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STUDY OF CLINICAL PROFILE OF ICU PATIENTS WITH SEPSIS

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ABSTRACT

Aim: The aim of the present study was to assess clinical profile of ICU patients with sepsis.

Methods: The present study was conducted at Dr. D.Y. Patil medical college and hospital and research center, Pimpri, Pune from August 2020 to September 2022 and 100 patients with sepsis from ICU were included.

Results: Among the study population, 61.00% of them were 30 to 65 years, 30.00% of them were >65 years and 9.00% of them were <30 years. Among the study population, 66.00% of them were male, 34.00% of them were female. Among the study population with Present history, 90.00% of them had fever, 76.00% of them had Weakness, 57.00% of them had Abdominal Pain, 47.00% of them had Breathlessness, 29.00% of them had Burning Micturition, 27.00% of them had Altered Sensorium, 21.00% of them had Vomiting, 81.00% of them had Cough, 12.00% of them had Loose Stools, 8.00% of them had Chest Pain. Among the study population, 94.00% were febrile, 85.00% of them had pulse rate >90 bpm, 93.00% of them had respiration rate >20 cpm, 82.00% of them had SBP<=120mmHg, 81.00% of them had DBP <=80mmHg, 6.00% of them had mean arterial pressure <=65, 32.00% of them had SPO2 on RA <=90%.

Conclusion: In intensive care units, sepsis continues to be a leading cause of death. Early detection of sepsis includes symptoms and signs, such as leucocytosis or leucopenia, confusion, hypoxia, hypotension, pyrexia, and tachycardia. In general, respiratory infections are responsible for around half of all sepsis cases. Incidence of severe sepsis was high among ICU admissions and they have a high mortality. Higher SOFA scores at admission were associated with higher mortality in severe sepsis

Keywords: Sepsis, ICU, clinical profile

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INTRODUCTION

Sepsis is a common cause of admissions to intensive care units (ICU). Severe sepsis and septic shock contribute to significant morbidity and mortality in ICU patients. The mortality rate of sepsis ranges from 30-40%.[1-3] Despite advances over the past two decades, mortality in sepsis remains unchanged.[4,5] Sepsis is a systemic, deleterious host response to infection leading to severe sepsis (acute organ dysfunction secondary to documented or suspected infection) and septic shock (severe sepsis and hypotension not reversed with fluid resuscitation). Pathophysiology of sepsis is complex and multifactorial. Infection triggers pro-inflammatory and anti-inflammatory response that contribute to the control of infection as well as the tissue damage that led to organ failure. Patient response to sepsis is dependent on characteristics of both the host (co-morbidities and immunosuppression) and the pathogen (virulence and organism load). Endothelial damage leads to coagulation abnormalities, such as intravascular coagulation, fibrinolysis, microvascular thrombi, and impaired tissue oxygenation. Vasodilation and hypotension lead to tissue hypoperfusion and decreased tissue oxygenation leading to organ failure.

Studies discussing the rate and demographics of sepsis are often carried out in high-income countries[6,7]; such studies form the basis for patient management guidelines. More studies from low- and middle-income countries (LMIC) can shed light on the difficulties faced in sepsis management in resource challenged environments and would better reflect the true global burden of sepsis.[8,9]

Because of its complexity from a pathophysiology, clinical, and therapeutic point of view, sepsis is one of the most important problems in the field of medicine. Although numerous definitions for this illness have been put out, it can generally be believed that they all refer to the clinical manifestation of the body's systemic response to an infection or an acute disease accompanied by inflammation. Although these definitions have been proposed, they are not universally accepted. In spite of advances in medical treatment, sepsis, severe sepsis, and septic shock are illnesses that greatly limit both the quality of life and the eventual survival of intensive care unit (ICU) patients. These conditions are linked with varying grades of organ dysfunction or failure.[10]

Sepsis mortality rates are associated with a pattern that is characterized by advancing dysfunction failure of non-pulmonary organ systems, including deteriorating neurologic, coagulation, and renal dysfunction during the course of the first three days of the illness. Initial pulmonary dysfunction is not related with an increased risk of mortality in patients who have sepsis syndrome, despite the fact that this dysfunction is widespread in these individuals. The rate of mortality is the result of one or more factors, including age, gender, immunity, and co-morbidities, among others. The organism that brings on sepsis is another factor that can affect mortality.[11] The aim of the present study was to assess clinical profile of ICU patients with sepsis.

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MATERIALS AND METHODS

The present study was conducted at Dr. D.Y. Patil medical college and hospital and research center, Pimpri, Pune from August 2020 to September 2022 and 100 patients with sepsis from ICU were included.

The approval was taken from institutional ethics committee before commencing the study. Informed and written consent was taken from all the patients. The Cases were drawn from general Medical ICU, from Dr. D.Y. Patil hospital and research center. A detailed clinical history was taken of all the patients regarding symptoms of septicemia. Patients was examined for signs and symptoms of Sepsis.

Patient was subjected to following investigations: - Complete blood count/ESR, BSL-R, AB, CRP, D- dimer, PT-INR, Renal function test/Serum electrolytes, Liver function test/ Serum Proteins, Urine R/M, culture and sensitivity, Blood culture and sensitivity, S. Ferritin, LDH, ECG.

Radiological imaging investigations

1. Chest x-ray PA view
2. USG Abdomen and Pelvis
3. CT Brain
4. MRI Brain
5. HRCT thorax

INCLUSION CRITERIA

1. All patients with sepsis aged 12 years and above.

Sepsis is considered present if infection is highly suspected or proven and two or more of the following Systemic inflammatory response syndrome (SIRS) criteria are met

- Heart rate >90 beats per minute (Tachycardia)
- Respiratory rate>20 breaths/minute or Paco2<32mm Hg (Tachypnea or hypocapnia due to hypoventilation)
- White blood cell count-<4000cells/microliter or >12,000cells/microliter or greater than 10% band forms (immature white blood cells) (leucopenia/leukocytosis)
- Body temperature<36 degree Celsius (96.8degreeF) or >38 degree Celsius (100.4-degree F)
- The new sepsis guidelines now identify organ dysregulation in sepsis as an increase in the Sequential organ failure assessment (SOFA) > or equal to 2.

EXCLUSION CRITERIA

1. Patients below the age of 12 years.

Statistical Analysis

Values for continuous data were expressed as mean ± SD and categorical variables as proportions. Continuous variables with normal distribution were compared using Student t test while those not normally distributed were analyzed using Mann Whitney U test. Categorical data were analyzed using Chi-square test.

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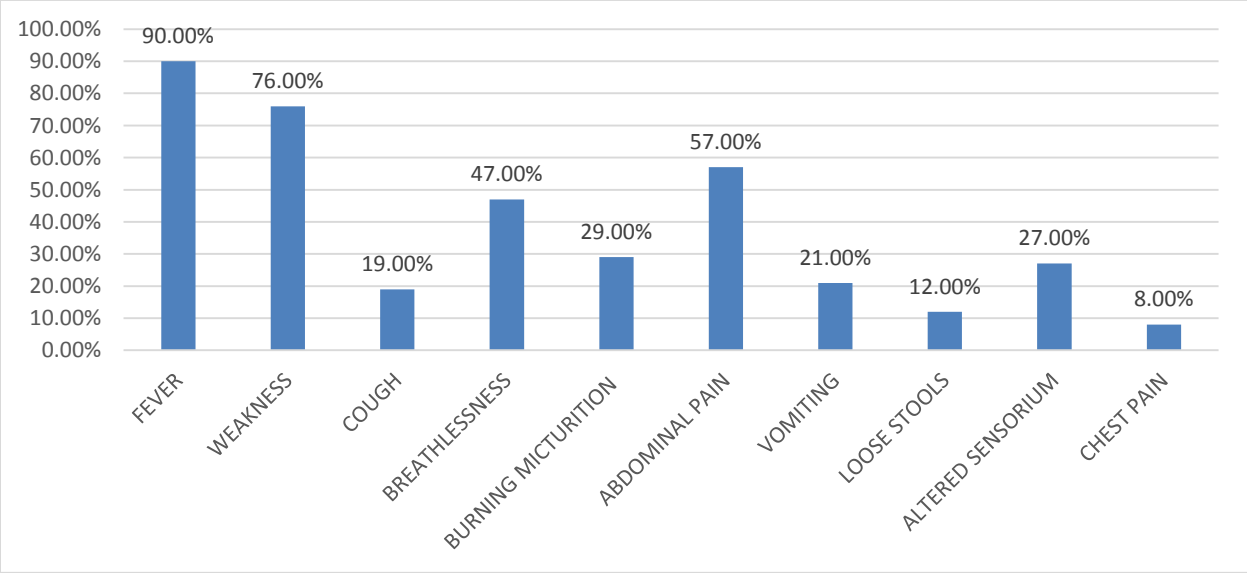
RESULTS

Table 1: Patient characteristics

Age	**Frequency**	**Percentages**
<30 years	9	9.00%
>65 years	30	30.00%
30 to 65 years	61	61.00%
Gender		
Male	66	66.00%
Female	34	34.00%
BMI		
<25	41	41.00%
>=30	4	4.00%
25 to <30	55	55.00%

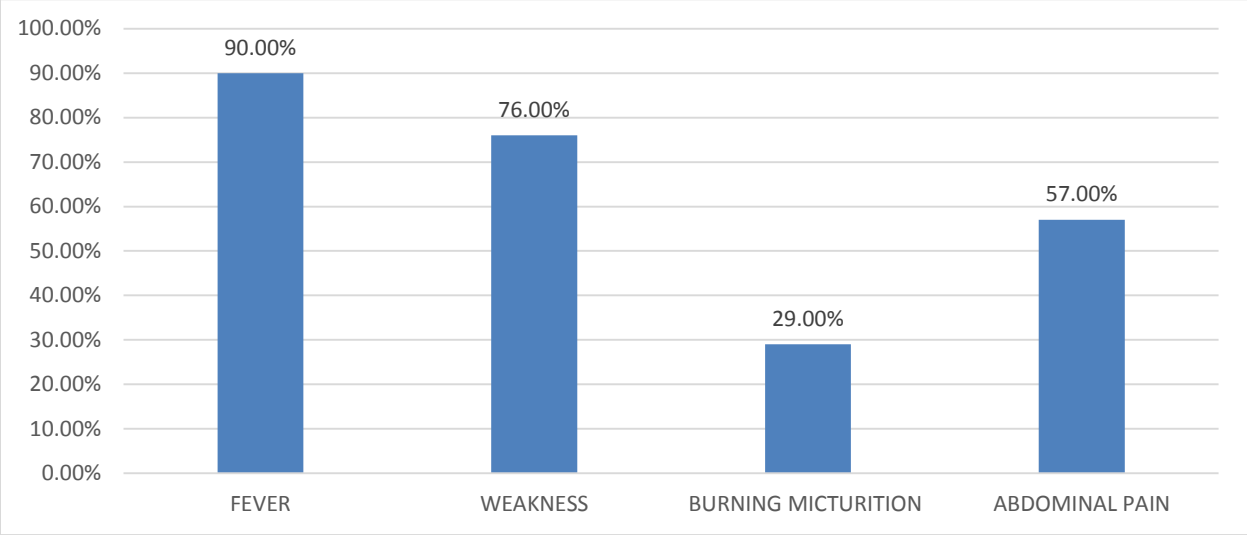
Among the study population, 61.00% of them were 30 to 65 years, 30.00% of them were >65 years and 9.00% of them were <30 years. Among the study population, the mean age was 56.07 ± 16.01. Among the study population, 66.00% of them were male, 34.00% of them were female. Among the study population, 41.00% of them BMI were <25, 55.00% of them were 25 to <30, 4.00% of them were >=30.

Graph 1: Clinical symptom in the study population

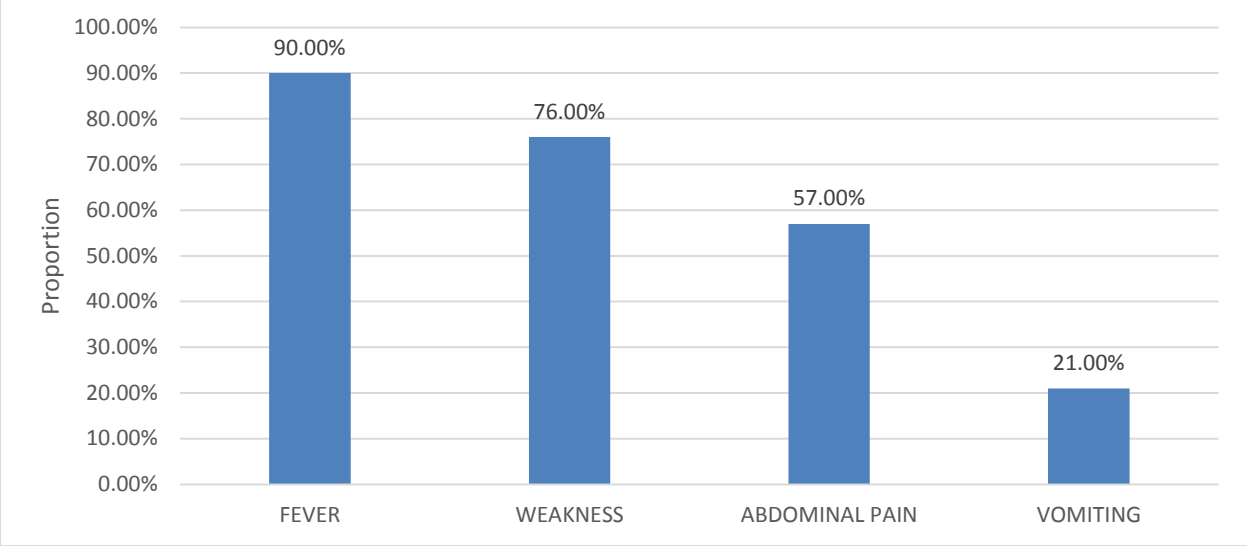


Among the study population with Present history, 90.00% of them had fever, 76.00% of them had Weakness, 57.00% of them had Abdominal Pain, 47.00% of them had Breathlessness, 29.00% of them had Burning Micturition, 27.00% of them had Altered Sensorium, 21.00% of them had Vomiting, 81.00% of them had Cough, 12.00% of them had Loose Stools, 8.00% of them had Chest Pain.

Graph 2: Clinical Symptoms in study population presenting with Urosepsis



Graph 3: Clinical symptoms in study population presenting with Acute Pancreatitis



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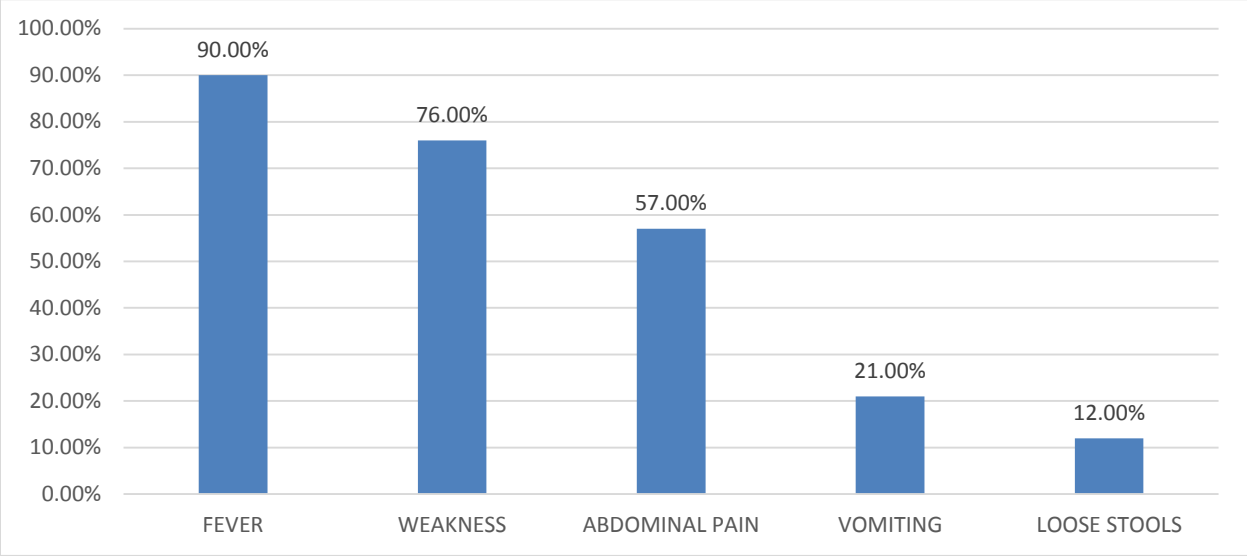
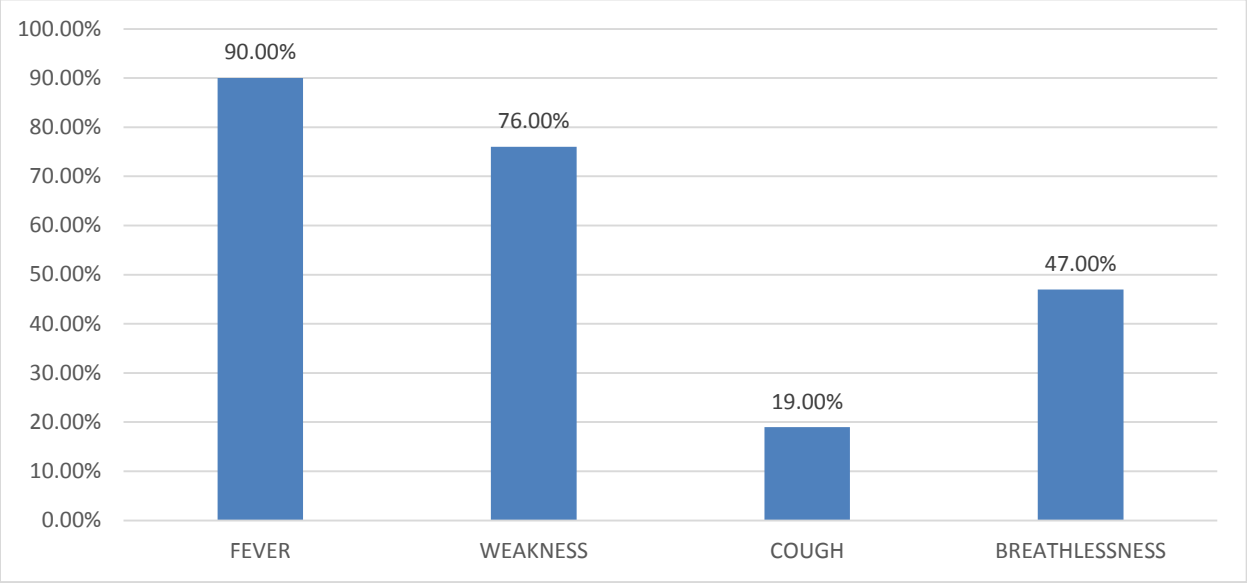
Graph 4: Clinical symptoms in study population presenting with Acute Gastroenteritis



Graph 5**:** Clinical Symptoms in study population presenting with Respiratory tract infections



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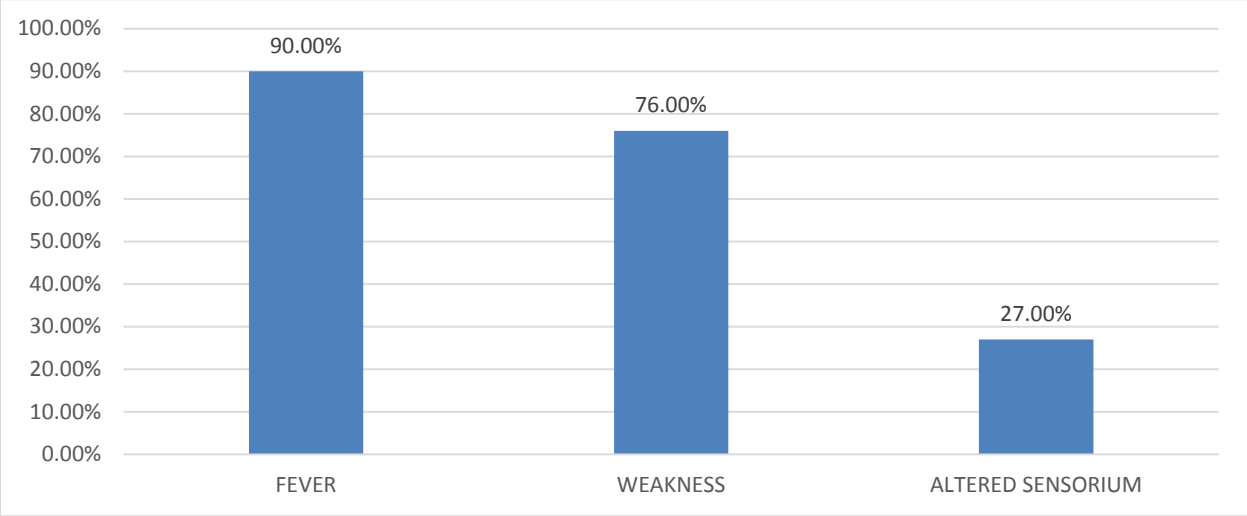
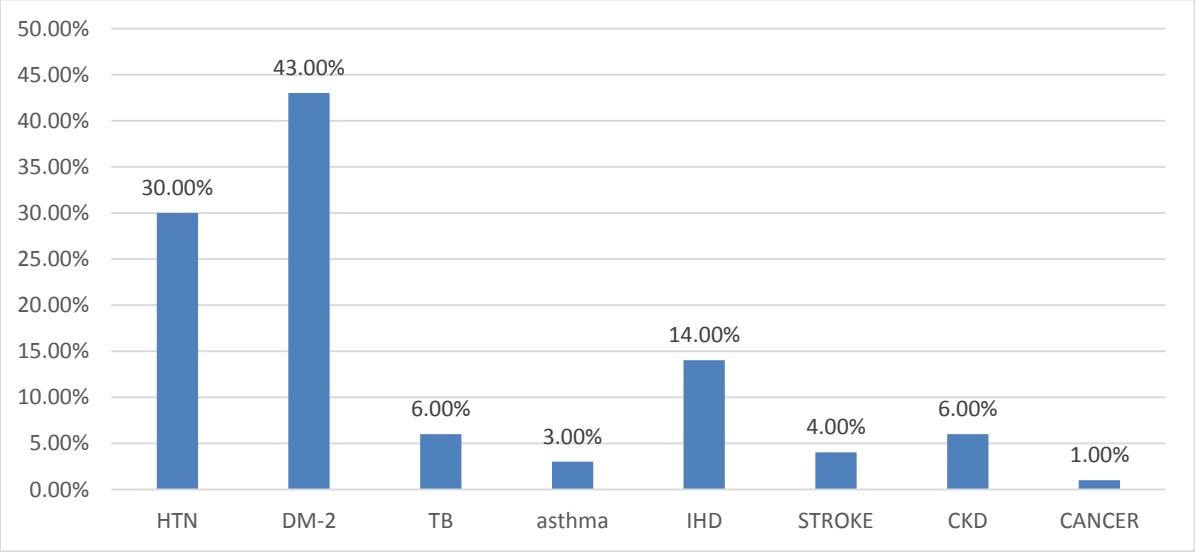
Graph 6: Clinical symptoms in study population presenting with CNS infections

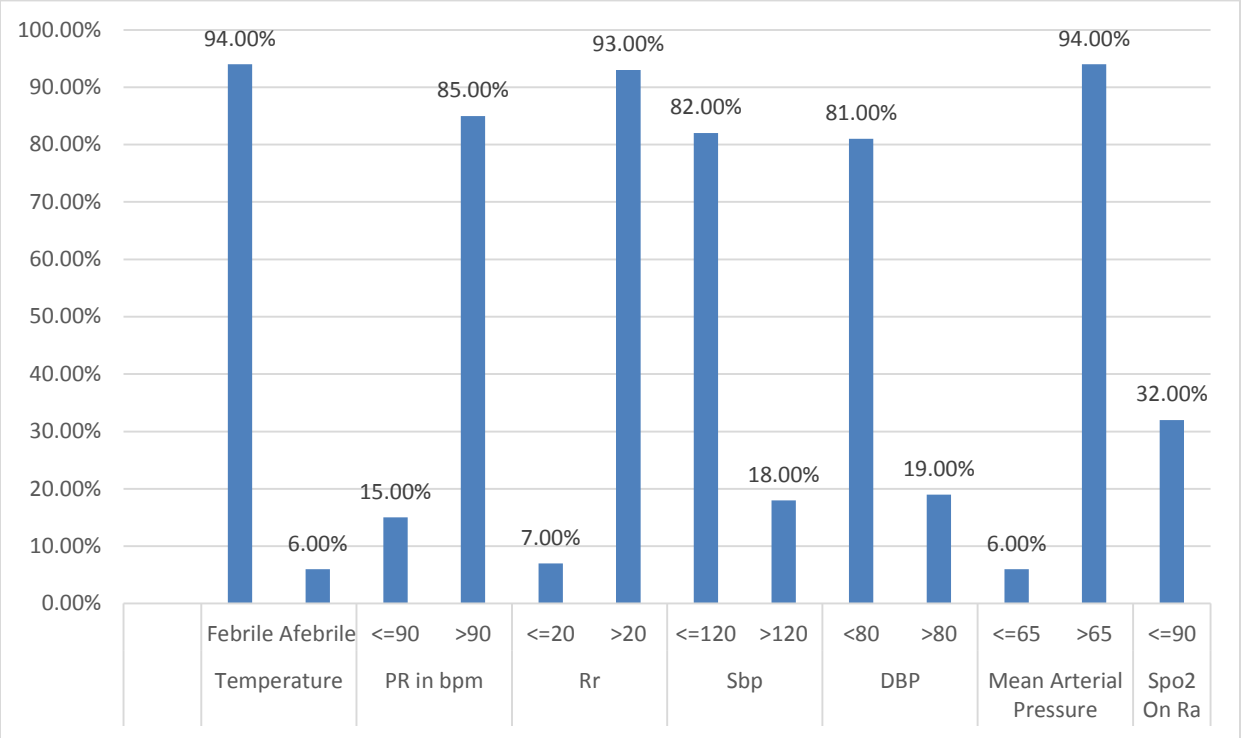


Graph 7: Descriptive analysis of non-modifiable risk factor in the study population



Among the study population with non-modifiable risk factor, 30.00% of them had Hypertension, 43.00% of them had DM-2, 6.00% of them had TB, 3.00% of them had Asthma, 14.00% of them had IHD, 4.00% of them had Stroke, 6.00% of them had CKD, 1% of them had cancer.

Graph 8: Vital parameter in the study population



Among the study population, 94.00% were febrile, 85.00% of them had pulse rate >90bpm,93.00% of them had respiration rate >20cpm , 82.00% of them had SBP<=120mmHg, 81.00% of them had DBP <=80mmHg, 6.00% of them had mean arterial pressure <=65, 32.00% of them had SPO2 on RA <=90%.

Table 2: Descriptive analysis of blood c/s in the study population

Blood C/S	**Frequency**	**Percentages**
No growth	73	73.00%
E coli	8	8.00%
Klebsiella pnemonnia	8	8.00%
Acinetobacter	4	4.00%
Candida Rugosa	1	1.00%
Candida species	1	1.00%
Enterobacter species	1	1.00%
Enterococcus	1	1.00%
Pseudomonas aeruginosa	1	1.00%
shigella species	1	1.00%
Stenotrophomonas maltophilia	1	1.00%

Among the study population in Blood C/S, 8.00% of them had E coli, 8.00% of them klebsiella pneumonia, 1.00% of them had Candida species.

Table 3: Laboratory parameters in the study population

Hb	**Frequency**	**Percentages**
<7	5	5.00%
>12	39	39.00%
10 to 12	21	21.00%
7 to 10	35	35.00%
WBC	**Frequency**	**Percentages**
<4000	9	9.00%
>=12000	69	69.00%
4000 to 12000	22	22.00%
Platelets	**Frequency**	**Percentages**
<100000	22	22.00%
>100000	78	78.00%
Hba1C	**Frequency**	**Percentages**
<5.7	30	30.00%
>6.4	57	57.00%
5.7 to 6.4	13	13.00%

Among the study population, 39.00% of them had Hb >12, 35.00% of them had between 7 to 10 and 5.00% had less than 7 and in population regarding WBC, 69.00% of them had >=12000, 22.00% of them had 4000 to 12000 and 9% had <4000, population with Platelet count, 78.00% of them had >100000, 28% of them had <100000, 57.00% of them HBA1C were >6.4, 30.00% of them were <5.7.

Table 3: Descriptive analysis of ventilation and Q SOFA score in the study population

Ventilation	**Frequency**	**Percentages**
Yes	36	36.00%
No	64	64.00%
Q SOFA score		
RR		
<=20	7	7.00%
>20	93	93.00%
SBP		
<=120	82	82.00%
>120	18	18.00%

GCS		
<=14	16	16.00%
>14	84	84.00%

Among the study population, 36.00% of them were under mechanical ventilation. Among the study population, 93.00% of them had respiration rate was >20cpm, 82.00% of them had SBP was <=120mmHg, 16.00% of them have GCS <=14.

Table 4: DIAGNOSIS in the study population

DIAGNOSIS	Frequency	Percent
Covid 19 pneumonia	6	6%
Urosepsis	27	27%
Acute pancreatitis	10	10%
Acute gastroenteritis	4	4%
CNS infections	5	5%
Respiratory tract infections	12	12%
Others	36	36%

Among the study population with DIAGNOSIS, 27% of them had Urosepsis, 4% of them had Acute gastroenteritis, 10% of them had Acute pancreatitis, 6% of them had Covid 19 pneumonia, 12% had respiratory tract infections and 5% had CNS infections.

DISCUSSION

Critically ill individuals with septicemia face a life-threatening condition that calls for prompt antibiotic treatment. These people are more at risk of dying from infections brought on by organisms that are resistant to treatment. While severe sepsis has been documented to more frequently cause respiratory failure in the intensive care unit (ICU), renal and cardiac dysfunction were frequently observed organ failures.

Our patients were relatively young with a mean age of 54 years when compared to previous studies from Australia (60.7 years) and Germany (67 years).[2,12] Among the study population, 61.00% of them were 30 to 65 years, 30.00% of them were >65 years and 9.00% of them were <30 years. According to research by Ginde et al. from 2014, septic shock or severe sepsis affected 41% of respondents between the ages of 18 and 34 compared to 71% of those who were 65 years or older (P 0.001). A significant relationship was discovered between age and both sepsis severity and 30-day mortality.[13] Among the study population, 66.00% of them were males, 34.00% of them were females. Male sex hormones or androgens have been shown to suppress cell-mediated immune responses. According to Martin K Angele et al., female sex hormones on the other hand had a protective effect that may contribute to the natural advantage of females in

sepsis cases. As a result, when treating sepsis patients, the hormonal status must be taken into consideration.[14]

A systematic review conducted by Fathi et al. identified the non-modifiable risk factors as age , sex and presence of co-morbidities and critical care interventions and other surgery related factors as modifiable risk factors of sepsis.[15] Among our study population with non-modifiable risk factors, 30.00% of them had Hypertension, 43.00% of them had DM-2, 6.00% of them had TB, 3.00% of them had Asthma, 14.00% of them had IHD, 4.00% of them had Stroke, 6.00% of them had CKD, 1.00% of them had cancer. Among our study population with modifiable risk factors, 50.00% of them had alcohol, 9.00% of them had smoking, 40.00% of them had tobacco, 7% of them had obesity. The pathogenesis of sepsis includes the replication of lymphocytes, induction of programmed cell death/apoptosis, increased expression of anti-inflammatory molecules, and upregulation of cell-associated co-suppressor receptors and ligands. New therapeutic strategies for enhancing immune function in sepsis patients have been made possible by a better understanding of the processes underlying this immunosuppression as well as the similarities between sepsis-induced immunosuppression and immunological deficiencies in cancer or immunosenescence.[16]

In our study population 57.00% of them had HBA1C >6.4, 30.00% of them had <5.7 and 13.00% of them had 5.7 to 6.4. Increased levels of free fatty acids (FFA) are caused in part by hepatic insulin resistance and in part by adipose tissue insulin resistance.[17] Without clear diagnostic criteria for viral sepsis, or at least to rule out bacterial sepsis, this invariably results in the overuse of antibiotics, which has negative effects on the host microbiome, antimicrobial resistance, and healthcare costs. Understanding non-bacterial causes of sepsis is crucial for reducing the use of ineffective treatments and developing effective ones that will improve outcomes. According to Gary T. Kinasewitz et al, there was no difference in response across causative microorganism groups, and markers of inflammation and coagulopathy correlated with the severity of acute disease as determined by baseline APACHE II scores.[18]

Among the study population in Urine culture sensitivity, 15.00% of them had E coli, 14.00% of them klebsiella pneumonnia, 2.00% of them had Candida species. In Blood culture sensitivity, 8.00% of them had E coli, 8.00% of them had klebsiella pneumonia, 1.00% of them had Candida species. Genitourinary infections were noted in 41% (95% CI, 29%-54%) of the cases, as compared to the rates of genitourinary infections in ICU patients with severe sepsis, which range from 5.4% to 9.1%.[19,20] The research by Moreno et al. (1999) asserts that the maximum SOFA score, which measures organ failures, has a substantial correlation with mortality and that the initial SOFA score can be used to determine the degree of organ dysfunction or failure at admission. Ferreira et al. found a correlation between a higher SOFA score in the first 48 hours (SOFA 48-0) and mortality (OR 1.52).[21,22] Sepsis is a major factor in LMICs requiring ICU admission. Currently, these patients are frequently treated in general wards, but more and more basic intensive care facilities are becoming available. The fact that there is still significant global heterogeneity in ICU capacity suggests that critically ill patients typically have very limited access to ICU services. Consideration of disease-specific and setting-specific factors is necessary

for strategies to improve the standard of sepsis management in resource-poor settings, as well as careful evaluation of the most effective adaptation and deployment strategies.[23]

CONCLUSION

In intensive care units, sepsis continues to be a leading cause of death. Early detection of sepsis includes symptoms and signs, such as leucocytosis or leucopenia, confusion, hypoxia, hypotension, pyrexia, and tachycardia. In general, respiratory infections are responsible for around half of all sepsis cases. Incidence of severe sepsis was high among ICU admissions and they have a high mortality. Higher SOFA scores at admission were associated with higher mortality in severe sepsis

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