Original Research Article

A Prospective Study for Analysis of Clinical, Biochemical and Microbiological Profile in Sepsis Patients Admitted in ICU at Tertiary Care Centre

Sukh Chain[1], Govind Sharan Sharma[2], Mansa Ram Saran[2]

[1]Junior Specialist, Department of General Medicine, S. K. Government Medical College, Sikar, Rajasthan, India
[2]Associate Professor, Department of General Medicine, S. K. Government Medical College, Sikar, Rajasthan, India
[3]Associate Professor, Department of General Medicine, S. K. Government Medical College, Sikar, Rajasthan, India

Received: 11-09-2021 / Revised: 12-11-2021 / Accepted: 08-12-2021

Abstract

Background: Sepsis and its complications are a common cause of infectious disease illness and mortality worldwide and is a significant contributor to child death in India. Hence; the present study was undertaken with the aim of assessing Clinical, Biochemical and Microbiological Profile in Sepsis Patients Admitted in ICU at Tertiary Care Centre.**Materials & methods:** A total of 100 patients of sepsis who were admitted were enrolled in the present study. Blood sample for bacterial culture/sensitivity were collected and sent soon after a diagnosis is made. Complete data was obtained during the stay in the hospital from the time of diagnosis which includes the hospital stay. The patients were interviewed and underwent thorough physical examination. Their Data comprising of name, age, sex, personal, occupational and proper history was recorded on the proforma. Blood samples were obtained and complete biochemical and microbiological profile was recorded.**Results:** Organ dysfunction was seen in 47 percent of the patients. Among them, renal dysfunction was present in 23 percent of the patients. Positive blood culture was seen 31 percent of the patients. Acenetobacter, Citrobacter, S.aureus, Klebsiella, Pseudomonas, E.coli, Gram negative bacilli and Streptococcus species were seen in 4 patients, 6 patients, 6 patients, 4 patients, 4 patients, 3 patients, 2 patients, 4 patients and 2 patients respectively.**Conclusion:** Positive blood cultures were found in 31% of patients with most commonly renal involvement.

Keywords: Sepsis, Microbiological.

Introduction

Sepsis and its complications are a common cause of infectious disease illness and mortality worldwide and is a significant contributor to child death in India. Consensus definitions of sepsis were first published in 1992 and later updated. Better understanding of the pathophysiology of sepsis, new diagnostics, and improved therapeutics were reviewed in the surviving sepsis campaign guidelines and subsequently revised. International guidelines were published, and these have been supported and published in Indian medical journals[1-4].In many studies a wide range of bacteria has been described in febrile patients including gram negative bacteria such as Escherichia coli, Pseudomonas aeroginosa, Klebsiella species, Neisseria meningitidis, Haemophilus influenzae, and gram positive such as Coagulase negative staphylococci (CONS), Staphylococcus aureus, Streptococcus pneumoniae, Streptococcus pyogenes, Streptococcus agalactiae, and Enterococcus faecium. The diagnosis of these infections can be confirmed by blood culture, which is routinely available in few hospitals in developing countries[4-6].Hence; the present study was undertaken with the aim of assessing Clinical, Biochemical and Microbiological Profile in Sepsis Patients Admitted in ICU at Tertiary Care Centre.

**Correspondence*
Dr. Mansa Ram Saran
Associate Professor, Department of General Medicine, S. K. Government Medical College, Sikar, Rajasthan, India
E-mail: drmansaram@gmail.com

Materials & Methods

The present study was undertaken in the Department of General Medicine, S. K. Government Medical College, Sikar, Rajasthan, India, with the aim of assessing Clinical, Biochemical and Microbiological Profile in Sepsis Patients Admitted in ICU at Tertiary Care Centre. A total of 100 patients of sepsis who were admitted were enrolled in the present study. Blood sample for bacterial culture/sensitivity were collected and sent soon after a diagnosis is made. Complete data was obtained during the stay in the hospital from the time of diagnosis which includes the hospital stay. The patients were interviewed and underwent thorough physical examination. Their Data comprising of name, age, sex, personal, occupational and proper history was recorded on the proforma. Blood samples were obtained and complete biochemical and microbiological profile was recorded. All the results were recorded and analyzed by SPSS software.

Results

29 percent of the patients belonged to the age group of 20 to 40 years while 26 percent of the patients belonged to the age group of more than 60 years. 41 percent of the patients were males. Mortality rate was 3 percent. Organ dysfunction was seen in 47 percent of the patients. Among them, renal dysfunction was present in 23 percent of the patients. Positive blood culture was seen 31 percent of the patients. Acenetobacter, Citrobacter, S.aureus, Klebsiella, Pseudomonas, E.coli, Gram negative bacilli and Streptococcus species were seen in 4 patients, 6 patients, 6 patients, 4 patients, 4 patients, 3 patients, 2 patients, 4 patients and 2 patients respectively.

Mean CRP was 4.2 mg/L mean Hb was 13.5 gm %. Mean SGOT and SGPT concentration was 43.5 U/L and 51.8 U/L respectively.

Table 1: Demographic data

Variable		Number	Percentage
Age group (years)	Less than 20	22	22
	20 to 40	29	29
	41 to 60	23	23
	More than 60	26	26
Gender	Males	41	41
	Females	59	59

Table 2: Outcome

Outcome	Number	Percentage
Mortality	3	3
Survived	97	97
Total	100	100

Table 3: Organ dysfunction

Organ dysfunction	Number	Percentage
Absent	53	53
Renal	23	23
Hepatic	22	22
CNS	1	1
Respiratory	1	1
Total	100	100

Table 4: Results of blood culture

Blood culture	Number	Percentage
Positive	31	31
Absence of growth	69	69
Total	100	100

Table 5: Microbiological culture profile

Profile	Number	Percentage
Acenetobacter	4	4
Citrobacter	6	6
S.aureus	6	6
Klebsiella	4	4
Pseudomonas	3	3
E.coli	2	2
Gram negative bacilli	4	4
Streptococcus species	2	2
Absence of growth	69	69
Total	100	100

Table 6: Biochemical profile

Biochemical profile	Mean	SD
C Reactive proteins (mg/L)	4.2	2.1
Hb (gm %)	13.5	4.8
WBC (x1000)	6.96	2.12
SGOT (U/L)	43.5	4.5
SGPT (U/L)	51.8	5.4

Discussion

Sepsis is defined as systemic inflammatory response syndrome (SIRS) caused by infection. However, infections can be difficult to confirm. Fever, tachycardia, hypotension, and other vital sign abnormalities found in SIRS are not specific for infection and overlap with noninfectious etiologies presenting with systemic inflammation. There is no gold standard for diagnosing infection, and though blood cultures processed with standard microbiologic techniques are a frequent diagnostic step, their likelihood of returning with the pathogen of interest depends on a variety of factors, including prior antibiotic therapy[7-10]. Hence; the present study was undertaken with the aim of assessing Clinical, Biochemical and Microbiological Profile in Sepsis Patients Admitted in ICU at Tertiary Care Centre.In the present study, 29 percent of the patients belonged to the age group of 20 to 40 years while 26 percent of the patients belonged to the age group of more than 60 years. 41 percent of the patients were males. Mortality rate was 3 percent. Organ dysfunction was seen in 47 percent of the patients. Among them, renal dysfunction was present in 23 percent of the patients. Positive blood culture was seen 31 percent of the patients. Our results were in concordance with the results obtained by Bridina L et al who also reported similar findings. In their study, author assessed microbiological profile of patients admitted with sepsis in an intensive care unit. From all 72 (100%) patients included in the study, 67 (93.05%) patients had immuno compromised background-tumors, intra-abdominal infections, complicated soft tissue infections, cardiovascular, endocrine, lung, liver, kidney diseases, HIV, viral hepatitis and alcohol addiction. Five (6.9%) patients were

not diagnosed with related diseases. Their data showed that most of the patients were in the age group of 60 to 79 (n=32.44%) and 20 of them (62.5%) died. Summarizing the results, all patients at the time of hospitalization had elevated C reactive protein (CRP). More than the half of patients 56 (77.7%) CRP was above 259 mg/L. Leukocytosis was diagnosed with 59 (81.9%) patients. Leukopenia was diagnosed with six (8.3%) patients. 32 (44.4%) patients had elevated liver indicators (ALT, AST). 39 (54.1%) patients had elevated kidney indicators. But the renal replacement therapy during hospitalization was received by 13 (18.1%) of patients. For the dead patients (n=36.50%) the renal replacement therapy was received by 25% (p = 0.12). Plating of blood was positive in 32 (44.4%) of all the patients. Blood agent in culture grows-Streptococcus betahemolytic group B was 1 (3.1%), Escherichia coli 3 (9.37%), Staphylococcus epidermidis 5 (15.6%), Staphylococcus hominis 1 (3.1%), Staphylococcus aureus 7 (21.9%), Staphylococcus haemolyticus 1 (3.1 %), Prevotella oralis 1 (3.1%), Streptococcus pneumonia 10 (31. 3%), Klebsiella pneumonia 1 (3.1%), Clostridium difficile 1 (3.1 %), Streptococcus beta-hemolytic group A 1 (3.1%). Microbiological plating of urine was positive in 11 (15.3%) patients; the most common agents in plating were E. coli and Staphylococci. Blood culture was mostly positive for less than a half of patients (44. 4%) [11,12].In the present study, Acenetobacter, Citrobacter, S.aureus, Klebsiella, Pseudomonas, E.coli, Gram negative bacilli and Streptococcus species were seen in 4 patients, 6 patients, 6 patients, 4 patients, 4 patients, 3 patients, 2 patients, 4 patients and 2 patients respectively. Mean CRP was 4.2 mg/L mean Hb was 13.5 gm %. Mean SGOT and SGPT concentration was 43.5 U/L and 51.8 U/L respectively. Similar findings were reported in the study conducted by Prem Sundar Batham et al. In their study, authors assessed the occurrence of positive blood culture among the different grades of sepsis and assess the type of organ dysfunction commonly encountered. Data was collected from 100 patients. Blood sample for bacterial culture/sensitivity were collected and sent soon after a diagnosis is made. Complete data was obtained during the stay in the hospital from the time of diagnosis which includes the hospital stay. The onset of severe sepsis and septic shock were assessed during hospital stay. Out of the 100 patients, the incidence of sepsis was found to be high in the elderly age group. 39% are males and 61% are females. 50% had sepsis, 39% had severe sepsis, 11% had septic shock. The common organ dysfunction encountered were renal 50%, followed by hepatic (46%), CNS (2%) and respiratory (2%).The number of organ dysfunction in individual patients are none in 50(50%), 1 in 47(47%) and 2 in 3(3%). Out of 100 patients, 26(26%) had positive blood culture and 74(74%) had no organism grown in blood culture. According to grade of sepsis, patient with only sepsis had 100% recovery, while 92.31% of severe sepsis recovered, 7.69% expired and those with septic shock 72.3% recovered and 27.27% expired.

Conflict of Interest: Nil
Source of support:Nil

Conclusion

In this study we conclude that positive blood cultures were found in 26% of patients which are predominantly gram negative organisms.[12]

References

1. RC Bone, RA Balk, FB Cerra. "Definitions for sepsis and organ failure and guidelines for the use of innovative therapies in sepsis. THE ACCP/SCCM consensus conference committee," Chest. 1992; 101:1644-1655.
2. Khilnani P, Deopujari S, Carcillo J. "Recent advances in sepsis and septic shock," Indian Journal of Pediatrics. 2008; 75(8):821-830.
3. Daniel RK, Scott AF, James MB, Sanjay S. Brief Report: Incidence, Etiology, Risk Factors, and Outcome of Hospital acquired Fever. J Gen Intern Med. 2006; 21:1184–1187.
4. Martin GS, Mannino DM, Eaton S, Moss M. The epidemiology of sepsis in the United States from 1979 through 2000. N Engl J Med. 2003; 17:1546-1554.
5. Brun-Buisson C, Meshaka P, Pinton P, Vallet B. EPISEPSIS: a reappraisal of the epidemiology and outcome of severe sepsis in French intensive care units. Intensive Care Med. 2004; 17:580–588.
6. Rangel-Frausto MS, Pittet D, Costigan M, Hwang T, Davis CS, Wenzel RP. The natural history of the systemic inflammatory response syndrome (SIRS). A prospective study. JAMA. 1995; 17:117–123.
7. Tziamabos AO, Kasper DL. Principle and practice of infectious diseases. Frank Polizano J. 2005; 26:2810–2816.
8. Madsen KH, Sorensen HT. Secular trends in incidence and mortality of bacteremia in Danish country. APMIS. 1999; 107:346–352.
9. James AK, Mark EJ, Deborah CD, Clyde T, Daniel FS, Gregory AV. Prevalence and antimicrobial susceptibilities of bacteria isolated from blood cultures of hospitalized patients in the United States in 2002. Ann Clin Microbio Antimicrobi. 2004; 3(Suppl 7):1–8.
10. Manjula M, Pyria D, Varsha G. Antimicrobial susceptibility pattern of blood isolates from a teaching Hospital in north India. Japan J Infec Dis. 2005; 58:174–176.
11. Bridina L, Krumina A. Biochemical and microbiological profile of patients admitted with sepsis in an intensive care unit. J Infect Dis Ther. 2017; 5:2.
12. Prem Sundar Batham. "Study on Sepsis-Clinical, Biochemical Profile and Correlation with Blood Culture". Journal of Evolution of Medical and Dental Sciences. 2015; 4(56):9703-9712