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Research Article

Insights into Sepsis Awareness among Defence Forces - A Comprehensive Pan-India Study

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Abstract

Sepsis and the ensuing septic shock is a serious state of tissue hypoperfusion initiated by a systemic inflammatory response due to an infection, which leads to impaired microcirculation and cytopathic hypoxia, which involves intense hypovolemia, vasodilation, and cardiac dysfunction. Despite the modern-day progress in medical science, the mortality rate in sepsis remains high. Early initiation of treatment in the form of broad-spectrum antibiotics and early, intense fluid intake are the basis for effective treatment of sepsis. Out of the 486 participants, only 19 were aware about sepsis (3.91%). One major issue in calculating the prevalence of sepsis remains the fact, that most countries fail to record and present the accurate number of cases. A properly analyzed data on the perception and awareness of Sepsis in the Indian population is the need of the hour, as India has yet to come up with effective solutions and guidelines for sepsis, a life-threatening complication that may have a high burden in the country. The present work was undertaken with an aim to fill this gap of knowledge.

Keywords*: Sepsis awareness, survey, defense forces.*

Introduction

The major key to human wellbeing is their physical and mental health. The wellbeing of the human condition is grossly dependent on the various physiological and psychological processes that continuously undertake their functions for the maintenance of the individual. Among these factors the functioning of physiological health often faces threats from external agents that may enter one's body from the outside environment.

The very first definition of sepsis, which is also known as septicemia, was put forward by Schottmueller in 1914, who presented it as, "Septicemia is a state of microbial invasion from a portal of entry into the blood stream which causes sign of illness." This definition remained unaltered throughout much of history as the terms sepsis and septicemia referred to several ill-defined clinical conditions present in a patient with

bacteremia1. In clinical practice, less than one half of the patients with signs and symptoms of sepsis have positive results on blood culture. Moreover, not all patients with bacteremia have signs of sepsis. Therefore, it should be clearly noted that sepsis and septicemia are not identical.

The definitions of sepsis and septic shock have rapidly evolved since the early 1990s. Sepsis may exist on a continuum of severity ranging from basic infection and bacteremia to sepsis and septic shock. Septic shock can lead to multiple organ dysfunction syndrome (MODS) and be fatal. Septic shock is defined as a condition in which collapse of the cardiovascular system is observed related to severe sepsis despite adequate fluid resuscitation. SCCM/ESICM taskforce, in 2016, defined sepsis as a life-threatening organ dysfunction caused by a dysregulated host response to infection. The definition of septic shock was also modified to as sepsis that has circulatory, cellular, and metabolic abnormalities that are associated with a greater risk of mortality than sepsis alone.

When the release of proinflammatory mediators in response to an infection exceeds the boundaries of the local environment, it leads to a more generalized response. If a similar process occurs even in the absence of any infection, for example from any kind of trauma or pancreatitis, then this process gets referred to as systemic inflammatory response syndrome (SIRS). Sepsis has been known to interfere with the distribution of blood flow from the peripheral organs to the central circulatory system of heart and the central nervous system of the brain, when oxygen delivery is inhibited2. Sepsis also leads to a decrease in the number of functional capillaries, which causes an additional limitation to the supply of oxygen at the tissue level3. Compared to normal conditions or among the critically ill patients without sepsis, patients with severe sepsis have been known to display decreased capillary density. This can be attributed to external compression of the capillaries by tissue edema, endothelial swelling and blocking of the capillary lumen by white blood corpuscles (WBC)'s or red blood corpuscles (RBC)'s4.

As many as 40% of patients with severe sepsis develop acute lung injury5, which covers a wide spectrum of pulmonary dysfunction secondary to parenchymal damage characterized by endothelial cell injury and destruction, deposition of platelet and leukocyte aggregation, destruction of type I alveolar pneumocytes and repair and hyperplasia of type II pneumocytes. The gradual migration of macrophages and neutrophils into the interstitial space and alveoli leads to the production of many other mediators, which contribute to the alveolar an epithelial cell damage.

In majority of patients with sepsis, the source of infection is usually identifiable. There are many possible sources of infection, however the most common sources leading to severe sepsis and septic shock in

descending order of frequency are outlined below:

- Lower respiratory tract infections
- Urinary tract infections
- Soft tissue infections
- CNS infections
- GI infections
- Foreign bodies leading to infections like intravascular devices

The constant increase in the number of immune-compromised patients, coupled with advancements in invasive diagnostic and therapeutic devices predisposing to infection have played a major role in the observed increase of cases. However, one major issue in calculating the prevalence of sepsis remains the fact, that most countries fail to record and present the accurate number of cases. In the late 1970s, it was estimated that 164,000 new cases of sepsis were being recorded in the United States (US) each year5. Since then, rates of sepsis in the US and other parts of the world have constantly increased. Presently about 1.7 million new cases are recorded each year in the US, with more than 250,000 deaths6 . Despite the advancements in modern day medicines, there has been significant increase in the rates of hospitalization and mortality due to sepsis7. Achieving significant mortality reductions in sepsis seems extremely difficult in present scenario, as many investigations have reported a very limited public knowledge about the critical conditions associated with sepsis that require timely intervention8,9. Public awareness can have a major impact in spreading the knowledge and leading to demands for improvement in approaches to treatment10.

Methodology

In this study, for data collection, a questionnaire was sent to defense force personnel (police, navy, etc.) to have proper and relevant data to analyze the awareness of Sepsis. Inclusion criteria set for this study were people who can read English from the selected population. The sample size was determined based on similar studies related to other topics and obtain strong statistically relevant final data. Data was collected through a well-defined online and offline Sepsis awareness survey. The chi-square test was undertaken to test if the correct responses reflected a genuine understanding or if it was chosen at random.

Results

The questionnaire survey was conducted with a total of 486 participants across the Indian states of Andhra Pradesh, Arunachal Pradesh, Assam, Bihar, Delhi, Goa, Gujarat, Karnataka, Kerala, Maharashtra, Mizoram, Odisha, Rajasthan, Sikkim, Tamil Nadu, Telangana and West Bengal. The participants were from various forms of the defence forces as army personnel, navy men and police. The survey started by asking the participants: 'Have you ever heard about the medical term Sepsis?'. Those who responded in negative were not considered for further questions regarding the awareness and perception of Sepsis. Only people who replied in yes were asked further questions. Out of the 486 participants, only 19 were aware about sepsis (3.91%). Their responses were considered for the rest of the survey.

The participants who responded in positive were then inquired about their source of information represented by the figure above. It was found that most participants had come to know about sepsis from other sources and from family members who had experienced the condition (Figure 1).

The next question asked to the participants was if they think sepsis, is a medical emergency. They were given four options of strongly disagree, disagree, agree, and strongly agree. 47.37% of the defence personnel chose the correct option of strongly agree. They were then asked their idea of what sepsis means, the four options presented were: 'Chronic progressive condition that affects the pumping power of your heart muscles', 'Infection in blood', 'A type of gastroenteritis that results in diarrhea with blood' and 'Life-threatening organ dysfunction caused by a dysregulated host response to infection'. Among these options, the correct option is that it is a 'life-threatening organ dysfunction caused by a dysregulated host response to infection' which was chosen by 8 participants. While 57.89% of the participants chose the wrong answer of infection in blood.

Next, the participants were presented with the statement "Tetanus is the synonym of Sepsis". The participants had four options to choose from. These options were: 'I think so', 'I don't think so', 'Wrong statement' and 'Don't know'. Among these given choices, the correct option to be chosen was 'Wrong statement'. 31.58% of the participants chose the right option. In order to check the depth of awareness among the participants, they are next given the question regarding the date of the 'World Sepsis Day'. Each participant was given four options. These options were: '13th February', '13th June', '13th September' and '13th December'. Among these options the correct answer was '13th September' which was selected by 63.16% of defense personnel.

The participants were then presented with the question, "Do you think lack of knowledge makes sepsis the number one preventable cause of death worldwide?" 78.95% opted for 'Yes', while 5.26% chose 'No' and 15.79 % stated 'Don't know'. In an attempt to understand how deep the awareness regarding sepsis is among the population they were asked "According to Global Sepsis Alliance every _____ someone dies of sepsis globally?" The participants were given four options to choose from: '2.8 days', '2.8 hours', '2.8 minutes' and '2.8 seconds'. Among these options, the correct answer was '2.8 seconds'. The responses were 26.32%, 21.05%, 15.79% and 36.84%, respectively.

Next the participants were asked what kind of infection can lead to sepsis? The participants were given five options, 'Bacterial', 'Viral', 'Fungal', 'All of the above' and 'None of the above', with the correct response being 'All of the above'. 47.37% (9) of the participants chose the first option, and 42.11% (8) chose the fourth option (Figure 2).

"Only immunocompromised people will get Sepsis" was the statement presented to participants in order to test for the level of misconception regarding sepsis. The participants were given three options to choose from. These options were, 'True', 'False' and 'Don't know'. The correct response to the statement being 'False'. Of the participants, 52.63% chose the correct response.

To test their understanding of sepsis treatment, the participants were asked, "Do you think Sepsis can be easily cured with antibiotics?". The participants were given three responses to choose from, 'Yes', 'No' and 'Don't know'. The correct response is 'No', which was selected by 42.11% of the participants (Figure 3).

To understand the participants understanding regarding Sepsis prevention, they were asked how sepsis can be prevented. The options given were, 'Vaccination', 'Awareness', 'Safe water' and 'All of the above'. The correct response to this question was 'All of the above'. 47.37% (9) of the participants chose the option of 'All of the above', while 26.32% (5) chose the option of 'Vaccination' and 'Awareness'

Figure 4 represents a question posed to the participants, to understand the awareness regarding post-sepsis syndrome among the population. The correct answer to this question was '50%'. Most of the participants (42.11%) stated that they had 'Never heard about post-sepsis syndrome' (Figure 4).

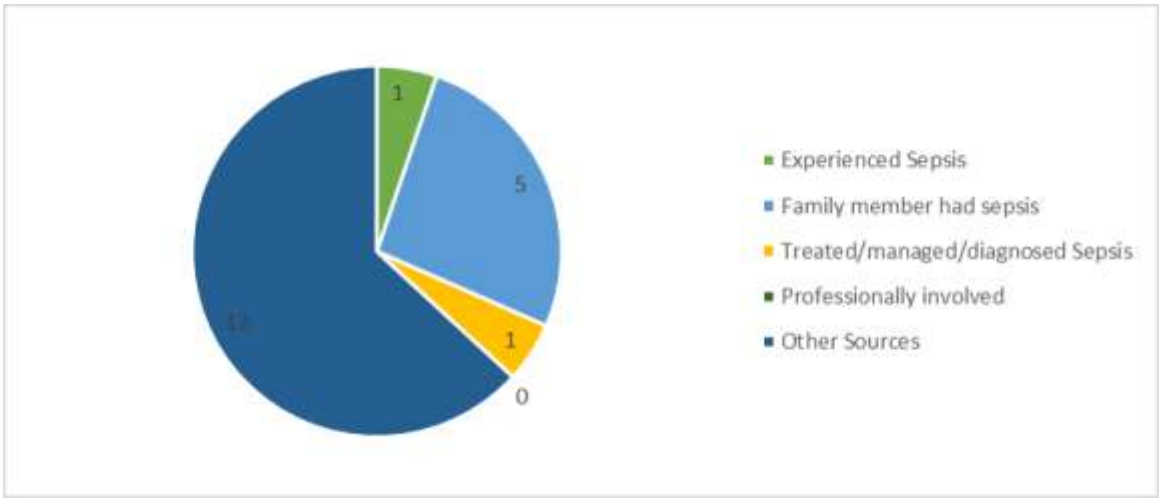

Figure 1 Pie chart showing the response to the question, 'How did you hear about sepsis?'

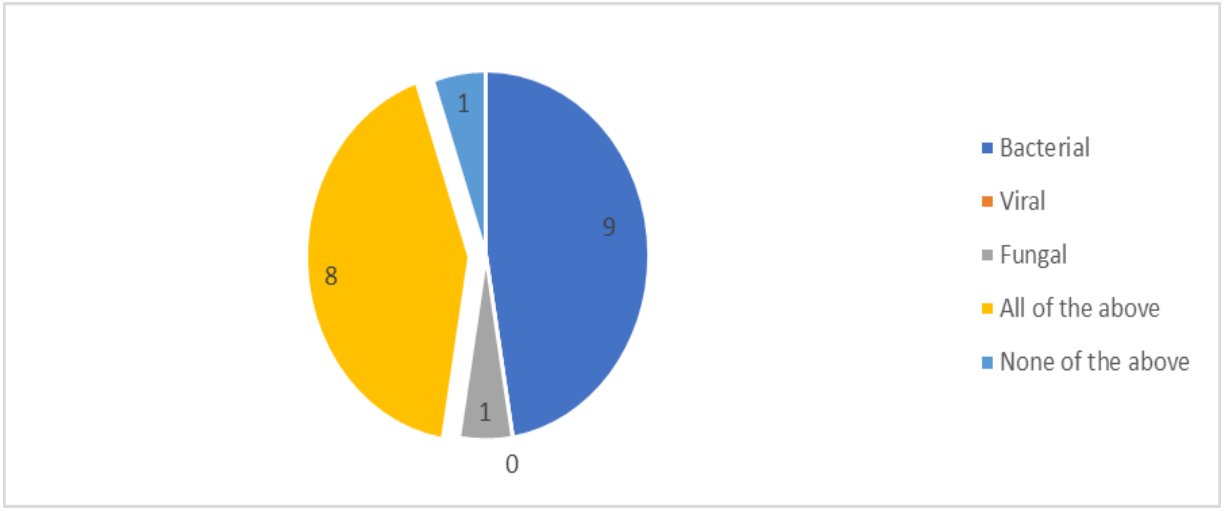

Figure 2 Pie chart showing the response to the question, 'What kind of infections lead to sepsis?

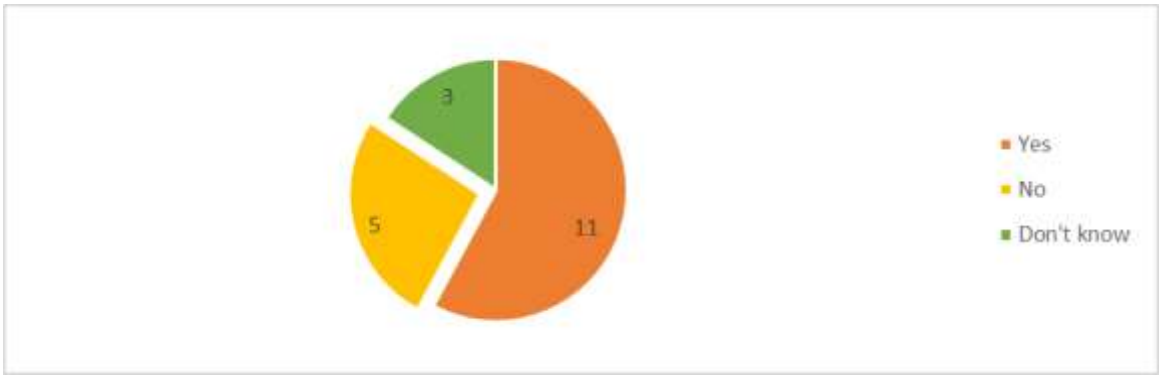

Figure 3 Pie chart showing the response to the question, 'Do you think Sepsis can be easily cured with antibiotics'?

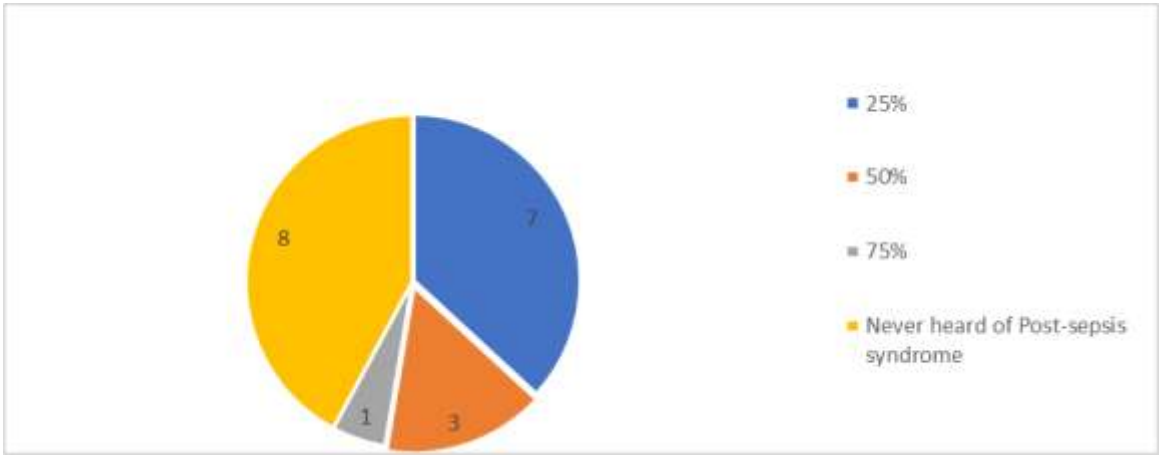

Figure 4 Pie chart showing the response to the question regarding the post sepsis syndrome among population.

Discussion

The process of Sepsis is extremely common and has a high rate of fatality. Despite this, global awareness about sepsis has been reported to be low, based on surveys from across the world. It is a major cause of deaths inside and outside hospital settings across the globe11. This survey was designed to test certain ideas that seemed plausible based on the conducted literature review. The first statement that was to be tested was that, awareness on Sepsis among the defence forces is very low / poor and their perception on Sepsis is not proper. This was based on already published global survey reports that had revealed a general lack of

awareness of the topic.

This survey revealed that the awareness regarding sepsis among the defence force in India is low. Only 19 (3.91%) people were aware of it. 467(96.09%) of the 486 participants were found to be entirely unaware of sepsis. This finding was comparable to international survey reports conducted over the last few decades across the globe. The rate was higher than that reported by Rubulotta et al. from the United States of America and certain other European countries in 200912. Their study found that 81% of the United States population had never heard of the term sepsis. In Germany 53% of people knew the word sepsis. Similar lower values of awareness was also reported by a public awareness survey conducted from Sweden, where 21% of participants had heard of sepsis13. In our present study more than 95% of participants had not heard of the term 'sepsis'. It can be argued that as the term sepsis remains one that is predominantly used by the medical community, a lay person can potentially understand the manifestations and consequences of a severe infection without having heard of sepsis. This may especially be the case in India where proficiency in the English language may not be present.

Regarding the source of information, the present survey found that, for a majority of the participants the source was indirect in nature, coming from digital or print media. This may be explained based on the technology boom that India has been going through over the last decade. With smartphone connectivity and affordable internet, digital media has emerged as primary source of information.

Epidemiologic data on sepsis has been found to vary depending on the origin of database– community based or hospital based, nature of data collection retrospective chart review, discharge diagnoses, diagnosis in death certificates, or prospective observational studies. Despite these shortcomings, the participants in the present survey appeared to be well aware of the life-threatening nature of the condition. However, it should be pointed out that the answer to this question may be derived based on intuition too.

However, this awareness did not appear when the same participants were asked to define sepsis. Most of the participants (57.89%), wrongly defined sepsis as an infection of the circulatory system. Their response to this question was still not statistically random, meaning that, there was genuine misinformation regarding what the public perceived to be sepsis.

The confusion regarding what constitutes sepsis was carried over to the next question too, where participants were asked to whether they thought tetanus and sepsis were same. Only one third of the participants clearly identified this as a wrong statement. The response of the participants regarding this question along with the

previous one can be coupled to summarize that the awareness regarding what constitutes 'sepsis' is still underdeveloped in India.

The next question presented to the participants was a non-intuitive and required knowledge of the condition, as the participants were asked to identify the 'World Sepsis Day'. This question was posed to identify if there were any ongoing attempts to raise awareness about sepsis among the population. Surprisingly enough, more than 60% of the participants answered correctly, this might be indicative of some success of the awareness programs undertaken by the government.

In the present survey, when the participants were asked about what kind of infection can lead to sepsis, more than 40% of the participants agreed that sepsis can originate from bacterial, viral, and/or fungal sources. This once again highlighted the lack of awareness among the participants. However, it should be noted that, bacterial infection remains till date to be the major cause behind sepsis. The latest European Prevalence of Infection in Intensive Care (EPIC II) study reported more gram-negative organisms (62.2% vs. 46.8%).

When the participants were asked 'How much percentage among Sepsis survivors suffer from post-sepsis syndrome?', most participants stated they had never heard of 'post-sepsis syndrome'. Post-sepsis syndrome (PSS) is a condition that affects up to 50% of sepsis survivors. Its symptoms include Difficulty sleeping, either difficulty getting to sleep or staying asleep, Fatigue, lethargy, Shortness of breath, difficulty breathing, Disabling muscle or joint pain and many other complications. The lack of public knowledge about sepsis may partly explain why there have been no such work previously done from India and why there is only a small amount of resources allocated towards sepsis research in the country.

Conclusion

Several kinds of research are being conducted to find more targeted therapies for treating sepsis and septic shock, thereby reducing mortality and reducing the lost number of years of quality life. Therefore, it was of crucial importance that the present study correctly identified the depth of perception among Indian citizens. The conducted survey revealed that the level of awareness on sepsis among the defence forces was low. This was comparable to available global surveys, where similar lack of awareness was observed. The data was statistically evaluated to find that in certain cases the perception was significantly lacking, and the choice of correct option was indistinguishable from chance selection.

Conflict of interest

There is no conflict of interest between the authors.

Acknowledgement

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