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(RESEARCH ARTICLE)

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Evaluation of knowledge of risk factors and warning signs of stroke among paramedical students

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Abstract

Stroke is a medical emergency caused by a blockage or rupture in the blood vessels that supply blood to the brain. This prevents brain tissue from receiving oxygen, leading to the death of brain cells within minutes and causing neurological damage, disability, or death.

Aim: The aim of the present study was to assess baseline knowledge regarding stroke risk factors, symptoms, treatment, and information resources. The "golden hour" is a time span of 60 minutes or less after stroke symptoms begin. There are two types of stroke, namely ischemic and hemorrhagic stroke. Ischemic stroke is further divided into thrombotic and embolic stroke. Hemorrhagic stroke is further divided into intracerebral hemorrhage and subarachnoid hemorrhage.

Methods: The research method used in the study is a quantitative research approach. Purposive sampling techniques were used and 1050 participants were assessed The questionnaire consists of demographic details such as department, level of education, family history, and knowledge questions based on risk factors and management.

Results: This study comprises 1040 patients who fulfill the inclusion criteria. The survey assessed the knowledge of risk factors and warning signs of stroke among future healthcare professionals (pharmacy, nursing, and AHS). The current findings reported that 51.8% of the paramedical students had knowledge about stroke, while the majority of them reported poor knowledge overall. The findings identified that 57.4% of the student population were knowledgeable about risk factors, 69.9% were knowledgeable about warning signs, and 51.8% were knowledgeable about management. These results were similar to many previous studies conducted around the world.

Conclusion: Better knowledge about stroke, recognizing the risk factors, and being able to provide immediate management are essential for paramedical students. This is crucial for reducing stroke incidence and improving survival rates of patients by providing better medical help through early detection, rapid intervention, and better long-term health outcomes not only in a medical setup but also in their respective environments.

Keywords: Stroke; Ischemic stroke; Hemorrhagic stroke; Thrombotic stroke; Embolic stroke; Intracerebral hemorrhage; Subarachnoid hemorrhage

1. Introduction

Stroke occurs when there is a sudden bleeding or blockage in the blood flow to the brain. Strokes are classified into two types: ischemic and hemorrhagic (1). An ischemic stroke occurs due to a blockage in the blood flow to the brain, leading

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to insufficient oxygen and nutrients being supplied to the brain. Asa result, brain cells begin to die within minutes. In a hemorrhagic stroke, leaked blood causes pressure on the brain cells, damaging them(2). Ischemic strokes are more common, accounting for 87% of all strokes, while hemorrhagic strokes account for 13%.

2. Materials and Methods

A cross-sectional study (questionnaire-based) was conducted among paramedical students—AHS, pharmacy, and nursing—at ACS Medical College and Hospital from November 2023 to May 2024. The study included students above the age of 18 years. The study was approved by the institutional ethical committee, and informed consent was obtained from all participants.

The questionnaire consisted of demographic details such as department, level of education, and family history, as well as knowledge questions based on risk factors and management. Each correct answer was given 2 points, each wrong answer was given 0 points, and "I don't know" was given 1 point. The level of knowledge was determined by the mean score (6.4%). A score higher than the mean was considered good, while a score lower than the mean was considered poor.

2.1. Statistical Analysis

The frequency, mean, standard deviation, percentage, chi square test were used to analyze the data by SPSS version 2.0

3. Results

A total of 1,040 participants were included in the study to assess knowledge of risk factors and warning signs of stroke among paramedical students. The findings reported that 51.8% of the paramedical students had knowledge about stroke, while the majority of the population reported poor knowledge. Among the student population, 57.4% were knowledgeable about risk factors, 69.9% were knowledgeable about warning signs, and 51.8% were knowledgeable about management. This study depicts that two-thirds of the undergraduate healthcare students were found to have good knowledge. The knowledge score was significantly higher among AHS undergraduates compared to nursing and pharmacy students.

4. Discussion

A total of 1040 participants were included in the study to assess knowledge of risk factors and warning signs of stroke among paramedical students. The findings reported that 51.8% of the paramedical students had knowledge about stroke, while the majority of the population reported poor knowledge.

Among the student population, 57.4% were knowledgeable about risk factors, 69.9% were knowledgeable about warning signs, and 51.8% were knowledgeable about management. This study depicts that two-thirds of the undergraduate healthcare students were found to have good knowledge. The knowledge score was significantly higher among AHS undergraduates compared to nursing and pharmacy students. This survey assessed the knowledge of Risk Factors and Warning Signs of Stroke among future healthcare professionals (pharmacy, nursing, and AHS) The current findings reported among 1040 participants, 51.8% of the paramedical students found good knowledge about the stroke, while the majority of them reported poor knowledge. This study would add a significant contribution in enhancing the health care professionals, patients, and individuals' knowledge about stroke, thereby helping in some aspects of the management of the diseases in the institution. The research findings may also be used by healthcare and educational organizations to create effective training programs to increase the clinical presentation of stroke understanding by healthcare professionals. Overall the current findings identified 57.4% of the student population were knowledgeable about risk factors, while 69.9% of them were knowledgeable about warning signs and 51.8% were knowledgeable about management(4). These results were similar to many previous studies conducted around the world.

The previous study by King Saud University(KSU), Riyadh Saudi Arabia among 205 participants who are pharmacy, nursing, and EMS undergraduates reported 53.2% of the studied population were knowledgeable about risk factors, while 53.2% of them were knowledgeable about warning signs (53.8%) of stroke the previous findings reported 32.2% of the UHCS from KSU found good knowledge about the stroke, while the majority of them reported poor knowledge(5).

In the current study, according to the questionnaire the majority of the participants parents don’t work in healthcare(87.30%) while the rest of the participants partners work in healthcare(12.70%). According to the study

done by King Saud University(KSU), Riyadh Saudi Arabia among pharmacy, nursing, and EMS undergraduates reports that majority of the participants parents don't work in healthcare (72.7%) and the reset of the participants parents do work in healthcare(27.3%)(6). The involvement of parents in heal care will influence the students in their knowledge on health issues and finding solutions(7).

The current study findings identified the majority of the participants agreed that hypertension was a major risk factor for stroke(73.7%-AHS, 3.20%-Pharmacy, 8.50%-Nursing) followed by heart disease, older age and history of prior stroke. These results were similar to many previous studies conducted around the world(8). For instance, a previous study by al-Malki et al. identified high blood pressure followed by high cholesterol and smoking as the risk actors of stroke. Another study in southwestern Nigeria among undergraduate students concluded that hypertension (82.6%), old age (74.9%), hypercholesterolemia (42.8%), diabetes (35.9%) and smoking (27%) were the commonly identified stroke risk factors(9). Increased awareness about early signs of stroke can improve overall disease diagnosis and treatment, morbidity, and death rates.

In the current study, according to the participants perception toward warning signs of stroke, commonly identified symptoms were loss of balance, difficulty in walking, difficulty in speaking/understanding or slurred speech, chest pain or heart palpitations, shortness of breath, severe headache with unknown cause and blurred eyes in one or both eyes respectively. Some other reports revealed numbness or weakness, difficulty in understanding speech, trouble in speaking or seeing, and walking and headache are important signs and symptoms of stroke(10).

Finally, the action to be taken in case of stroke is vital during critical conditions and emergency cases. However, in a study by Almalki et al study, more than two-thirds (69.7%) of the students would call an ambulance and this was followed by driving to the nearest hospital (51.8%) and telling the patient's family.

Table 1 Demographic information

	Questions				
1.	**Demographic factors**				
			AHS	**Pharmacy**	**Nursing**
	Department		84.5%	3.8%	11.7%
			UG	PG	
	Level of education		96.6%	3.4%	
			YES	NO	
	Parents work in healthcare		12.7%	87.3%	
2.	**Risk factor**				
			AHS	**Pharmacy**	**Nursing**
	Diabetes	True	43.7%	2.1%	6.8%
		False	23.6%	1.3%	2.6%
		I don't know	17.3%	3%	2.3%
	Hypertension	True	73.7%	3.2%	8.5%
		False	4.6%	4%	2%
		I don't know	6.3%	2%	1.3%
	Hyperlipidemia	True	48.5%	1.9%	5.3%
		False	14.8%	7%	3.4%
		I don't know	21.3%	1.2%	3.1%
	Heart disease	True	65%	2.2%	7.7%
		False	8.8%	1.1%	2.7%

		I don't know	10.8%	2%	1.3%
	Alcohol	True	63.4%	3.1%	8.1%
		False	8.8%	6%	2%
		I don't know	12.3%	1%	1.6%
	Tobacco	True	57.1%	2.5%	7.1%
		False	11.9%	7%	2.1%
		I don't know	15.5%	6%	2.5%
	Birth control	True	26.1%	1.6%	4.2%
	Pills	False	23.6%	1.3%	4%
		I don't know	34.9%	9%	3.5%
	High blood cell	True	32.3%	1.9%	4.8%
	Count	False	24.8%	1.3%	3.6%
		I don't know	27.4%	5%	3.4%
	Old age	True	58.1%	2.1%	7.1%
		False	13%	1.3%	2.8%
		I don't know	13.5%	3%	1.8%
	Gender	True	26.9%	1.3%	4.9%
		False	32.5%	2%	5.3%
		I don't know	25.1%	4%	1.5%
	Heredity and	True	41.5%	2%	5.9%
	Genetics	False	20.6%	1.3%	3.4%
		I don't know	22.4%	5%	2.5%
	Histroy of prior	True	55.8%	2.5%	6.9%
	Stroke	False	7.2%	9%	2.6%
		I don't know	21.5%	4%	2.2%
	Lack of exercise	True	41.7%	1.7%	7.1%
		False	21.1%	1.5%	2.9%
		I don't know	21.7%	5%	1.7%
3.	**Warning signs**				
			AHS	**PHARMACY**	**NURSING**
	Blurred eyes in 1 Or both eyes	True	48.3%	2.3%	5.5%
		False	11.8%	7%	3.4%
		I don't know	24.4%	8%	2.9%
	Chest pain or Heart palpitation	True	58.8%	2.6%	8.1%
		False	13%	8%	1.6%
		I don't know	12.8%	4%	2%
	Difficulty in speaking and understanding or slurred speech	True	64%	3.2%	7.7%

		False	8.4%	3%	2.1%
		I don't know	12.1%	3%	1,9%
	Difficulty in walking	True	68.8%	3%	8.4%
		False	6.8%	4%	1.9%
		I don't know	8.8%	4%	1.4%
	Dizziness	True	62.9%	2.6%	7.4%
		False	9.5%	8%	2%
		I don't know	12.1%	4%	2.3%
	Loss of balance	True	69.5%	3.5%	8.8%
		False	5.9%	1%	1.3%
		I don't know	9.1%	2%	1,6%
	Numbness or weakness of the face and/or limb of the body	True	60.1%	2.4%	7.7%
		False	8.2%	9%	3.2%
		I don't know	16.3%	5%	7.1%
	Severe headache with unknown cause	True	51.2%	2.6%	7.6%
		False	12.5%	7%	5.2%
		I don't know	20.9%	5%	5.2%
	Shortness of breath	True	54.4%	2%	8.6%
		False	12.8%	1%	9.2%
		I don't know	17.3%	8%	2%
4.	**Management**				
	I will call the ambulance	True	78.8%	3.5%	1.0%
		False	5.8%	3%	1.7%
	I will give home remedies	True	53.1%	2.4%	7.4%
		False	28.5%	1.3%	4.3%
	I will give the patient first the painkiller to control the pain	Yes	43.4%	1.3%	5.6%
		NO	41.2%	2.4%	6.2%
	Anything and no let the patient recover by Him/her self	Yes	19.3%	6%	3.9%
		NO	65.2%	3.2%	7.8%
	I will take the patient to the hospital immediately	Yes	5.6%	2%	1.1%
		NO	78.9%	3.6%	10.7%

Variables	**Frequency n (%)**
Educational degree	

AHS	879 (84.5%)
PHARMACY	39 (3.8%)
NURSING	122 (11.7%)
Parents work in healthcare	
YES	132 (12.7%)
NO	908 (87.3%)
Level of education	
UG	1005 (96.6%)
PG	35 (3.4%)
A stroke or brain attack happens when blood flow to your brain is stopped	
YES	777 (74.7%)
NO	141 (13.5%)
I DON'T KNOW	122 (11.7%)
A stroke affect ability to move eat and other body function	
YES	749 (72%)
NO	161 (15.4%)
I DON'T KNOW	130 (12.5%)
What is the window period of thrombolysis in hours ?	
0 - 4.5 h	412 (39.6%)
4.5 - 6 h	368 (35.3%)
12 - 24 h	135 (12.9%)
>24 h	125 (12%)

Table 2 Risk factors of stroke

Risk factors	**AHS (n = 879) n (%)**	**Pharmacy (n = 39) n (%)**	**Nursing (n = 122) n (%)**	**Total (n = 1040) n (%)**
Diabetes				
True	454 (51.6)	22 (56.4)	71 (58.2)	547 (52.59)
False	245 (27.9)	14 (35.9)	27 (22.1)	286 (27.5)
I Don't Know	180 (20.5)	3 (7.7)	24 (19.7)	207 (19.9)
Hypertension				
True	766 (73.7)	33 (3.2)	88 (8.5)	887 (85.3)
False	48 (4.6)	4 (4.0)	21 (2.0)	73 (7.0)
I Don't Know	65 (6.3)	2 (2.0)	13 (1.3)	80 (7.7)
Hyperlipidemia				
True	504 (48.5)	20 (1.9)	55 (5.3)	579 (55.7)
False	154 (14.8)	7 (7.0)	35 (3.4)	196 (18.8)

I Don't Know	221 (21.3)	12 (1.2)	32 (3.1)	265 (25.5)
Heart disease				
True	676 (65.0)	23 (2.2)	80 (7.7)	779 (74.9)
False	91 (8.8)	11 (1.1)	28 (2.7)	130 (12.5)
I Don't Know	112 (10.8)	5 (5.0)	14 (1.3)	131 (12.6)
Alcohol				
True	659 (63.4)	32 (3.1)	84 (8.1)	775 (74.5)
False	92 (8.8)	6 (6.0)	21 (2.1)	119 (11.4)
I Don't Know	128 (12.3)	1 (1.0)	17 (1.6)	146 (14.0)
Tobacco				
True	594 (57.1)	26 (2.5)	74 (7.1)	694 (66.7)
False	124 (11.9)	7 (7.1)	22 (2.1)	153(14.7)
I Don't Know	161 (15.5)	6 (6.0)	26 (2.5)	193 (18.6)
Birth control pills				
True	271 (26.1)	17 (1.6)	44 (4.2)	332 (31.9)
False	245 (23.6)	13 (1.3)	42 (4.0)	300 (28.8)
I Don't Know	363 (34.9)	9 (9.0)	36 (3.5)	408 (39.2)
High red blood cell count				
True	336 (32.3)	20 (1.9)	50 (4.8)	406 (39.0)
False	258 (24.8)	14 (1.3)	37 (3.6)	309 (29.7)
I Don't Know	285 (27.4)	5 (5.0)	35 (3.4)	325 (31.3)
Older age				
True	604 (58.1)	22 (2.1)	74 (7.1)	700 (67.3)
False	135 (13.0)	14 (1.3)	29 (2.8)	178 (17.1)
I Don't Know	140 (13.5)	3 (3.0)	19 (1.8)	162 (15.6)
Gender				
True	280 (26.9)	14 (1.3)	51 (4.9)	345 (33.2)
False	338 (32.5)	21 (2.0)	55 (5.3)	414 (39.8)
I Don't Know	261 (25.1)	4 (4.0)	16 (1.5)	281 (27.0)
Heredity or genetics				
True	432 (49.1)	21 (2)	61 (5.9)	514 (49.4)
False	214 (24.3)	13 (1.3)	35 (3.4)	262 (25.2)
I Don't Know	233 (26.6)	5 (5)	26 (2.5)	264 (25.4)
History of prior stroke				
True	580 (55.8)	26 (2.5)	72 (6.9)	678 (65.2)
False	75 (7.2)	9 (9)	27 (2.6)	111 (10.7)
I Don't Know	224 (21.5)	4 (4)	23 (2.2)	251 (24.1)

Lack of exercise				
True	434 (41.7)	18 (1.7)	74 (7.1)	526 (50.6)
False	219 (21.1)	16 (1.5)	30 (2.9)	265 (25.5)
I Don't Know	226 (21.7)	5 (5)	18 (1.7)	249 (23.9)

Table 3 Warning signs of stroke

Warning signs	**AHS (n = 879) n (%)**	**Pharmacy (n = 39) n (%)**	**Nursing (n = 122) n (%)**	**Total (n = 1040) n (%)**
Blurred vision in 1 or both eyes				
True	502 (48.3)	24 (2.3)	57 (5.5)	583 (56.1)
False	123 (11.8)	7 (7)	35 (3.4)	165 (15.9)
I Don't Know	254 (24.4)	8 (8)	30 (2.9)	292 (28.1)
Chest pain or heart palpitations				
True	611(58.8)	27 (2.6)	84 (8.1)	722 (69.4)
False	135 (13.0)	8 (8)	17 (1.6)	160 (15.4)
I Don't Know	133 (12.8)	4 (4)	21 (2.0)	158 (15.2)
Difficulty in speaking and understanding or slurred speech				
True	666 (64.0)	33 (3.2)	80 (7.7)	779 (74.9)
False	87 (8.4)	3 (3)	22 (2.1)	112 (10.8)
I Don't Know	126 (12.1)	3 (3)	20 (1.9)	149 (14.3)
Difficulty in walking				
True	716 (68.8)	31 (3.0)	87 (8.4)	834 (80.2)
False	71 (6.8)	4 (4)	20 (1.9)	95 (9.1)
I Don't Know	92 (8.8)	4 (4)	15 (1.4)	111 (10.7)
Dizziness				
True	654 (62.9)	27 (2.6)	77 (7.4)	758 (72.9)
False	99 (9.5)	8 (8)	21 (2)	128 (12.3)
I Don't Know	126 (12.1)	4 (4)	24 (2.3)	154 (14.8)
Loss of balance				
True	723 (69.5)	36 (3.5)	92 (8.8)	851 (81.8)
False	61 (5.9)	1 (1)	13 (1.3)	75 (7.2)
I Don't Know	95 (9.1)	2 (2)	17 (1.6)	114 (11)
Numbness or weakness of the face and or limb of the body				
True	625 (60.1)	25 (2.4)	80 (7.7)	730 (70.2)
False	85 (8.2)	9 (9)	25 (2.3)	118 (11.3)
I Don't Know	169 (16.3)	5 (5)	18 (1.7)	192 (18.5)
Severe headache with unknown cause				

True	532 (51.2)	27 (2.6)	70 (6.7)	629 (60.5)
False	130 (12.5)	7 (7)	26 (2.5)	163 (15.7)
I Don't Know	217 (20.9)	5 (5)	26 (2.5)	248 (23.8)
Shortness of breath				
True	566 (4.4)	21 (2)	71 (6.8)	658 (63.3)
False	133 (12.8)	10 (1.0)	30 (2.9)	173 (16.6)
I Don't Know	180 (17.3)	8 (8)	21 (2.0)	209 (20.1)

Table 4 Management of stroke

MANAGEMENT	**AHS (n = 879) n (%)**	**Pharmacy (n = 39) n (%)**	**Nursing (n = 122) n (%)**	**Total (n = 1040) n (%)**
I will call the ambulance				
YES	583 (56.1)	25 (2.4)	77 (7.4)	685 (65.9)
NO	296 (28.5)	14 (1.3)	45 (4.3)	355 (34.1)
I will give home remedies				
YES	451 (43.4)	14 (1.3)	58 (5.6)	523 (50.3)
NO	458 (41.2)	25 (2.4)	64 (6.2)	517 (49.7)
I will give the patient the first painkiller to control the pain				
YES	201 (19.3)	6 (6)	41 (3.9)	248 (23.8)
NO	678 (65.2)	33 (3.2)	81 (7.8)	792 (7.6)
I won't do anything to let the patient recover by him/herself				
YES	58 (5.6)	2 (2)	11 (1.1)	71 (6.8)
NO	821 (78.9)	37 (3.6)	111 (10.7)	969 (93.2)
I will take the patient to the hospital immediately				
YES	821 (78.9)	37 (3.6)	111 (10.7)	969 (93.2)
NO	58 (5.6)	2 (2)	11 (1.1)	71 (6.8)

5. Conclusion

This study depicts that about half of the paramedical students found to have good knowledge. The knowledge percentage was higher among each branch of paramedical students who participated according to the number of participants. Therefore, health education programs play a major role to help the students understand about storke and the issues related to it. Incorporating more innovative approaches on teaching and topics about stroke and various other diseases in clinical practises will undoubtedly enhance better results on treatment, care and betterment of the patients health.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

The present research work involves humans as Subjects and hence it is approved by Institutional Ethical Committee No.963/2023 IEC/ ACSMCH/Dt.17/09/2023.

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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