

Analysis of Age wise Difference in Signs and Symptoms of Various Types of Strokes- Observational Study

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Abstract: Purpose of the Study: Stroke is a major global health challenge, ranking second only to heart disease in terms of mortality and posing a growing burden of morbidity and disability. Understanding how stroke symptoms vary by sex and age can aid in early recognition and prompt treatment, potentially reducing prehospital delays and improving patient outcomes. This prospective observational study aimed to assess the prevalence of stroke and disability post-stroke among patients aged 25-55 years. Additionally, it sought to gauge the initial understanding of stroke signs, symptoms, and risk factors among patients arriving at the emergency department (ED) with this condition.

Methods: The observational study was conducted at Krishna Hospital of Krishna Institute of Medical Sciences, Karad, India, from August 2023 to October 2023. Patients diagnosed with stroke, aged 25-55 years, and possessing sufficient cognitive and communicative ability were included. Data collection included demographic information, stroke symptoms, stroke subtype, and associated risk factors.

Results: Of 250 cases of stroke, 76 occurred at patient home, 82 occurred during acute hospitalization for another diagnosis, 92 occurred or were first evaluated at a medical facility other than an emergency room setting, the age range of 250 stroke patients was from 25 to 55 years with mean & SD of 41.35±10.66 years with median age of 44 years. There were 171(68.4%) males and 79(31.6%) females. Among included cases, 61% were ischemic strokes, 39% were hemorrhagic strokes (intracerebral or subarachnoid). Youngest patient in the whole of the study group was 26 years old while the oldest patient in the study group was 53 years old.

Conclusion: This study highlights the varied presentation of stroke symptoms across different age groups. For individuals aged 25-55, generalized weakness is the predominant symptom of ischemic stroke across all age ranges. However, specific signs vary by age. In the 25-35 group, symptoms include weakness, vomiting, and visual disturbances. Ages 36-45 commonly experience headache, weakness, and fainting. For those 46-55, signs may include facial drooping, fainting, difficulty writing, loss of consciousness, and vomiting. Many people overlook these symptoms due to a lack of awareness. In hemorrhagic stroke, those aged 25-35 typically exhibit vomiting, nausea, and headache; ages 36-45 show similar symptoms, while ages 46-55 commonly experience vomiting, numbness, and weakness.

Keywords: Stroke, Ischemic stroke, Hemorrhagic stroke.

1. Introduction

Stroke ranks as the third most common cause of death and a significant contributor to disability. The impact of stroke is particularly pronounced among older individuals, who experience a higher occurrence and prevalence of ischemic stroke compared to their younger counterparts. Age stands out as the primary unalterable risk factor for all types of strokes. With each decade beyond 55 years of age, the likelihood of experiencing a stroke increases substantially, more than doubling for both men and women.¹ The majority of epidemiological data has primarily focused on mortality rates and associated risk factors, with less emphasis on characterizing incident events⁶. The current prevalence rate in India varies from 44.54 to 150/100000.⁷

Recognizing sex- and age-related disparities in the manifestation of unusual symptoms at the onset of stroke could potentially enhance stroke treatment if identified during initial contact and decrease prehospital delays. Failure to recognize stroke symptoms upon presentation may result in delayed treatment and compromised clinical outcomes⁷. Patient delay often stems from an inability to recognize symptoms or hesitation to promptly respond to them. Stroke symptoms can be classified as either typical (such as hemiparesis, facial palsy, visual or language disturbances) or atypical (including headache, dizziness, confusion, or sensory symptoms). Few published studies have prospectively demonstrated the transition of stroke within a population from a lower economic status to a higher one through long-term observational research with incidence rate data.⁸

Risk factors for stroke can be categorized into modifiable and non-modifiable factors. The influence of risk factors at different ages is different¹⁷. Non-modifiable risk factors include age, sex, family history, and race/ethnicity, while modifiable risk factors encompass hypertension, smoking, diet, and physical inactivity⁹. Variations in the prevalence of major risk factors among different stroke subtypes underscore the importance of understanding the underlying pathophysiology for effective patient management and care. Despite the emergence of several significant modifiable risk factors, hypertension remains the most prevalent risk factor globally, including in our country. Other studies have identified diabetes mellitus, obesity, dyslipidemia, heart failure, and atrial fibrillation as significant comorbid conditions associated with stroke development. Unhealthy lifestyles such as tobacco smoking, alcohol abuse, and sedentary behavior have also been documented as risk factors for stroke in the literature.¹⁰ Genderwise differences in signs and symptoms have been evaluated. Females and males showed differences in features like weakness, headache, nausea and fever¹⁶.

Despite the expectation that patients would acquire greater knowledge of stroke risk factors and symptoms after experiencing a stroke, studies indicate otherwise. Research reveals that both stroke patients and their caregivers often possess inadequate understanding of stroke, including its causes and preventative measures. Surprisingly, previous stroke occurrences did not influence knowledge levels regarding stroke. Additionally, the awareness of stroke among patients post-stroke was found to be just as low as in randomly selected healthy individuals. Transient Ischemic Attacks (TIAs) stand apart from other types of strokes mentioned earlier due to the temporary interruption of blood flow to the brain. Similar to ischemic strokes, TIAs frequently result from blood clots, akin to other types of strokes, as they carry a significant short-term risk of stroke.¹¹ Hence TIAs are not considered in the study.

Ischemic stroke encompasses various subtypes, including large vessel (41%), lacunar (18%), cardioembolic (10%), other determined (10%), and undetermined (20%) categories. Etiological factors include extracranial carotid disease in 25-26% and intracranial carotid disease in 30% of cases. The Kolkata study revealed that the basal ganglia-thalamic region was the most common site (75%) of hemorrhage, whereas the subcortical region was the predominant site of infarction (75.6%).¹²

In rural areas characterized by poverty, illiteracy, and limited healthcare access, awareness regarding stroke risk factors tends to be deficient among the majority of the population. Alarming, the selection, recognition, and description of symptoms vary widely, with typically three to six warning signs highlighted. Presently, many awareness campaigns utilize the simplified FAST message, stressing facial weakness, arm weakness, speech difficulties, and the importance of prompt action (National Health Service: When stroke strikes act FAST).¹³⁻¹⁴

In older women, the elevated incidence and case fatality rates of stroke were strongly linked to the high prevalence of hypertension. Trigger factors were identified in 44.2% of acute stroke patients. Understanding the risk factors (RFs) associated with stroke may enhance both primary and secondary prevention efforts, motivating individuals to adopt preventive behaviors such as lifestyle modifications. This, in turn, could lead to a reduced incidence of cerebrovascular issues in the future. Previous studies have shown that a considerable number of patients at high risk of stroke are unaware of their risk.¹⁴

Many states in India have numerous hard-to-reach areas, impacting the quality of public health due to accessibility and availability issues. Given this, alongside the epidemiological shift occurring in the country, it is imperative to study the disease patterns among this section of the population. While some studies delve into the risk of stroke in older adults with multi-morbidity, there remains a scarcity of literature on stroke and its economic burden in the north-eastern states of India. Examining stroke and its economic ramifications in the North-eastern states of India is crucial for several reasons. This region exhibits distinct socio-economic demographic and disease profiles, marked by a high prevalence of stroke risk factors and limited access to specialized healthcare services. Furthermore, the unique cultural and dietary practices in these states, which differ significantly from the rest of the country, may influence stroke incidence and management.¹⁵

By investigating stroke risk factors and economic burdens in this context, we can facilitate the development of targeted interventions and policies to effectively address the stroke burden, improve patient outcomes, and mitigate the economic impact on individuals, families, and the healthcare system in the region. Therefore, the primary objective of the study is to assess the prevalence of stroke in India and the disability post-stroke.

The objective of this prospective study was to gauge the initial understanding of stroke signs, symptoms, and risk factors among patients arriving at the emergency department (ED) with this condition. The study sought to evaluate the level of awareness within the population regarding the signs and symptoms of stroke, its risk factors, and their perceptions regarding the severity of the issue.

2. Materials & Methods

This observational study was approved by the Institutional Ethics Committee of KVV, Deemed to be University, Karad. All subjects gave written informed consent before participating in the study. Patients with recurrent stroke or recurrent TIA were recruited from both in-patient and out-patient units in Krishna Hospital of Krishna Institute of Medical Sciences, Karad which is a primary hospital in the area. Data was collected from August 2023 to October 2023. The inclusion criteria for this study required individuals to have a confirmed diagnosis of stroke supported by medical records, fall within the age range of 25 to 55 years old, possess sufficient cognitive and communicative abilities, and demonstrate willingness to participate in the research. Conversely, the exclusion criteria entail individuals with other neurological conditions, unstable medical conditions that may hinder study participation, stroke-like conditions stemming from systemic diseases like infection, and patients with transient ischemic attacks are not eligible for inclusion in the study. The sample size determined was 250 by using the reference article.

The frequency of common stroke signs and symptoms among stroke incidences were determined and evaluated for associations with sex, and stroke subtype. Statistical analysis was performed using SPSS computational program for windows, version 28. Descriptive analysis was performed by constructing frequency tables for the variables. The patient’s symptoms of stroke and age groups were compared with the use of chi-square tests. The results were considered statistically significant when $p < 0.05$. The following variables were considered for inclusion in the model: the 7 stroke symptom categories described above, overall stroke severity (estimated retrospectively), age, stroke subtype, gender, and prior history of stroke.

3. Results

Of 250 cases of stroke, 76 occurred at patient home, 82 occurred during acute hospitalization for another diagnosis, 92 occurred or were first evaluated at a medical facility other than an emergency room setting, the age range of 250 stroke patients was from 25 to 55 years with mean & SD of 41.35 ± 10.66 years with median age of 44 years. There were 171 (68.4%) males and 79 (31.6%) females. Among included cases, 61% were ischemic strokes, 39% were hemorrhagic strokes (intracerebral or subarachnoid). Youngest patient in the whole of the study group was 26 years old while the oldest patient in the study group was 53 years old.

TABLE NO.1. Demographics for strokes age>25years

Demographics for strokes age>25years			
	25-35Years	36-45Years	46-55Years
No.	86	62	102
Sex (M, F)	(64,22)	(43,19)	(64,38)
Average age at stroke±SD	28.2674±3.66	22.24±2.568	51.814±2.869
Median age at stroke	26.5	43	52

In 25-35 years, age group total number of patients 86, 36-45 years age group total number of patients 62- and 46-55-years age group total number of patients 102. The sex of male was more than comparison for female. Average of the age at stroke 25-35, 36-45 and 46-55 are 28.2674 ± 3.66 , 22.24 ± 2.568 and 51.814 ± 2.869 respectively and median age at stroke are 26.5, 43 and 52 respectively. It was statistically significant.

TABLE NO.2 Comparison between Symptoms of stroke and age group (n=250)

Symptoms of Stroke	Age Group in percentage
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	25-35years	36-45years	46-55years	t value	p value
Generalized weakness	61(70.93%)	46(74.19%)	40(39.22%)	48.06	0.001(S)
Headache	35(40.70%)	47(75.81%)	35(34.31%)		
Language disorder	37(43.02%)	25(40.32%)	41(40.20%)		
Visual disturbance	40(46.51%)	36(58.06%)	55(53.92%)		
Weakness	33(38.37%)	37(59.68%)	53(51.96%)		
Nausea	26(30.23%)	38(61.29%)	54(52.94%)		
Loss of consciousness	37(43.02%)	33(53.24%)	59(57.84%)		
Numbness	43(50%)	29(46.77%)	43(42.16%)		
Writing	36(41.86%)	38(61.29%)	64(62.75%)		
Vomiting	44(51.16%)	30(48.39%)	59(57.84%)		
Fainting	39(45.35%)	41(66.13%)	65(63.73%)		
Facial drooping	23(26.74%)	34(54.84%)	66(64.71%)		

The table represents the various signs and symptoms found in ischemic stroke patients. In age group 25-35 the most common symptom was generalized weakness. In 36-45 age group also the most common symptom was generalized weakness. However in 46-55 age group the most common symptom found was facial drooping.

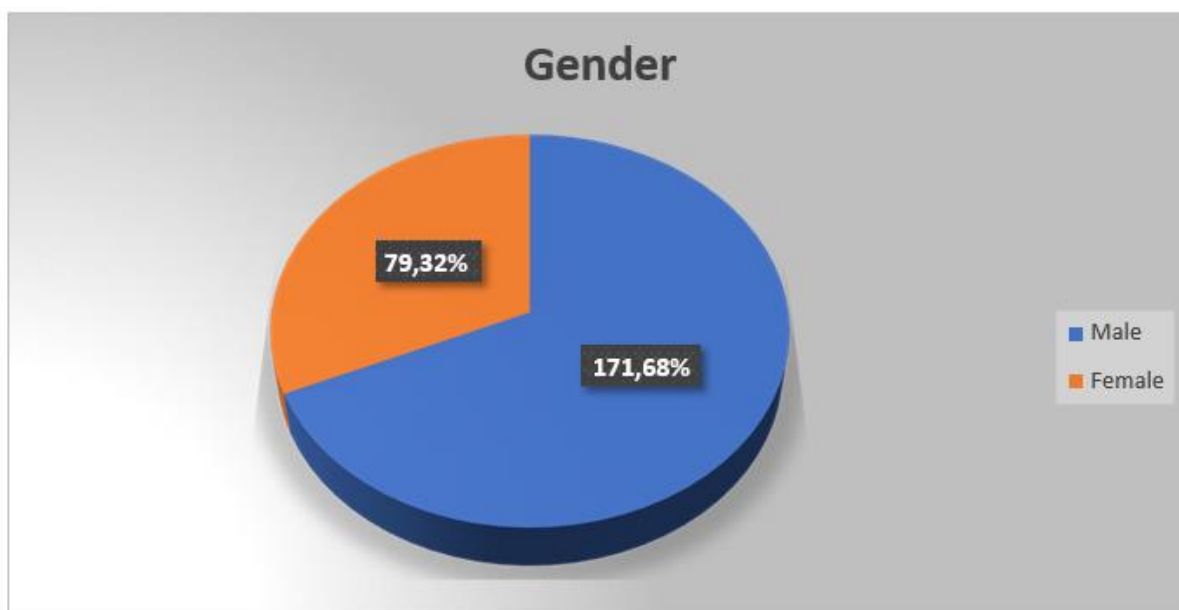


FIGURE.1 Gender Distribution

The above pie chart represents the number of males (68%) and the number of females (32%) included in the study.

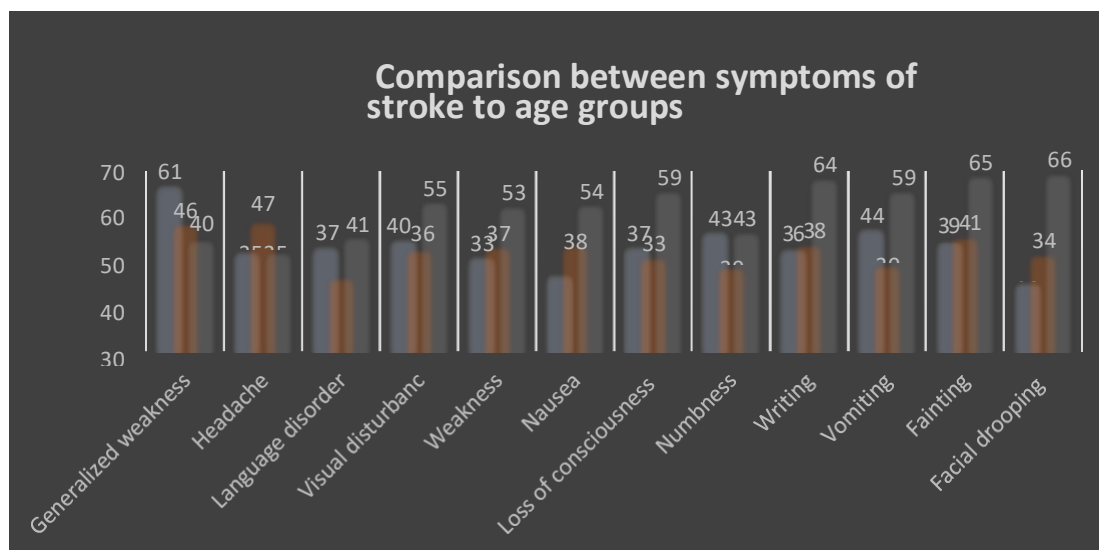


FIGURE. 2 Comparison between symptoms of ischemic stroke to age groups

In the graph it is evident that generalized weakness is the most common symptom among 25-35 years age group, while headache is found commonest in 35-45 years age group. In the 45-55 years age group the commonest symptom found was facial drooping.

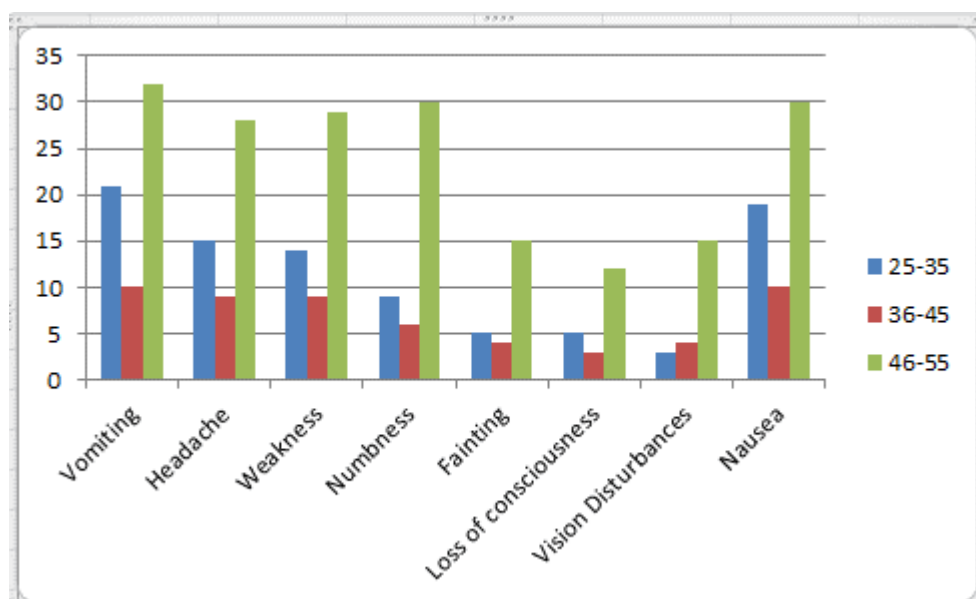


FIGURE 3: Comparison of different age related signs and symptoms in hemorrhagic stroke.

The graph shows different age related signs and symptoms observed in haemorrhagic stroke of which vomiting was the highest in 25-35 age group. It was found that nausea and vomiting were common in 36-45 age group and patients in 46-55 also reported vomiting as the most common symptom.

TABLE NO.3 Comparison between type of stroke and age group (n=250)

Age Group	Hemorrhagic stroke	Ischemic stroke	t value	p value
25-35	32(37.21%)	54(62.79%)	7.442	0.0242(S)
36-45	16(25.81%)	46(74.19%)		
46-55	48(47.06%)	54(52.94%)		

The above table 3 shows in 25-35 age group subjects were having 37.21% Hemorrhagic stroke and 62.79% Ischemic stroke, 36-45 age group 25.81% Hemorrhagic stroke and 74.19% Ischemic stroke and 46-55 age group 47.06% Hemorrhagic stroke and 52.94% Ischemic stroke.

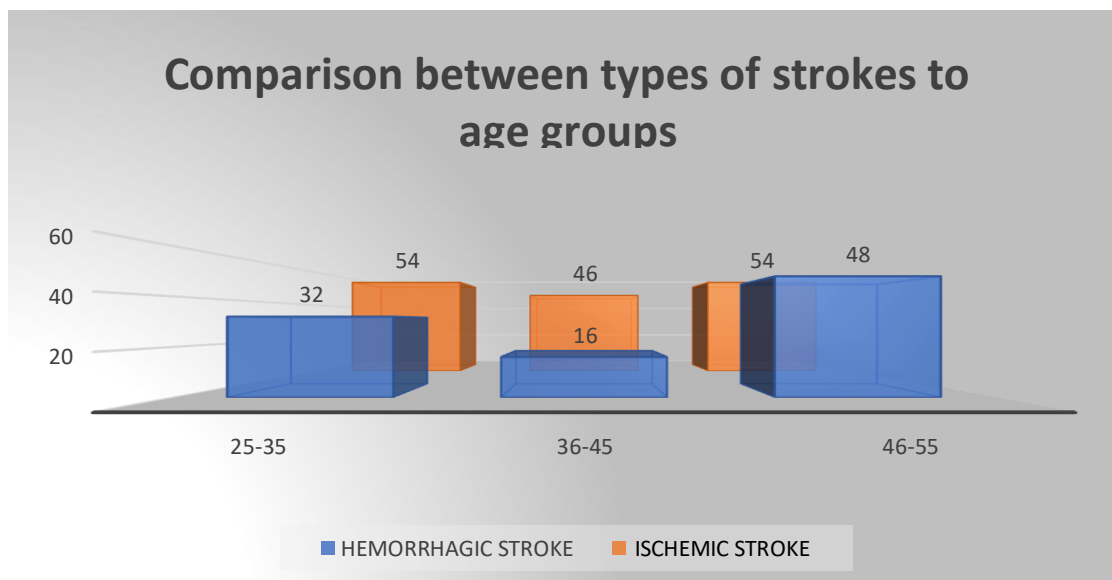


FIGURE.4 Comparison between types of strokes to age groups

The above graph shows the number of patients in different age groups according to the type of stroke.

4. Discussion

In this observational study, we investigated the variations in patient-reported stroke symptoms based on sex and age within a stroke population. As age increased, we observed a decrease in the frequency of reported sensory changes (an atypical symptom) and upper extremity paresis (a typical symptom). The impact of stroke is particularly pronounced in the elderly. Our analysis revealed that older patients displayed a distinct pattern of stroke risk factors and comorbid conditions compared to their younger counterparts. Specifically, older patients hospitalized with ischemic stroke exhibited a higher prevalence of atrial fibrillation, hypertension, prior coronary heart disease, and prior history of stroke or transient ischemic attack (TIA), along with a lower prevalence of smoking. Additionally, they presented with more severe stroke deficits upon admission.²

The chain of survival and acute treatment approaches for stroke and transient ischemic attack (TIA) bear significant resemblances to those of acute coronary syndrome. Timely recognition and appropriate action upon acute symptoms are crucial for reducing morbidity and mortality, ensuring prompt and accurate revascularization therapy. In our investigation, we noted that female patients were more likely to present with atypical symptoms, such as loss of consciousness and nausea/vomiting, at the onset of stroke. Healthcare professionals identified these symptoms. Previous research indicated that females experienced longer hospital arrival times, leading to a decreased likelihood of receiving reperfusion therapy, primarily due to delays dependent on the patient. However, after adjusting for age, stroke severity, and cohabitant status, the sex disparity in prehospital delay disappeared. In our analysis, 36% of both women and men arrived within 180 minutes from symptom onset, and we did not observe a significant sex difference in timely hospital arrival within this timeframe. Having a bystander or cohabitant present at the onset of stroke has previously been linked to an increased likelihood of stroke recognition and immediate contact with emergency medical services. Nevertheless, the perception of symptom severity was associated with timely hospital arrival in other studies. Lack of information, ignorance of risk factors, and the inability to manage such risk factors may contribute to this effect. Even when patients understand the risk factors, they may not attribute them to stroke causation or be able to afford the cost of medications.⁷⁻⁹

Additionally, since managing stroke risk factors often requires lifelong adherence, many patients may fail to comply adequately. These factors may have various impacts on the high prevalence of stroke. Consistent with previous studies, cardiac diseases such as atrial fibrillation, coronary disease, and heart failure were commonly associated with ischemic stroke rather than hemorrhagic strokes. Atrial fibrillation, a significant source of

cardioembolic stroke, was frequently observed in patients, consistent with other research. Patients with atrial fibrillation were less likely to experience hemorrhagic stroke than ischemic stroke, aligning with the pathophysiology of stroke, where atrial fibrillation is a common cause of cardioembolic stroke that occludes cerebral arteries, favoring ischemic stroke over hemorrhagic stroke. This finding is consistent with studies conducted in Zambia and elsewhere. For instance, a study by Kuriakose et al. reported that vomiting may favor hemorrhagic stroke, potentially serving as an indicator of stroke diagnosis in settings where brain imaging is not readily available.⁹

The outcomes of admissions in our study indicate favorable results, particularly in terms of the number of patients successfully treated and discharged or referred to other facilities. This positive outcome can be attributed to several factors, including the availability of CT scan imaging and ECG for all our patients. However, a notable concern arises from the high number of patients who left against medical advice (DAMA). Some DAMA patients lacked the financial means to cover the required services, while others lost hope, especially in cases of slow recovery, and opted to either pass away at home or seek treatment from alternative medical practitioners. The decision to DAMA often stemmed from incorrect cultural or religious beliefs, with some attributing their illness to spiritual attacks. Thus, there is a pressing need for effective and sustained health education and communication strategies to improve early presentation and access to quality healthcare services in our community. Previous studies have shown that younger stroke patients and those with higher levels of education tend to possess greater stroke knowledge, highlighting the importance of educational initiatives in enhancing healthcare awareness.¹⁰

Educating stroke patients and their caregivers should follow a well-structured approach, considering that stroke is a chronic disease and the information needed evolves over time. Healthcare providers should also consider important factors influencing the behavior of stroke patients, including social, cultural, and economic contexts, as these aspects significantly impact patients' lifestyles and disease awareness.

Different stroke recognition instruments must be tailored to their intended audience. For public education and campaigns, it may be necessary to focus on promoting a select number of clinical signs, while additional assessments such as glucose measurements to rule out non-strokes or specific stroke subgroups are best reserved for paramedic use or triage purposes in hospitals.¹¹⁻¹²

Implementing strategies to increase physical activity levels and raise awareness about the importance of sleep hygiene can contribute to reducing the incidence of stroke.¹³ Given India's vast and diverse population, addressing the burden of stroke requires a multifaceted approach that takes into account regional risk factors and variations in healthcare infrastructure.¹⁴⁻¹⁵ This tailored approach is essential for effectively managing stroke across different communities and regions.

5. Conclusion

The study is on stroke patients having different types of strokes such as ischemic and hemorrhagic. The goal of the study is to find out the which symptom is severe, moderate, and mild according to different age group. For the age group between 25-55 years, generalized weakness emerges as the predominant symptom of ischemic stroke, consistent across all age brackets. However, distinct signs and symptoms manifest within specific age ranges. In the 25-35 age group, common symptoms include generalized weakness, vomiting, and visual disturbances. For individuals aged 36-45, symptoms such as headache, generalized weakness, and fainting are prevalent. In the 46-55 age group, signs such as facial drooping, fainting, difficulty in writing, loss of consciousness, and vomiting are frequently observed. Lack of awareness often leads many individuals to disregard these symptoms, mistakenly deeming them less significant. While in haemorrhagic stroke in age group 25-35 the common symptoms were vomiting, nausea and headache. In age group 36-45 it was found similar to the previous age bracket. While in 46-55 age group vomiting, numbness and generalized weakness were commonly found.

6. Acknowledgement

I have dedicated considerable effort to this project, but its success would not have been achievable without the generous support and assistance of numerous individuals. I extend my heartfelt gratitude to all of them. I am particularly indebted to Dr. Suraj Kanase for their invaluable guidance, continuous supervision, and provision of essential project information. Additionally, I am grateful for their unwavering support throughout the project's completion. Dr. Kanase's mentorship and willingness to share their extensive knowledge significantly contributed to our comprehension of the project. Furthermore, I extend my thanks and appreciation to my

colleagues who collaborated in the project development, as well as to those individuals who generously offered their expertise and assistance.

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