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General Medicine

CHARACTERISTICS OF SOURCE OF INFECTION AND CULTURE POSITIVITY IN SEVERE SEPSIS

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ABSTRACT

Objectives : Sepsis and severe sepsis is a major cause of mortality worldwide. The most important concern in the management of septic patients is the right choice of antibiotics. The main aim of the study to detect the source of infection and culture positivity as it can help in better treatment ,decrease the length of stay and mortality. **Material and Methods :** This study had been conducted over a period of 1 year in tertiary care hospital. A total of 104 patients were enrolled in this study as per inclusion criteria for severe sepsis. All important investigations relevant to the study were sent.

Results : Out of total 104 patients ,UTI was major source of infection in 63 patients follow by respiratory tract infection in 43 patients. Blood culture was positive in 32 patients and Urine culture positive in 50 patients with majority had E. coli growth. Sputum/ET culture was positive in 21 patients.

Conclusion : Early detection of source of infection , isolation of organism and timely intervention in the form of antibiotics and removal of source of infection can help in decreasing mortality, length of stay in hospital and cost in severe septic patients.

KEYWORDS : Sepsis , culture , source of infection , mortality

INTRODUCTION :

Sepsis and severe sepsis is a major cause of mortality worldwide. Severe sepsis leads to multiorganfailure and that is the main cause of death in septic patients. A variety of biomarkers have been studied for their ability to help in earlier diagnosis, treatment decisions, or assessment of prognosis in sepsis. The biomarkers procalcitonin, C-reactive protein (CRP), interleukin 6, the TREM-1 receptor (triggering receptor expressed on myeloid cells-1), and lipoprotein binding protein may improve early diagnosis of a bacterial infection.

Despite numerous advances in the supportive care of the patients, overall mortality has changed little in past 20 years. The main objectives of this study is to detect the source of infection and culture positivity as it can help in right choice of antibiotics, better management of patients and decrease the overall mortality

MATERIAL AND METHODS : This is a prospective observational study conducted in tertiary care hospital over a period of 1 year.

INCLUSION CRITERIA :

1. Patients were enrolled as per criteria for SIRS
2. Evidence for source of infection

EXCLUSION CRITERIA :

1. Patients on immunosuppressive therapy
2. Immunocompromised patients
3. Pregnant patients

Statistical Analysis was done using P value. P value < 0.05 was considered significant.

Detailled history and examination was done. All important investigations including complete blood count, renal function test, liver function test, urine routine , urine culture, blood culture ,Chest X-ray were sent.Besides that sputum analysis /wound swab culture/ ET gram stain/culture were also sent according to patient profile.

Outcome: It measures the early detection of source of infection , isolation of organism and timely intervention in the form of antibiotics and removal of source of infection can help in decreasing mortality, length of stay in hospital and cost in severe septic patients.

Observation and results :

This study has been conducted over a period of 1 year, enrolled total of 104 patients. Mean age of patients in study was 55.3+- 16.81 years. Out of total 104 patients 56 patients were males and 48 were females.

In our study, in total 104 patients, there were total 129 sources of infection identified with some patients having multiple sources of infection.(Table 1)

Urinary tract was the major source of infection in 63 patients (60.58%) followed by respiratory tract in 43 patients (41.35% of total infection sources).

In 11 (10.57%) patients, GIT was the source .Soft tissue was identified as the source of infection in 10 (9.62%) of patients.

1 patient (0.96%) each had CNS and CRBSI as source of infection.

Table 1 : Source of infection

Sr. No.	Source of Infection	Number	Percentage
1.	CNS	1	0.96
2.	GIT	11	9.62
3.	RESP	43	41.35
4.	SOFT TISSUE	10	9.62
5.	UTI	63	60.58
6.	CRBSI	1	0.96

Out of the total 104 patients, blood culture was positive in 32(30.76%) patients. Out of these 32 patients, 10 patients (31.25%) had S. Aureus growth in blood culture (9.61% of total 104 patients). 8 patients (25%) each showed growth of E.Coli and Klebsiella in blood culture (it is 7.69% of total 104 patients).

3 patients (9.3%) had A. Baumannii growth in blood culture (2.88% of total patients) (Figure 1)

1 patient (3.13%) each had Enterococcus, Pseudomonas and Candida growth in blood culture respectively (0.96% of total 104 patients).

Blood culture was negative in 72 patients (69.23%).

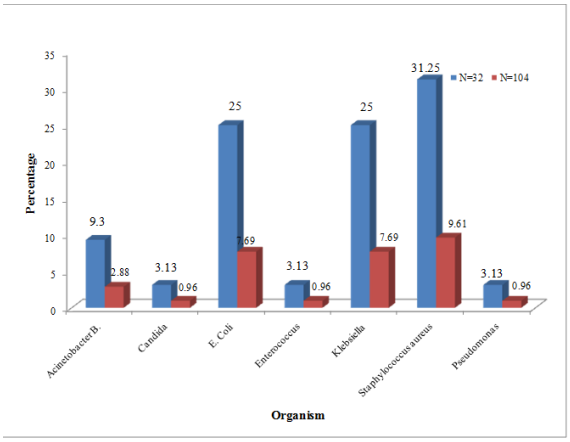

Figure -1 (Blood culture)

Out of the total 104 patients, urine culture was positive in 50(48.07%) patients. Out of these 50 patients, 26 patients (52%) had E. coli growth in urine culture [25.00% of total 104 patients]. 8 patients (16.00%) showed growth of Enterococcus in urine culture (it is 7.69% of total 104 patients) followed by 6 patients (12.00%) showing klebsiella growth. (Figure 2)

Urine culture showed Candida growth in 4 (8.00%) patients followed by S.Aureus in 3 (6.00%) patients.

Acinetobacter was grown in 2 (4.00%) patients and Pseudomonas and Citrobacter were seen in 1(2.00%) patient each in urine culture.

Polymicrobial growth was seen in 3 patients.

Urine culture was negative in 54 patients (51.93%)

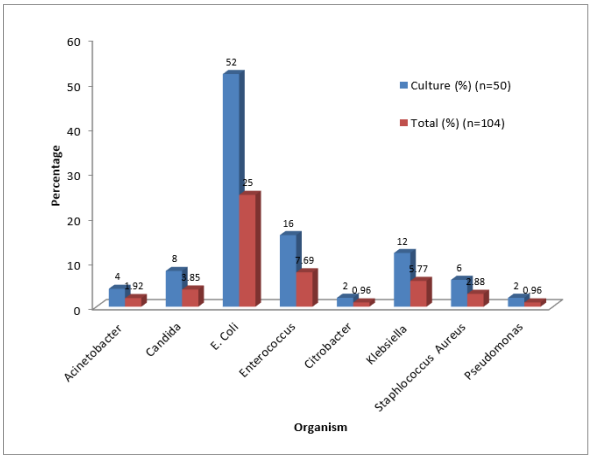

Figure 2 – Urine culture

Out of the total 104 patients, Sputum / ET Culture was positive in 21(20.19%) patients.

Out of these 21 patients, 3 patients (14.28%) had E. coli growth in culture [6.73% of total 104 patients]. 6 patients (16.00%) showed growth of Klebsiella in respiratory secretion culture (it is 8.65% of total 104 patients) followed by 4 patients (3.85%) showing Acinetobacter growth.

ET / Sputum culture showed Pseudomonas, Enterococcus growth in 2 (9.52%) patients each.

Candida was grown in 1 (4.76%) patient in ET Culture.

Out of the total 104 patients, 64 (61.54%) patients were having multiorgan failure. 40 patients [38.46%)] didn't have multiorgan involvement.

Out of the total 104 patients, 45 (43.27%) patients recovered (23.08%), 24 patients took DAMA and 35 patients (33.65%) expired.

Out of the total 64 patients with MOFS, 20(31.24%) recovered,14(21.88%) were DAMA and 30(46.88%) patients expired. Out of the total 40 patients without MOFS, 25(62.50%) recovered,10(25%) were DAMA and 5(12.50%) patients expired.

p-value for Recovered patients in two groups is **0.008** which is statistically significant. p-value for Expired patients in two groups is **0.007** which is statistically significant. p-value for DAMA patients is statistically not significant (**0.448**).

DISCUSSION :

Severe sepsis and septic shock are leading causes of death in non-coronary ICUs in developed countries (**Martin et al.2003**[1], **Sands et al.1997**) [2] .Severe sepsis or septic shock accounts for as many deaths as acute myocardial infarction in hospitals (**Angus et al. 2001**)[3]. The first clinical signs of sepsis include the unspecific symptoms of systemic inflammatory response (SIRS); fever, tachycardia, tachypnea, or elevation of the peripheral leukocyte count.

Sepsis and septic shock continues to be major cause of morbidity and mortality It is the tenth most common cause of death in united states. Since the 1930's,Studies have shown an increasing incidence of sepsis (both gram positive and gram negative bacteria) increased from 3.8 cases per 1000 admissions in 1970 to 8.7 per 1000 admissions in 1987. The increase in number of patients who are immunocompromised and an increasing use of invasive diagnostic and therapeutic devices predisposing to infection are the major reasons for increase in incidence of sepsis.

An infectious insult results in the stimulation of immune system .This response is usually advantageous, but when uncontrolled or excessive, it becomes deleterious for the patient. This is the situation in septic shock (**Christov NV,1996).**

The present study was conducted over a period of 15 months from 01st jan.2013 to 30th march 2014. A total of 104 patients were enrolled in the study.

The baseline demographic characteristics and various parameters of recovery of patients were evaluated and noted as per the profoma attached.

All patients included in the study were in the age group from 18-85 years. Maximum number of patients, 29 (27.88%) were in the age group of 56-65 years followed by age group 46-55 years (22.12%). The age distribution is comparable to the previous study done by **Briegel J et al.**[4]

Bacteremia associated mortality gradually increased with age and was especially notable after the age of 45. Similar observation was made by **Salive ME et al**. [5]

Age thus plays a major role in mortality due to septicemia. Out of the total 104 patients, 60 patients (57.69%) were males and 44 patients (42.31%) were females. In male patients out of 60 patients 24 recovered (40%), 22 expired (36.66%) and 14 were DAMA (23.33%).In females out of total 44 patients, 21 recovered (47.72%),13 expired (29.54%) and 10 were DAMA(27.72%). So in our study it has been observed that male patients have higher mortality as compared to female patients.

Impact of gender on severe infections is in highly controversial discussion with natural survival advantage of females described in animal studies but contradictory to those described human data **(Schroder J et al)**.

In our study, in total 104 patients, there were total 129 sources of infection identified with some patients having multiple sources of infection.

Urinary tract was the major source of infection in 63 patients (60.58%) followed by respiratory tract in 43 patients (41.35% of total infection sources).

In 11 (10.57%) patients, GIT was the source .Soft tissue was identified as the source of infection in 10 (9.62%) of patients. 1 patient (0.96%) each had CNS and CRBSI as source of infection

This is comparable to the previous studies by various authors which concluded that the lung is the primary source of infection both in severe sepsis and in septic shock, followed by the abdomen, the urinary tract, soft tissues and primary blood stream infection (**Annane et al, 2003**)[6]

In our study, blood culture was positive in 32(30.76%) patients. Out of these 32 patients, 31.25% had S. Aureus growth in blood culture [9.61% of total 104 patients]. 25% each showed growth of E. Coli and Klebsiella in blood culture (it is 7.69% of total 104 patients).

9.3% had Acinetobacter Baumannii growth in blood culture (2.88% of total patients) 3.13% each had Enterococcus, Pseudomonas and Candida growth in blood culture respectively (0.96% of total 104 patients). Blood culture was negative in 72 patients (69.23%)

According to **Martin et al,**[1] the proportion of severe sepsis and septic shock with unidentified pathogen is about one third. In some studies the infection was not documented in 40% of cases, possibly due to the increase in empiric antibiotic treatment. This difference in the present

study could be due to difference in local prevalence of infections and possibly due to prior use of antibiotics.

Gram-negative bacilli - mostly represented by Escherichia Coli, Pseudomonas Aeruginosa, Klebsiella Pneumonia - were more prevalent than Gram-positive cocci – S. Aureus , Streptococcus Pneumonia, Enterococcus sp. However, Gram-positive microorganisms have become the most common microorganisms isolated in the more recent studies **(Bloch KC et al)** [7]. This data is being reflected in the present study.

The percentage of polymicrobial infection as well as the proportion of multi resistant bacteria like Pseudomonas and methicillin-resistant Staphylococci, has significantly increased over time (Annane 2002)[8]. The similar trend was also seen in our study.

In our study, out of 104 patients, 64 (61.54%) patients had MOFS and 40 (38.46%) patients were without MOFS. Among 64 patients with MOFS, 30 patients (46.87 %) got expired as compared to 40 patients without MOFS where number of patients expired was 5(12.5%).

MOF became the main cause of death in ICUs, and, since the first studies which described this entity during the 1970s, mortality remains almost the same, in spite of all the research in laboratories and ICUs .The mortality of ICU septic patients ranges from 20% to 60%.

Poole, et al [9] observed a 66% mortality in their study on patients with severe sepsis.

Hebert, et al [10] found a strong linear correlation between the number of system failures and 30 day hospital mortality. Mortality ranged from 10% for patients who had no organ system failure, to 100% in patients who had 5 or more organ system failures.

CONCLUSION : Conclusion : Early detection of source of infection , isolation of organism and timely intervention in the form of antibiotics and removal of source of infection can help in decreasing mortality, length of stay in hospital and cost in severe septic patients.

Conflicts of interest - None

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