RESEARCH PAPER

Awareness and Preventive Behaviours of Stroke Among Hypertensive Patients

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ABSTRACT

Background

Stroke is a leading cause of mortality and disability worldwide, with hypertension recognized as its most significant modifiable risk factor. This study aimed to assess the awareness and preventive behaviour regarding stroke among patients with hypertension in selected hospitals in Chennai.

Methods

A descriptive correlational design was adopted with 100 hypertensive patients recruited through consecutive sampling. Data were collected using reliable, pretested and validated tools such as structured knowledge questionnaire and a preventive behavior checklist. Statistical analysis included descriptive measures, correlation testing, and association with demographic and clinical variables using chi square test.

Results

More than half of the participants demonstrated moderately adequate knowledge (54%), while 30% had adequate knowledge and 16% required improvement with Mean score of 13.89/20 ± 3.61. Regarding preventive behaviour toward stroke among hypertensive patients was largely inadequate, with 55% demonstrating poor behaviour, 43% average, and only 2% good with Mean score of 48.87/60 ± 13.41. A weak positive correlation was observed between awareness and preventive behavior, though not statistically significant ($p>0.05$). Significant associations were found between awareness and knowledge ($p<0.01$), and preventive behaviour with age, gender, and family income ($p<0.001$). Clinical variables such as BMI was significantly associated with awareness, while diastolic BP was associated with preventive behavior.

Conclusion

Preventive behaviour toward stroke among hypertensive patients was largely inadequate despite moderately adequate awareness. Nurses play a vital role in bridging this gap by strengthening awareness and promoting effective preventive practices to reduce stroke risk in this high risk population.

Keywords: Hypertension; Stroke prevention; Awareness; Preventive behavior; Patient education

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Introduction

Stroke is a leading cause of death and disability worldwide, with hypertension recognized as its most

significant modifiable risk factor. According to the World Health Organization, nearly 15 million people suffer a stroke annually, with five million deaths and another five million left permanently disabled [1]. Hypertension contributes substantially to premature mortality and long-term disability, making it a critical public health concern [2].

Globally, hypertension affects more than 1.28 billion adults aged 30–79 years, with two-thirds living in low- and middle-income countries where awareness and preventive practices are often inadequate [3]. Recent data highlight that stroke incidence has doubled in low- and middle-income countries over the past four decades, while high-income countries report declines due to improved awareness and preventive strategies [4].

In India, hypertension prevalence ranges between 12% and 21%, with urban rates estimated at 25% compared to 10% in rural areas [5]. The National Family Health Survey-5 (NFHS-5) reported hypertension prevalence of 24% in men and 21% in women, reflecting a rising trend compared to previous years [6]. Chennai alone records nearly 10,000 new stroke cases annually, underscoring the urgent need for preventive interventions [7].

Preventive behaviors such as weight management, regular physical activity, moderation of alcohol intake, and dietary modifications are proven to reduce stroke risk [8]. However, recent Indian studies reveal that more than 60% of hypertensive patients lack adequate awareness of stroke risk factors and warning signs, leading to delayed medical intervention and poor outcomes [9].

Given the rising prevalence of hypertension and its strong association with stroke, this study was undertaken to assess the awareness and preventive behaviors among hypertensive patients in selected hospitals in Chennai. Patients with hypertension face significant challenges in preventing complications such as stroke, which is one of the leading causes of death and disability worldwide. Despite hypertension being the most important modifiable risk factor, awareness among patients is often inadequate, leading to delayed recognition of symptoms and poor preventive practices [10]. Globally, more than 1.28 billion adults are affected by hypertension, with two-thirds residing in low- and middle-income countries where access to preventive care and education is limited [11].

In India, hypertension prevalence ranges between 12–21%, with urban rates higher than rural, and stroke incidence continues to rise, particularly in younger populations [12]. Chennai alone reports nearly 10,000 new stroke cases annually, underscoring the urgent need for effective awareness and preventive strategies [13]. Lifestyle modifications such as weight control, regular physical activity, reduced salt intake, and moderation of alcohol consumption are proven to reduce stroke risk [14]. However, studies reveal that more than 60% of hypertensive patients lack adequate knowledge of stroke risk factors and warning signs, resulting in poor self-care and delayed medical intervention [15].This study addresses a critical gap in stroke prevention by assessing the awareness and preventive behaviors among hypertensive patients. By identifying knowledge deficits and behavioral patterns, the findings can inform nursing-led educational interventions that empower patients to adopt healthier practices, ultimately reducing stroke risk and improving quality of life.

Aim of the Study

The aim of this study is to assess the awareness and preventive behaviors of stroke among patients with hypertension in selected hospitals in Chennai, thereby identifying gaps in knowledge and practice and guiding targeted interventions to reduce stroke risk.

Methods

Research Approach and Design: A cross sectional, descriptive correlational research design was employed to assess the awareness and preventive behaviors of stroke among patients with hypertension at selected hospitals in Chennai. This design was chosen to evaluate both knowledge levels and preventive practices, as well as their associations with demographic and clinical variables

Study Setting: The research was conducted at Apollo Hospital, Chennai, which provides specialized care for patients with hypertension and related cardiovascular conditions

Population and Sample: The target population comprised patients diagnosed with hypertension attending outpatient departments at the selected hospital. Participants were selected based on specific inclusion and exclusion criteria to ensure representativeness.

Sample Size: 100 patients (with known case of Hypertension)

Sampling Technique: Consecutive sampling method was used to recruit participants

Inclusion Criteria

- Patients diagnosed with hypertension by Physician (systolic BP ≥140 mmHg or diastolic BP ≥90 mmHg).

- Patients willing to participate and provide informed consent.

Exclusion Criteria

- Patients with cognitive impairment or unable to respond to the questionnaire.
- Patients unwilling to provide informed consent.

Variables

- **Study Variables:** Awareness and preventive behaviour regarding stroke.
- **Attribute Variables**
  - **Demographic Variables:** Age, sex, education, occupation, family income, residence, type of family.
  - **Clinical Variables:** BMI, systolic BP, diastolic BP, duration of illness, medication adherence, comorbidities.

Data Collection Instruments

Data were collected using a self-administered questionnaire through interview method. The tools included:

- **Demographic Proforma:** Captured age, gender, education, occupation, family income, type of family, dietary habits, personal habits, family history of hypertension, and prior information regarding stroke.
- **Clinical Proforma:** Recorded weight, height, BMI, heart rate, systolic and diastolic blood pressure, duration of illness, comorbidities and their duration, family history of comorbidities, current medications, daily salt intake, smoking and alcohol habits, blood sugar, and cholesterol levels.
- **Structured Knowledge Questionnaire:** Comprised 20 multiple-choice items on stroke awareness (general information, causes, management, and prevention). Each correct response scored 1 point; maximum score 20. Scores were interpreted as:
  - 16–20 (>75%): Adequate knowledge
  - 10–15 (51–75%): Moderately adequate knowledge
  - <10 (<50%): Needs improvement
- **Preventive Health Behavior Rating scale:** Included 20 items on diet, physical activity, medication adherence, healthy habits, and follow-up. Rated on a 4-point scale (Always=4 to Rarely/Never=1). Obtainable score is 20-80. Scores were interpreted as:
  - 66–80 (75–100%): Good preventive behaviour
  - 50–65 (50–74%): Average preventive behaviour
  - 20 – 49 (<50%): Poor preventive behaviour

Validity and Reliability of Tools

The tools were reviewed by subject experts in nursing and medical sciences to establish content validity. Reliability was tested through pilot study administration, and necessary modifications were made to ensure clarity, accuracy, and consistency of responses

Data Collection Procedure: Data were collected through face-to-face interviews using the structured tools. Responses were coded, verified, and analysed using descriptive and inferential statistics to determine levels of awareness, preventive practices, correlations, and associations with demographic and clinical variables

RESULTS

Table 1: Frequency and Percentage Distribution of Demographic Variables of Patients with Hypertension. (N =100)

Variables	Categories	f & %
Age in years	20-30	12
	31-40	39
	41-50	25
	>50	24
Gender	Male	53
	Female	47
Educational qualification	Illiterate	5
	Primary education	2
	Secondary	7
	Higher Secondary	8
	Graduate	48
	Postgraduate	30
Occupation	Employee	49
	Self-employed/ business	9
	Housewife (if female)	18
	Retired	14
	Unemployed	9
	Housewife (if female)	18
	Retired	14
	Unemployed	9
Monthly Family Income	≤10,000	28
	10,001 – 30,000	22
	30,001 – 50,000	29
	≥50,001	21

Data presented in Table 1 shows that, less than half of them were aged 31-40 years (39%), graduates (48%), employed (49%), and their family income was between Rs. 30001- 50000 (29%). Majority of them were residing in the semi-urban area (65%), moderate workers (69%), and had mixed dietary habits (80%). Around half of them were from joint family (50%), were males (53%) and 33 % of them had previous information regarding stroke through self- reading.

Table 2: Frequency and Percentage Distribution of Clinical Variables of Patients with Hypertension (N=100)

Clinical Variables	f & %
Body Mass Index(kg/m2)	
Underweight (<18)	2
Normal (18.5-23)	56
Overweight (23.1-25)	35
Obesity (more than 25)	7
Systolic Blood Pressure	
80 – 120 mm hg	31
121 – 150 mm hg	60
> 150 mm hg	9

Diastolic Blood Pressure	
60 – 80 mm hg	60
81 – 100 mm hg	34
> 100 mm hg	6
Duration of illness	
< 6 months	57
6 - 11months	24
12 - 24 months	13
>24 months	6
Co-morbidity	
Diabetes mellitus	23
Rheumatic heart disease	8
Coronary heart disease	0
Rheumatic valvular heart disease	0
Renal failure	0
Liver failure	2
Thyroid problem	3
Others, if any specify	0
Daily salt intake	
Half teaspoon	44
One teaspoon	45
More than one teaspoon	11
Smoking Habit	
Yes	6
No	94
Abstinent from smoking (currently)	0
Alcohol intake	
Yes	9
No	87
Currently abstinent	4
Cholesterol level	
< 200 mg / dl	98
> 200 mg/dl	2
Random Blood sugar level	
< 70 mg/dl	0
70 – 140 mg /dl	89
> 140 mg /dl	11
Takes medicine regularly	
Yes	62
No	38
Medication Category	
Diuretics	26
Vasodilators	25
Others (if any, specify)	18
Calcium channel blockers	8
Beta-blockers + Digoxin	7
ACE Inhibitors	7
Angiotensin receptor blockers	3
Unlabeled/Gray segment	6

Data presented in Table 2 depicts that more than half of the hypertensive patients' BMI was normal between 18.5–23 kg/m² (56%), followed by 35% whose duration of illness was more than 6 months (57%). Majority of them had a systolic BP of 121–150 mmHg (60%), diastolic BP of 60–80 mmHg (60%), and were taking medicines regularly (62%). Most of them did not have smoking habits (94%) or alcohol intake (87%). Their blood cholesterol level was <200 mg/dl (98%), random blood sugar level was 70–140 mg/dl (89%), and 45% reported taking one teaspoon of salt daily.

Table 3: Frequency and Percentage Distribution of Level of Awareness on Stroke among Patients with Hypertension.
(N=100)

Level of Awareness (Obtainable score 0-20)	**f & %**
Adequate Knowledge (16-20)	30
Moderately Adequate knowledge (10-15)	54
Needs Improvement (<10)	16

Table 3 reveals that, more than half of them had moderately adequate knowledge (54%), followed by adequate knowledge (30%) and 16% of them needed improvement in their knowledge of stroke.

Table 4: Frequency and Percentage Distribution of Preventive Behaviour on Stroke among Patients with

Hypertension.
(N=100)

Level of Preventive Behavior (Obtainable score 20-80)	f & %
Good Preventive Behaviour	2
Average Preventive Behaviour	43
Poor Preventive Behaviour	55

The data presented in Table 4 indicate that more than half of the patients with hypertension (55%) exhibited poor preventive behaviour regarding stroke, followed by 43% of the patients demonstrated average preventive behaviour, while only 2% showed good preventive behaviour. Overall, the findings suggest that a majority of patients had inadequate levels of preventive behaviour toward stroke.

Table 5: Mean and Standard Deviation of Awareness and Preventive Behaviour of stroke among Patients with Hypertension.
(N=100)

Variables	Obtainable score	Mean	SD	Mean %
Awareness	0 - 20	13.89	3.61	69.45
Preventive Health Behavior	20 - 80	48.87	13.41	61.08

The findings from Table 5 reveal that, the Mean and SD of the awareness of stroke was, M=13.89, SD+3.61 and level of preventive behavior on stroke was, M=48.87, SD+13.41 among patients with Hypertension.

Table 6: Correlation between Awareness and Preventive Behaviour scores of Patients with Hypertension.
(N=100)

Assessment	r value	p value
Awareness Vs Preventive Behavior	0.0243	0.810 (NS)

Table 6 reveals that, there was a weak positive correlation between knowledge and preventive behavior of stroke among patients with hypertension which was not statistically significant (p>0.05).

Table 7: Association of Demographic Variables with Awareness and Preventive Behaviour among Patients.
(N=100)

emographic Variables	Awareness			Preventive Behavior		
	Up to Mean	Above Mean	Chi square & p value	Up to Mean	Above Mean	Chi square & p value
Age						
20-40	27	24	0.3601	11	41	**14.503**
Above 40	23	26	0.548(NS)	28	20	**0.000***
Gender						
Male	25	23	0.1603	33	17	**10.24***
Female	25	27	0.689(NS)	17	33	**0.001***
Educational Qualification						
Secondary	13	4	**5.741**	6	8	0.163
Higher Secondary	37	46	**0.017***	32	54	0.686(NS)
Occupation						
Employee	30	29	0.0413	26	33	2.249
Unemployed/House wife	20	21	0.839(NS)	12	29	0.134(NS)
Family monthly income in INR						
10001-30000	28	22	1.4414	23	26	**6.02**
30001->50000	22	28	0.230(NS)	12	39	**0.014***
Residence						
Rural	44	38	2.439	31	53	0.837
Urban	6	12	0.118(NS)	4	12	0.360(NS)

Table 7 depicts that, there was a significant association between awareness and demographic variables like educational qualification (p<0.01). However, there was no significant association between awareness and demographic variables like age, gender, occupation, family monthly income, and residence (p>0.05).

Regarding preventive behavior there was a significant association between preventive behavior and

demographic variables like age, gender and family income (P<0.001). However, there was no significant association between preventive behavior and demographic variables like educational qualification, occupation, and residence (p>0.05).

Table 8: Association of Clinical Variables with Awareness and Preventive Behavior (N=100)

Clinical Variables	Awareness			Preventive Behavior		
	Up to Mean	Above Mean	Chi square p value	Up to Mean	Above mean	Chi square P value
Body Mass Index (kg/m2)						
Normal (<18.5-23)	34	24	**4.1051**	41	26	1.3088
Obesity (more than 25)	16	26	**0.0427***	18	22	**0.025**
Systolic blood pressure						
80-130	34	32	0.1347	32	29	0.3783
131->150	26	28	0.7136(NS)	18	21	0.5385(NS)
Diastolic blood pressure						
60 – 80 mm hg	29	31	0.1667	25	35	**4.166**
81 – > 100 mm hg	21	19	0.6830(NS)	25	15	**0.041***
Duration of illness						
6 - 11months	43	38	1.6244	47	34	10.9812
12 - > 24 months	7	12	0.2024(NS)	3	16	**0.001**

Table 8 depicts that, there was a significant association between awareness and clinical variable- BMI at p<0.01. However, there was no significant association between awareness and other clinical variables like systolic BP, diastolic BP, and duration of illness.

Discussion

The present study assessed awareness and preventive behavior regarding stroke among 100 hypertensive patients in Chennai. The findings revealed that 54% of participants demonstrated moderately adequate knowledge, while 30% had adequate knowledge and 16% required improvement. These results are consistent with prior Indian studies indicating that more than 60% of hypertensive patients lack adequate awareness of stroke risk factors and warning signs [16]. Similarly, Pawar et al. reported that only 28% of hypertensive patients could correctly identify stroke symptoms, underscoring the persistent knowledge gap [17].

The present study findings reveal that a majority of patients with hypertension (55%) demonstrated poor preventive behaviour toward stroke, while 43% exhibited average preventive behaviour and only 2% showed good preventive behaviour. This indicates a significant gap in awareness and adoption of stroke prevention strategies among hypertensive patients.

Hypertension is a well-established risk factor for stroke, and effective preventive behaviours—such as adherence to medication, dietary modification, regular physical activity, and routine health monitoring—are crucial in reducing stroke risk. The high proportion of patients with poor preventive behaviour observed in this study may be attributed to inadequate knowledge, lack of motivation, poor health literacy, or limited access to health education programs.

The low percentage (2%) of patients demonstrating good preventive behaviour is a matter of concern, highlighting the need for structured educational and behavioural interventions. Healthcare professionals, particularly nurses, play a vital role in educating patients and reinforcing preventive practices through continuous counselling and follow-up

The findings of the present study are supported by a study conducted by Natwarlal Patidar et al. (2025) at All India Institute of Medical Sciences Jodhpur, which assessed awareness and preventive practices regarding stroke among hypertensive patients[18]. The study was a cross-sectional survey conducted among 324 hypertensive patients attending outpatient departments. The results revealed that a significant proportion of patients had inadequate awareness and poor preventive practices related to stroke, emphasizing gaps in knowledge and behavior toward stroke prevention.

Similarly, another study by Shyamala et al. (2025), conducted in rural areas of the National Capital Region (NCR), India, among 230 hypertensive patients, reported that only 44.78% of participants correctly identified stroke risk factors, while awareness of warning signs (35.22%) and symptoms (22.61%) was considerably low. This study highlighted poor knowledge and suboptimal preventive practices among hypertensive individuals [19].

These findings are consistent with the present study, where the majority of patients exhibited poor (55%) and average (43%) preventive behaviour toward stroke, indicating the need for effective health education and intervention programs in the Indian context.

Correlation analysis revealed a weak positive relationship between awareness and preventive behavior ($r = 0.0243$, $p = 0.810$), indicating that knowledge alone may not directly translate into preventive action. Ito et al. demonstrated through a systematic review and meta-analysis that nurse-led interventions significantly improve blood pressure control, highlighting the importance of clinical support in sustaining preventive behaviors [20].

Associations between awareness and education ($p < 0.01$), and between preventive behavior with age, gender, and family income ($p < 0.001$), emphasize the role of sociodemographic factors. For instance, in this study, 48% of participants were graduates, and this group showed significantly higher awareness scores compared to those with lower education. Preventive behavior was stronger among females (70% above mean) compared to males (34% above mean), consistent with findings from the European Stroke Organisation, which reported that women were 1.5 times more likely to adopt preventive practices [21].

Clinical variables also played a significant role. Body Mass Index (BMI) was found to be significantly associated with awareness ($p < 0.05$), with 56% of patients having a normal BMI and demonstrating higher awareness scores. Preventive behavior was significantly associated with diastolic blood pressure (DBP) ($p < 0.05$), as patients with controlled DBP (60–80 mmHg) exhibited better preventive practices compared to those with elevated DBP (>100 mmHg). These findings are reinforced by Ito et al., who demonstrated that nurse-led interventions in primary care effectively improved blood pressure control, thereby reinforcing the importance of clinical management in shaping preventive behaviors [20].

Innovative educational interventional strategies such as Virtual Reality Therapy and Bibliotherapy also can positively impact the targeted population including patients with any conditions[22-23].

Recent evidence underscores the importance of tailored educational interventions. Zhang et al. reported that nurse-led health education programs improved awareness scores by 35% and preventive behavior scores by 28% among hypertensive patients [24]. The BMC Systematic Review Group concluded that community-based nursing interventions reduced stroke incidence by 15% in high-risk populations [25]. Zhang et al. also highlighted the promise of nurse-led digital health programs, with pooled analyses confirming significant improvements in home blood pressure monitoring and adherence [24]. Furthermore, Bhavya et al. demonstrated the effectiveness of integrated behavioral models in improving cardiovascular risk awareness among hypertensive patients, reinforcing the role of structured education in modifying health behaviors [26]. Exploration and assessment of patients' profile including their knowledge and practices are crucial in providing patient care [27- 28]. It is also reinforced by Mohana et al that, Educational interventions of nurses and enhancing their knowledge can improve patients' outcome including their knowledge and healthy practices [29]. Simulation based learning is another approach that can be effectively used in teaching various population including patients to improve their desirable behaviours [30-32]

Taken together, these findings emphasize that structured health education, individualized counseling, and community-based nursing interventions are essential to bridge the gap between knowledge and practice. Despite limitations such as the small sample size and single-center design, Bhavya's study [26] contributes valuable insights into the role of awareness and preventive behavior in stroke prevention, consistent with

global evidence that educational strategies can modify patient behaviors and reduce stroke incidence.

Conclusion

The study underscores the pivotal importance of awareness and preventive behaviour in mitigating stroke risk among individuals with hypertension. Despite the recognized link between hypertension and stroke, the findings revealed that participants possessed only moderately adequate knowledge and demonstrated poor to average preventive practices. This highlights a critical gap that mirrors existing literature on limited stroke awareness in hypertensive populations. Strengthening educational interventions, fostering behavioural change, and integrating preventive strategies into routine hypertension management are essential to reduce stroke burden. Targeted health education and community-based initiatives can empower patients to adopt effective preventive behaviours, thereby improving outcomes and reducing the incidence of stroke among this high-risk group.

Author contributions

All authors contributed equally to the conceptualization and design of the study.

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Data Availability

Data will be made available upon request made to the corresponding author.

Declarations

Ethical statement

The Institutional Ethics Committee (REG.No:ACONC/IEC/2024/028) of Apollo College of Nursing discussed. The Ethics Committee approved the project and the progress will be reviewed periodically. This approval is valid for three years. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Patient Consent for Publication

Yes obtained

Competing Interests

All authors confirm that they do not have any conflicts of interest to disclose.

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