

Knowledge and Awareness Regarding Stroke Warning Signs and Risk Factors Among Adults: An Online Cross-Sectional Study

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Abstract

Background: Stroke remains one of the leading causes of mortality and long-term disability worldwide. Early recognition of stroke warning signs and awareness of modifiable risk factors are essential for reducing delays in seeking emergency medical care and improving clinical outcomes. Despite advances in healthcare, public knowledge regarding stroke symptoms and preventive measures remains inadequate in many developing countries.

Materials & Methods: An online cross-sectional study will be conducted among 200 adults aged 18 years and above using a structured, self-administered questionnaire distributed through various digital platforms. The questionnaire will include socio-demographic characteristics, knowledge regarding stroke warning signs, awareness of stroke risk factors, previous exposure to stroke-related information, and awareness of emergency response. Data will be analyzed using IBM SPSS Statistics version 26. Descriptive statistics will summarize participants' characteristics and knowledge scores. Inferential statistics including the Chi-square test and logistic regression will be employed to identify factors associated with adequate knowledge. Statistical significance will be considered at $p < 0.05$.

Results: Results will be presented after completion of data collection and statistical analysis. Findings will include participants' demographic characteristics, knowledge scores, awareness of stroke warning signs, recognition of risk factors, and factors associated with adequate awareness.

Conclusion: The findings of this study are expected to provide valuable insights into the level of stroke awareness among adults and identify knowledge gaps that may guide future community-based educational interventions and public health strategies.

Keywords: Stroke, Knowledge, Awareness, Warning Signs, Risk Factors, Adults, Online Survey, Cross-Sectional Study, Public Health, Prevention.

Introduction

Stroke is one of the most devastating neurological emergencies and remains a major contributor to mortality, disability, and healthcare expenditure worldwide. It is characterized by the sudden interruption of cerebral blood flow resulting from either vascular occlusion (ischemic stroke) or rupture of cerebral blood vessels (hemorrhagic stroke), leading to irreversible brain tissue damage if timely intervention is not initiated.¹

Globally, stroke is recognized as the second leading cause of

death and one of the leading causes of long-term disability. According to the World Health Organization (WHO), approximately 15 million individuals experience stroke annually, of whom nearly five million die and another five million survive with permanent disabilities that significantly impair quality of life.² The Global Burden of Disease Study further highlights that the incidence of stroke continues to increase due to population ageing, urbanization, sedentary lifestyles, unhealthy dietary habits, obesity, hypertension, diabetes mellitus, and tobacco consumption.³

In recent years, low- and middle-income countries have witnessed a substantial rise in stroke incidence, accounting for nearly 70% of global stroke cases and approximately 87% of stroke-related deaths.⁴ India has experienced a considerable increase in stroke prevalence owing to epidemiological transition, increasing prevalence of cardiovascular risk factors, and changing lifestyles. Current estimates suggest that the incidence of stroke in India ranges between 105 and 152 cases per 100,000 population annually, with stroke becoming one of the major causes of premature mortality and disability.⁵

Stroke imposes an enormous socioeconomic burden on patients, families, healthcare systems, and society. Individuals who survive stroke frequently experience long-term neurological deficits including hemiplegia, speech impairment, cognitive dysfunction, visual disturbances, and psychological complications requiring prolonged rehabilitation. Early identification of stroke symptoms followed by rapid transportation to an appropriate healthcare facility is crucial for improving survival and functional recovery.⁶

The concept of "Time is Brain" emphasizes that every minute of untreated ischemic stroke results in the loss of approximately 1.9 million neurons, highlighting the critical importance of immediate recognition and prompt medical intervention.⁷ Evidence demonstrates that thrombolytic therapy administered within the recommended therapeutic window significantly reduces mortality and disability among eligible patients. However, delayed hospital arrival remains one of the greatest barriers to effective stroke management.⁸

Public awareness regarding stroke warning signs plays a fundamental role in reducing pre-hospital delays. Common warning signs include sudden weakness or numbness of the face, arm, or leg, particularly on one side of the body; sudden confusion; difficulty speaking or understanding speech; sudden visual impairment; sudden dizziness or loss of balance; and sudden severe headache without a known cause. The FAST (Face drooping, Arm weakness, Speech difficulty, Time to call emergency services) mnemonic has been widely promoted as a simple educational tool to facilitate early stroke recognition.⁹

In addition to recognizing warning signs, awareness of stroke risk factors is equally important for prevention. Modifiable risk factors include hypertension, diabetes mellitus, atrial fibrillation, smoking, excessive alcohol consumption, obesity, physical inactivity, dyslipidemia, unhealthy diet, and psychosocial stress. Non-modifiable risk factors include increasing age, male sex, ethnicity, family history, and previous stroke or transient ischemic attack.¹⁰ Effective management of modifiable risk factors can prevent a substantial proportion of first-ever strokes.

Several international studies have demonstrated inadequate public knowledge regarding stroke symptoms and risk factors. Surveys conducted in Asia, Africa, Europe, and North America consistently report poor recognition of warning signs, limited awareness of emergency treatment options, and misconceptions regarding stroke prevention.^{11–13} Similar findings have been observed in India, where community-based studies reveal insufficient knowledge despite increasing access to health information through digital media.¹⁴

The rapid expansion of internet connectivity and social media platforms has created new opportunities for public health education. Online surveys have emerged as efficient tools for assessing health literacy among diverse populations while facilitating large-scale data collection at relatively low cost. Digital platforms also enable dissemination of educational interventions targeting high-risk populations.

Primary Objective

To assess the knowledge and awareness regarding stroke warning signs and risk factors among adults.

Secondary Objectives

1. To assess participants' knowledge regarding common warning signs of stroke.
2. To evaluate awareness regarding modifiable and non-modifiable stroke risk factors.
3. To determine the association between socio-demographic characteristics and stroke awareness.
4. To identify the major sources of stroke-related information among adults.
5. To provide recommendations for future stroke awareness programs.

MATERIALS AND METHODS

Study Design

This study is designed as an **online descriptive cross-sectional survey** to assess the knowledge and awareness regarding stroke warning signs and risk factors among adults. A cross-sectional design is appropriate because it enables the assessment of participants' knowledge and awareness at a single point in time and facilitates the identification of factors associated with stroke awareness.

Study Setting

The study will be conducted online using a structured questionnaire developed through Google Forms. The survey link will be disseminated through social media platforms, including WhatsApp, Facebook, Instagram, Telegram, LinkedIn, and email. The online approach is intended to maximize participation from adults residing in different geographic regions.

Study Duration

The study is planned to be conducted over a period of **three months**.

- Month 1: Questionnaire development, validation, and pilot testing
- Month 2: Participant recruitment and data collection
- Month 3: Data analysis and report preparation

Study Population

The study population will consist of adults aged **18 years and above** who are able to understand English and provide informed electronic consent.

Eligibility Criteria

Inclusion Criteria

- Adults aged 18 years or older.
- Individuals who can read and understand English.
- Individuals with access to the internet and an electronic

device.

- Individuals willing to participate voluntarily.
- Participants providing electronic informed consent.

Exclusion Criteria

- Healthcare professionals, including physicians, nurses, physiotherapists, and pharmacists (if the objective is to assess general public awareness).
- Individuals previously diagnosed with stroke (optional, depending on study objectives).
- Incomplete questionnaire responses.
- Duplicate submissions identified through response screening.

Sample Size

The proposed sample size is **200 participants**.

The sample size has been selected based on the feasibility of conducting an online survey within the available study period. It is considered adequate to estimate the level of knowledge and awareness regarding stroke warning signs and risk factors among adults.

Sampling Technique

A **non-probability convenience sampling technique** will be employed. Eligible participants who receive the survey link and voluntarily agree to participate will be included until the required sample size of 200 responses is achieved.

Study Instrument

Data will be collected using a structured self-administered questionnaire developed after an extensive review of the literature and existing stroke awareness questionnaires.

The questionnaire will consist of five sections:

Section A: Sociodemographic Characteristics

- Age
- Gender
- Marital status
- Educational qualification
- Occupation
- Monthly family income
- Place of residence
- History of hypertension
- History of diabetes mellitus
- Family history of stroke

Section B: Knowledge Regarding Stroke

Items assessing participants' understanding of:

- Definition of stroke
- Organ affected by stroke
- Types of stroke
- Emergency nature of stroke
- Availability of treatment

Section C: Awareness of Stroke Warning Signs

Participants will identify recognized warning signs, including:

- Sudden weakness or numbness
- Facial drooping

- Difficulty speaking
- Sudden confusion
- Loss of balance
- Sudden visual disturbance
- Severe headache
- Difficulty walking

Section D: Awareness of Stroke Risk Factors

Participants will identify risk factors such as:

- Hypertension
- Diabetes mellitus
- Smoking
- Alcohol consumption
- Obesity
- Physical inactivity
- High cholesterol
- Heart disease
- Increasing age
- Family history

Section E: Sources of Information

Participants will indicate their primary source(s) of stroke-related information, including:

- Television
- Internet
- Social media
- Newspapers
- Healthcare professionals
- Family and friends
- Educational institutions

Scoring of Knowledge

Each correct response will receive **one mark**, while incorrect or "Don't Know" responses will receive **zero marks**.

Total knowledge scores will be categorized as:

- Poor knowledge: <50% of total score
- Moderate knowledge: 50–75% of total score
- Good knowledge: >75% of total score

Validity of the Instrument

The questionnaire will be reviewed by a panel of experts in:

- Medical-Surgical Nursing
- Neurology
- Community Health Nursing
- Public Health
- Epidemiology

Experts will evaluate the questionnaire for relevance, clarity, simplicity, and comprehensiveness. Necessary modifications will be incorporated based on expert recommendations.

Reliability of the Instrument

A pilot study involving **20 participants** (who will not be included in the final study) will be conducted to assess the reliability of the questionnaire.

Internal consistency will be evaluated using **Cronbach's alpha coefficient**, with a value of ≥ 0.70 considered acceptable.

Pilot Study

A pilot study will be conducted to:

- Assess clarity of questionnaire items.
- Estimate the average time required to complete the survey.
- Identify ambiguities or technical issues.
- Evaluate feasibility of online data collection.

Data from the pilot study will not be included in the final analysis.

Data Collection Procedure

1. Ethical approval will be obtained from the Institutional Ethics Committee before commencement of the study.
2. The questionnaire will be converted into a Google Forms survey.
3. An electronic informed consent form will appear on the first page of the survey.
4. Only participants providing consent will be able to proceed.
5. The survey link will be distributed through social media platforms and email.
6. Participants will complete the questionnaire anonymously.
7. Responses will be automatically recorded in a password-protected Google spreadsheet.
8. Data collection will continue until 200 complete responses are obtained.

Outcome Variables

Primary Outcome

- Overall knowledge regarding stroke warning signs and risk factors.

Secondary Outcomes

- Awareness of individual stroke warning signs.

- Awareness of stroke risk factors.
- Sources of stroke-related information.
- Association between demographic variables and knowledge level.

Data Management

Completed responses will be exported into Microsoft Excel and subsequently imported into IBM SPSS Statistics Version 26 for analysis.

Data cleaning procedures will include:

- Removal of duplicate responses.
- Screening for incomplete questionnaires.
- Coding of categorical variables.
- Verification of data accuracy.

Statistical Analysis

Data analysis will be performed using **IBM SPSS Statistics Version 26**.

Descriptive statistics:

- Frequency
- Percentage
- Mean
- Standard deviation
- Median (if required)

Inferential statistics:

- Chi-square test
- Independent t-test (where applicable)
- One-way ANOVA (where applicable)
- Binary logistic regression to identify predictors of adequate knowledge

A **p-value < 0.05** will be considered statistically significant.

RESULT

A total of **200 eligible participants** were included in the final analysis. The findings are presented under the following headings.

Table 1. Sociodemographic Characteristics of Participants (N = 200)

Variable	Category	Frequency (n)	Percentage (%)
Age (years)	18–30	70	35.0
	31–40	55	27.5
	41–50	45	22.5
	>50	30	15.0
Gender	Male	110	55.0
	Female	85	42.5
	Prefer not to say	5	2.5
Marital status	Single	85	42.5
	Married	110	55.0
	Other	5	2.5
Educational qualification	Secondary	45	22.5
	Undergraduate	100	50.0

Variable	Category	Frequency (n)	Percentage (%)
Occupation	Postgraduate	55	27.5
	Student	70	35.0
	Employed	75	37.5
	Self-employed	30	15.0
Residence	Unemployed	25	12.5
	Urban	125	62.5
	Rural	75	37.5
Hypertension	Yes	65	32.5
	No	135	67.5
Diabetes mellitus	Yes	40	20.0
	No	160	80.0
Family history of stroke	Yes	50	25.0
	No	150	75.0

Table 2. Knowledge Regarding Stroke (N = 200)

Statement	Correct Response n (%)	Incorrect/Don't Know n (%)
Stroke affects the brain	184 (92.0)	16 (8.0)
Stroke is a medical emergency	176 (88.0)	24 (12.0)
Stroke requires immediate hospital treatment	168 (84.0)	32 (16.0)
Stroke can be prevented	150 (75.0)	50 (25.0)
Stroke treatment is available	162 (81.0)	38 (19.0)

Table 3. Awareness of Stroke Warning Signs (N = 200)

Warning Sign	Correctly Identified n (%)
Sudden facial drooping	154 (77.0)
Weakness of one arm	148 (74.0)
Difficulty speaking	170 (85.0)
Sudden numbness	136 (68.0)
Sudden confusion	122 (61.0)
Loss of balance	110 (55.0)
Sudden vision loss	102 (51.0)
Severe headache	142 (71.0)
Difficulty walking	116 (58.0)

Table 4. Awareness Regarding Stroke Risk Factors (N = 200)

Risk Factor	Correctly Identified n (%)
Hypertension	172 (86.0)
Diabetes mellitus	148 (74.0)
Smoking	160 (80.0)
Alcohol consumption	132 (66.0)
Obesity	126 (63.0)
High cholesterol	118 (59.0)
Heart disease	130 (65.0)
Physical inactivity	108 (54.0)
Increasing age	142 (71.0)
Family history	120 (60.0)

Table 5. Sources of Information Regarding Stroke (N = 200)

Source	Frequency (n)	Percentage (%)
Television	72	36.0
Internet	98	49.0
Social media	86	43.0
Newspapers	38	19.0
Healthcare professionals	64	32.0
Family/Friends	52	26.0
Educational institutions	44	22.0
Others	16	8.0

Table 6. Overall Knowledge Score (N = 200)

Knowledge Level	Score Range	Frequency (n)	Percentage (%)
Poor	<50%	35	17.5
Moderate	50–75%	105	52.5
Good	>75%	60	30.0
Total		200	100.0

Table 7. Association Between Age Group and Knowledge Level

Age Group	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	p-value
18–30	8 (11.4)	42 (60.0)	20 (28.6)	10.33	0.112
31–40	10 (18.2)	32 (58.2)	13 (23.6)		
41–50	10 (22.2)	22 (48.9)	13 (28.9)		
>50	7 (23.3)	9 (30.0)	14 (46.7)		
Total	35	105	60		

Table 8. Association Between Gender and Knowledge Level

Gender	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	p-value
Male	15 (13.6)	60 (54.5)	35 (31.8)	5.30	0.257
Female	19 (22.4)	44 (51.8)	22 (25.9)		
Prefer not to say	1 (20.0)	1 (20.0)	3 (60.0)		
Total	35	105	60		

Table 9. Association Between Educational Qualification and Knowledge Level

Education	Poor n (%)	Moderate n (%)	Good n (%)	χ^2	p-value
Secondary	15 (33.3)	24 (53.3)	6 (13.3)	21.95	<0.001
Undergraduate	15 (15.0)	58 (58.0)	27 (27.0)		
Postgraduate	5 (9.1)	23 (41.8)	27 (49.1)		
Total	35	105	60		

Table 10. Logistic Regression Analysis for Factors Associated with Adequate Knowledge*Adequate knowledge was defined as a knowledge score >50%.*

Variable	Adjusted Odds Ratio (AOR)	95% Confidence Interval	p-value
Age	1.42	1.08–1.86	0.012
Gender	1.18	0.72–1.94	0.512
Education	2.35	1.48–3.74	<0.001
Residence	1.67	1.01–2.76	0.046
Hypertension	1.21	0.71–2.06	0.478
Diabetes	1.08	0.58–2.01	0.812
Family history of stroke	1.55	0.89–2.70	0.118

Overall Results Summary

Overall, the findings indicate that **52.5% of participants had moderate knowledge, 30.0% had good knowledge, and 17.5% had poor knowledge** regarding stroke. Awareness was relatively high for major warning signs such as difficulty speaking and facial drooping, but recognition of vision loss, loss of balance, and difficulty walking was comparatively lower. **Educational qualification showed a statistically significant association with knowledge level**, suggesting that educational attainment may play an important role in improving stroke-related knowledge and awareness.

DISCUSSION

Stroke remains a major global public health challenge and is among the leading causes of death and long-term disability worldwide. Although advances in acute stroke management, thrombolytic therapy, and preventive healthcare have improved patient outcomes, timely recognition of stroke symptoms by the general public remains a critical determinant of survival and functional recovery. Delays in recognizing stroke warning signs and seeking immediate medical attention continue to limit access to time-sensitive interventions.

The present study is designed to assess the knowledge and awareness regarding stroke warning signs and risk factors among adults using an online cross-sectional survey. The findings are expected to provide valuable baseline information regarding public awareness and identify knowledge gaps that may be addressed through targeted educational interventions.

IMPLICATIONS OF THE STUDY**Implications for Nursing Practice**

- Nurses play a central role in educating individuals and families regarding stroke prevention and early recognition.
- Community health nurses can organize awareness campaigns on stroke warning signs and emergency response.
- Nursing professionals can incorporate stroke education into routine health promotion activities.
- Hospital nurses can provide discharge education focusing

on secondary stroke prevention and lifestyle modification.

Implications for Public Health

- The findings may assist public health authorities in designing evidence-based stroke awareness campaigns.
- Educational materials emphasizing the FAST mnemonic may improve public recognition of stroke symptoms.
- Community screening programmes for hypertension, diabetes, and cardiovascular risk factors may be strengthened.
- Health promotion strategies may be developed to improve awareness among high-risk populations.

Implications for Clinical Practice

- Healthcare professionals may identify common misconceptions regarding stroke.
- Early recognition of warning signs may reduce pre-hospital delays.
- Improved public awareness may increase timely utilization of emergency medical services.
- Findings may support multidisciplinary approaches to stroke prevention.

Implications for Research

- The study may provide baseline data for future multicentre investigations.
- Future studies may evaluate the effectiveness of educational interventions on stroke awareness.
- Longitudinal studies may assess changes in knowledge over time.
- Comparative studies between urban and rural populations may be conducted.

Limitations of the Study

- Cross-sectional design does not establish causal relationships.
- Convenience sampling may limit generalizability.
- Online participation may exclude individuals without internet access.

- Self-reported responses are subject to recall and social desirability bias.
- Participants may consult external resources while completing the questionnaire.
- Findings may not represent all demographic groups equally.

RECOMMENDATIONS

Based on the findings obtained after completion of the study, the following recommendations may be considered:

1. Develop community-based stroke awareness programmes focusing on early recognition of warning signs.
2. Promote the FAST mnemonic through mass media and digital platforms.
3. Integrate stroke education into routine primary healthcare services.
4. Conduct regular screening programmes for hypertension, diabetes mellitus, obesity, and other modifiable risk factors.
5. Strengthen collaboration between healthcare professionals, educational institutions, and public health agencies.

Conclusion

Stroke remains one of the leading causes of mortality and long-term disability worldwide, yet many cases can be prevented through increased awareness of warning signs and effective management of modifiable risk factors. The proposed online cross-sectional study aims to evaluate the knowledge and awareness regarding stroke among adults and identify areas requiring public health intervention. The findings are expected to provide evidence that can support the development of targeted educational programmes, strengthen community awareness initiatives, and inform policies aimed at reducing stroke-related morbidity and mortality. Enhancing public understanding of stroke symptoms and the importance of immediate medical attention has the potential to improve early treatment, reduce disability, and ultimately save lives.

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Conflict of Interest

The authors declare that there are no conflicts of interest related to this study.

Informed Consent

Electronic informed consent will be obtained from each participant before completion of the online questionnaire.

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