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Assessment of Stroke Awareness and Knowledge of Risk Factors among Patients, Relatives, and Caregivers in a Tertiary Care Center in India: A Cross-Sectional Study

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ABSTRACT

Background: Stroke is a leading cause of disability and mortality worldwide, particularly in low- and middle-income countries like India. Early recognition of stroke symptoms and risk factors is crucial for timely medical intervention and improved patient outcomes.

Methods: A cross-sectional study was conducted at Index Medical College from January to June 2024. The study included 460 participants, comprising 200 stroke patients, 130 relatives, and 130 caregivers. Participants were interviewed using a structured questionnaire to assess their knowledge of stroke symptoms, risk factors, and the affected organ. Data were analyzed using Epi Info, and logistic regression was employed to identify predictors of stroke awareness.

Results: The mean age of participants was 53.5±14.1 years, with a male predominance of 50%. Paralysis of one side of the body was the most recognized stroke symptom (65%), and hypertension was the most identified risk factor (60%). Higher education (OR 3.5, 95% CI 2.0–6.1, p<0.001), younger age (OR 2.1, 95% CI 1.2–3.7, p=0.004), and urban residence (OR 1.8, 95% CI 1.1–2.9, p=0.02) were significant predictors of stroke awareness. Late arrivers (after 6 hours of stroke onset) had significantly lower awareness of stroke symptoms and risk factors compared to early arrivers (p<0.001).

Conclusion: The study revealed significant gaps in stroke awareness among the study population, particularly among less educated and rural participants. These findings highlight the need for targeted educational interventions to improve stroke recognition and timely medical response, which could ultimately enhance stroke outcomes.

Key-words: Stroke, Awareness, Risk Factors, Symptoms, India, Education, Timely Intervention

INTRODUCTION

The WHO has said that stroke is the "incoming epidemic of the 21st century."

Given that stroke resulted in 12.2 million incident cases, 101 million prevalent cases, 143 million years of life lost due to disability, and 6.6 million deaths in 2019, this is hardly shocking [1]. One of the three countries in the Middle East and North Africa with the highest stroke prevalence in 2019 was reportedly the United Arab Emirates (UAE) [2].

The Ministry of Health and Prevention disclosed that in 2022, 50% of stroke patients were under the age of 45, in contrast to the global statistic indicating that 80% of

stroke patients were over 65 [3]. Even with great medical progress, stroke morbidity and mortality are still high [4-6]. It is linked to a significant healthcare cost burden, with estimates of up to US $721 billion in 2017 [7]. Furthermore, the worldwide trend of ageing is anticipated to elevate the total incidence of strokes. Additionally, there is an increased risk of various types of strokes associated with the prevalence of comorbidities, including diabetes, hypertension, congenital heart disease, and a history of prior stroke [8,9].

Early diagnosis of chronic illnesses such as stroke necessitates heightened awareness and knowledge. The World Health Organization has recognized the importance of leading efforts to enhance knowledge of medical conditions and associated risk factors. Epidemiological research indicates a positive correlation between higher health literacy and preventive actions, especially in the context of chronic non-communicable diseases [10,11]. People's attitudes and behaviors can be influenced by their knowledge level; conversely, unfavorable attitudes and behaviors may raise the risk of illness and the ensuing morbidity and death. When it comes to stroke, early symptom detection and prompt, effective treatment can improve people's prognoses [12].

Stroke is a prominent worldwide public health issue, making a substantial contribution to both disability and death, particularly in low- and middle-income nations such as India. According to estimates from the World Health Organisation, stroke ranks as the second most common cause of death globally and is a major contributor to long-term impairment [13]. In India, stroke incidence has been rising, with substantial implications for both individuals and the healthcare system [14]. Despite advancements in stroke management, including the availability of thrombolytic therapy, the effectiveness of these interventions largely depends on the timely recognition of stroke symptoms and the immediate seeking of medical attention [15].

However, awareness of stroke symptoms and risk factors remains critically low in many parts of the world, including India. Limited knowledge among patients, their relatives, and caregivers not only delays treatment but also exacerbates the long-term impacts of stroke on individuals and healthcare systems [16]. This study was conducted at Index Medical College, Indore, in 2024 to evaluate stroke awareness among patients, their relatives, and caregivers. The results provided insights into the current state of stroke awareness and identified areas for targeted public health interventions to improve outcomes.

MATERIALS AND METHODS

Study Design and Setting- This cross-sectional study was conducted at Index Medical College, Indore, from January to June 2024. The study included stroke patients, their relatives, and caregivers who were either admitted to the hospital or visited the outpatient department during the study period.

Sample Size- The sample size was calculated using the formula for estimating proportions in a population:

$$n=Z^2 \times p \times (1-p)/d^2$$

Where:
n=required sample size;
Z=Z value (1.96 for 95% confidence level);
p=estimated proportion of the population with stroke awareness (50%);
d=margin of error (5%).

The estimated proportion p was assumed to be 50%, as this provides the maximum sample size and is a common practice when no prior data is available [17]. This value of 50% is often used in studies where the prevalence of the variable of interest is unknown [18]. Substituting the values into the formula.
Considering a 10% non-response rate, the final sample size was adjusted to 423 participants. To ensure adequate power and account for potential dropouts, the sample size was rounded up to 460 participants.

Data Collection- A standardized questionnaire that skilled interviewers conducted was used to gather data. The questionnaire consisted of sections on demographic information, knowledge of stroke symptoms, risk factors, and the organs affected by stroke. The questionnaire was pretested on a sample of 25 participants to ensure clarity and relevance.

Inclusion Criteria
- Adults aged 18 years and older.
- Stroke patients (ischemic or hemorrhagic), relatives, or caregivers attending Index Medical College.
- Participants who provided informed consent.

Exclusion Criteria

- Patients with severe cognitive impairments or those unable to provide informed consent.
- Participants did not speak Hindi or English, as the questionnaire was only available in these languages.
- Relatives or caregivers who had not been involved in the care of the stroke patient for at least one month before the study.

Statistical Analysis- Software called Epi Info was used to enter and analyze data. The data were summarized using descriptive statistics, and the predictors of stroke awareness were found using logistic regression analysis. After calculating odds ratios (OR) and 95% confidence intervals (CI), statistical significance was determined at $p < 0.05$.

Ethical Considerations- The study protocol was reviewed and approved by the Institutional Ethics Committee of Index Medical College (Approval Number: IMC/EC/2024/017). Pre-inclusion in the study, all subjects provided written informed consent.

RESULTS

The study included 460 participants, comprising 200 stroke patients, 130 relatives, and 130 caregivers. The mean age of the participants was 53.5±14.1 years, with a slight male predominance (50%). Most of the participants were from urban areas (62%) and had secondary or higher education (63%). The detailed demographic characteristics of the participants are summarized in Table 1.

Table 1: Demographic Characteristics of Participants

Variable	Patients (%) (n=200)	Relatives (%) (n=130)	Caregivers (%) (n=130)	Total (%) (n=460)
Age (Mean±SD)	61.3±12.8	44.5±13.4	52.7±10.2	53.5±14.1
Gender Male	66	52	30	50
Female	34	48	70	50
Urban	70	55	60	62
Rural	30	45	40	38
Education Level				
Illiterate	20	10	5	12
Primary	30	25	20	25
Secondary	30	35	40	35
College and above	20	30	35	28

The participants' knowledge of stroke symptoms was assessed, and the findings are presented in Table 2. Paralysis of one side of the body was the most recognized symptom (65%), followed by difficulty speaking (50%) and severe headache with no known cause (42%). However, a significant proportion of participants did not know any stroke symptoms (15%).

Table 2: Knowledge of Stroke Symptoms Among Participants

Stroke Symptoms	Patients (%) (n=200)	Relatives (%) (n=130)	Caregivers (%) (n=130)	Total (%) (n=460)
Paralysis of one side of the body	60	65	70	65
Difficulty speaking	45	50	55	50
Sudden vision loss	30	25	40	32
Sudden confusion	35	30	45	37

Severe headache with no known cause	40	35	50	42
No knowledge of any symptoms	20	10	15	15

Participants' knowledge of stroke risk factors was similarly evaluated. Hypertension was the most recognized risk factor (60%), followed by diabetes (45%) and smoking (30%). The detailed results are shown in Table 3.

Table 3: Knowledge of Stroke Risk Factors Among Participants

Risk Factor	Patients (%) (n=200)	Relatives (%) (n=130)	Caregivers (%) (n=130)	Total (%) (n=460)
Hypertension	55	60	65	60
Diabetes	40	45	50	45
Smoking	25	30	35	30
High cholesterol	20	25	30	25
Physical inactivity	15	20	25	20
No knowledge of any risk factors	20	10	15	15

Logistic regression analysis was performed to identify predictors of stroke awareness among the participants. Higher education (OR 3.5, 95% CI 2.0–6.1, p<0.001), younger age (OR 2.1, 95% CI 1.2–3.7, p=0.004), and urban residence (OR 1.8, 95% CI 1.1–2.9, p=0.02) were significant predictors of stroke awareness. The detailed analysis is shown in Table 4.

Table 4: Predictors of Stroke Awareness (Logistic Regression Analysis)

Variable	OR (95% CI)	p-value
Higher Education	3.5 (2.0–6.1)	<0.001
Younger Age	2.1 (1.2–3.7)	0.004
Urban Residence	1.8 (1.1–2.9)	0.02
Male Gender	1.2 (0.8–1.9)	0.30
High Income	1.5 (0.9–2.5)	0.10

Participants who arrived at the hospital within 6 hours of stroke onset (early arrivers) had significantly better knowledge of stroke symptoms and risk factors compared to those who arrived later (p<0.001). Table 5 presents the comparison between early and late arrivers.

Table 5: Comparison of Stroke Awareness Between Early and Late Arrivers

Variable	Early Arrivers (n=220)	Late Arrivers (n=240)	p-value
Knowledge of Stroke Symptoms	70	50	<0.001
Knowledge of Stroke Risk Factors	65	45	<0.001
Timely Seeking Medical Help	75	40	<0.001

DISCUSSION

The findings of this study highlight a critical gap in stroke awareness among stroke patients, their relatives, and caregivers at Index Medical College, Indore. Despite the availability of effective treatments, such as thrombolysis, the lack of knowledge about stroke symptoms and risk factors significantly delays medical intervention, reducing the chances of favorable outcomes [19]. This study's results are consistent with other studies conducted in both developed and developing countries, where awareness of stroke remains suboptimal [20]. The findings also align with previous research conducted in India, demonstrating that stroke awareness is generally low, particularly in rural areas and among less educated populations [21].

The study revealed that higher education, younger age, and urban residence were significant predictors of better stroke awareness. These findings suggest that educational interventions should be tailored to target less educated, older, and rural populations to enhance stroke recognition and timely response [22]. Additionally, the significant difference in stroke awareness between early and late arrivers underscores the importance of public health campaigns focused on the early signs of stroke and the urgency of seeking medical help [23].

One of the key strengths of this study is the use of a large and diverse sample, which enhances the generalizability of the findings. However, the study's cross-sectional design limits the ability to establish causality between the predictors and stroke awareness. Furthermore, the hospital-based setting may not fully represent the general population, particularly those who do not seek medical attention for stroke symptoms [24].

CONCLUSIONS

This study underscores the urgent need for targeted educational interventions to improve stroke awareness, particularly among less educated, older, and rural populations. By enhancing knowledge of stroke symptoms and risk factors, public health efforts can lead to earlier medical intervention, improving outcomes for stroke patients in India.

Future research should consider community-based studies with larger sample sizes to confirm these findings and further explore the factors influencing stroke awareness in different population subgroups.

CONTRIBUTION OF AUTHORS

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