Original Research Article

A study of clinical profile of sepsis in patients admitted in Intensive care unit at tertiary care hospital

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Abstract

Background: Sepsis is defined as life threatening organ dysfunction caused by a dysregulated host response to infection and Organ dysfunction is newly defined in terms of a change in baseline SOFA (sequential organ failure assessment) score. Present cross-sectional study was conducted with the objective describe clinical profile of sepsis in patients admitted in Intensive care unit at tertiary care hospital. **Material and Methods:** Present study was single-center, descriptive observational study, conducted in patients, age>14 years, of either gender, having sepsis admitted in ICU. **Results:** Out of 64 cases, majority of the cases were from 31-40 years and 51-60 years (21.9%). Mean age of the study population was 51.56 ± 19.48 years. Males were predominant (57.8%) with male to female ratio as 1.378:1. Sputum culture was found positive in 24(37.5%) cases followed by urine culture in 17(26.6%), pus culture in 6(9.4%) and CSF as well as biopsy culture found positive in 2 cases each i.e. 3.1%. Streptococcus pneumoniae was predominantly found microorganism (31.3%) followed by E. Coli (28.1%), Staphylococcus aureus (9.4%), Klebsiella pneumoniae (6.3%). Most commonly involved site of infection was lungs (43.8%) followed by urinary bladder (15.6%), kidney (10.9%) and brain (9.4%) cases. Death rate was 42.2% in our study. Mean duration of ICU stay was 5.84±3.16 days. Majority of the patients stayed in ICU for less than 7 days i.e. 39(60.9%) and remaining 25 i.e. 39.1% stayed in ICU for more than 7 days. **Conclusion:** Sputum and urine cultures were predominantly found to be positive. Most common site of infection was lungs and urinary bladder. Mortality was 42.2%, majority of deaths were in 31-40 years age group, male. In 33.3% of deaths, Streptococcus pneumonae was the predominant causative organism. In almost half of the deaths, sputum culture was positive.
Keywords: sepsis, sputum culture, SOFA score, APACHE score.

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INTRODUCTION

Sepsis is derived from the Greek word "putrid" and it was believed that purification of wound was caused by contact with air and death occurred when the process of purification reached the blood and termed as "septiciemia."[1] In February 2016, the European Society of Intensive Care Medicine and the SCCM published new consensus definitions of sepsis and related clinical criteria. Sepsis is now defined as life threatening organ dysfunction caused by a dysregulated host response to infection and Organ dysfunction is newly defined in terms of a change in baseline SOFA (sequential organ failure assessment) score.[2] Septic shock is defined as the subset of sepsis in which underlying circulatory and cellular or metabolic abnormalities are profound enough to increase mortality substantially. Novel mechanistic insights about sepsis have not yet translated into specific drug treatments. However, mortality has declined even as the severity and incidence

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of sepsis have risen.[3,4] Early diagnosis and causal treatment including the administration of antimicrobial agents highly influence the success of treatment.[5] Sepsis is major world wide cause of morbidity and mortality and causes a large burden of disease with negative impact in a community. Hence the present cross-sectional study was conducted with the objective describe clinical profile of sepsis in patients admitted in Intensive care unit at tertiary care hospital.

MATERIAL AND METHODS

Present study was single-center, descriptive observational study, conducted in Department of Medicine, Vilasrao Deshmukh Government Medical College, India. Study duration was of 18 months (July 2018 to June 2019). Study was approved by institutional ethical committee.

Inclusion criteria: All patients, age>14 years, of either gender, having sepsis admitted in ICU and willing to participate in study after written consent

Exclusion criteria: Active hematological malignancies**.** Active cancer**.** Immunosuppression and steroid dependent**.** HIV infection**.** Chronic renal failure**.** Advance cirrhosis**.** Age, gender, clinical features, laboratory markers of sepsis, outcome, blood culture etc. variables were studied**.**

All patients were managed according to standard sepsis management protocols including initial fluid resuscitation. Subsequent fluid administration was based upon central venous pressure measurement, lactate clearance and urine output. Early empiric broad spectrum antibiotics were started and organ support was given as required. Data related to demography, co-existing illnesses, parameters to assess Acute Physiology and Chronic Health Evaluation (APACHE) II and Sequential Organ Failure Assessment (SOFA) scores and other relevant laboratory data were collected. Data regarding the source of infection and supportive measures given were recorded. Primary outcome data related to mortality and secondary outcome data on ventilator days, ICU length of stay (LOS) and ventilator free days were collected. Data was collected and compiled using Microsoft Excel, analysed using SPSS 23.0 version. Frequency, percentage, means and standard deviations (SD) was calculated for the continuous variables, while ratios and proportions were calculated for the categorical variables. Difference of proportions between qualitative variables were tested using chi- square test or Fisher exact test as applicable. P value less than 0.5 was considered as statistically significant.

RESULTS

Out of 64 cases, majority of the cases were from 31-40 years and 51-60 years (21.9%). Mean age of the study population was 51.56 ± 19.48 years. Males were predominant (57.8%) with male to female ratio as 1.378:1

Table 1: Distribution according to age

	Frequency	Percent
Age group in years		
< 20	6	9.4
21-30	8	12.5
31-40	14	21.9
41-50	11	17.2
51-60	14	21.9
> 60	11	17.2
Gender		
Male	37	57.8
Female	27	42.2

In all 64 patients, fever was present (100%). Giddiness was complained by 45(70.3%), vomiting by 43(67.2%), shivering by 35(54.7%), palpitations by 15(23.4%) and sweating by 13(20.3%) patients. Clinical features revealed tachycardia and hyperthermia in all patients 64(100%) followed by leukocytosis 63(98.4%) and tachypnoea in 62(96.9%) cases.

Table 2: Distribution according to symptoms

	Frequency	Percent
Symptoms		
Fever	64	100.0
Giddiness	45	70.3
Vomiting	43	67.2
Shivering	35	54.7
Palpitations	15	23.4
Sweating	13	20.3
Signs		
Hyperthermia	64	100.0

Tachycardia	64	100.0
Tachypnoea	62	96.9
Leukocytosis	63	98.4

Sputum culture was found positive in 24(37.5%) cases followed by urine culture in 17(26.6%), pus culture in 6(9.4%) and CSF as well as biopsy culture found positive in 2 cases each i.e. 3.1%. CSF culture found positive for Neisseria meningococci and Streptococcus pneumonae in one case each i.e. 1.6%. Sputum culture was seen positive for Streptococcus pneumonae in 18(28.1%) cases, Klebsiella pneumonae in 5(7.8%) cases and Mycobacterium TB in 1 case i.e. 1.6%.

Table 3: Distribution according to culture reports

Culture positive report	Frequency	Percent
Sputum culture	24	37.5
Streptococcus pneumonae	18	28.1
Klebsiella pneumonae	5	7.8
Mycobacterium TB	1	1.6
Urine culture	17	26.6
Pus culture	6	9.4
Biopsy culture	2	3.1
CSF culture	2	3.1
Neisseria meningococci	1	1.6
Streptococcus pneumonae	1	1.6
Stool culture	1	1.6
Blood culture	0	0

Streptococcus pneumoniae was predominantly found microorganism in 20 patients i.e.31.3% followed by E. Coli in 18 cases i.e. 28.1%, Staphylococcus aureus in 6(9.4%), Klebsiella pneumoniae in 4(6.3%).

Table 4: Distribution according to causative organism

Causative organism	Frequency	Percent
Streptococcus pneumoniae	20	31.3
E. Coli	18	28.1
Staphylococcus aureus	6	9.4
Nil	5	7.8
Klebsiella pneumoniae	4	6.3
Herpes simplex virus	3	4.7
Hepatitis B virus	2	3.1
Beta hemolytic streptococci	2	3.1
Klebsiella pneumoniae and staphylococcus aureus	1	1.6
Mycobacterium T.B and streptococcus pyogenes	1	1.6
Neisseria meningococci	1	1.6
Streptococcus pyogenes	1	1.6

Most commonly involved site of infection was lungs in 28(43.8%) followed by urinary bladder in 10(15.6%), kidney in 7(10.9%) and brain in 6(9.4%) cases. Liver, lower limb and uterus was involved in 2 cases each i.e. 3.1%

Table 5: Distribution according to Site of infection

Site of infection	Frequency	Percent
Lungs	28	43.8
Urinary bladder	10	15.6
Kidney	7	10.9
Brain	6	9.4
Liver	2	3.1
Lower limb	2	3.1
Uterus	2	3.1
Heart	1	1.6
Urethra	1	1.6
Large intestine	1	1.6

Out of 64 patients, 27 died and 37 survived. So the death rate was 42.2% in our study. Mean duration of ICU stay was 5.84±3.16 days. Majority of the patients stayed in ICU for less than 7 days i.e. 39(60.9%) and remaining 25 i.e. 39.1% stayed in ICU for more than 7 days.

Table 6: Distribution according to outcome

Outcome	Frequency	Percent
Death	27	42.2
Survived	37	57.8
Total	64	100.0
ICU stay duration (days)		
< 7 days	39	60.9
> 7 days	25	39.1

Mean SOFA score in age group below 20 years was 20.45±18.06, between 21- 30 years was 20.10±12.47, 31-40 years was 29.45±17.48, between 41-50 years was 17.68±11.84, 51-60 years was 27.51±13.23 and above 60 years was 36.39±16.75. When we compared the mean SOFA score between all age groups, the difference was statistically significant ($p<0.05$). There is statistically significant difference in the mean value of SOFA score on last day of patients stay in ICU.

Table 7: Comparison of SOFA score according to age group

Age group (in years)	N	Mean ± Std. Deviation	F	p	Inference
< 20	6	20.45 ± 18.06	2.29	0.05	Significant
21-30	8	20.10 ± 12.47			
31-40	14	29.45 ± 17.48			
41-50	11	17.68 ± 11.84			
51-60	14	27.51 ± 13.23			
> 60	11	36.39 ± 16.75			
Total	**64**	**26.18 ± 15.83**			

Mean APACHE score in age group below 20 years was 16.52±10.96, between 21-30 years was 18.40±9.45, 31-40 years was 21.24±9.52, between 41-50 years was 14.05±7.04, 51-60 years was 22.31±7.86 and above 60 years was 26.25±7.41. When we compared the mean APACHE score between all age groups, the difference was statistically significant ($p<0.05$). There is statistically significant difference in the mean value of APACHE score on last day of patients stay in ICU.

Table 8: Comparison of APACHE score according to age group

Age group (in years)	N	Mean ± Std. Deviation	F	p	Inference
< 20	6	16.52 ± 10.96			
21-30	8	18.40 ± 9.45			
31-40	14	21.24 ± 9.52			
41-50	11	14.05 ± 7.04			
51-60	14	22.31 ± 7.86	2.74	0.047	Significant
> 60	11	26.25 ± 7.41			
Total	**64**	**20.30 ± 9.13**			

Out of 27 deaths, majority were from 31-40 years age group i.e. 9(33.3%) followed by 6(22.2%) from above 60 years, 5(18.5%) from 51-60 years age group. Out of 37 survived patients, majority were from 51-60 years age group i.e. 9(24.3%) followed by 8(21.6%) from 41-50 years and 6(16.2%) from 21-30 years age group. There is no difference in the proportion of patients within the range of age group ($p>0.05$).

Table 9: Distribution according to age and outcome

Age group in years	Death		Survived		Total
	Frequency	Percent	Frequency	Percent	
< 20	2	7.4	4	10.8	6
21-30	2	7.4	6	16.2	8
31-40	9	33.3	5	13.5	14
41-50	3	11.1	8	21.6	11
51-60	5	18.5	9	24.3	14
> 60	6	22.2	5	13.5	11
Total	**27**	**100.0**	**37**	**100.0**	**64**

Chi square-5.89, p- 0.31(>0.05), Not significant

DISCUSSION

We included total 64 cases fulfilling the eligibility criteria in our study. Majority of the cases were from 31-40 years and 51-60 years i.e. 14(21.9%). It is then followed by 11 patients i.e. 17.2% from 41-50 years and above 60 years. Least were from less than 20 years age group i.e. 6(9.4%). Mean age of the study population was 51.56±19.48 years. In our study, majority of the patients were males i.e.

37(57.8%) and remaining were females i.e. 27(42.2%). Males were predominant with male to female ratio as 1.378:1. Ullah AR *et al.*,[6] included total of 450 patients, of whom 268 patients were diagnosed with sepsis. Majority 147 (54.9%) were male patients with a mean age of 54.8 years which is similar to our findings. Paary TT *et al.*,[7] included total 356 patients of sepsis in their study with mean age of the patients as 54±17 years. Males were 64.2% and females were 34.8%. These findings are almost comparable with our study findings. In our study, streptococcus pneumoniae was predominantly found microorganism (31.3%), followed by E. Coli (28.1%), Staphylococcus aureus (9.4%) Klebsiella pneumoniae (6.3%). Ullah AR *et al.*,[6] isolated Escherichia coli Extended spectrum beta lactamase (ESBL) from 20.9%, Acinetobacter baumannii 9.36%, Methicillin-resistant Staphylococcus aureus in 6.74% and Candida 11.6%. Greenberg BM *et al.*,[8] in their study reported that gram-positive organisms were present in 58% of the blood isolates and gram-negative organisms were present in 36% of the isolates. In another study, Grace CJ *et al.*,[9] found that gram-positive organisms were isolated from 69.6% of the blood culture-positive cases and gram-negative organisms in 30.4%. Martin GS *et al.*,[10] in their study observed that among the organisms reported to have caused sepsis in 2000 in USA, gram-positive bacteria accounted for 52.1% of cases, with gram-negative bacteria accounting for 37.6%. In our study, sputum culture was found positive in 24(37.5%) cases followed by urine culture in 17(26.6%), pus culture in 5(7.8%) and CSF as well as biopsy culture found positive in 2 cases each i.e. 3.1%. Ullah AR *et al.*,[6] found positive blood culture in 34%, positive urine culture in 25.4% and positive sputum culture in 18.4% cases. Grace *et al.*,[9] observed blood culture positivity to be 40.3% in patients suspected of having septicemia that is comparable to our study considering the fact that most of our patients were on antibiotic therapy at the time of blood collection for culture. Anand AK *et al.*,[11] reported blood culture was positive in 115 (28.75%) out of 400 patients. shows the blood culture isolates in the patients. Gram-negative ones (51.30%) were more commonly grown than gram-positive organisms (48.7%). The most common organism isolated was *Staphylococcus aureus* (in 49 cases) followed by *E. coli* (in 36 cases). Ullah AR *et al.*,[6] reported lung as most common site of infection in his study as 45.7% cases followed by urinary tract in 18.7%, abdomen in 6% and skin/soft tissue in 5.8% cases. Paary TT *et al.*,[7] reported that most common source of infection was from respiratory tract (37.2%) followed by urinary tract (10.3%) and intra-abdominal (9.5%) site. A similar observation was made by Greenberg BM *et al.*,[8] in their study in which they found that the most common source of bacteremia was the urinary tract with 26% of the suspected cases having the disease at that site followed by the lungs (16.38%). Leibovici *et al.*,[12] also found that the urinary tract was the most common source of bacteremia in the elderly. Ullah AR *et al.*,[6] reported death rate of 40.7% which is consistent with our study findings. Albert C. *et al.*,[13] also reported mortality with severe sepsis as 42% which is consistent with our study findings. One of the recent multicenter study has revealed a cumulative rate of 28.4% among the patient population suffering from sepsis and septic shock. Comparing our results with this multicenter study it was revealed that the cumulative mortality rate of severe sepsis and septic shock was 40.7%.[14] This is much higher in comparison to the studies done in the developed nations.[15,16] Paary TT *et al.*,[7] reported Overall mortality among patients with severe sepsis/ septic shock was 51.6%. However lower mortality rates have been reported from Australia and France which were 26.5% and 35% respectively.[17,18] Mean SOFA score in our study was 26.18±15.83. Mean APACHE 2 score in our study was 20.30±9.13. Paary TT *et al.*,[7] reported mean SOFA score in his study as 7.58±4.05 which is less as compared to our score and mean APACHE 2 score as 23.37±9.47 which is comparable to our score. Anand AK *et al.*,[11] reported 19% of patients expired and a significant correlation was found between the outcome of sepsis and the stage of sepsis at the time of admission (P = 0.032). Similarly, Leibovici *et al.*,[12] found that 35% of the patients aged 80 years and above and 30% of the patients aged 60-79 years died during hospital stay. In our study, mean duration of ICU stay was 5.84 ± 3.16 days. Majority of the patients stayed in ICU for less than 7 days (60.9%) and 39.1% stayed in ICU for more than 7 days. The mean ICU time-span as reported by Naqvi IH *et al.*,[19] was 9.06±11.97days which is higher as compared to our study findings. Mean duration of ICU stay was more as reported by two earlier studies in comparison with our study.[20,21]

CONCLUSION

Majority of the patients were from 31-40 and 51-60 years age group, male patients were predominant in our study with male to female ratio 1.37:1. Sputum and urine cultures were predominantly found to be positive. Most common site of infection was lungs and urinary bladder. Mortality was 42.2%, majority of deaths were in 31-40 years age group, male. In 33.3% of deaths, Streptococcus pneumonae was the predominant causative organism. In almost half of the deaths, sputum culture was positive.

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