PUBLIC AWARENESS OF SEPSIS COMPARED TO ACUTE MYOCARDIAL INFARCTION AND STROKE IN TABUK, SAUDI ARABIA

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ABSTRACT

Background: There has been a troubling annual increase of 8-13% in sepsis cases, and this concerning trend has been attributed to the lack of public knowledge regarding sepsis and the severe consequences of delays in identification and treatment.

Method: The study was conducted in 2022 in Tabuk City, Saudi Arabia. It employed a cross-sectional observational design and involved 348 participants from the general public in Tabuk, including individuals of both genders aged 18 and above who agreed to participate. A structured questionnaire comprising 21 questions was used to assess the knowledge of the participants regarding sepsis in comparison to stroke and acute myocardial infarction (AMI). Data were analyzed using the Statistical Package for Social Sciences version 20.

Result: The results indicated that the age group between 18-40 years (78.2%) exhibited a higher level of awareness regarding sepsis than the age group above 40 years (21.8%). Females (69.1%) demonstrated significantly higher awareness of sepsis than males (30.8%). Among the participants who exhibited awareness of sepsis, 74.4% had a university education, while 15.8% had completed high school. Of individuals aware of myocardial infarction, 69.9% were female. Regarding stroke awareness, 72.9% of participants had a university education, and 17.4% had finished high school. Overall, across all demographic categories, higher levels of awareness were recorded for stroke and myocardial infarction in comparison to sepsis. It is crucial to note that these findings highlight the need for equal awareness of sepsis, as it is a health condition that is equally, if not more, severe.

Conclusion: These findings underscore the necessity of targeted educational campaigns to enhance awareness and knowledge regarding these critical health conditions, especially among males and individuals with lower education.

Keywords: Sepsis, Stroke, Myocardial Infarction, Awareness.

INTRODUCTION

Sepsis is a syndrome characterized by organ failure caused by an impaired host response to infection. Every year, sepsis is estimated to impact 30 million individuals worldwide, resulting in over 6 million fatalities. It is also one of the major causes of death among critically ill patients. Over the past ten years, the worrisome annual increase of 8-13% in sepsis cases has been attributed to a lack of public knowledge of sepsis and the severe consequences of delays in identification and treatment. It is also one of the leading causes of death in critically unwell individuals, with a mortality rate of 30%-40% [1,2].

Despite a shortage of epidemiological research on sepsis in Saudi Arabia, a study carried out at Buraidah Central Hospital in Qassim found that sepsis affected 16.6% of all patients in critical care, with 40.3% of those instances ending in death [1]. Since Tabuk and Buraidah are geographically close to each other and have almost the same population count, we can estimate the risk in Tabuk by revealing this information.

Sepsis is supposedly not widely known. According to a global poll on sepsis knowledge, the general population in the United States and Europe (France, Germany, Italy, Spain, and the United Kingdom) was unaware of the term "sepsis" between 47% and 96% [3].

Neurologic dysfunction brought on by abrupt embolic occlusions in the cerebral vessels is known as an ischemic stroke. It is a significant contributor to death and a significant source of adult disability, accounting for around 87% of all global stroke occurrences [4]. According to the World Health Organization (WHO), ischemic heart disease (IHD) is the leading cause of death in 2019. IHD contributed to around 182 million disability-adjusted life years (DALYs), 9.14 million fatalities, and 197 million prevalent cases in 2019 [5].

Noura and her colleagues published a study titled "Public Awareness of Sepsis Compared to Acute Myocardial Infarction and Stroke in Jeddah, Saudi Arabia." The study's findings showed that public awareness and knowledge of sepsis are low among the Jeddah population compared to awareness and knowledge of AMI and Stroke [1]. Similarly, a study with 1,081 participants titled "Sepsis Awareness and Knowledge in the General Korean Population: Comparing Awareness and Knowledge of Myocardial Infarction and Stroke" has been released. Minji Park

reported that sepsis awareness is low compared to acute myocardial infarction and stroke [2]. In 2015, a study was conducted on the public's awareness of sepsis in Sweden, and the study showed that awareness and knowledge of sepsis in Sweden were poor compared to other severe conditions [3].

Since sepsis can develop suddenly and rapidly, it is a life-threatening condition for which awareness of the symptoms is crucial. For individuals with sepsis, early detection and timely treatment are essential to improve outcomes. Our study aims to compare the public's knowledge of sepsis to that of Acute Myocardial Infarction and Stroke to better plan management and improve outcomes among the population of Tabuk, Saudi Arabia.

MATERIAL AND METHODS

The first page of the questionnaire includes statements about the purpose of this study, information that will be used only to achieve the study's goals, eligibility criteria, and consent from participants, which was obtained through the questionnaire. Ethical approval from the ethical committee of Tabuk University was obtained (Approval No: UT-242-98-2023).

This cross-sectional observational study was conducted in Tabuk City, Saudi Arabia, in 2023. It started in January and ended in June. The sampling method used was convenience sampling.

Sample size:
• Confidence level: 95%
• Standard deviation: 0.5

• Confidence interval (margin of error): ± 5%

The sample size was calculated using the formula:

$$\text{Sample size} = \frac{(z\text{-score})^2 \times \text{StdDev} \times (1 - \text{StdDev})}{(\text{confidence interval})^2}$$

Substituting the values:

$$\frac{(1.96)^2 \times 0.5 \times (0.5)}{(0.05)^2} = \frac{3.8416 \times 0.25}{0.0025} = \frac{0.9604}{0.0025} = 384.16$$

Thus, the sample size was estimated to be 348 using the Qualtrics calculator with a 95% confidence level.

Participants included both genders and those older than 18 who agreed to be involved in the study. We excluded those under 18 years old and those who do not live in Tabuk. Data collection and instrumentation were performed using a self-administered online survey via Google Forms in Arabic. The survey was developed by the researchers based on a substantial body of prior relevant literature to achieve the research objectives [1–3].

The tool is an online structured questionnaire presented to the participants via WhatsApp to collect data from those who agreed to participate. The questionnaire was composed of 21 questions to assess knowledge about sepsis compared to MI and stroke. Our cross-sectional study measured the awareness, knowledge, and attitudes of the general population in Tabuk, Saudi Arabia. The questions were chosen based on published

research that we believe may affect the outcomes.

The study consists of four parts: patient sociodemographic data (age, gender, region, marital status, employment, and education level); awareness, symptoms, and risk factors of sepsis; awareness, symptoms, and risk factors of MI; and awareness, symptoms, and risk factors of stroke.

Data entry and analysis were performed using Microsoft Excel. The collected data were presented as numbers and percentages and analyzed using the Statistical Package for Social Sciences (SPSS) version 20.

RESULTS

The study included a total of 561 participants with completed responses. The majority, 73.8%, were 18-40 years old, and 26.2% were older than 40 years. Table 1 illustrates the socio-demographic details of the participants. The majority, 72.9%, were female, and only 27.1% were male. Among the participants, almost half (52.8%) were single, 42.2% were married, and 2.7% were divorced. Almost half of the participants (52.2%) were unemployed, and 43.3% were employed. There were 4.5% retired personnel. The majority, 74.9% of the participants, had a university education, 16.8% had a high school education, 5.2% had postgraduate education, and 1.1% had primary education. Additionally, one individual had no education.

According to Table 2 above, the 18-40 age group (78.2%) had a higher awareness of sepsis than the older than 40 years group

Character		Count (N%)
Age	18-40	414(73.8)
	Older than 40	147(26.2)
Gender	Female	409(72.9)
	Male	152(27.1)
Social status	Single	296(52.8)
	Widow	13(2.3)
	Divorced	15(2.7)
	Married	237(42.2)
Occupation	Employee	243(43.3)
	Retired	25(4.5)
	Unemployed	293(52.2)
Educational level	High school education	94(16.8)
	Intermediate education	11(2)
	Postgraduate	29(5.2)
	Primary education	6(1.1)
	Uneducated	1(0.2)
	University education	420(74.9)

Table 1: Sociodemographic details of the participants (N=561)

(21.8%). Chi-square analysis proved that the impact of age on sepsis awareness is significant (p=0.015). Females (69.1%) had a significantly higher awareness of sepsis than males (30.8%) (p=0.014). Among the participants who had awareness of sepsis, 74.4% had a university education, and 15.8% had a high school education. The effect of education on sepsis awareness was found to be significant (p=0.018).

Additionally, 69.9% of the respondents who had an awareness of myocardial infarction were female. It was found that gender has a significant impact on awareness of myocardial infarction (p=0.024). Similarly,

Character		Sepsis				P-val	MI				P-val	Stroke				P-val
		No		Yes			No		Yes			No		Yes		
		Count	N %	Count	N %		Count	N%	Count	N%		Count	N%	Count	N%	
Age	18-40	191	69.2	223	78.2	0.015	139	73.5	275	73.9	0.923	110	74.8	304	73.4	0.740
	Older than 40	85	30.8	62	21.8		50	26.5	97	26.1		37	25.2	110	26.6	
Gender	Female	212	76.8	197	69.1	0.041	149	78.8	260	69.9	0.024	124	84.4	285	68.8	<0.001
	Male	64	23.2	88	30.9		40	21.2	112	30.1		23	15.6	129	31.2	
Social status	Single	135	48.9	161	56.5	0.132	97	51.3	199	53.5	0.915	68	46.3	228	55.1	0.212
	Widow	9	3.3	4	1.4		4	2.1	9	2.4		3	2.0	10	2.4	
	Divorced	6	2.2	9	3.2		6	3.2	9	2.4		6	4.1	9	2.2	
	Married	126	45.7	111	38.9		82	43.4	155	41.7		70	47.6	167	40.3	
Occupation	Employee	121	43.8	122	42.8	0.274	79	41.8	164	44.1	0.240	66	44.9	177	42.8	0.732
	Retired	16	5.8	9	3.2		5	2.6	20	5.4		5	3.4	20	4.8	
	unemployed	139	50.4	154	54.0		105	55.6	188	50.5		76	51.7	217	52.4	
Educational level	High school education	49	17.8	45	15.8	0.018	28	14.8	66	17.7	0.586	22	15.0	72	17.4	0.002
	Intermediate education	4	1.4	7	2.5		3	1.6	8	2.2		0	0.0	11	2.7	
	Postgraduate	8	2.9	21	7.4		9	4.8	20	5.4		2	1.4	27	6.5	
	Primary education	6	2.2	0	0.0		3	1.6	3	0.8		4	2.7	2	0.5	
	Uneducated	1	0.4	0	0.0		1	0.5	0	0.0		1	0.7	0	0.0	
	University education	208	75.4	212	74.4		145	76.7	275	73.9		118	80.3	302	72.9	

Table 2: Relationship of sociodemographic characteristics with disease awareness

68.8% of the respondents who had an awareness of stroke were female. It was found that gender has a significant impact on awareness of stroke (p<0.001). Among the participants who were aware of stroke, 72.9% had a university education, and 17.4% had a high school education. The effect of education on stroke awareness was found to be significant (p=0.002). In general, across all demographic categories, a higher level of awareness was reported for stroke and myocardial infarction than for sepsis.

As shown by Table 3, only half of the participants (50.8%) could define sepsis, while 49.2% could not. For myocardial infarction, 66.3% could define the term correctly, while for stroke, 73.8% could. Accordingly, we can see a higher awareness of strokes than myocardial infarction. The lowest level of awareness is for sepsis.

Table 3: Participants' knowledge of the definition of Sepsis, Myocardial Infarction, and Stroke (n=561)

Definition	Yes, N (%)	No, N (%)
Correctly defined the term sepsis	285(50.8)	276(49.2)
Correctly defined the term myocardial infarction	372(66.3)	189(33.7)
Correctly defined the term stroke	414(73.8)	147(26.2)

When discussing sepsis, the most known symptom was a high heart rate (57.9%), followed by shortness of breath (50.1%). However, only 23% were correct about diarrhea, and 14.6% were correct about skin rash and eczema. Regarding the risk factors for sepsis, the majority, 67.4% of the participants, correctly identified primary comorbidities, and 66.1% correctly identified low immunity.

Disease		Correctly answered, N (%)
Sepsis	**Symptoms**	
	Chills and fever	265(47.2)
	Disorientation	196 (34.9)
	Shortness of breath	281(50.1)
	High heart rate	325(57.9)
	Low blood pressure	255(45.5)
	Diarrhea	129(23)
	Skin rash and eczema	82(14.6)
	Risk Factors	
	Primary comorbidities	378(67.4)
	Low immunity	371(66.1)
	Catheter	123(21.9)
Myocardial infarction	**Symptoms**	
	Sudden pain or discomfortable in the chest	407(72.5)
	Sudden pain or discomfort in the jaw, neck, or back	157(28)
	Sudden pain or discomfort in arms or shoulders	209(37.3)
	Sudden shortness of breath	206(36.7)
	Risk Factors	
	Smoking	442(78.8)
	Obesity	416(74.2)
	Diabetes	254(45.3)
Stroke	**Symptoms**	
	Difficulty speaking	421(75)
	Weakness in the arm and leg	238(42.4)
	Change mental status	327(58.3)
	Facial drooping	271(48.3)
	Risk Factors	
	Smoking	303(54)
	Hypertension	442(78.8)
	Diabetes	228(40.6)

Table 4: Participants' knowledge of sepsis, myocardial infarction, and stroke risk factors and symptoms

In the case of myocardial infarction, the most common symptom was sudden pain or discomfort in the chest, known by 72.5% of the participants. This was followed by sudden pain or discomfort in the arms or shoulders (37.3%). The most common risk factor was smoking (78.8%), followed by obesity (74.2%).

When considering stroke, the most known symptom was difficulty speaking (75%), followed by a change in mental status (58.3%). Regarding the risk factors for stroke, the most commonly identified were hypertension (78.8%) and smoking (54%). Table 4 shows participants' knowledge about sepsis, myocardial infarction, stroke risk factors, and symptoms.

DISCUSSION

This 2022 study in Tabuk City, Saudi Arabia, utilized a cross-sectional observational design to compare awareness levels of sepsis, myocardial infarction (MI), and stroke. A structured 21-question questionnaire assessed participants' knowledge of definitions, symptoms, and risk factors. The overall awareness of sepsis was slightly lower than that for MI and stroke. While around half of the participants correctly defined sepsis, a larger proportion accurately defined MI, and an even larger majority correctly defined stroke. This finding contrasts with a 2018 study in Jeddah, where sepsis awareness was similar to that of MI and stroke [1].

Our results align with studies in Europe, America, and Sweden, which also found poor sepsis knowledge[3]. Similarly, Park et al.[5]

in Korea reported low awareness of sepsis compared to a better knowledge of MI and stroke. Comparable findings were observed in Singapore [6]. In our study, sepsis awareness was higher than in Korea (50.8% vs. 27.3%), possibly due to health education deficiencies and the complex nature of sepsis diagnosis [5,7]. Awareness of stroke and MI definitions was lower compared to Korea [5].

Regarding sepsis symptoms, about half of our participants identified fever and chills, unlike the 2018 Jeddah study, which highlighted difficulty breathing [1]. Both studies showed strong awareness of chest pain as a primary MI symptom, and difficulty speaking as a keystroke symptom, indicating effective public health messaging [1].

In terms of risk factors, over half of our participants recognized comorbidities and low immunity as significant for sepsis, consistent with the Jeddah study [1]. For MI, our participants identified smoking and obesity as key risk factors, while the Jeddah study pointed to increased cholesterol, reflecting regional differences in public health education. Both studies identified hypertension as the primary risk factor for stroke, suggesting well-established awareness of its role in stroke risk [1].

Overall, awareness levels of sepsis, MI, and stroke were similar across both studies, with minor variations in specific areas. Both studies indicated a generally adequate understanding of these conditions, highlighting effective public health education, though regional differences suggest a need for targeted educational

interventions to address specific knowledge gaps.

CONCLUSION

The knowledge of the general population about sepsis, stroke, and myocardial infarction in Tabuk City is suboptimal. The knowledge is alarmingly poor regarding sepsis and risk factors for stroke and myocardial infarction. More effort is needed to increase public awareness of these fatal and common diseases.

LIMITATIONS

Lack of previous research studies on this topic, As you know citing and referencing prior research studies constitutes the basis of the literature review for the study, and these prior studies provide the theoretical foundations for the research question you are investigating.

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