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Public Awareness and Knowledge of Sepsis: A Cross-Sectional Survey of Adults in Saudi Arabia

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ABSTRACT

Introduction: Sepsis is a life-threatening condition characterized by a dysregulated response to infection; however, the understanding in the general population is low or lacking especially in regions like Saudi Arabia where such situations are sparse. The present study strives to assess the general awareness and knowledge of sepsis among the adult Saudi population and aims to identify the potential determinants of such awareness.

Methods: It is a cross-sectional research study. The present study was able to solicit data with a time frame from July to November 2024 through an online and self-administered survey instrument that can be circulated over social media sites. Sample criteria included participants that were over 18 years of age and resided in Saudi Arabia. The data were analyzed with reference to socio demographic, level of prevalence and knowledge about sepsis using e-SPSS.

Results: Out of 544 respondents, only 32% reported prior awareness of sepsis, with 19.8% indicating good knowledge. The most well-known symptoms were fever (58.6%) and pain (44.3%), but little was known about other symptoms and their causes. Age, educational attainment, and work in healthcare were among the demographic variables that were substantially linked to increased awareness.

Conclusion: The research provides evidence that a substantial number of the adult population in Saudi Arabia are not aware and do not have sufficient knowledge of sepsis. The data points to the fact that people in Saudi Arabia are in dire need of education on sepsis to improve recognition of this diagnosis and understanding of its significance, aiming at bettering the outcomes and emergence

Highlights: This study assesses adult public awareness and knowledge of sepsis in Saudi Arabia. The results indicate an extremely low awareness level, with only 32% of participants aware of sepsis and even fewer demonstrating good knowledge. Statistically significant differences were observed based on education level, age, and healthcare work status. The findings suggest an urgent need for targeted public health interventions to enhance early detection and improve sepsis knowledge among Saudi adults.

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Introduction

The dysregulated host response to infections that results in physiological, pathological, and biological abnormalities is the

hallmark of sepsis, a potentially fatal illness [1]. Sepsis has shown a noticeable increase in the past ten years globally [2]. Thus, the gravity of this issue is staggering, with nearly fifty million people worldwide affected by sepsis in 2017 alone [3]. The financial burden of sepsis is equally staggering, as the Agency for Healthcare Research and Quality has identified it as the most expensive condition treated in U.S. hospitals, costing a staggering $24 billion in 2013 [4]. This underscores the urgent need for effective prevention and management strategies [5]. Early detection of sepsis not only can aid in therapy optimization, but it also enhances overall results [6]. Tragically, the symptomatic presentation of sepsis remains a significant challenge for clinicians, as patients can exhibit a wide range of symptoms, from the easily identifiable, such as fever, chills, and productive cough, to the vague and atypical, particularly in the elderly or immunocompromised. This diagnostic complexity can delay crucial interventions, further exacerbating the devastating consequences of this condition. In response to this pressing public health crisis, in 2012 the first World Sepsis Day was created by the Global Sepsis Alliance and its founding members which is in September 13th, a platform to raise awareness and improve the quality of sepsis management. To this end, they have created the acronym "SEPSIS" assists with the easy recollection of important symptoms, such as slurred speech or confusion, severe muscle pain or shivering, and not peeing during the day. extreme dyspnoea, a sense of impending death, and discoloured or mottled skin. A 2020 study found that the mnemonic may lead to missed diagnosis, especially when immunosuppression and intraabdominal infection are involved. This mnemonic needs to be modified for the local context. The impact of sepsis, however, extends far beyond the acute episode [5]. Survivors often face long-term morbidity, including cognitive impairment, recurrent septic episodes, and increased mortality, underscoring the need for comprehensive, multidisciplinary approaches to address this devastating condition [7]. According to new available data the global sepsis-related deaths reported in 2017 was estimated to be around 11 million deaths, representing 19.7% of all global deaths [3]. Public awareness of sepsis is essential for early detection and treatment, which can improve survival rates, as most sepsis cases start in the community [8]. Despite the paucity of research on public awareness and understanding in Saudi Arabia, a study carried out in Jeddah found that 27.47% of the population as a whole is aware of the proper definition of sepsis, indicating how little our culture knows about the condition. The promotion management necessary to reduce fatal outcomes may be significantly hampered by this ignorance [9]. The overall lack of understanding about sepsis is disproportionate to significant death rate of sepsis worldwide [10]. To design optimal health education provision, it is important to assess the knowledge and awareness of adults about sepsis. What adults in all regions of Saudi Arabia know and understand has not been comprehensively examined. Assessing adult Saudi Arabians' public awareness and knowledge of sepsis as well as the factors impacting their comprehension and recognition of the condition were the goals of this study.

Materials and Methods

Study Design and Participants

This work aimed at finding out the level of awareness of sepsis among Saudi Arabian adults and determine factors that may affect the knowledge and perception of sepsis using a cross-sectional research design. This research was conducted between July and November 2024 and data collection was done through an online self-complete questionnaire. Before the survey started with each participant, they were required to give their consent in writing. The actual survey was done using Google Forms where the link was shared on social media platforms; Twitter, Instagram, and WhatsApp. The collected data were analyzed and safely stored using the latest Statistical Package for the Social Sciences (SPSS) - version 26.

Inclusion and Exclusion Criteria

The study included adult participants aged 18 years and older, both male and female, who are residents of Saudi Arabia, regardless of nationality. All participants consented to take part in the study. The study excluded individuals under 18 years of age and non-residents of Saudi Arabia.

Sample Size

The sample size was computed by a sample size calculator; available through the web site; Raosoft software using the following requirements: confidence interval of 95% and level of margin of error of 5%. Taken an estimated adult population of Saudi Arabia at around 32 million it was found out that minimum sample size required was 385 to make up a representative sample of the population. This threshold was used to achieve sufficient statistical power analysis and to generalize the study results.

Questionnaire Development and Pilot Testing

The questionnaire was administered in English and was checked by authorities concerning the theme of the study and its feasible goals. It was then translated to Arabic via double translation method in which one author translated the questionnaire from English to Arabic and another independent author back translated to English. The translated version was discussed among the members of the panel of experts who made the final decision regarding the differences observed. The response instrument for this study was a structured questionnaire which consisted of three major parts. The first part hence entitled Consent Information, explained the study and sought permission from participants to participate in the study. After it, participants were to express their consent for taking the survey and only if they agreed, they could go on further: while those who disagreed were to be expelled from the study. The second section elicited information on participant's age, gender, nationality, marital status, residence, education, monthly income, and employment status the participant was asked whether s/he worked in the health sector. The last part evaluated the content knowledge gains of participants in terms of sepsis, the extent of their awareness of the condition, perceived occurrence of symptoms, causes of sepsis, and prevention methods, and common sources of information on sepsis. Such a structure was designed to grasp multiple characteristics of the respondents, as well as their awareness of sepsis.

Validity and Reliability

The internal consistency of the questionnaire was established using Cronbach alpha method resulting to 0.7 reliability value. Furthermore, assessment of validity established that all the questions aligned with the overall knowledge score, with a correlation coefficient of $r \geq 3$ for the entire questionnaire ensuring the overall utility for capturing the intended construct.

Data Collection and Distribution

The questionnaire was disseminated electronically via social media platforms such as WhatsApp, Instagram, and X (formally Twitter). This method was selected to ensure a broad reach and participation of the target population, given the prevalent use of social media in Saudi Arabia.

Ethical Consideration

The study received ethical approval from the Ethics Committee of King Faisal University, under the reference number KFU-REC-2024-SEP-ETHICS2559. All participants were fully informed about the study's purpose and assured that their involvement was voluntary, with the option to withdraw at any point without facing any consequences. Strict measures were taken to protect confidentiality; only the research team had access to the data, and all identifying information was removed to maintain privacy.

Data Analysis

The data were collected, reviewed and then fed to Statistical Package for Social Sciences version 26 (SPSS: An IBM Company). All statistical methods used were two-tailed with an alpha level of 0.05 considering significance if P value is less than or equal to 0.05. An overall awareness and knowledge score were computed by summing the correct answers where the correct answer was given a 1-point score and 0 was given otherwise. Participants with knowledge scores less than 60% of the total correct answers were considered with poor knowledge and awareness level while others with knowledge score of 60-100% were considered to have good knowledge and awareness about sepsis. Descriptive analysis was done by prescribing frequency distribution and percentage for study variables including participants' personal data, residence data, employment, and their sepsis infection history. Also, participants' knowledge and awareness about sepsis, the source of their information and their future interest in an education program about sepsis were tabulated while the overall awareness level and source of information were graphed. Cross tabulation for showing factors associated with participants awareness about sepsis using Pearson chi-square test and exact probability test for small frequency distributions.

Results

A total of 544 eligible participants completed the study survey. Exact of 141 (25.9%) were from western region, 137 (25.2%) from the central region, 117 (21.5%) from northern region and others from other regions. Participants ages ranged from 19 to 88 years with a mean age of 30.4 ± 11.2 years old. A total of 364 (66.9%) were females. As for marital status, 319 (58.6%) were single and 210 (38.6%) were married. Considering educational level, 327 (60.1%) had a bachelor degree, 130 (23.9%) had secondary education and 29 (5.3%) had a post-graduate degree. Monthly income less than 5000 SR was reported by 139 (25.6%) participants, 212 (39%) had monthly income exceeding 10000 SR. A total of 121 (22.2%) were unemployed, 211 (38.8%) were students and 212 (39%) were employed. Only 114 (21%) worked in health care field. As for history of sepsis infection, it was among only 11 (2%) participants (Table 1).

Table 1: Personal Characteristics of Study Participants, Saudi Arabia (n=544)

Personal Characteristics	No	%
Region		
Central Region	137	25.2%
Northern Region	117	21.5%
Eastern Region	90	16.5%
Western Region	141	25.9%
Southern Region	59	10.8%
Age in years		
18-20	82	15.1%
21-25	186	34.2%
26-30	76	14.0%
31-40	79	14.5%
41-50	89	16.4%
> 50	32	5.9%
Mean ± SD	30.4 ± 11.2	
Gender		
Male	180	33.1%
Female	364	66.9%
Marital status		
Single	319	58.6%
Married	210	38.6%
Divorced / widow	15	2.8%
Educational level		
Below secondary	16	2.9%
Secondary education	130	23.9%
Diploma	42	7.7%
Bachelor degree	327	60.1%
Post-graduate	29	5.3%
Monthly income		
< 5000 SR	139	25.6%
5000-10000 SR	193	35.5%
> 10000 SR	212	39.0%
Employment		
Unemployed	121	22.2%
Student	211	38.8%
Employed	212	39.0%
Work in health care field		
Yes	114	21.0%
No	430	79.0%
Have you ever had sepsis?		
Yes	11	2.0%
No	533	98.0%

Table 2. Public awareness and Knowledge of sepsis among study participants. Exact of 174 (32%) of the study participants heard about sepsis before. Also, 108 (19.8%) reported they had good knowledge about sepsis but 318 (58.5%) have never heard of it. As for symptoms of sepsis, the most reported were fever (58.6%), Pain or discomfort (44.3%), Rapid heartbeat (39.3%), confusion (24.3%), and High blood pressure (23.5%). Considering the common causes of sepsis, 328 (60.7%) reported for bacterial infection, 158 (29.3%) reported for Viral infection and 125 (23.1%) reported for Fungal infection. About preventive measures, Good personal hygiene was the most reported (53.1%), Immediate treatment of infections (48.9%), and vaccinations (45%), and Healthy lifestyle (41.4%).

Table 2: Public Awareness and Knowledge of Sepsis Among Study Participants, Saudi Arabia (n=544)

Knowledge and awareness	No	No
Have you heard about sepsis before?		
Yes	174	32.0%
No	370	68.0%
How would you rate your knowledge about sepsis?		
Have never heard of it	318	58.5%
Basic knowledge	118	21.7%
Fairly good knowledge	72	13.2%
Very good knowledge	36	6.6%
Symptoms associated with sepsis		
Fever	319	58.6%
Rapid heartbeat	214	39.3%
Confusion	132	24.3%
High blood pressure	128	23.5%
Low blood pressure	101	18.6%
Pain or discomfort	241	44.3%
I don't know	29	5.3%
The common causes of sepsis		
Bacterial infection	328	60.7%
Viral infection	158	29.3%
Fungal infection	125	23.1%
Parasitic infection	93	17.2%
Injuries or wounds	162	30.0%
Chronic diseases	141	26.1%
I don't know	25	4.6%
Preventive measures of sepsis		
Good personal hygiene	289	53.1%
Vaccinations	245	45.0%
Immediate treatment of infections	266	48.9%
Healthy lifestyle	225	41.4%
Avoiding injuries	161	29.6%
I don't know	21	3.9%

Figure 1. The Overall Public Awareness and Knowledge of Sepsis Among Study Participants. A total of 107 (19.7%) had an Overall Good Awareness Level While Most of them (80.3%; 437) had Poor knowledge level. Considering Source of Information, the Most Reported Included Internet (46.3%), Social Media (37.1%), Health Care Workers (32%), and Family / Friends (17.7%) (Figure 2).

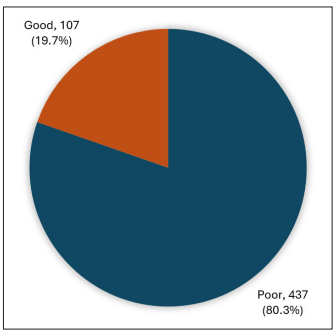

Figure 1: The Overall Public Awareness and Knowledge of Sepsis Among Study Participants, Saudi Arabia (n=544)

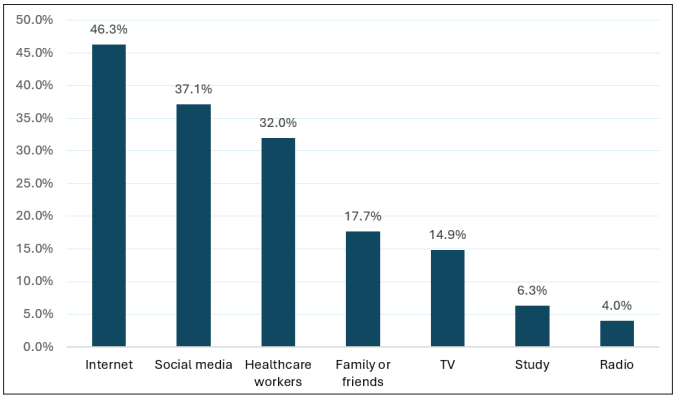

Figure 2: Source of Information About Sepsis among Study Participants, Saudi Arabia (n=544)

Table 3. Intention for future knowledge about sepsis among study participants. A total of 303 (55.7%) were interested in joining educational programs about sepsis. The most preferred source of information for future knowledge included internet (67.6%), HCWs (49.1%), social media (30.5%), Educational brochures/ leaflets (28.5%), and Community health centers (26.5%).

Table 3: Intention for Future Knowledge About Sepsis Among Study Participants (n=544)

Intention for knowledge	No	%
Are you interested in joining educational programs about sepsis?		
Yes	303	55.7%
No	241	44.3%
Where would you look for information if you wanted to know more about sepsis?		
Internet	368	67.6%
Healthcare workers	267	49.1%
Social media	166	30.5%
Educational brochures/leaflets	155	28.5%
Community health centers	144	26.5%
None	9	1.7%

Table 4. Factors associated with public knowledge and awareness about sepsis. A total of 30.7% of participants at the central region had an overall good knowledge about sepsis versus 11.1% of others at the northern region (P=.002). Also, 25% of those who aged more than 50 years had an overall knowledge level versus 11.2% of others aged 41-50 years (P=.009). Likewise, 34.5% of participants with a post-graduate degree had an overall good awareness about sepsis compared to 12.5% of those with low educational level (P=.048). Good knowledge was detected among 27.5% of students in comparison to 12.4% of unemployed participants (P=.001) and among 38.4% of HCWs versus 14.7% of others (P=.001). A total of 90.9% of those who had their information of their study had good knowledge compared to 46.9% of those who gained information from internet (P=.001).

Table 4: Factors Associated with Public Knowledge and Awareness About Sepsis

Factors		Overall knowledge level				p-value
		Poor		Good		
		No	%	No	%	
Region	Central Region	95	69.3%	42	30.7%	
	Northern Region	104	88.9%	13	11.1%	
	Eastern Region	72	80.0%	18	20.0%	
	Western Region	117	83.0%	24	17.0%	
	Southern Region	49	83.1%	10	16.9%	
Age in years	18-20	67	81.7%	15	18.3%	
	21-25	140	75.3%	46	24.7%	
	26-30	61	80.3%	15	19.7%	
	31-40	66	83.5%	13	16.5%	
	41-50	79	88.8%	10	11.2%	
	> 50	24	75.0%	8	25.0%	
Gender	Male	145	80.6%	35	19.4%	
	Female	292	80.2%	72	19.8%	
Marital status	Single	247	77.4%	72	22.6%	
	Married	179	85.2%	31	14.8%	
	Divorced / widow	11	73.3%	4	26.7%	
Educational level	Below secondary	14	87.5%	2	12.5%	
	Secondary education	101	77.7%	29	22.3%	
	Diploma	38	90.5%	4	9.5%	
	Bachelor degree	265	81.0%	62	19.0%	
	Post-graduate	19	65.5%	10	34.5%	
Monthly income	< 5000 SR	110	79.1%	29	20.9%	
	5000-10000 SR	164	85.0%	29	15.0%	
	> 10000 SR	163	76.9%	49	23.1%	
Employment	Unemployed	106	87.6%	15	12.4%	
	Student	153	72.5%	58	27.5%	
	Employed	178	84.0%	34	16.0%	
Work in health care field	Yes	70	61.4%	44	38.6%	
	No	367	85.3%	63	14.7%	
Have you ever had sepsis?	Yes	10	90.9%	1	9.1%	
	No	427	80.1%	106	19.9%	
If yes, where did you hear about sepsis for the first time?	Healthcare workers	18	32.1%	38	67.9%	
	Internet	43	53.1%	38	46.9%	
	Social media	33	50.8%	32	49.2%	
	Family or friends	14	45.2%	17	54.8%	
	TV	12	46.2%	14	53.8%	
	Radio	1	14.3%	6	85.7%	
	Study	1	9.1%	10	90.9%	

P: Pearson X^2 test ^: Exact probability test
* $P < 0.05$ (significant)

Figure 3. The Relation Between Participants overall Knowledge and Awareness about Sepsis and their Interest in Future Education. A total of 54.5% of Participants with Poor Knowledge Showed their Future Interest Compared to 60.7% of others with Good Knowledge (P=.241).

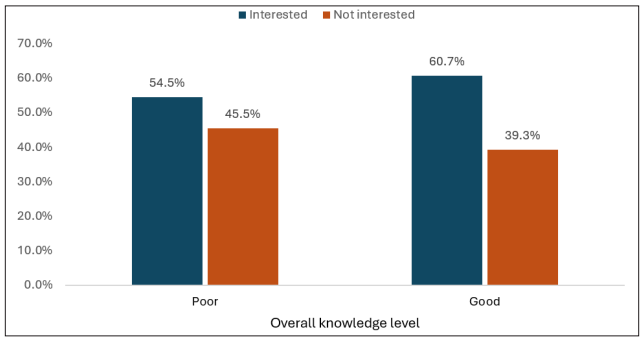

Figure 3: The Relation Between Participants Overall Knowledge and Awareness about Sepsis and their Interest in Future Education

Discussion

Despite its severity and prevalence of sepsis, the public awareness and knowledge of sepsis remain alarmingly low worldwide, yet early recognition and timely intervention are crucial in reducing sepsis-related fatalities [11]. This study aimed to increase public awareness and knowledge of sepsis among adults in Saudi Arabia. Our study revealed that less than a third (32%) of participants had heard about sepsis. Our findings are consistent with several studies globally, where sepsis awareness is low. For instance, a scoping review by Feiz et al. reported even a lower awareness level of 18.8% [11].

There were significant gaps in knowledge about sepsis, with more than half (58.5%) of respondents reporting they had never even heard of it. Among those who were familiar with sepsis, only a small fraction (6.6%) felt they had a satisfactory understanding of the condition. This result contradicts a study conducted in among adults in Canada, where 61.4% had heard about sepsis [12]. The disparities could be attributed to differences in population and public health education. Another study conducted by Regina et al. in Switzerland revealed an overwhelming awareness of 98.5% [13]. However, this study was conducted among health practitioners like nurses, paramedics, and physicians who are more frequently exposed to sepsis in their clinical work.

The majority of the respondents (58.6%) recognized fever as the most common symptom of sepsis with more than a third mentioning pain and discomfort (44.3%) and rapid heartbeat (39.3%) as significant symptoms. However, confusion, a common symptom of sepsis, was recognized by fewer than a quarter (24.3%) of respondents. This may be due to confusion being more commonly associated with severe sepsis or septic shock, rather than with milder infections, making it less familiar to the general public. Our findings are consistent with a study by Alnofaiey et al. with Saudi Arabia which found that fever was the most commonly known symptom (31.5%), followed by Tachycardia (28.6%) [14]. Most respondents demonstrated good awareness about the causes of sepsis with 60.7% correctly identifying bacterial infections as a primary cause. However, less than a third of the respondents knew that viral (29.3%), fungal (23.1%), and parasitic infections (17.2%), as well as chronic diseases (26.1%) were possible causes. Similar finding was also observed in study conducted in Germany whereby 76% correctly identified bacterial infection as the primary cause of sepsis [15].

Our study revealed that the majority of the respondents would be interested in joining sepsis educational programs with 43% expressing no interest and hence a notable gap in perceived awareness interest. When asked about where they would obtain about sepsis, internet emerged as the most preferred source of information as mentioned by 67.6% of the respondents followed by healthcare professionals (49.1%) then social media (30.5%). This aligns with findings from a recent study on health literacy which depicts that the internet and the health care providers are increasingly used for health information [16].

A number of factors were significantly associated with knowledge and awareness about sepsis. Our results reveal that age plays a significant role, with those aged 41-50 exhibiting the highest level of good knowledge (25.0%), compared to younger age groups (p-value = 0.009). This may reflect more life experience and exposure to healthcare information over time. Educational level was significantly associated with sepsis knowledge (p-value = 0.048), as those with higher educational attainment, particularly those with a diploma or above, demonstrated better knowledge. This is consistent with existing research, suggesting that education enhances health literacy [17]. Employed respondents and especially those working in healthcare exhibited significantly higher knowledge (p-value = 0.001). Lastly, the source from which participants first learned about sepsis was significantly associated with knowledge (p-value = .001), with healthcare workers being the most influential source for those with better knowledge. The other variables like gender, marital status, and monthly income did not show any relationship with knowledge and awareness about sepsis. Similar to our study, Parsons et al. higher education, health care employment, and older age were significantly associated with higher awareness [10].

Conclusion

Our study's findings indicate that there is a significant knowledge and public awareness gap about sepsis in Saudi Arabia. Only a tiny percentage of participants had a satisfactory understanding of sepsis, and the majority's knowledge was inadequate, despite the fact that the illness has a substantial impact on health outcomes. Additionally, some demographic traits that affect knowledge levels may be used as a guide to create tailored educational programs that successfully engage particular groups of people. Those living in the central region, those with postgraduate degrees, and those working in the healthcare industry were more aware than others. Social media, medical professionals, and the internet all contribute significantly to increasing public knowledge of sepsis. The results demonstrate the Need of focused educational initiatives.

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