

Original Research Article

Clinicohematological profile of patients of sepsis admitted in intensive care unit in a tertiary care hospital in Western India

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ABSTRACT

Background: Sepsis is a life-threatening medical condition triggered due to body's response to an infection. If empirical treatment for sepsis and bacteraemia is held up it will increase chances of mortality as well as duration of stay and cost. Hence, there is a need for risk stratification. So, we planned to study the clinicohematological profile of patients of sepsis admitted to this hospital in ICU.

Methods: This was an observational study. A total of 50 patients of sepsis were included. All included participants were subject to CBC, RFT, LFT, RBS, Urine RM, ESR, chest X-ray, USG Abdomen. Laboratory evaluations were performed in the institutional pathology and biochemistry labs. Data was analysed to assess the clinicohematological profile of the patients of sepsis to identify common factors which if taken care of in time can reduce development to sepsis and the morbidity and mortality related to it.

Results: Most common presenting complaint was fever (72%), followed by altered sensorium (58%), vomiting (30%), jaundice (30%) and breathlessness (20%). Most noticed signs were pallor (36%), icterus (36%), edema (6%), reduced air entry (34%) and crepitations (26%). Most common source of the infection were abdomen (28%), urinary tract infection (26%) and community acquired pneumonia (24%).

Conclusions: Most common presenting complaints were fever, breathlessness, altered sensorium. Most common source of sepsis were urinary tract infection, lung, and abdomen which if adequately treated in time would aid in reducing the number of sepsis patients and thus will control the morbidity, mortality and cost associated with sepsis.

Keywords: Clinical profile, Hematological profile, Sepsis

INTRODUCTION

Sepsis is a systemic, mischievous host reaction to infection leading to acute organ dysfunction secondary to documented or suspected infection and septic shock.¹ It is a contributing factor in >200,000 deaths per year in the United States. With a population of 1.22 billion, today India is grappling with various health issues. One of them is management of illnesses like 'Sepsis', which is taking a toll not only in rural India but is also prominent in urban India. India currently tackles 750,000 cases of Sepsis

every year of which overall mortality rate in ICU patients is 12.08% and in the severe stage Sepsis patients it is 59.26%.²

Sepsis is a life-threatening medical condition triggered due to the body's response to an infection. It is often caused by microorganisms invading the body, either limited to a specific body part or can be widespread in the bloodstream.¹ There are typically four progressive stages of Sepsis namely SIRS (Systemic Inflammatory Response Syndrome), SEPSIS, Septic Shock and MODS

(Multiple Organ Dysfunction Syndrome). Approximately two-thirds of the sepsis cases occur in patients with significant underlying illness. The rising incidence of severe sepsis has been attributable to the aging of the population, the increasing longevity of patients with chronic diseases. The widespread use of immunosuppressive drugs, indwelling catheters, and mechanical devices has also played a role. In an international ICU prevalence study, the case-fatality rate among infected patients (33%) greatly exceeded that among uninfected patients (15%).³

If empirical treatment for sepsis and bacteremia is holdup it will increase chances of mortality 1 as well as duration of stay and cost.^{4,5} Hence, there is a need for risk stratification.

As sepsis is very common in patients admitted to ICU, it would be useful to know the clinicohematological profile of the patients coming with sepsis. This will give insight into which infections progress more commonly to sepsis and which is the gender or age group more affected. This insight will be helpful to decide which group of patients to be treated more aggressively to prevent them from going into sepsis.

So, authors planned to study the clinicohematological profile of patients of sepsis admitted to this hospital in ICU.

METHODS

Study design of this study was a cross sectional, observational study which was done to identify the association between sepsis and hyperlactatemia and clinical and laboratory manifestations of sepsis.

Inclusion criteria

All suspected and known cases of sepsis (> 18 years in age) coming to were enrolled for the study. All patients confirmed to have sepsis clinically or by laboratory investigation and who gave written informed consent for participating in the study were included. Sepsis was described as a clinical syndrome combined with organ injury: Documented or suspected and some of the following:⁶

Fever (core temperature >38.3°C), Hypothermia (core temperature <36°C), Heart rate >90 bpm or >2 SD above the normal value for age, Tachypnea: >30 bpm, Altered mental status, Significant edema or positive fluid balance (>20 mL kg⁻¹ over 24 h), Hyperglycemia (plasma glucose >110 mg dL⁻¹) in the absence of diabetes, Leukocytosis (white blood cell count >12,000/μL), Leukopenia (white blood cell count <4,000/μL), Normal white blood cell count with >10% immature forms Plasma C reactive protein >2 SD above the normal value Plasma procalcitonin >2 SD above the normal value, Arterial hypotension (systolic blood pressure <90 mmHg,

mean arterial pressure <70, or a systolic blood pressure decrease >40 mmHg in adults or <2 SD below normal for age) Mixed venous oxygen saturation >70% Cardiac index >3.5 l min⁻¹ m⁻², Arterial hypoxemia (PaO₂/FiO₂ <300), Acute oliguria (urine output <0.5 ml kg⁻¹ h⁻¹ or 45 mM L⁻¹ for at least 2 h) Creatinine increase ≥0.5 mg dL⁻¹, Coagulation abnormalities (international normalized ratio >1.5 or activated partial thromboplastin time >60 s), Ileus (absent bowel sounds), Thrombocytopenia (platelet count <100,000/μL), Hyperbilirubinemia (plasma total bilirubin >4 mg dL⁻¹ or 70 mmol L⁻¹).

Exclusion criteria

The patients who did not give written informed consent were excluded from the study.

Study period it was conducted for one and a half year from January 2015 to June 2016.

Study population it was recruited from the patients admitted in ICU of a tertiary care hospital on west coast of Gujarat. It was started after procuring approval for the study from the Institutional ethics committee.

All cases enrolled were subject to clinical and laboratory investigation for confirmation of sepsis. All included participants were subject to ABG (Arterial blood gas analysis), CBC (Complete blood count), RFT (Renal function test), LFT (Liver function test), RBS (Random blood sugar), Urine RM, ESR, chest X-ray and USG Abdomen. Laboratory evaluations were performed in the institutional pathology and biochemistry labs.

Statistical analysis

Data so collected was analysed to assess the clinicohematological profile of patients of sepsis and to identify the common sites of infection leading to sepsis. Data is presented as mean±SD or percentage.

RESULTS

Total 50 patients were enrolled in the study and were analyzed. Out of 50 patients 31(62%) were male while 19 (38%) were females; 11 (22%) patients were of age ≤ 30 years, 8 (16%) were between age of 31 to 40 years, 9 (18%) patients were between 41 to 50 years of age, 10 (20%) patients were between 51-60 years while 12 (24%) patient were >60 years (Table 1) in age.

Thus majority (>60%) patients were males and were > 40 years old.

Past history of Diabetes mellitus was present in 17 (34%) patients, hypertension was present in 13 (26%) patients, tuberculosis in 3(6%) patients, ischemic heart disease in 4 (8%) patients, sickle cell hemoglobinopathies 2 (4%)

patients bronchial asthma in 1 (2%) patient and liver disease in 1 patient (2%).

Among 36 (72%) patients had fever, vomiting was present in 15 (30%), altered sensorium was present in 29 (58%), breathlessness was present in 10 (20%), jaundice was seen in 15 patient (30%), cough was present in 1 (2%), convulsion was present in 5 (10%) and abdominal pain was present in 12 patients (24%).

Table 1: Mean vitals of the study population.

Variable	Mean±Std. Deviation
Age in years	46.4±17.23
Pulse/ min	108.96±17.720
Respiratory Rate/min	28.04±5.043
Systolic BP (mmhg)	101.20±18.428
Diastolic BP (mmhg)	65.20±12.778

In the study population, mean age was 46.4±17.23 years. Mean pulse rate was 108.96±17.72 per minute and mean respiratory rate was 28.04±5.04 per minute Mean systolic and diastolic blood pressures were 101±18.428 mm Hg and 65.20±12.778 respectively. Thus, most of the patients were elderly. Both mean pulse rate and respiratory rate showed tachycardia and tachypnoea while both systolic and diastolic blood pressure were lower than normal (Table 1).

Pallor was seen in 18 patients (36%), icterus was present in 18 patients (36%), edema in 3 patients (6%), reduced air entry in 17 patients (34%) and crepitations in 13 patients (26%).

In per abdomen Examination splenomegaly was present in 11 patients (22%), hepatomegaly in 7 patients (14%) and ascites was seen in 3 patients (6%) (Table 2).

Table 2: Abnormal findings seen on examination in study participants.

General examination	No of patients	Percentage (n=50)
Pallor	18	36.0
Icterus	18	36.0
Cyanosis	0	0
Clubbing	0	0
Lymphadenopathy	0	0
Edema	3	6.0
Air entry reduced	17	34.0
Crepitation present	13	26.0
Splenomegaly	11	22.0
Hepatomegaly	7	14.0
Ascitis	3	6.0

Lab investigations revealed anemia and leukocytosis as major manifestations (mean hemoglobin was 10.99±2.74 mg/dl and mean total leukocyte count was

16938±9887.423/ cumm). However, mean platelet count was in the normal range; 1.98±1.24 mg/dl. Blood urea, serum creatinine, bilirubin and liver enzymes were all elevated while ABG showed hypoxia and hypocapnea (Table 3).

Table 3: Results of investigation in study population.

Variables	Mean±Std. Deviation
Hb (mg/dl)	10.992000±2.7441842
TLC (per cumm3)	16936.00±9887.423
Platelet count (per cumm3)	1.984200±1.2466905
Erythrocytes sedimentation rate (mm)	49.438±29.0262
Random blood sugar (mg/dl)	165.00±80.524
pH	7.368980± 1478708
PaCo2(mm Hg)	31.978800±14.3914864
PaO2 (mm Hg)	70.91±19.36
Bicarbonates (mEq/L)	18.912000±6.4374745
Oxygen saturation in blood (%)	92.154000±10.4665299
Urea (mg/dl)	107.24±95.321
Creatinine (mg/dl)	2.362000±1.8728882
Bilirubin (mg/dl)	2.974000±4.0765036
SGPT(U/l)	188.800±561.7456
SGOT(U/l)	183.2050±568.75657

Out of 50 patient's urine microscopies showed >2-3 pus cells in 20 patients, chest x ray revealed consolidation in 9 (18%) and pleural effusion in 3 (6%).

Ultra-Sonography of abdomen revealed splenomegaly in 12 (24%) patients, hepatomegaly in 8 (16%) patients and ascites in 3 (6%) patients (Figure 1).

Out of 50 patients, source of the infection in 14 patients (28%) was abdomen, urinary tract infection in 13 (26%), and community acquired pneumonia in 12 (24%), which were the most common infections observed to be occurring before sepsis. 1 Patient (2%) had dengue, 4 patients (8%) had enteric fever, 5 patients (10%) had malaria and 1 patient (2%) had meningitis. (Table 4)

Out of 50 patients, 24 (48%) patients were discharged while 26 (52%) patients died.

Table 4: Source of infection in the study population.

Source of infection	Frequency (%)
Abdomen	14 (28.0 %)
Community acquired infection	12 (24.0%)
Dengue	1 (2.0%)
Enteric fever	4 (8.0%)
Malaria	5 (10.0%)
Meningitis	1 (2.0%)
Urinary tract infection	13 (26.0%)
Total	50 (100.0%)

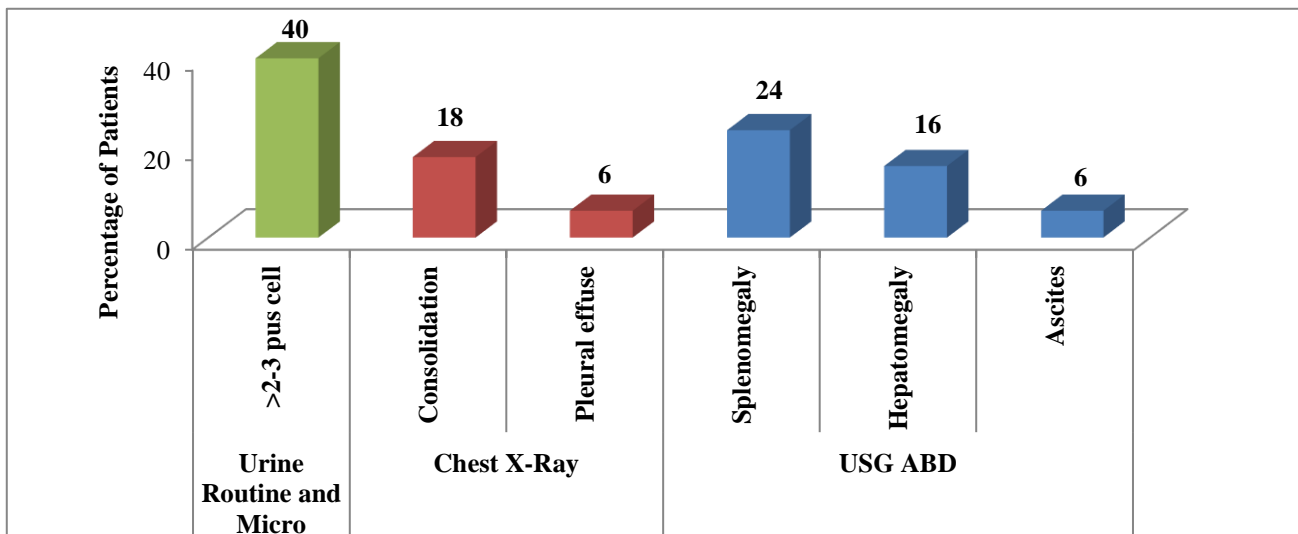


Figure 1: Urinary and radiological findings in study population.

DISCUSSION

Sepsis or severe sepsis is a severe condition that arises when the body's reaction to infection causes injury to its own tissues and organs.⁷ Sepsis is the harmful host response to infection, systemic response to proven or suspected infection plus some degree of organ hypofunction. Fever, chills, rapid breathing and heart rate, confusion and disorientation are most common symptoms.

Fever or hypothermia, leukocytosis or leukopenia, tachypnea and tachycardia are cardinal signs of the systemic response. In this study also, 72% patients had fever which was the most common symptom, followed by vomiting, altered sensorium, breathlessness and jaundice. Abdominal pain, cough and convulsion were also observed in a few patients. Similarly, pallor, icterus, edema, dyspnea, reduced air entry, and crepitations were the commonly observed signs in this study. Splenomegaly and hepatomegaly were also seen in remarkable number of patients. Thus, the study confirmed the previously noted common symptoms and signs.

Sepsis is caused by an immune response actuated by an infection.^{8,9} Mostly, the infection is bacterial, but sepsis can also be due to fungi, viruses or parasites.⁷ Usual locations for the primary infection include lungs (most common), brain, urinary tract, skin, and abdominal organs in ICU. Risk factors include young or old age, a weakened immune system from conditions such as cancer or diabetes, major trauma, or burns.¹

In this study, most common sources of infection were abdomen, urinary tract infection in and community

acquired pneumonia. Frequencies of the three most important sources of infection (abdominal, pulmonary, and urosepsis) differed significantly between groups in this study. This might be associated with different strains of pathogens; but, unfortunately, we had no data on the strain of the pathogen.

A larger study, including 1948 patients, showed a higher frequency of pneumonia in severe sepsis and cryptic shock and a higher frequency of urosepsis in dysoxic shock, in contrast to this result. The different patterns may be attributable to the overall different patient populations in different studies. For example, a study by recruited patients admitted to all areas of the hospital (whereas only patients admitted to an ICU were included in this study) with a high proportion of patients without shock, low frequency of abdominal infection, and the study taking place in an emerging nation.¹⁰

CONCLUSION

This study confirmed the previous findings that fever, breathlessness, jaundice and altered sensorium are the common presentations of sepsis. Tachycardia, tachypnea and hypotension are the common findings on general examination. Authors also confirmed that urinary tract infection, community acquired pneumonia and abdominal infections are the most common sources of infection leading to sepsis.

Thus, urinary tract infections, respiratory tract infections and abdominal infection if treated timely and adequately would aid in reducing the number of sepsis patients and thus will control the morbidity, mortality and cost associated with sepsis.

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Ethical approval: Not required

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