



Stroke Knowledge, Awareness, and Preventive Behaviors Among a Chinese Ethnic Minority Group with Hypertension in Guangxi, the People's Republic of China*

ความรู้ ความตระหนัก และพฤติกรรมการป้องกันโรคหลอดเลือดสมอง
ของชนกลุ่มน้อยชาวจีนที่เป็นโรคความดันโลหิตสูง
ในกวางซี สาธารณรัฐประชาชนจีน*

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Abstract

Stroke knowledge, awareness, and preventive behaviors are essential for individuals with hypertension to reduce their risk of stroke. To date, information regarding these constructs in the Zhuang ethnic minority, who face cultural, linguistic, and healthcare access barriers, is limited. This descriptive correlation study aimed to examine stroke knowledge, awareness, and preventive behaviors among Zhuang populations with hypertension, and the relationship between stroke knowledge and prevention behaviors, and between stroke awareness and preventive behaviors. Purposive sampling was used to select 346 Zhuang with hypertension in Guangxi, the People's Republic of China. The research instruments included the Stroke Knowledge and Sources of Knowledge Questionnaire, the Stroke Awareness Questionnaire, and the Stroke Preventive Behavior Questionnaire. Descriptive statistics and Spearman's rank-order correlation were used for data analysis.

The findings indicated that participants had a moderate level of stroke knowledge, awareness, and preventive behaviors. A statistically significant weak positive correlation was found between stroke awareness and preventive behaviors ($r = .247, p < .01$), while no significant correlation was observed between stroke knowledge and preventive behaviors ($r = -.035, p = .51$).

This study's findings reveal the need to enhance stroke knowledge, awareness, and preventive behaviors among a Chinese minority group with hypertension. To ensure the adoption of stroke preventive behaviors, nurses should focus on increasing stroke awareness among persons with hypertension.

Keywords: Awareness; Hypertension; Knowledge; Preventive behaviors; Stroke

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Received 17 July 2025; Revised 25 August 2025; Accepted 26 August 2025



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บทคัดย่อ

ความรู้ ความตระหนัก และพฤติกรรมการป้องกันโรคหลอดเลือดสมอง เป็นสิ่งสำคัญต่อการลดความเสี่ยงของการเกิดโรคหลอดเลือดสมองในผู้ที่มีภาวะความดันโลหิตสูง ปัจจุบันข้อมูลเกี่ยวกับสิ่งเหล่านี้ในชนกลุ่มน้อยชาวชว่ง ซึ่งมีอุปสรรคด้านวัฒนธรรม ภาษา และการเข้าถึงบริการสุขภาพยังมีอย่างจำกัด การศึกษาเชิงพรรณนาหาความสัมพันธ์ครั้งนี้ มีวัตถุประสงค์เพื่อศึกษาความรู้ ความตระหนัก และพฤติกรรมการป้องกันโรคหลอดเลือดสมองในชาวชว่งที่มีภาวะความดันโลหิตสูง และศึกษาหาความสัมพันธ์ระหว่างความรู้กับพฤติกรรมการป้องกันโรคหลอดเลือดสมอง และระหว่างความตระหนักกับพฤติกรรมการป้องกันโรคหลอดเลือดสมอง เลือกกลุ่มตัวอย่างแบบเฉพาะเจาะจงจากชาวชว่งที่มีภาวะความดันโลหิตสูงในกว๋างซี สาธารณรัฐประชาชนจีน จำนวน 346 คน เครื่องมือการวิจัย ได้แก่ แบบสอบถามความรู้และแหล่งที่มาของความรู้โรคหลอดเลือดสมอง แบบสอบถามการรับรู้โรคหลอดเลือดสมอง และแบบสอบถามพฤติกรรมการป้องกันโรคหลอดเลือดสมอง วิเคราะห์ข้อมูลโดยใช้สถิติเชิงพรรณนา และสถิติ Spearman's rank-order correlation

ผลการวิจัยพบว่า ความรู้ ความตระหนัก และพฤติกรรมการป้องกันโรคหลอดเลือดสมองของกลุ่มตัวอย่างอยู่ในระดับปานกลาง ความตระหนักเกี่ยวกับโรคหลอดเลือดสมองมีความสัมพันธ์ทางบวกในระดับต่ำอย่างมีนัยสำคัญทางสถิติกับพฤติกรรมการป้องกันโรคหลอดเลือดสมอง ($r = .247, p < .01$) ในขณะที่ไม่พบความสัมพันธ์ระหว่างความรู้เกี่ยวกับโรคหลอดเลือดสมองและพฤติกรรมการป้องกันโรคหลอดเลือดสมอง ($r = -.035, p = .51$)

ผลการศึกษาแสดงให้เห็นถึงความจำเป็นในการส่งเสริมความรู้ ความตระหนัก และพฤติกรรมการป้องกันโรคหลอดเลือดสมองของชนกลุ่มน้อยชาวจีนที่เป็นโรคความดันโลหิตสูง เพื่อให้แน่ใจว่าผู้ป่วยมีพฤติกรรมการป้องกันโรคหลอดเลือดสมอง พยาบาลควรมุ่งเน้นการเพิ่มความตระหนักรู้เกี่ยวกับโรคหลอดเลือดสมองในผู้ที่มีความดันโลหิตสูง

คำสำคัญ: ความตระหนักรู้ ความดันโลหิตสูง ความรู้ พฤติกรรมการป้องกัน โรคหลอดเลือดสมอง

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Background and significance

Stroke is a major health problem worldwide. Hypertension, considered an important risk factor for stroke, is highly prevalent yet poorly controlled in China (Ma et al., 2021; Zhang et al., 2023). Ethnic disparities further exacerbate this issue. The Zhuang, the largest ethnic minority group in China, is one of the more conservative groups due to its unique culture and customs. They live in remote rural and mountainous areas, with limited educational resources and school facilities. The Zhuang have higher hypertension prevalence but lower rates of awareness, treatment, and control compared to the Han, the majority population in China (Fan et al., 2022). Therefore, they are a high-risk group for stroke.

Stroke prevention requires an emphasis on making suitable lifestyle modifications as well as responding quickly to stroke signs and symptoms (Bushnell et al., 2024). Increased stroke knowledge, awareness, and preventive behaviors are some of the best preventive measures (Barakat et al., 2021). Stroke knowledge consists of knowledge of the disease, risk factors, warning signs, and stroke treatments. Stroke awareness is an individual's perception of stroke severity and the impact caused by stroke (Pothiban et al., 2018). Stroke prevention behaviors are actions taken by an individual to prevent stroke in an asymptomatic state, including healthy food consumption, stress reduction, avoidance of alcohol consumption, regular exercise, and adherence to prescribed medication and appointments (Pothiban & Srirat, 2019).

Based on the Knowledge, Attitude, and Practice (KAP) model, knowledge provides the basic information for practice, and attitude affects an individual's perception of practice (Badran, 1995). An individual's degree of knowledge and attitudes regarding health issues frequently impact their practice. Accumulation of knowledge and attitudes leads to intelligibility, and then awareness is established. Both knowledge and awareness lead to action (Badran, 1995). With stroke prevention, in addition to increasing knowledge levels, it is also necessary to influence individual attitudes through health education, which leads to awareness, therefore encouraging the implementation of preventative behaviors. Evidence shows that both stroke knowledge and awareness are positively associated with preventive behaviors among older adults, regardless of stroke risk status (Pothiban & Srirat, 2019).

Stroke knowledge, awareness, and preventive behaviors vary across populations. Among hypertensive populations, stroke knowledge ranges from low (Abate et al., 2019; Wan et al., 2014) to high levels (Arisegi et al., 2018). Information on stroke awareness among hypertensive populations is limited. However, stroke awareness among the general population has demonstrated low (Al-Obaidi et al., 2023) to high levels (Pothiban et al., 2018). Stroke preventive behaviors among hypertensive populations have also been reported at low (Liang et al., 2023) to moderate levels (Wan et al., 2014). These variations in stroke knowledge, awareness, and preventive behaviors may be attributed to differences in characteristics of the population, such as cultural beliefs, education levels, socioeconomic status, and geographic context (Li et al., 2019; Yang et al., 2019). Therefore, population-specific investigations are essential to inform targeted stroke prevention



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strategies.

To date, limited research has explored stroke knowledge, awareness, and preventive behaviors among specific populations in China. Existing studies indicate generally low levels of stroke knowledge and awareness, particularly among rural residents and hypertensive patients (Li et al., 2019; Wan et al., 2014). No study has specifically examined those in the Zhuang minority with hypertension, a high-risk, yet underserved group. Assessing baseline levels of stroke knowledge, awareness, and preventive behaviors is a critical step in designing effective health education strategies for high-risk populations. As findings from other populations cannot be generalized to the Zhuang ethnic group, this study aims to examine stroke knowledge, awareness, and preventive behaviors among hypertensive individuals in this underserved minority population. Additionally, the associations between knowledge and preventive behaviors, as well as awareness and preventive behaviors, were explored. The information gained from this study will be the basis for developing effective future interventions to promote stroke preventive behaviors among the Zhuang minority with hypertension.

Research objectives

1. To examine stroke knowledge among the Chinese Zhuang minority with hypertension in Guangxi Province, the People's Republic of China.
2. To examine stroke awareness among the Chinese Zhuang minority with hypertension in Guangxi Province, the People's Republic of China.
3. To examine stroke preventive behaviors among the Chinese Zhuang minority with hypertension in Guangxi Province, the People's Republic of China.
4. To examine the relationship between stroke knowledge and preventive behaviors, and between stroke awareness and preventive behaviors among the Chinese Zhuang minority with hypertension in Guangxi, the People's Republic of China.

Conceptual framework

This study's conceptual framework is based on the KAP model (Badran, 1995) and the literature review. Stroke knowledge refers to an accurate understanding of stroke disease, risk factors, warning signs, and early management. Attitudes refer to inclinations to behave in a certain way in a particular situation; to observe and interpret events based on certain predispositions; or to organize thoughts into logical and interconnected systems (Badran, 1995). In this study, attitudes toward stroke are related to awareness of its severity and impacts. Adopting preventive behaviors may help reduce the risk of stroke among individuals with hypertension. Stroke knowledge and awareness are positively associated with preventive behaviors, as knowledge offers a basis for informed actions and awareness may motivate behavioral change. Preventive actions, in turn, could reinforce knowledge and awareness.



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Methodology

Population and sample

The target population included members of the Zhuang minority with hypertension in Guangxi Province, the People's Republic of China.

The sample included 346 Chinese Zhuang minority hypertension patients at Xincheng Hospital in Guangxi Province, the People's Republic of China. The sample size was estimated using the G*Power program. The researcher used an effect size of 0.15, an alpha level of 0.05, and a power of 0.80. Since there had been no prior study investigating the relationship between the studied variables among hypertensive patients in China, an effect size of 0.15 was selected based on the relationship between stroke awareness and preventive behaviors reported in a study from Thailand (Pothiban & Srirat, 2019).

The inclusion criteria were 1) being at least 20 years old, 2) having been diagnosed with hypertension at least for three months, 3) being able to read and write Chinese language, 4) voluntarily taking part in the research, and 5) having a total score of 3-5 on the Chinese version of Mini-Cog (only for persons aged 60 and older), which indicates no cognitive impairment.

Research instruments

1. The General Data Form. This was developed by the researcher based on the literature review, and there are two parts: demographic data and medical data.

2. The Stroke Knowledge and Sources of Knowledge Questionnaire (SKSKQ). The SKSKQ was developed by Pothiban et al. (2018) and consists of 22 questions about stroke knowledge, including knowledge of the disease (3 items), risk factors (7 items), warning signs (5 items), and early management (7 items), as well as three questions about knowledge sources. Stroke knowledge items are true-false questions (1 = right answer, 0 = wrong answer or do not know). Possible scores range from 0 to 22 and are classified into three levels based on the SKSKQ developers (≤ 7 = low, 8-14 = moderate, and ≥ 15 = high) (Pothiban et al., 2018). The actual scores were utilized in the relationship analysis.

3. The Stroke Awareness Questionnaire (SAQ). The SAQ, developed by Pothiban et al. (2018), has 14 items with a 4-point Likert scale (1 = disagree to 4 = strongly agree). Possible scores range from 14 to 56 and are categorized into three levels based on the SAQ developers (≤ 18 = low, 19-37 = moderate, and ≥ 38 = high) (Pothiban et al., 2018). The higher the score, the greater stroke awareness, and the actual scores were utilized in the relationship analysis.

4. The Stroke Preventive Behavior Questionnaire. Developed by Pothiban and Srirat (2019), there are 15 items with a 4-point Likert scale (1 = never to 4 = always). The possible scores range from 15 to 60, with higher scores meaning better stroke prevention behaviors. The scores are categorized into three levels based on the questionnaire developers (≤ 29 = low, 30-44 = moderate, and ≥ 45 = high) (Pothiban & Srirat, 2019). The actual scores were utilized in the relationship analysis.



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The SKSKQ, SAQ, and Stroke Preventive Behavior Questionnaire were translated from the English version into Chinese by the researcher using the forward and backward translation based on Brislin (1986)'s translation model.

Validity and reliability of research instruments

The validity of the SKSKQ, the SAQ, and the Stroke Preventive Behavior Questionnaire was tested by the developers (Pothiban et al., 2018; Pothiban & Srirat, 2019), demonstrating good validity (S-CVI of 0.95, 0.94, and 0.94, respectively). The three questionnaires were translated from English into Chinese using the forward and back translation method based on Brislin (1986). As the original versions were translated into Chinese equivalently without any modification, the validity of these instruments was not tested for this study.

The reliability of the Chinese versions of the instruments was tested with 10 subjects who met the inclusion criteria, but were not included in the study's sample. The Kuder-Richardson 20 for the SKSKQ-CH was 0.82, and the Cronbach's alpha values for the SAQ-CH and Stroke Preventive Behavior Questionnaire-CH were 0.85 and 0.81, respectively.

Ethical considerations

The study was approved by the Institutional Review Board of the Faculty of Nursing, Chiang Mai University, COA No. 115/2024 (Date of Approval: September 11, 2024). Permission for data collection was also obtained from the directors of nursing at Xincheng County Hospital. All participants were provided with written and verbal information about the study objectives and processes, the protection of confidentiality and anonymity, and the right to refuse or withdraw from the study at any time. Informed consent was obtained from each participant before data collection.

Data collection

The first researcher collected data by herself after receiving IRB approval and permission from authorities at Xincheng County Hospital. During data collection, the researcher wore polite clothes with a name tag, but not a hospital nurse uniform. All questionnaires were distributed to the participants after they gave informed consent. They were asked to fill these out by themselves during their spare time in a quiet area of the outpatient waiting zone. The completed questionnaires were then returned to a survey box located in the clinic area. It took approximately 20 minutes for each participant to complete the questionnaires. The researcher collected the questionnaires from the box at the end of each day's data collection.

Data analysis

Data were analyzed using SPSS version 22.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics were used to analyze demographic data, medical data, stroke knowledge, awareness, and preventive behaviors scores. The Kolmogorov-Smirnov (KS) test indicated a non-normal distribution of the stroke knowledge, awareness, and preventive behavior scores. Therefore, Spearman's rank-order correlation was used to examine the relationships between stroke knowledge and preventive behaviors, and between stroke awareness and preventive behaviors.



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The statistical significance level was set at 0.05.

Results

The participants in this study were 346 members of the Chinese Zhuang minority with hypertension, of whom 179 (51.73%) were male while 167 (48.27%) were female. Their ages range from 28-64 years old with a mean of 45.71 (SD = 10.20). Regarding education, 153 participants (44.22%) had obtained a secondary school degree, and 109 participants (31.50%) had completed primary school, while 30 participants (8.67%) had no formal education. A majority (n = 301, 86.99%) were married. In addition, 240 participants (69.36%) were farmers, and most of them (n = 236, 68.21%) had a monthly household income 2000-5000 yuan (Table 1).

Table 1 Demographic characteristics of the participants (n = 346)

Demographic characteristics	Frequency	Percentage (%)
Gender		
Male	179	51.73
Female	167	48.27
Age (years old) (mean = 45.71, SD = 10.20, range 28-64)		
20-39 years old	116	33.53
40-59 years old	190	54.91
≥60 years old	40	11.56
Education Level		
No formal education	30	8.67
Primary school	109	31.50
Secondary school	153	44.22
High school/High Vocational Certificate	35	10.12
Bachelor's degree or above	19	5.49
Marital Status		
Married	301	86.99
Single	24	6.94
Widowed/Divorced/Separated	21	6.07
Occupation		
Farmer	240	69.37
Laborer	32	9.25
Self-employed	30	8.67
Others	37	10.69
Unemployed	7	2.02
Household Income		
Less than 2,000 yuan	18	5.20
2000-5000 yuan	236	68.21



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Table 1 Demographic characteristics of the participants (n = 346) (continue)

Demographic characteristics	Frequency	Percentage (%)
5000-10000 yuan	72	20.81
10000-20000 yuan	15	4.33
More than 20,000 yuan	5	1.45

The participants have been diagnosed with hypertension from 3 to 36 months, with a mean of 14.34 months (SD = 14.34). Most of them (n = 242, 69.94%) had been diagnosed for one year or less. Blood pressure data showed that 312 participants (90.17%) had a systolic blood pressure above 140 mmHg, and 309 participants (89.31%) had a diastolic blood pressure above 90 mmHg. Two hundred and thirteen participants (61.56%) had at least one comorbidity, among which hyperlipidemia (n = 112, 52.58%) and diabetes mellitus (n = 80, 37.56%) were common. More than half of the participants (n = 189, 54.62%) received only one medication, while 155 participants (44.87%) received two medications (Table 2).

Table 2 Medical characteristics of the participants (n = 346)

Medical characteristics	Frequency	Percentage (%)
Duration of having been diagnosed with hypertension (months)		
(Mean = 14.34, SD = 14.34, range 3-36)		
3-12 months	242	69.94
13-24 months	56	16.19
24-36 months	48	13.87
Systolic blood pressure (SBP) (range = 122-159 mmHg)		
< 140 mmHg	34	9.83
≥140 mmHg	312	90.17
Diastolic blood pressure (DBP) (range = 74-109 mmHg)		
< 90 mmHg	37	10.69
≥ 90 mmHg	309	89.31
Having co-morbidity		
Yes	213	61.56
One morbidity	204	58.96
Two morbidities	9	2.60
No	133	38.44
Co-morbidity conditions (n = 213)*		
Diabetes Mellitus	80	37.56
Heart Disease	15	7.04
Hyperlipidemia	112	52.58
Others	15	7.04



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Table 2 Medical characteristics of the participants (n = 346) (continue)

Medical characteristics	Frequency	Percentage (%)
Current medications		
One medication	189	54.62
Two medications	155	44.80
Three medications	2	0.58

Note. *204 participants had one co-morbidity and nine participants had two co-morbidities

Stroke knowledge among the participants was at a moderate level, with a mean score of 12.78 (SD = 5.88) and a median score of 13.00. When analyzing the scores of each participant, 85 (24.57%), 118 (34.10%), and 143 (41.33%) participants had low, moderate, and high levels of stroke knowledge, respectively (Table 3).

Table 3 Descriptive statistics of stroke knowledge score of participants (n = 346)

Levels of stroke knowledge	Possible score	Score range	M (SD)	Frequency (%)
Low	0-7	2-7	4.73 (1.57)	85 (24.57)
Moderate	8-14	8-14	11.50 (1.81)	118 (34.10)
High	15-22	15-22	18.64 (2.25)	143 (41.33)
Total	0-22	2-22	12.78 (5.88)	

Note. Median score = 13.00

Stroke awareness among participants was at a moderate level, with a mean score of 28.15 (SD = 8.90) and a median score of 26.00. Most of the participants (n = 239, 69.07%) had a moderate level of stroke awareness. Fifty-four participants (15.61%) had high levels of awareness, while 53 participants (15.32%) had lower levels (Table 4).

Table 4 Descriptive statistics of stroke awareness score of participants (n = 346)

Levels of stroke awareness	Possible score	Score range	M (SD)	Frequency (%)
Low	0-18	14-18	16.79 (0.98)	53 (15.32)
Moderate	19-37	19-37	26.93 (3.91)	239 (69.07)
High	38-56	38-54	44.66 (5.74)	54 (15.61)
Total	0-56	14-54	28.15 (8.90)	

Note. Median score = 26.00

Stroke preventive behaviors among participants were at a moderate level, with a mean score of 35.02 (SD = 7.78) and a median score of 38.00. Most of the participants had a moderate level of stroke preventive behaviors (n = 246, 71.10%), and only six participants (1.73%) had a



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high level (Table 5).

Table 5 Descriptive statistics of stroke preventive behavior score of participants (n = 346)

Levels of preventive behaviors	Possible score	Score range	M (SD)	Frequency (%)
Low	15-29	18-29	23.42 (2.86)	94 (27.17)
Moderate	30-44	30-44	39.14 (3.04)	246 (71.10)
High	45-60	45-57	47.50 (4.72)	6 (1.73)
Total	15-60	18-57	35.02 (7.78)	

Note. Median score = 38.00

There was a statistically significant weak positive correlation between stroke awareness and stroke prevention behavior ($r = .247$, $p < .01$); however, the association between stroke knowledge and stroke prevention behavior was not statistically significant ($r = -.035$, $p = .514$).

Discussion

The findings revealed that participants in this study had a moderate level of stroke knowledge ($M = 12.78$, $SD = 5.88$) which seems higher than that reported in two previous studies conducted in China (Liang et al., 2023; Wan et al., 2014). However, the differences cannot be directly compared due to the different measurement tools.

Compared with one study using the same measurement tool, this study revealed a moderate level of stroke knowledge among participants, while the study from northern Thailand reported a high level of stroke knowledge in older people (Pothiban et al., 2018). The inconsistent results may be due to the source of the stroke knowledge they had acquired. Participants in Pothiban et al.'s study lived in the suburbs of a large modern province, where the population had access to a variety of sources of knowledge, such as television and social media.

A possible reason for the moderate stroke knowledge found in the current study is that this study took place in ethnic minority areas, where residents had limited access to stroke knowledge due to their remote geographical locations, inconvenient transportation, and the uneven distribution of medical services. Hospitals and primary medical institutions, where doctors and nurses provide education through medical treatment, are the main health education sites for minority ethnic groups in China. Some health centers and hospitals also provide health education to patients during outpatient visits, using common tools like health brochures, videos, and posters. Barriers such as language differences, a lack of culturally tailored materials, and geographic isolation can contribute to the inadequate effectiveness of health education among minority populations (Du et al., 2024). The moderate level of stroke knowledge among minority hypertensive patients suggests the need for more culturally and linguistically tailored educational support to improve their disease management and prevention capacity.



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The participants in this study demonstrated a moderate level of stroke awareness. This finding aligned with a previous Thai study that examined rural community members and reported low to moderate levels of awareness (Wanichanon et al., 2024). In contrast, other studies in Thailand (Pothiban et al., 2018) and India (Venkatesh & Srivastava, 2016) have reported high levels of stroke awareness. The moderate level of stroke awareness identified in this study may be affected by some characteristics of the participants. Many of the participants in this study had low levels of education and income, both of which can influence an individual's access to health knowledge and disease prevention awareness. Individuals with low income or low education may have lower disease awareness due to restricted access to medical resources (Yang et al., 2019).

The moderate awareness observed in this study may also be related to cultural and social factors specific to ethnic minority groups in China. In these communities, reliance on traditional medicine, delayed care-seeking behavior, and reluctance to disclose illness can reduce urgency in stroke recognition. Language and cultural barriers further impede the dissemination of health education. These findings suggest that targeted, culturally sensitive health education interventions are needed to address stroke awareness gaps in this high-risk population.

The moderate level of stroke preventive behavior among Zhuang hypertensive patients can be attributed to multiple factors. Culturally, many patients rely on traditional medicine and underestimate the importance of modern medical guidance. Economically, limited income and geographic isolation restrict access to healthcare services and healthy food choices. Additionally, many participants had only recently been diagnosed with hypertension and lacked awareness of stroke risk, while comorbidities further complicated their disease management and medication adherence. Traditional high-fat, high-salt diets, alcohol consumption, and low health literacy also weakened their ability to adopt effective preventive behaviors. These findings highlight the urgent need for culturally sensitive health education, better resource allocation, and improved access to preventive care in minority communities.

In this study, no significant correlation was found between stroke knowledge and stroke preventive behaviors, consistent with previous findings among elderly high-risk populations in Thailand (Pothiban & Srirat, 2019). However, this contradicts studies in China that have reported a positive association between knowledge and prevention practices (Liang et al., 2023; Wan et al., 2014). The lack of correlation in this study suggests that knowledge alone may not lead to behavioral change, as supported by the KAP model, which posits that behavior is influenced not only by knowledge but also by attitudes and beliefs (Badran, 1995). Cultural traditions, language barriers, and limited healthcare access among ethnic minority groups may hinder the application of knowledge to practice.

In this study, a weak positive correlation was observed between stroke awareness and preventive behaviors, which aligns with studies in Thailand and China (Du et al., 2024; Pothiban & Srirat, 2019). This supports the KAP model's emphasis on awareness and attitude as precursors



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to behavioral change. Enhancing stroke awareness may improve the motivation to engage in preventive actions, such as managing blood pressure and adopting healthier lifestyles (O'Donnell et al., 2016). Thus, culturally sensitive education strategies that address awareness, attitudes, and behavioral skills are crucial to improving stroke prevention behaviors in ethnic minority hypertensive populations.

In conclusion, participants in this study demonstrated moderate levels of stroke knowledge, awareness, and preventive behaviors. The findings underscore the need to enhance these factors among a Chinese minority group with hypertension. While stroke awareness showed a weak positive correlation with preventive behaviors, no significant correlation was observed between stroke knowledge and preventive behaviors. Thus, enhancing stroke awareness should be prioritized to promote preventive behaviors in this population.

Applications of research findings

This study found that minority hypertensive patients in Guangxi had moderate levels of stroke knowledge, awareness, and preventive behaviors, highlighting gaps in current health education. Clinically, nurses should integrate tailored education and behavioral support into routine care to help patients turn knowledge into action and improve health outcomes.

Suggestions for further research

Future research should include a broader range of ethnic groups to explore differences in stroke knowledge, awareness, and preventive behaviors. Additionally, other factors, such as social support, healthcare access, and cultural beliefs, which may influence stroke preventive behaviors, should also be examined.

References

- Abate, A. T., Bayu, N., & Mariam, T. G. (2019). Hypertensive patients' knowledge of risk factors and warning signs of stroke at Felege Hiwot Referral Hospital, Northwest Ethiopia: A cross-sectional study. *Neurology Research International*, 2019(1), 8570428. <https://doi.org/10.1155/2019/8570428>
- Al-Obaidi, H., Khidhair, Z., Jirjees, F., Barakat, M., AlSalamat, H., Kharaba, Z., Alfoteih, Y., Haddad, C., Mansour, S., Hallit, S., Malaeb, D., & Hosseini, H. (2023). Factors associated with knowledge and awareness of stroke in the Iraqi population: A cross-sectional study. *Frontiers in Neurology*, 14, 1144481. <https://doi.org/10.3389/fneur.2023.1144481>
- Arisegi, S. A., Awosan, K. J., Oche, M. O., Sabir, A. A., & Ibrahim, M. T. (2018). Knowledge and practices related to stroke prevention among hypertensive and diabetic patients attending specialist hospital, Sokoto, Nigeria. *Pan African Medical Journal*, 29, 63. <https://doi.org/10.11604/pamj.2018.29.63.13252>
- Badran, I. G. (1995). Knowledge, attitude and practice the three pillars of excellence and wisdom: A place in the medical profession. *EMHJ-Eastern Mediterranean Health Journal*, 1(1), 8-16.



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- Barakat, M., AlSalamat, H. A., Jirjees, F., Al-Obaidi, H., Hussain, Z., K., El Hadidi, S., Mansour, S., Malaeb, D., & Hosseini, H. (2021). Factors associated with knowledge and awareness of stroke among the Jordanian population: A cross-sectional study. *F1000Res*, 10, 1242. <https://doi.org/10.12688/f1000research.74492.2>
- Brislin, R. W. (1986). The wording and translation of research instruments. In W. J. Lonner & J. W. Berry (Eds.), *Cross-cultural research and methodology series, Vol. 8. field methods in cross-cultural research* (pp. 137–164). Sage Publications.
- Bushnell, C., Kernan, W. N., Sharrief, A. Z., Chaturvedi, S., Cole, J. W., Cornwell, W. K. 3rd., Cosby-Gaither, C., Doyle, S., Goldstein, L. B., Lennon, O., Levine, D. A., Love, M., Miller, E., Nguyen-Huynh, M., Rasmussen-Winkler, J., Rexrode, K. M., Rosendale, N., Sarma, S., Shimbo, D., ... Whelton, P. K. (2024). 2024 guideline for the primary prevention of stroke: A guideline from the American Heart Association/American Stroke Association. *Stroke*, 55(12), e344–e424. <https://doi.org/10.1161/STR.0000000000000475>
- Du, Y., Xue, N., Liang, J., & Deng, Y. (2024). Knowledge, attitude, skill, and practice of emergency nurses regarding the early management of patients with acute ischemic stroke in Beijing. *Journal of Emergency Nursing*, 50(1), 95-105. <https://doi.org/10.1016/j.jen.2023.08.009>
- Fan, G., Jiang, Z., Li, J., Shi, L., Gui, C., & Huang, R. (2022). Prevalence, awareness, treatment and control of hypertension in Guangxi Zhuang Autonomous Region. *Scientific Reports*, 12(1), 900. <https://doi.org/10.1038/s41598-021-04735-1>
- Li, S., Cui, L. Y., Anderson, C., Zhu, S., Xu, P., Wei, T., Luo, Y., Chen, S., Jiang, N., Hong, Y., Liu, W., Li, J., Gao, C., Yu, C., Shan, G., Wang, L., & Peng, B. (2019). Public awareness of stroke and the appropriate responses in China: A cross-sectional community-based study (FAST-RIGHT). *Stroke*, 50(2), 455-462. <https://doi.org/10.1161/strokeaha.118.023317>
- Liang, J., Luo, C., Ke, S., & Tung, T. H. (2023). Stroke related knowledge, prevention practices and associated factors among stroke patients in Taizhou, China. *Preventive Medicine Reports*, 35, 102340. <https://doi.org/10.1016/j.pmedr.2023.102340>
- Ma, Q., Li, R., Wang, L., Yin, P., Wang, Y., Yan, C., Ren, Y., Qian, Z., Vaughn, M. G., McMillin, S. E., Hay, S. I., Naghavi, M., Cai, M., Wang, C., Zhang, Z., Zhou, M., Lin, H., & Yang, Y. (2021). Temporal trend and attributable risk factors of stroke burden in China, 1990–2019: An analysis for the global burden of disease study 2019. *The Lancet Public Health*, 6(12), e897-e906.
- O'Donnell, M. J., Chin, S. L., Rangarajan, S., Xavier, D., Liu, L., Zhang, H., Rao-Melacini, P., Zhang, X., Pais, P., Agapay, S., Lopez-Jaramillo, P., Damasceno, A., Langhorne, P., McQueen, M. J., Rosengren, A., Dehghan, M., Hankey, G. J., Dans, A. L., Elsayed, A., ... Yusuf, S. (2016). Global and regional effects of potentially modifiable risk factors associated with acute stroke in 32 countries (INTERSTROKE): A case-control study. *Lancet*, 388(10046), 761-775. [https://doi.org/10.1016/s0140-6736\(16\)30506-2](https://doi.org/10.1016/s0140-6736(16)30506-2)



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- Pothiban, L., Khampolsiri, T., & Srirat, C. (2018). Knowledge and awareness of stroke impacts among northern Thai population. *Pacific Rim International Journal of Nursing Research*, 22(3), 212-222.
- Pothiban, L., & Srirat, C. (2019). Association between stroke knowledge, stroke awareness, and preventive behaviors among older people: A cross-sectional study. *Nursing & Health Sciences*, 21(3), 399-405. <https://doi.org/10.1111/nhs.12614>
- Venkatesh, U., & Srivastava, D. (2016). Knowledge, attitude and practice in relation to stroke: Comparative study between hypertensive and non-hypertensive patients attending a tertiary care centre in Gorakhpur, Uttar Pradesh. *Journal of Medical Science and Clinical Research*, 4(12), 15014-15021. <https://dx.doi.org/10.18535/jmscr/v4i12.116>
- Wan, L. H., Zhao, J., Zhang, X. P., Deng, S. F., Li, L., He, S. Z., & Ruan, H. F. (2014). Stroke prevention knowledge and prestroke health behaviors among hypertensive stroke patients in mainland China. *Journal of Cardiovascular Nursing*, 29(2), E1-E9. <https://doi.org/10.1097/JCN.0b013e31827f0ab5>
- Wanichanon, W., Ananchaisarp, T., Buathong, N., & Choomalee, K. (2024). Knowledge and attitude towards stroke among the population of one rural community in Southern Thailand: A survey. *BMJ Open*, 14(2), e080269. <https://doi.org/10.1136/bmjopen-2023-080269>
- Yang, J., Chen, X., Bai, Z., Tao, S., Pan, X., Hu, Z., & Qin, X. (2019). Social network status and influencing factors in community-dwelling elderly stroke patients. *Chinese General Practice*, 22(10), 1243. <https://doi.org/10.12114/j.issn.1007-9572.2019.00.092> (in Chinese)
- Zhang, M., Shi, Y., Zhou, B., Huang, Z., Zhao, Z., Li, C., Zhang, X., Han, G., Peng, K., Li, X., Wang, Y., Ezzati, M., Wang, L., & Li, Y. (2023). Prevalence, awareness, treatment, and control of hypertension in China, 2004-18: Findings from six rounds of a national survey. *BMJ*, 380, e071952. <https://doi.org/10.1136/bmj-2022-071952>