



AN OBSERVATIONAL STUDY ON PREVALENCE AND RISK FACTORS CONTRIBUTING TO CEREBROVASCULAR STROKE

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ABSTRACT

Cerebrovascular accident (CVA) is a major global health problem and a leading cause of death and long-term disability. The burden of stroke continues to rise, especially in developing countries like India, due to increasing exposure to lifestyle-related and age-related risk factors. Understanding the prevalence and associated risk contributors is essential for improving prevention, early detection, and management. This study aims to assess the prevalence of stroke and identify key modifiable and non-modifiable risk factors among patients admitted to a tertiary care hospital. An observational study was conducted on 152 confirmed CVA patients admitted to the Government District General Hospital, Karimnagar. Data were collected over six months from patient case notes and included demographic details, social history, risk factors, stroke type, and severity scoring. The severity of Ischemic stroke % hemorrhagic stroke was assessed using the Framingham Risk Score (FRS) and Intracerebral Hemorrhage (ICH) scales respectively. Most patients belonged to the 60–79-year age group, with the highest proportion in the 70–74-year range (19.10%). Females (53.29%) were slightly more affected than males (46.71%). Social habits showed that 16.40% consumed alcohol, 13.10% smoked, and 8.50% engaged in both, while 62% had no addictions. Ischemic stroke was predominant (74%; n=112) than hemorrhagic stroke accounted for 26% (n=40). Among ischemic stroke patients, FRS classification showed: 32% low risk, 26% moderate risk, and 42% high risk, with males contributing more to high-risk categories. Hemorrhagic stroke severity via the ICH scale showed 45% low risk, 52.5% moderate risk, and 2.5% high risk. Hypertension emerged as the most common risk factor (39.50%), followed by alcohol (16.40%), diabetes (15.10%), smoking (13.10%), family history (5.30%). Severity-specific prevalence among patients showed 35.50% as low severity, 32.90% with moderate and 31.60% as high severity overall. In conclusion, this study demonstrates that ischemic stroke is more prevalent than hemorrhagic stroke, with elderly individuals and females being more commonly affected. Hypertension remains the dominant modifiable risk factor, indicating the need for strict blood pressure control and lifestyle modification. The findings highlight the importance of early risk assessment, patient education, and targeted preventive strategies to reduce stroke incidence and severity in the population.

Key words: Stroke, cerebrovascular accident, Ischemic stroke, hemorrhagic stroke, hypertension, prevalence, risk factors

INTRODUCTION

Stroke or cerebrovascular accident (CVA) is one of the commonest causes of mortality and disability across the world affecting around 11 million people each year (Krishnamurthy et al., 2010) by striking of blood vessel or rupturing of blood vessel in the brain. The WHO definition of stroke is “rapidly developing clinical signs of focal (or global) disturbance of cerebral function,” with symptoms lasting 24 h or longer or leading to death, with no apparent cause other than of vascular origin (Warlow, 1998). The American Stroke Association recently proposed a revised definition of stroke for the 21st century that includes clinical and tissue criteria. Any objective evidence of persistent brain, spinal cord, or retinal cell death attributed to a vascular etiology based on pathological or imaging data with or without the presence of clinical symptoms is included in this definition (Sacco ET AL., 2019). Stroke can be explained as the sudden death of some brain cells due to lack of oxygen when the blood flow to the brain is lost by blockage or rupture of an artery to the brain (Johnson ET AL., 2016). Stroke is broadly categorized as ischemic and hemorrhagic. Ischemic stroke is most common type of stroke, affecting around 80% of those who have one. It occurs when a clot blocks or slows blood flow, depriving the brain of oxygen and nutrients. Hemorrhagic stroke occurs when blood vessels rupture, causing leakage of blood in or around the brain (O’Sullivan et al., 2019).

Compared with stroke in older adults, stroke in the young adults has significantly large social and economic impact by leaving victims disabled during their most productive years and create a long term burden on them, their families and the community. In contrast to older adults, the incidence of ischemic stroke among young adults has been rising globally since the 1980s (Ekker et al., 2018; Nagaraja et al., 2009). The incidence is even higher in developing countries sharing almost more than half of the overall stroke burden (Krishnamurthy et al., 2010). Earlier population based studies in India have shown an overall incidence of stroke up to 23-145 per 100,000 persons per year (Kaul et al., 2009). Modifiable or reversible risk factors like hypertension, Diabetes, heart diseases, obesity, smoking, hyperlipidemia etc and non-modifiable or irreversible risk factors like age, gender, race, heredity are associated with the stroke (Choudhury et al., 2015). In the present study, we have evaluated prevalence and risk factors contributing to the cerebrovascular stroke.

MATERIALS

The present prospective observational study was conducted in the General Medicine department of Government General Hospital, Karimnagar, Telangana within a period of 6 months from July to December, 2025. Data was collected from 152 patients diagnosed with cerebrovascular accident (CVA) or cerebrovascular stroke (CVS) with a ration of male to female as 1:1 by following inclusion and exclusion criteria of the study.

INCLUSION CRITERIA:

- Patients with a confirmed or clinically diagnosis of cerebrovascular stroke.
- Patient aged ≥ 18 years.
- Patients who are admitted in hospital.
- Patients who are willing to give informed consent to participate in the study.
- Patients with one or more medical co-morbidities such as hypertension, diabetes, dyslipidemia, obesity, alcohol, smoking, atrial fibrillation.

EXCLUSION CRITERIA:

- Patients with age < 18 years

- Refusal of consent to include in the study
- Stroke patients with incomplete clinical records.
- Stroke patients with pregnancy and lactation.

STUDY PROCEDURE:

This observational study was initiated at single centre by selecting the cerebrovascular stroke patients based on Inclusion and exclusion criteria of the study. Patients were enrolled in this study based upon demographic details & Laboratory details. The study commenced with an extensive literature review and meticulous preparation of the research protocol to establish a strong theoretical foundation and clear methodological framework. Following this, a structured data collection form was designed to ensure systematic and consistent recording of relevant variables. Data were collected over six months from patient case notes and included demographic details, social history, risk factors, stroke type, and severity scoring. Once the form was finalized, data collection was undertaken carefully, adhering to the predefined inclusion and exclusion criteria. The collected data was analyzed based on the predetermined parameters like age, gender, severity of disease etc. In this study, scaling systems like Framingham Risk score (FRS) scale and intra-cerebral hemorrhagic (ICH) scale were used to evaluate and assess the risk severity in ischemic stroke & hemorrhagic stroke patients respectively. Descriptive statistics were applied to analyze prevalence patterns and risk distributions.

RESULTS

The present study was conducted in the General Medicine department of Karimnagar Government General Hospital within a period of 6 months from July to December, 2025. Data was collected from 152 patients diagnosed with cerebrovascular accident (CVA) or cerebrovascular stroke (CVS) by following inclusion and exclusion criteria of the study. The collected data was analyzed assigned based on the predetermined criteria and was as follows.

Among the 152 patients of CVA, most of the patients were found in the age groups of 60-64 years (26 patients with 17.10%), 65-69 years (27 patients with 17.80%), 70-74 years (29 patients with 19.10%), and 75-79 years (24 patients with 15.80%) as shown in Table 1.

Table 1: Frequency of CVA patients in different age groups

The collected data was analyzed based on the social habits such as alcohol consumption and

AGE (YEARS)	NO. OF PATIENTS (N=152)	Frequency %
20-34	0	0%
35-39	5	3.20%
40-44	7	4.60%
45-49	9	5.90%
50-54	8	5.30%
55-59	17	11.20%
60-64	26	17.10%
65-69	27	17.80%
70-74	29	19.10%
75-79	24	15.80%

smoking. As shown in figure 1, 5 patients (3.20%) accounted for regular alcohol consumption, 20 patients (13.10%) were habitual smokers, and 13 patients (8.50%) had a habit of both alcohol consumption and smoking. The remaining 94 patients (62%) had no significant social habits leading to stroke risk.

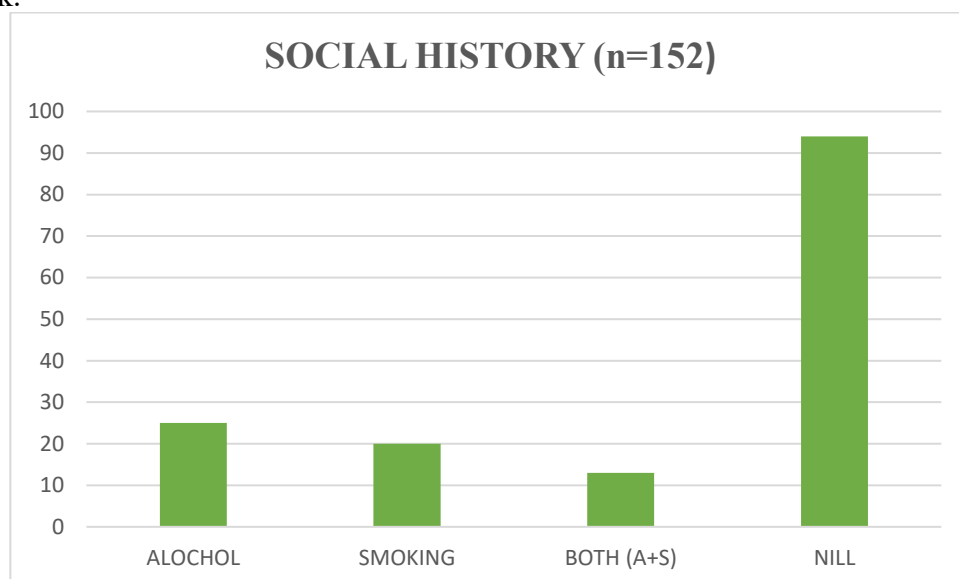


Fig.1. Graphical representation of the patient's data according to social history

In this study, we observed that out of the 152 CVA patients, almost three-quarters of all stroke cases (112) were found as ischemic strokes accounting 74% of total cases, while one-quarter (40) cases of CVA were found as hemorrhagic strokes (26%) (Figure 2).

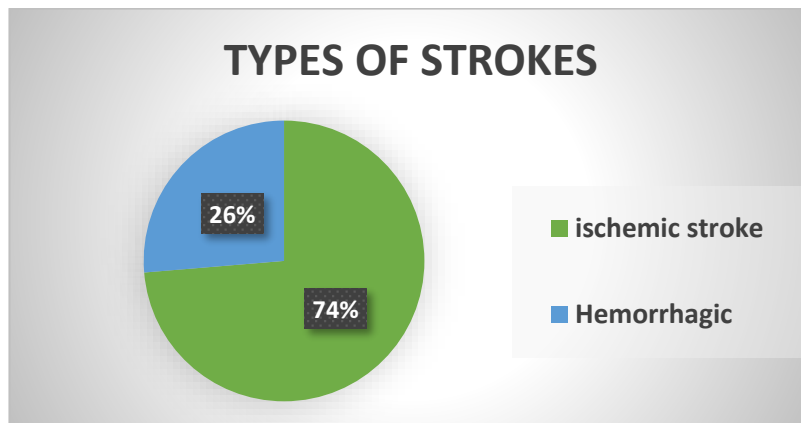


Fig.2. Graphical representation of patient's data according to types of strokes

In the present study, we have used Framingham Risk score (FRS) scaling system to evaluate and assess the risk severity in ischemic stroke patients. Among 112 patients of ischemic strokes; we found that 36 patients (32%) had low-risk, while 29 patients (26%) showed a moderate-risk, and about 47 patients (42%) had a high-risk severity as shown in figure 3

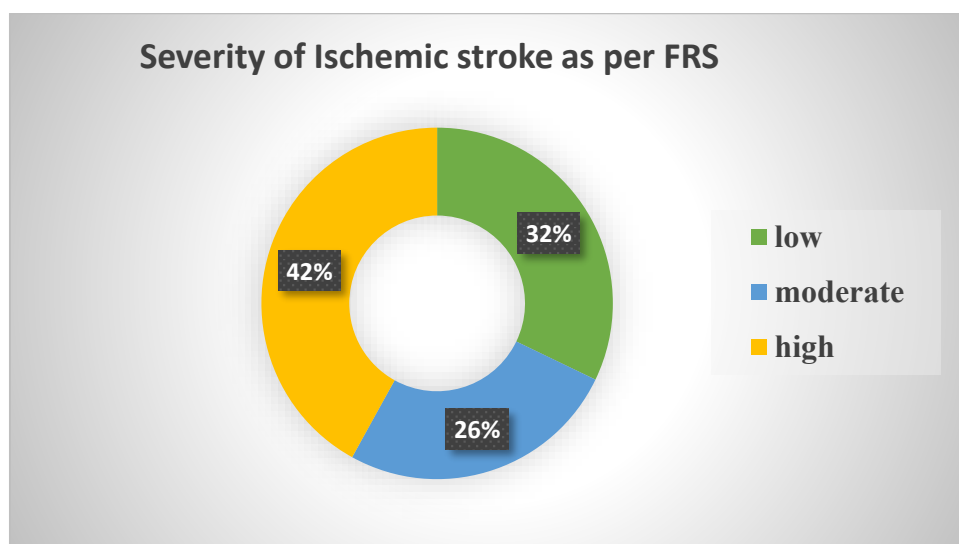


Fig. 3. Severity of Ischemic Stroke in patients based on the Framingham risk score.

Additionally, we also evaluated the severity of ischemic stroke based on gender and found as 36 males (32.10%) & 11 females (9.80%) with high-risk group, where as almost equal ratio in moderate-risk level. But, most of the female strokes patients were found with low-risk than that of males as shown in figure 4.

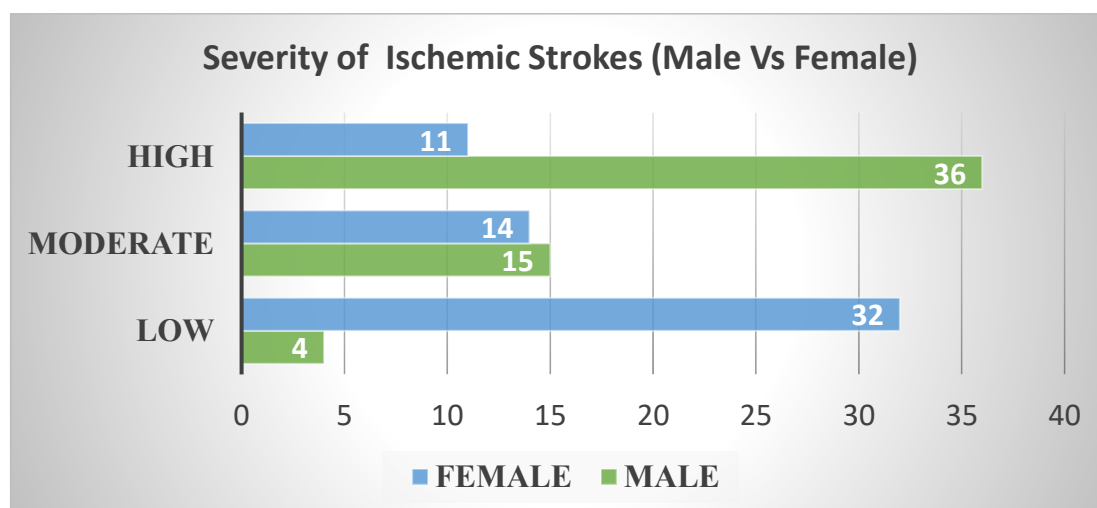


Fig.4. Gender wise representation of Severity of Ischemic stroke in patients

In this study, we have used Intra-cerebral Hemorrhagic (ICH) scale to evaluate the severity of hemorrhagic strokes in patients. As shown in figure 5, among the total of 40 Hemorrhagic stroke patients, 18 patients (45%) with low-risk range, 21 patients (52.50%) with moderate-risk, whereas only 1 patient (2.50%) was found with high-risk severity according to the ICH scoring system.

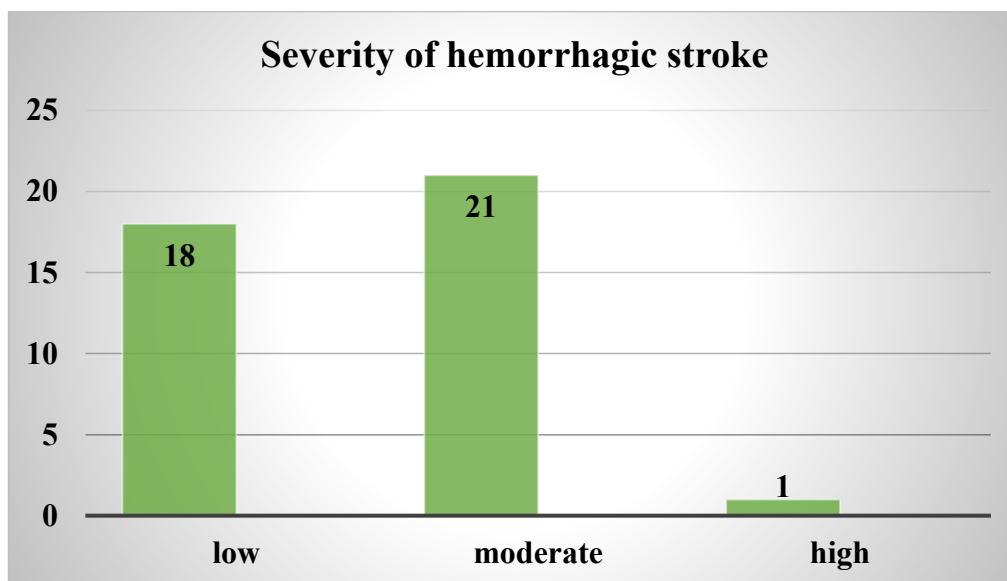


Fig.5. Severity of hemorrhagic stroke in patients based ICH scale

As shown in figure 6, it was found in this study that among the 40 hemorrhagic stroke patients, 7 males (17.50%) and 11 females (27.50%) were identified as low-risk. In contrast, 13 males (32.50%) and 8 females (20%) were identified in moderate-risk, and in high-risk severity, males were 0(0%), and females were 1(2.50%), respectively as per ICH scale scoring system.

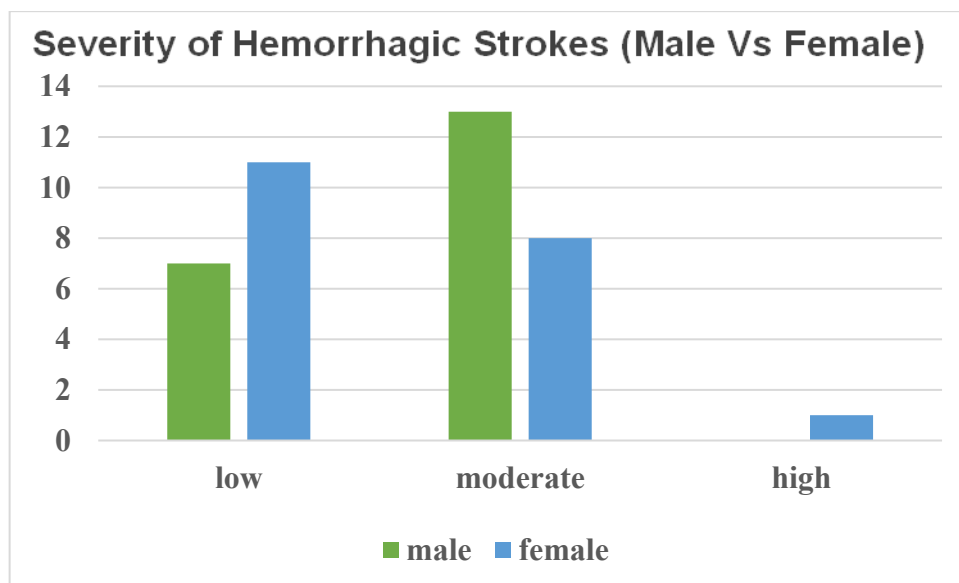


Fig.6. Gender wise representation of hemorrhagic patients

Stroke is associated with modifiable and non-modifiable risk factors (Coudhury et al., 2015). In this we have evaluated the modifiable risk factors of stroke and found that hypertension was associated with 60 patients (39.50%), diabetes mellitus was seen in 23 patients (15.10%), dyslipidemia in 6 patients (3.90%), atrial fibrillation in 6 patients (3.90%), smoking in 20 patients (13.10%), alcohol in 25 patients (16.40%), obesity in 4 patients (2.60%), and family history in 8 patients (5.30%) as shown in Table 2.

Table. 2: Modifiable risk factor in patient's of CVA.

Risk factors	No. of patients (N=152)
Hypertension	60
Diabetic Mellitus	23

Dyslipidemia	6
Atrial Fibrillation	6
Smoking	20
Alcohol	25
Obesity	4
Family History	8

Assessment of Severity Specific Prevalence (%) in strokes: In the present study, from the collected data of 152 patients, based on the both FRS and ICH scales used for evaluation of severity of strokes, we found the severity specific prevalence as 54 patients (35.5%) was with low risk level, 50 patients (32.90%) with moderate and 48 patients (31.6%) with high risk was identified (table 3 & Figure 7).

Table. 3: Patient's data based on the impact of Framingham risk score & ICH scale

Severity	As per FRS Scale	As per ICH scale	Total (%)
Low	36	18	54 (35.5%)
Moderate	29	21	50 (32.9%)
High	47	1	48 (31.6 %)

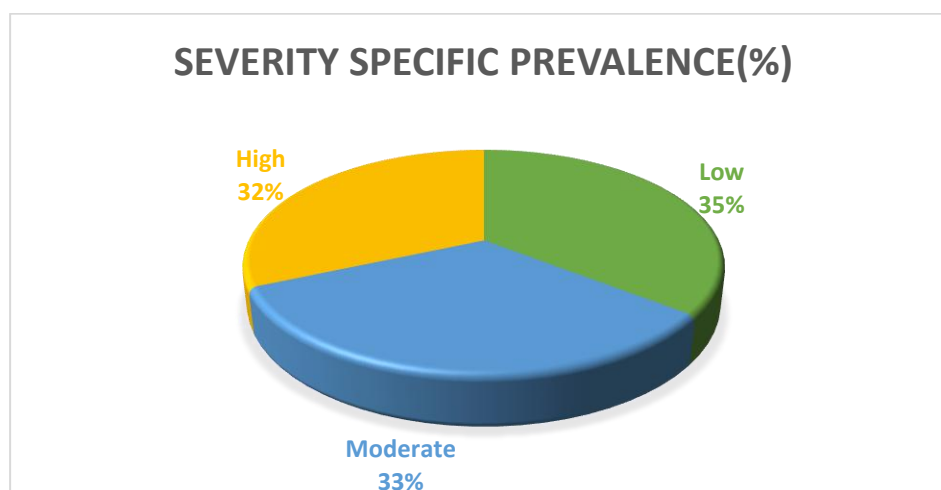


Fig. 7: Patients' data based on the severity specific prevalence (%) of CVA.

DISCUSSION

In the present study, we have evaluated the prevalence and risk factors contributing to the cerebrovascular stroke in Karimnagar, Telangana. Data was collected from 152 patients diagnosed with cerebrovascular accident (CVA) or cerebrovascular stroke (CVS) with a ratio of male to female as 1:1 by following inclusion and exclusion criteria of the study. Among the 152 patients of CVA, most of the patients were found in the age groups of 60-64 years (26 patients with 17.10%), 65-69 years (27 patients with 17.80%), 70-74 years (29 patients with 19.10%), and 75-79 years (24 patients with 15.80%) reflecting the aged persons are more prone for stroke. Similarly, Itagi et al., (2020) found a mean age of 58.49 ± 13.97 years, with the most common age group being 61 to 70 years. In this present study, we observed that the occurrence of ischemic strokes is more common than hemorrhagic stroke as 74% of total cases belong to ischemic strokes (Figure 2). The results of the study was similar to the studies reported by Rathore et al., (2011) and Jha et al., (2023).

Based on the Framingham Risk score (FRS) scale, ischemic strokes severity was categorized and found that 36 patients (32%) had low-risk, while 29 patients (26%) showed a moderate-risk, and about 47 patients (42%) had a high-risk severity as shown in figure 3. Among this high risk patients, 36 males (32.10%) & 11 females (9.80%) were identified. But, most of the female strokes patients were found with low-risk than that of males.

Analysis of hemorrhagic stroke patients for severity of risk based on Intra-cerebral Hemorrhagic (ICH) scale revealed that 18 patients (45%) with low-risk range, 21 patients (52.50%) with moderate-risk, whereas only 1 patient (2.50%) was found with high-risk severity and also revealed that among the 40 hemorrhagic stroke patients, 7 males (17.50%) and 11 females (27.50%) were identified as low-risk.

The modifiable risk factors associated with stroke this study was found as hypertension with 60 patients (39.50%), diabetes mellitus in 23 patients (15.10%), smoking in 20 patients (13.10%), alcohol in 25 patients (16.40%) reflecting the significant risk associated with these reversible risk factors with stroke. These results were as similar to the reports of Suryanarayana, (2019).

The results of the study reveals that severity specific prevalence as 54 patients (35.5%) are with low risk level, 50 patients (32.90%) with moderate and 48 patients (31.6%) are with high risk among all the collected data as similar to the reports of Raju et al., (2024).

CONCLUSION

The study demonstrates that ischemic stroke is more prevalent than hemorrhagic stroke, with elderly individuals and females being more commonly affected. Hypertension remains the dominant modifiable risk factor, indicating the need for strict blood pressure control and lifestyle modification. The findings highlight the importance of early risk assessment, patient education, and targeted preventive strategies to reduce stroke incidence and severity in the population. The most common modifiable risk factors for stroke in young patients were hypertension, smoking, diabetes, physical inactivity, dyslipidemia, obesity, and alcohol consumption.

Limitations: The study was single center study with a relatively small sample size, hence our findings may not be generalized in all the strokes.

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Conflict of interest: None declared

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