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ASSESSMENT OF KNOWLEDGE AND AWARENESS TOWARD RISK FACTORS AND WARNING SIGNS OF STROKE AMONG CARDIAC PATIENTS IN SAUDI ARABIA

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Abstract

Background: Stroke is a significant global health and social problem. Patients with comorbidities like diabetes, hypertension, or cardiac diseases have a greater risk of developing stroke. To prevent stroke and improve stroke patients' prognosis, awareness should be raised primarily in high-risk individuals. **Objectives:** To assess knowledge and awareness of stroke risk factors and warning signs among heart disease patients in Saudi Arabia. **Methods:** This is a survey questionnaire-based cross-sectional study targeting Saudi cardiac patients who are over 18 years of age. The questionnaire consisted of 38 questions aimed to assess the awareness of stroke in cardiac patients. The collected data was forwarded to the SPSS program, version 25, where statistical analysis was carried out. **Results:** As regard knowledge and awareness score about stroke, (46.8%) of the participants, exhibited a high level of knowledge, suggesting a commendable level of understanding and familiarity with stroke-related assessments. Furthermore, nearly 29%, demonstrated a moderate level of knowledge. The remaining 24.3% of participants reported a low level of knowledge. Moreover, (85.7%) recognized high blood pressure as a significant risk factor to the development of stroke and speech problems (71.1%) as warning signs of stroke. **Conclusion:** Nearly half of the participants demonstrated a high level of knowledge regarding stroke, with a substantial portion showing moderate understanding. It is promising that the majority recognized high blood pressure, smoking, diabetes, and cardiac disease as significant risk factors for stroke. However, there is room for improvement, especially in understanding warning signs such as sudden memory loss and double vision.

Keywords: Stroke, cardiac patients, awareness, risk factors, warning signs, knowledge, heart diseases.

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Introduction:

Strokes represent a global health and social issue, and the situation is speculated to further increase in subsequent decades as the world's population ages [1]. Furthermore, It constitutes one of the primary contributors to death and disability in grownups [2]. stroke harms the brain and suppresses the way it operates by cutting off blood flow to particular portions of the brain [3]. Prevention approaches focusing on modifiable variables such as heart disease, high cholesterol hypertension, diabetes, smoking, a poor diet, and insufficient levels of exercise are capable of decreasing the stroke burden by up to 80% [4, 5]. As reported by the World Health Organization (WHO), stroke accounted for 11.7% of all fatalities and was the second leading cause of death [6]. Stroke incidence in Saudi Arabia (KSA) is approximately 43.8 per 100,000 [7]. Moreover, cerebrovascular disease is the major cause of death in KSA around 6.4% [8]. Increasing stroke awareness in the community is crucial for reducing its incidence and improving prognosis [9]. That's why the FAST campaign was developed to emphasize the FAST (facial, arm, speech, time) message, helping people recognize the warning signs of stroke and seek treatment promptly [10]. A similar study was published in 2021 the result showed that among the study participants, less than half (45.8%) of them had adequate knowledge of stroke risk factors, and only less than half (42.7%) of study respondents had adequate knowledge about stroke warning signs [11]. In 2018, studies were conducted on the knowledge of hypertensive and diabetic patients regarding stroke warning signs and the results showed that the majority of participants had adequate knowledge about stroke's risk factors and warning signs [12, 13]. However, a study in Saudi Arabia's eastern province revealed that many participants were unaware of facial asymmetry as a stroke warning sign and did not know about t-PA as a treatment for stroke [6]. Another study has been conducted in Egypt on the assessment of cerebrovascular stroke risk factors and level of knowledge among hypertensive elderly and the result was unsatisfactory; more than half of the elderly had a poor level of CVS knowledge, despite that about 23% of the elderly had a history of previous stroke [14]. For the reason that in Saudi Arabia, stroke is a rapidly increasing disease and a major cause of morbidity and mortality [9]. Awareness and knowledge of warning signs and risk factors of stroke are crucial to help in the prevention and treatment of stroke especially in high-risk people like cardiac patients [15]. However, there is a rarity of research evidence in KSA conducted about the awareness of risk factors and alarming signs of stroke among patients with cardiac disease. Therefore, the purpose of this study is to estimate the level of knowledge and awareness of warning signs and risk factors among adults with cardiac disease in KSA. Study results will help the authorities of local health to plan educational campaigns to promote awareness and knowledge among patients with cardiac disease to decrease and minimize the occurrence of stroke and its costs and burdens. Objective: To assess knowledge and awareness of stroke risk factors and warning signs among heart disease patients in Saudi Arabia.

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Materials and Methods:

Study design and Study setting:

This survey questionnaire-based cross-sectional study was undertaken in 2023-2024 on the Saudi Arabian population to assess their awareness regarding stroke.

Participants, recruitment, and sampling procedure: The selected study participants consisted of Saudi adults aged 18 and above who have been diagnosed with heart conditions.

Inclusion and Exclusion criteria:

Saudi cardiac patients aged ≥18 years were included in the study, while non-Saudi, participants younger than 18, and critically ill and psychiatric patients were excluded.

Sample size:

The minimum sample size required for this study is 384 participants which was calculated by using the Raosoft formula with a confidence level of 95%.

Method for data collection and instrument (Data collection Technique and tools):

In our study, we used a questionnaire which was done by Woldetsadik FK et al [4]. It consists of 39 items on the knowledge and awareness of stroke among cardiac patients. This questionnaire was created based on consultation with relevant studies in the field. The first four items gather information about socio-demographic factors, the following four items inquire about clinical data, such as the duration since being diagnosed with cardiac disease, the presence of diabetes mellitus (DM), hypertension, family history of stroke, and whether the participant knows someone who has had a stroke. The subsequent five items focus on assessing the participants' general knowledge of stroke. Seven additional items inquire about their familiarity with the warning signs of stroke, while nine items aim to understand their knowledge of the risk factors associated with stroke. Furthermore, nine items evaluate the participants' stroke prevention practices.

Scoring system:

The level of knowledge and awareness toward risk factors and warning signs of stroke was assessed via a scoring system. This system assigns a score ranging from zero to 30, with correct responses receiving a score of 1 and incorrect or "I don't know" responses receiving a score of 0. Based on the final score obtained, participants will be categorized into three groups: good (≥80%), fair (60-79%), and poor (<60%) knowledge and awareness levels regarding stroke.

Prompted responses of the four sections on knowledge were considered for calculating knowledge scores. The total score on knowledge was calculated by combining scores of the below-mentioned four sections of knowledge: general knowledge about stroke, knowledge of warning signs of stroke, knowledge of risk factors of stroke, and stroke prevention practice. The maximum possible score for the knowledge part was thus 7+5+9+9=30.

Overall, there were 30 questions regarding knowledge in the questionnaire. If a person answers all questions correctly, 30 scoring points are awarded. The total 30 points were divided into four sections of which 5 points (17%) attributed to general knowledge about stroke section, 7 points (23%) to knowledge of warning signs of stroke, 9 points (30%) to Knowledge of risk factors of stroke, 9 points (30%) to Stroke prevention practice.

Those respondents who obtained a knowledge score of 24 or above were considered a high level, while

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a score between 23-18 was considered a moderate level. A score below 18 was considered a low level.

Analyzes and entry method:

The computer's "Microsoft Office Excel Software" (2016) program was employed to insert the information that has been gathered. The data was then forwarded to the SPSS program, version 25, where statistical analysis was carried out. Mean and Standard Deviation of all observations were determined. A p-value less than 0.05 was considered statistically significant. The variables were presented as percentages and frequencies. The values were tested according to the need and type of data provided.

Results:

Numerous demographic characteristics of a population are shown in [Table 1]. The provided table presents the sociodemographic characteristics of the study participants (n=740), offering valuable insights into the diverse background of the sample. The mean age of the participants is 46.9 years with a standard deviation of 17.2 years, indicating a wide range of age representation. The gender distribution is relatively balanced, with 51.1% female and 48.9% male participants. Regarding the duration of cardiac disease diagnosis, a significant proportion (51.6%) of the participants have been diagnosed for more than 3 years, suggesting a relatively long-term engagement with the healthcare system. The educational level of the participants is also diverse, with the majority (40.3%) holding a bachelor's degree, followed by high school or less (21.9%), and a smaller percentage (11.4%) being uneducated. The regional distribution of the participants indicates a well-represented sample, with participants from different provinces, including the Northern (12.4%), Southern (31.4%), Middle (25.7%), Eastern (13.0%), and Western (17.6%) regions. This regional diversity enhances the generalizability of the findings. Regarding the participants' medical conditions, 39.2% have a diagnosis of diabetes mellitus (DM), 49.7% have hypertension, 13.5% have a family history of stroke, and 27.3% know someone who had a stroke. These comorbidities and risk factors are crucial considerations in understanding the overall health profile of the study population. The comprehensive sociodemographic and medical data presented in this table provide a solid foundation for further analysis and interpretation of the study findings. Researchers can leverage this information to identify potential associations, trends, and implications for healthcare interventions targeting cardiac disease management and prevention.

Table (1): Sociodemographic characteristics of participants (n=740)

Parameter		**No.**	**Percent (%)**
Age (Mean: 46.9, STD:17.2)	30 or less	174	23.5
	31 to 50	228	30.8
	51 to 60	192	25.9
	more than 60	146	19.7
Gender	Female	378	51.1
	Male	362	48.9

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How long have you been diagnosed with a cardiac disease?	Less than 6 months	120	16.2
	6 months to 1 year	94	12.7
	1 year to 3 years	144	19.5
	More than 3 years	382	51.6
Education level	Uneducated	84	11.4
	Primary school	42	5.7
	Middle school	60	8.1
	High school or less	162	21.9
	Diploma	42	5.7
	Bachelor's degree	298	40.3
	Post graduate education	52	7.0
Region of residence	Northern province	92	12.4
	Southern province	232	31.4
	Middle province	190	25.7
	Eastern province	96	13.0
	Western province	130	17.6
Do you have a DM?	Yes	290	39.2
	No	430	58.1
	I don't know	20	2.7
Do you have Hypertension?	Yes	368	49.7
	No	346	46.8
	I don't know	26	3.5
Do you have a family history of stroke?	Yes	100	13.5
	No	544	73.5
	I don't know	96	13.0
Do you know someone who had a stroke?	Yes	202	27.3
	No	474	64.1
	I don't know	64	8.6

As shown in figure 1, Stroke prevention is a critical public health concern, with significant implications for individual well-being and societal healthcare costs. The survey results presented in the figure suggest a prevailing belief among the respondents that stroke can indeed be prevented, with the majority (522 respondents) answering in the affirmative. This aligns with the growing body of scientific evidence that highlights the modifiable risk factors associated with stroke, such as hypertension, diabetes, high cholesterol, physical inactivity, and unhealthy dietary habits. By targeting these risk factors through a multifaceted approach involving public education, early intervention, and comprehensive healthcare strategies, it may be possible to significantly reduce the incidence and burden of stroke within the population. However, the presence of a sizable proportion (174 respondents) who are uncertain about

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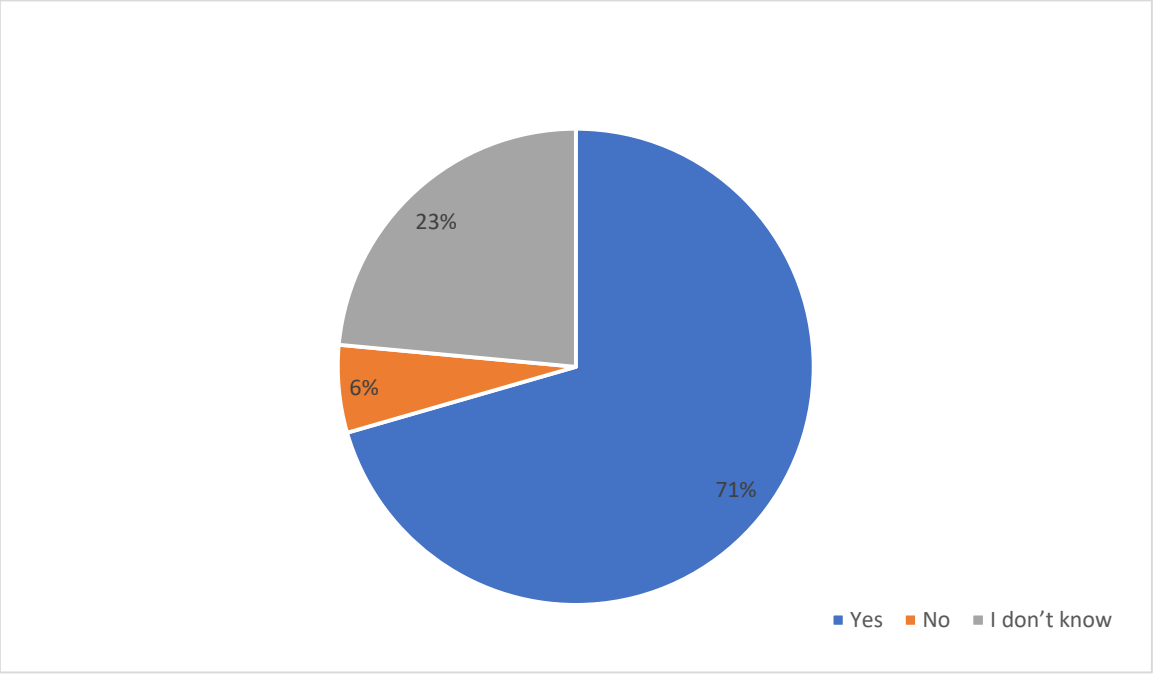
the preventability of stroke underscores the continued need for robust public awareness campaigns and accessible healthcare resources to empower individuals with the knowledge and tools necessary to take proactive measures in safeguarding their cardiovascular health. Ultimately, the survey results suggest a cautious optimism regarding the potential to mitigate the impact of stroke, reinforcing the importance of sustained efforts to translate this belief into tangible improvements in stroke prevention and management.

Figure (1): Illustrates if the participants think that stroke could be prevented.



As illustrated in table (2), The provided data offers valuable insights into the general knowledge and awareness of the warning signs associated with stroke among a sample population of 740 individuals. The results indicate a relatively high level of familiarity with the concept of stroke, as 79.5% of respondents reported having prior knowledge about the disease. However, the data also reveals some gaps in understanding, particularly regarding the nature of stroke and its associated warning signs. While a majority of respondents (69.2%) correctly identified stroke as a disease of the brain, a substantial portion (19.2%) were unsure about this fact. Similarly, the misconception that stroke is a contagious disease was present in 4.3% of the sample, underscoring the importance of educating the public on the non-infectious nature of this condition. Regarding the preventability of stroke, the data shows that 70.5% of respondents believe it can be prevented, which is an encouraging finding. However, a significant proportion (23.5%) were uncertain about this, highlighting the need for more comprehensive public awareness campaigns on the modifiable risk factors and preventive measures for stroke. The data also provides valuable insights into the recognition of stroke warning signs. A majority of respondents correctly identified sudden onset of dizziness (65.1%), headache (63.2%), weakness/numbness (69.5%), fainting (65.7%), and speech problems (71.1%) as warning signs of

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stroke. However, a substantial proportion were unaware of the association between sudden memory loss (32.7%) and double vision (33.8%) with stroke, suggesting a need for more targeted education on the full spectrum of stroke warning signs. Overall, the data reflects a mixed picture, with a generally high level of awareness about stroke but some persistent gaps in knowledge and understanding. Continued efforts to improve public education and awareness, particularly on the modifiable risk factors, the non-infectious nature of stroke, and the recognition of the full range of stroke warning signs, can contribute to more timely identification and management of this potentially devastating condition.

Table (2): Parameters related to general knowledge and warning signs of stroke (n=740).

Parameter		**No.**	**Percent (%)**
Have you ever read/heard about a disease called stroke?	Yes	588	79.5
	No	128	17.3
	I don't know	24	3.2
Is stroke a disease of the brain?	Yes	512	69.2
	No	86	11.6
	I don't know	142	19.2
Is stroke contagious?	Yes	32	4.3
	No	586	79.2
	I don't know	122	16.5
Do you think stroke can be prevented?	Yes	522	70.5
	No	44	5.9
	I don't know	174	23.5
Is stroke an old person's disease?	Yes	84	11.4
	No	474	64.1
	I don't know	182	24.6
Sudden onset of dizziness is one of the warning signs of stroke	Yes	482	65.1
	No	58	7.8
	I don't know	200	27.0
Sudden onset of headache is one of the warning signs of stroke	Yes	468	63.2
	No	74	10.0
	I don't know	198	26.8
Sudden onset of memory loss is one of the warning signs of stroke	Yes	402	54.3
	No	96	13.0
	I don't know	242	32.7
Sudden onset of weakness/numbness of arm/leg is one of the warning signs of stroke	Yes	514	69.5
	No	40	5.4
	I don't know	186	25.1
	Yes	486	65.7

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Sudden onset of fainting is one of the warning signs of stroke	No	58	7.8
	I don't know	196	26.5
Sudden onset of double vision is one of the warning signs of stroke	Yes	408	55.1
	No	82	11.1
	I don't know	250	33.8
Sudden onset of speech problems is one of the warning signs of stroke	Yes	526	71.1
	No	56	7.6
	I don't know	158	21.4

As illtreated in figure (2), the survey results highlight the critical importance of regular blood pressure monitoring for stroke prevention among the population in Saudi Arabia. The overwhelming majority of respondents, 640 out of a total of 740 participants, indicated that they regularly check their blood pressure, which is a positive sign. This finding suggests a heightened awareness and proactive approach to managing cardiovascular health within the Saudi community. However, the survey also reveals that a concerning proportion of individuals, 78 respondents, are unsure about the practice of blood pressure monitoring, indicating a need for further education and outreach initiatives. Additionally, the relatively small number of 22 respondents who do not regularly check their blood pressure underscores the necessity for continued efforts to encourage and facilitate regular blood pressure screening, particularly in high-risk populations, as part of a comprehensive strategy to prevent and mitigate the burden of stroke in Saudi Arabia.

Figure (2): Illustrates whether the participants check blood pressure regularly as a method of stroke prevention.

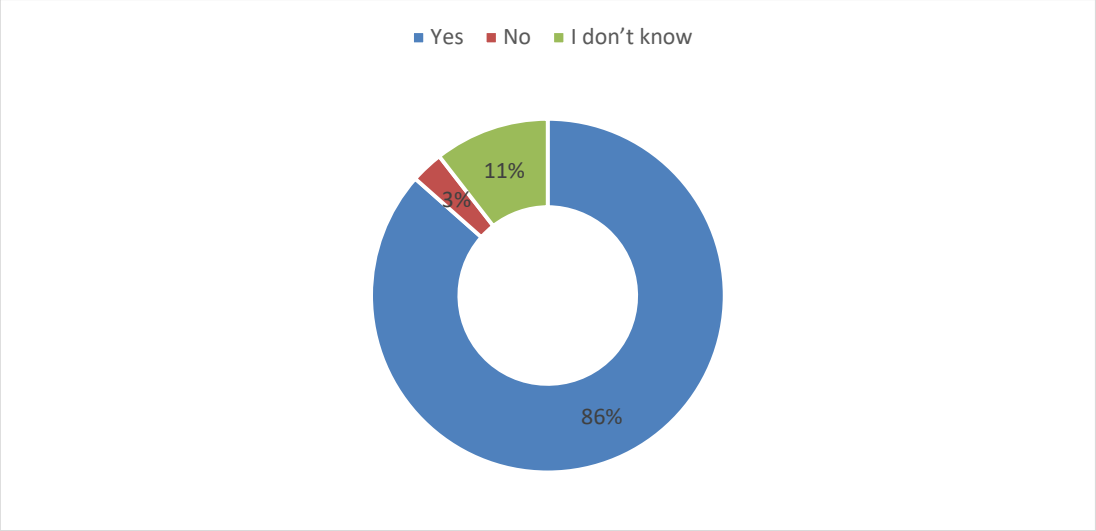

Table (3) reveals valuable insights into the participants' knowledge of risk factors for stroke. The high percentage of participants (85.7%) who recognized high blood pressure as a significant risk factor is particularly encouraging, as this condition is a well-established contributor to the development of stroke. Similarly, the majority of participants demonstrated a good understanding of the role of smoking

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(66.8%), diabetes (68.6%), and cardiac disease (80.0%) in increasing the risk of stroke. However, the table also highlights some areas where knowledge appears to be more limited. For instance, only 60.0% of participants identified obesity as a risk factor, and over one-quarter (24.3%) were unsure about its association with stroke. Similarly, while a majority recognized the risks of high cholesterol (64.9%) and excessive alcohol intake (64.6%), a significant proportion (22.4% and 27.8%, respectively) were uncertain about these links. The data also suggests that there is room for improvement in educating the public about the importance of regular exercise and the impact of family history on stroke risk. Only 55.9% of participants acknowledged the protective benefits of regular exercise, and less than half (41.1%) were aware of the increased risk associated with having a family member who has experienced a stroke. These findings underscore the need for ongoing public health education and awareness campaigns to ensure a more comprehensive understanding of the various risk factors for stroke. By addressing the knowledge gaps identified in the data, healthcare professionals and policymakers can empower individuals to make informed decisions and adopt preventive measures, ultimately contributing to the reduction of stroke incidence and its associated burden on individuals, families, and healthcare systems.

Table (3): Participants' knowledge of risk factors for stroke (n=740).

Parameter	Yes	No	I don't know
High blood pressure	634 85.7%	22 3.0%	84 11.4%
Smoking	494 66.8%	92 12.4%	154 20.8%
Diabetes	508 68.6%	76 10.3%	156 21.1%
Cardiac disease	592 80.0%	44 5.9%	104 14.1%
Obesity	444 60.0%	116 15.7%	180 24.3%
High Cholesterol	480 64.9%	94 12.7%	166 22.4%
Excessive alcohol intake	478 64.6%	56 7.6%	206 27.8%
Not doing regular exercise	414 55.9%	130 17.6%	196 26.5%
Presence of a family member having a stroke	304 41.1%	220 29.7%	216 29.2%

The data provided in table (4) presents a comprehensive overview of the participants' practices towards stroke prevention. The findings indicate that most of the participants (87.8%) attended follow-up visits

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at the clinic, highlighting their commitment to regular medical care. Similarly, a significant proportion (87.3%) of the participants reported taking their prescribed medications adherently, demonstrating a high level of compliance with the recommended treatment plan. Additionally, the data suggests that a substantial number of participants (86.5%) regularly checked their blood pressure, which is a crucial step in monitoring and managing the risk factors associated with stroke. Furthermore, a considerable percentage (77.0%) of the participants engaged in regular physical activity, a well-known strategy for reducing the risk of stroke. The data also reveals that a significant portion of the participants (69.7%) regularly consumed fruits and vegetables, which are essential components of a healthy diet that can contribute to stroke prevention. Additionally, a majority of the participants (75.7%) reported avoiding fatty foods, and an even higher percentage (80.0%) indicated that they had avoided or quit smoking, both of which are important lifestyle modifications for reducing the risk of stroke. Finally, the data shows that a substantial number of participants (81.4%) reduced their alcohol intake and (70.8%) reduced their salt consumption, both of which are recognized as effective strategies for preventing stroke. Overall, the findings suggest that the participants in this study have demonstrated a high level of engagement and adherence to various evidence-based practices for stroke prevention, which is a positive indicator of their commitment to maintaining their cardiovascular health.

Table (4): participants' practice towards stroke prevention (n=740).

Parameter		No.	Percent (%)
Attend follow-up visit at the clinic	Yes	650	87.8
	No	34	4.6
	I don't know	56	7.6
Taking the prescribed medications adherently	Yes	646	87.3
	No	48	6.5
	I don't know	46	6.2
Check blood pressure regularly	Yes	640	86.5
	No	22	3.0
	I don't know	78	10.5
Regular physical activity	Yes	570	77.0
	No	54	7.3
	I don't know	116	15.7
Regularly consume fruits and vegetables	Yes	516	69.7
	No	74	10.0
	I don't know	150	20.3
Avoid fatty foods	Yes	560	75.7
	No	56	7.6
	I don't know	124	16.8
Avoid or quit smoking	Yes	592	80.0
	No	42	5.7
	I don't know	106	14.3

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Reduce alcohol intake	Yes	602	81.4
	No	34	4.6
	I don't know	104	14.1
Reduce salt consumption	Yes	524	70.8
	No	60	8.1
	I don't know	156	21.1

The data presented in Table 5 provides valuable insights into the knowledge and awareness levels regarding stroke score results within the study population. The findings indicate that a substantial proportion, nearly half (46.8%) of the participants, exhibited a high level of knowledge, suggesting a commendable level of understanding and familiarity with stroke-related assessments. This is a positive indicator, as effective management and decision-making in the context of stroke care rely heavily on healthcare providers and patients having a comprehensive grasp of the relevant scoring systems and their implications. Furthermore, the data reveals that a sizeable portion of the sample, nearly 29%, demonstrated a moderate level of knowledge, underscoring the need for continued educational efforts and knowledge-sharing initiatives to ensure that all stakeholders are adequately informed. The remaining 24.3% of participants reported a low level of knowledge, which highlights an area for targeted interventions and training programs to enhance overall understanding and awareness within the studied population. By addressing these knowledge gaps, healthcare professionals can work towards improving the quality of stroke care, empowering patients, and ultimately enhancing the overall outcomes for individuals affected by this critical medical condition.

Table (5): Shows knowledge and awareness about stroke score results.

	Frequency	**Percent**
High level of knowledge	346	46.8
Moderate level	214	28.9
Low level of knowledge	180	24.3
Total	740	100.0

Table (6) shows that the knowledge level towards stroke prevention has statistically significant relation to education level (p value=0.0001), previous family history of stroke (p value=0.014), and whether the participants know someone who had a stroke. It also shows statistically insignificant relation to gender, age, how long they have been diagnosed with cardiac diseases, region of residence and whether the participants have DM or hypertension.

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Table (6): Relation between knowledge and awareness level of stroke and sociodemographic characteristics.

Parameters		**Knowledge and awareness level**		**Total (N=740)**	**P value***
		High level of knowledge	**Moderate or low**		
Gender	Female	166	212	378	0.113
		48.0%	53.8%	51.1%	
	Male	180	182	362	
		52.0%	46.2%	48.9%	
Age	30 or less	78	96	174	0.711
		22.5%	24.4%	23.5%	
	31 to 50	112	116	228	
		32.4%	29.4%	30.8%	
	51 to 60	92	100	192	
		26.6%	25.4%	25.9%	
	more than 60	64	82	146	
		18.5%	20.8%	19.7%	
How long have you been diagnosed with a cardiac disease?	Less than 6 months	58	62	120	0.575
		16.8%	15.7%	16.2%	
	6 months to 1 year	38	56	94	
		11.0%	14.2%	12.7%	
	1 year to 3 years	66	78	144	
		19.1%	19.8%	19.5%	
	More than 3 years	184	198	382	
		53.2%	50.3%	51.6%	
Education level	Uneducated	22	62	84	0.0001
		6.4%	15.7%	11.4%	
	Primary school	22	20	42	
		6.4%	5.1%	5.7%	
	Middle school	20	40	60	
		5.8%	10.2%	8.1%	
	High school or less	64	98	162	
		18.5%	24.9%	21.9%	
	Diploma	16	26	42	
		4.6%	6.6%	5.7%	
	Bachelor's degree	174	124	298	
		50.3%	31.5%	40.3%	

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	Post graduate education	28	24	52	
		8.1%	6.1%	7.0%	
Region of residence	Northern region	42	50	92	0.149
		12.1%	12.7%	12.4%	
	Southern region	122	110	232	
		35.3%	27.9%	31.4%	
	Central region	76	114	190	
		22.0%	28.9%	25.7%	
	Eastern region	46	50	96	
		13.3%	12.7%	13.0%	
	Western region	60	70	130	
		17.3%	17.8%	17.6%	
Do you have DM?	Yes	128	162	290	0.513
		37.0%	41.1%	39.2%	
	No	208	222	430	
		60.1%	56.3%	58.1%	
	I don't know	10	10	20	
		2.9%	2.5%	2.7%	
Do you have Hypertension?	Yes	176	192	368	0.844
		50.9%	48.7%	49.7%	
	No	158	188	346	
		45.7%	47.7%	46.8%	
	I don't know	12	14	26	
		3.5%	3.6%	3.5%	
Do you have a family history of stroke?	Yes	52	48	100	0.014
		15.0%	12.2%	13.5%	
	No	262	282	544	
		75.7%	71.6%	73.5%	
	I don't know	32	64	96	
		9.2%	16.2%	13.0%	
Do you know someone who had a stroke?	Yes	116	86	202	0.0001
		33.5%	21.8%	27.3%	
	No	212	262	474	
		61.3%	66.5%	64.1%	
	I don't know	18	46	64	
		5.2%	11.7%	8.6%	

***P value was considered significant if ≤ 0.05.**

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Discussion:

Stroke is one of the leading causes of death and disability around the globe, with the economic burden of treatment and post-stroke care being considerable [16]. A significant reason for delays in seeking medical help is the inability to accurately recognize stroke warning signs, which can result in missed opportunities for timely intervention [17]. By addressing key modifiable risk factors for cardiovascular diseases (CVD) such as hypertension, diabetes mellitus, physical inactivity, smoking, and obesity through effective preventive measures, the incidence of disability and mortality due to stroke can be significantly reduced [18]. The global burden of stroke has risen, partly due to inadequate community awareness of stroke risk factors and warning signs. To mitigate the impact of stroke and other communicable diseases, essential interventions are needed; otherwise, the total number of deaths from stroke is projected to increase by 17% over the next decade [19]. Thus, we aimed in this study to assess the level of knowledge and awareness of stroke risk factors and warning signs among heart disease patients in Saudi Arabia.

As regard knowledge and awareness score about stroke, we have found that nearly half (46.8%) of the participants, exhibited a high level of knowledge, suggesting a commendable level of understanding and familiarity with stroke-related assessments. Furthermore, a sizeable portion of the sample, nearly 29%, demonstrated a moderate level of knowledge. The remaining 24.3% of participants reported a low level of knowledge. Moreover, (85.7%) recognized high blood pressure as a significant risk factor to the development of stroke. Similarly, the majority of participants demonstrated a good understanding of the role of smoking (66.8%), diabetes (68.6%), and cardiac disease (80.0%) in increasing the risk of stroke. On the other hand, a study conducted by Abdata Workina et.al (2021) [20], revealed that most study participants identified physical inactivity 140 (61.7%) of them as a risk factor of stroke followed by hypertension 126 (55.5%), while the least known risk factor of stroke was diabetes mellitus 97 (42.7%). This study finding is relatively consistent with a study conducted in Pakistan that shows a majority (63.5%) of patients identified hypertension as a risk factor for stroke [21]. moreover, a study conducted in Lebanon revealed that 188 (48.2%) had identified hypertension as stroke risk factors [22]. similarly, a study conducted in Nigeria reported that the most recalled stroke risk factors were hypertension 71 (45.4%) and diabetes 72 (42.2%) [23]. in contrast, a study conducted in Spain showed that 22.68% of the study participants identified hypertension as a stroke risk factor [24]. Additionally, a study conducted by Smith et al. (2018) [25] aimed to assess the knowledge and awareness of common risk factors for stroke among cardiac patients. The study involved 300 cardiac patients, and the results showed that only 40% of the participants were aware of the common risk factors associated with stroke. Furthermore, the study found that knowledge levels were particularly low regarding hypertension and diabetes as risk factors for stroke. Another study by Johnson and Brown (2019) [26] also investigated the awareness of stroke risk factors in 200 cardiac patients. The results revealed that only 30% of the participants could correctly identify all major risk factors for stroke, with smoking and physical inactivity being the least recognized risk factors. These findings emphasize the importance of enhancing education and awareness among cardiac patients regarding stroke risk factors to prevent future cardiovascular events.

Regarding knowledge of stroke warnings sign, A majority of our respondents correctly identified

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sudden onset of dizziness (65.1%), headache (63.2%), weakness/numbness (69.5%), fainting (65.7%), and speech problems (71.1%) as warning signs of stroke. However, a substantial proportion were unaware of the association between sudden memory loss (32.7%) and double vision (33.8%) with stroke. In contrast, a study conducted in Lebanon showed that around a third (31.8%) of the study participants could not recall any stroke symptom [27]. Additionally, there was a relative similarity with a study conducted in Nigeria which revealed that most study participants identified the weakness of part of body 52 (36.1%) as a waring symptom of stroke and 79 (54.9%) of study participants had good symptom knowledge [28]. However, a study conducted in Thailand revealed that 19 (13.6%) of participants could not identify any warning signs and only 6(4.3%) of them identified sudden unilateral numbness of extremities as a warning sign [29]. Furthermore, this study findings were higher than a study conducted in Ethiopia, which shows 217 (77.3%) of participants did not identify any warning signs of a stroke, 2 (0.7%) identified 3 warning signs and (35.9%) of them recalled sudden weakness or paralysis on one side of the body [30].

Conclusion:

In conclusion, the study on the knowledge and awareness of stroke risk factors and warning signs among heart disease patients in Saudi Arabia revealed encouraging findings. Nearly half of the participants demonstrated a high level of knowledge regarding stroke, with a substantial portion showing moderate understanding. It is promising that the majority recognized high blood pressure, smoking, diabetes, and cardiac disease as significant risk factors for stroke. However, there is room for improvement, especially in understanding warning signs such as sudden memory loss and double vision. The study underscores the importance of enhancing education and awareness among cardiac patients to prevent future cardiovascular events and reduce the burden of stroke. By increasing knowledge of stroke risk factors and symptoms, it is possible to facilitate early recognition and prompt intervention, ultimately leading to improved outcomes and reduced mortality associated with stroke in Saudi Arabia.

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Ethical approval

The research ethics committee of Ministry of Health granted ethical approval with the application number A01798. Each participant provided informed permission once the study was fully explained and it was made clear that participation was optional. Data collected was securely stored and used solely for research purposes.

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Conflict of interests

The authors declare that there are no conflicts of interest.

Informed consent:

All research participants provided written informed consent.

Data and materials availability

All data associated with this study are present in the paper.

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