Among the 180 stroke patients, ischemic stroke (142, 78.9%) was more common than hemorrhagic stroke (38, 21.1%). The majority of patients belonged to the 60–80 years age group (92), followed by 40–60 years (69). Hemorrhagic stroke was most frequent in 60–80 years (16). Males (115) predominated compared to females (65), with ischemic stroke more common among males (85).

Table 2: Comorbidity-Related Risk Factors and Stroke Type (n = 180)

Risk Factor	Category	Hemorrhagic Stroke (n=38)	Ischemic Stroke (n=142)	Total
Hypertension	Yes	15	113	128
	No	23	29	52
Diabetes Mellitus	Yes	13	80	93
	No	25	62	87
Hyperlipidemia	Yes	5	29	34
	No	33	113	146
Obesity	Yes	7	45	52
	No	31	97	128
Coronary Artery Disease (CAD)	Yes	25	21	46
	No	13	121	134
Total		38	142	180

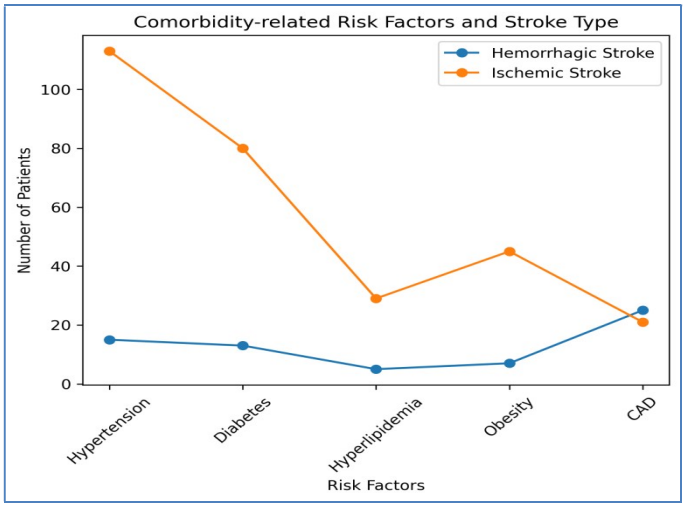

Figure 2: Comorbidity-Related Risk Factors and Stroke

Hypertension was the most common comorbidity, observed in 128 patients, predominantly among ischemic stroke cases (113). Diabetes mellitus was present in 93 patients, with 80 ischemic cases. Hyperlipidemia was identified in 34 patients (29 ischemic). Obesity was observed in 52 patients (45 ischemic). Coronary artery disease was reported in 46 patients, with higher occurrence in hemorrhagic stroke (25).

Table 3: Social Habits–Related Risk Factors and Stroke Type (n = 180)

Risk Factor	Category	Hemorrhagic Stroke (n=38)	Ischemic Stroke (n=142)	Total
Smoking	Yes	18	61	79
	No	20	81	101
Alcohol Consumption	Yes	18	59	77
	No	20	83	103
Tobacco Use	Yes	5	10	15
	No	33	132	165
Total		38	142	180

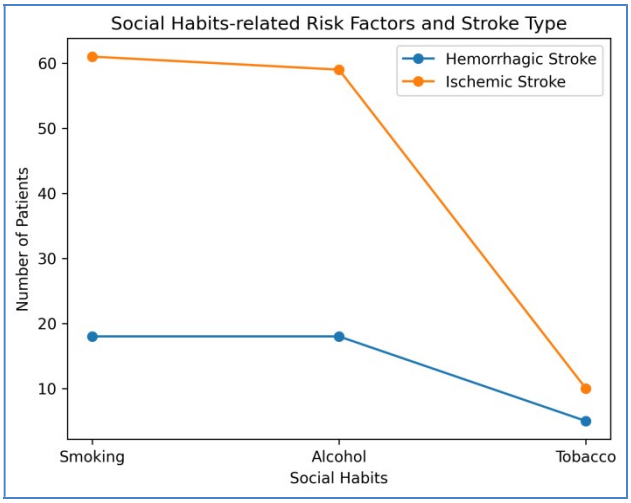

Figure 3: Social Habits–Related Risk Factors and Stroke Type

Among social habits, smoking was reported in 79 patients, including 61 ischemic and 18 hemorrhagic stroke cases. Alcohol consumption was observed in 77 patients, with 59 ischemic stroke cases. Tobacco use was less frequent, reported in 15 patients (10 ischemic, 5 hemorrhagic). Overall, smoking and alcohol consumption were more commonly associated with ischemic stroke patients.

Discussion

In the present study of 180 patients, ischemic stroke (142 cases, 78.9%) was more common than hemorrhagic stroke (38 cases, 21.1%). Most patients were aged 60–80 years (92 cases), and males (115) were more affected than females (65). These findings are consistent with previous studies. A study reported that ischemic stroke accounts for about 70–80% of all strokes globally, showing that ischemic stroke is the predominant type. Another hospital-based study also reported higher ischemic stroke incidence compared to hemorrhagic stroke and observed that stroke occurrence increases with advancing age and is more common in males. These similarities suggest that age-related vascular changes, lifestyle factors, and higher exposure to risk

factors in men may contribute to the higher burden of ischemic stroke.[11,12]

In this study, hypertension (128 patients) was the most common comorbidity, followed by diabetes (93), obesity (52), coronary artery disease (46), and hyperlipidemia (34). Hypertension and diabetes were particularly more frequent among ischemic stroke patients. Similar findings were reported in previous studies, where hypertension was identified as the most significant modifiable risk factor for stroke. One Indian clinical study reported hypertension in about 58% of stroke patients, confirming its strong association with cerebrovascular disease. Another epidemiological analysis also reported that vascular risk factors such as high blood pressure, hyperglycemia, and dyslipidemia are major contributors to ischemic stroke burden. These results highlight the importance of early detection and proper management of chronic diseases to prevent stroke occurrence.[13,14]

The present study found that smoking (79 patients) and alcohol consumption (77 patients) were common lifestyle risk factors among stroke patients, especially in ischemic stroke cases. Tobacco use was reported in 15 patients. Similar trends were reported in earlier studies where smoking and alcohol were identified as important modifiable risk factors for stroke. Smoking contributes to vascular damage and increases clot formation, thereby increasing ischemic stroke risk. Another epidemiological study also reported that lifestyle factors such as smoking, unhealthy diet, and sedentary habits significantly contribute to stroke occurrence in many populations. These findings emphasize the need for public health awareness and lifestyle modifications to reduce stroke incidence and improve long-term cardiovascular health.[15,16]

Conclusion

This study highlights the important risk factors and patterns of stroke among the study population. The findings showed that ischemic stroke was more common than hemorrhagic stroke, particularly among older adults and male patients. Major medical conditions such as hypertension, diabetes, obesity, and coronary artery disease were frequently observed among stroke patients, indicating their strong role in increasing stroke risk. In addition, lifestyle habits such as smoking and alcohol consumption were also common among many patients, further contributing to the development of stroke. These results suggest that stroke can be largely prevented by controlling chronic diseases, adopting healthier lifestyles, and increasing public awareness about risk factors. Early diagnosis, proper medical management, and lifestyle modifications may help reduce stroke occurrence and improve patient outcomes.

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