



Original Research Article

Etiology and outcome of patients with sepsis: A tertiary centre study

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Abstract

Background: Incidence of sepsis is 270 cases per-100,000 person-years and responsible for 26.0% death. Aim of study to evaluate etiological factors responsible for sepsis and outcomes in terms of organ dysfunction, metabolic dysfunction and patient's recovery and hospital stay.

Methods: This was a prospective observational study carried out over a period of one year in Department of Medicine in collaboration with Intensive care unit. Total 150 cases were enrolled in the study suffering from sepsis as per consensus guidelines.

Results: Pneumonia was the most common cause of sepsis (66.0%). Most common co-morbidities associated with sepsis were hypertension in 4.67% followed by COPD 4%. 40% patients expired during study period. 25.33% patients of sepsis suffered from Acute kidney injury.

Conclusion: Outcome of the patients in terms of hospital stay and mortality was high in septicemic patients.

Introduction

Worldwide, sepsis is common, with an estimated population approximate incidence of 270 cases per-100,000 person-years and responsible for 26.0% death.^[1] Multiple reasons suggested that magnitude of sepsis associated mortality and morbidity is underestimated. To reduce mortality, there is an urgent need to improve, understanding of causes of sepsis and prevention; however, this information is rarely available in tropical

countries.^[2] South Asian country, a wide range of known and emerging pathogens may be responsible for causing infections leading to sepsis.^[3] Various studies have examined causes of fever^[4-8] and bacteraemia^[9] in this region. However, none of the study applied a pre-defined wide array of diagnostic tests and assessed the relative distribution of pathogenic bacteria, parasite and viral agents identified in patients admitted with community-acquired sepsis.

Definition of adult sepsis, proposed in the 1991, based on the concept of systematic inflammatory response syndrome (SIRS), which is characterized by the presence of two or more of following: body temperature $>38^{\circ}\text{C}$ or $<36^{\circ}\text{C}$; heart rate >90 beats/min; respiratory rate of >20 breaths/min or a PaCO_2 of <32 mmHg; and a white blood cell count of $>12,000$ cells/ μL or $<4,000$ cells/ μL .^[10] Recognizing the limitations of initial definitions, many modifications were made time to time. Recent modification was done in 2016 (Sepsis-3). According to Sepsis-3, sepsis is a syndrome of “life-threatening organ dysfunction caused by a dysregulated host response to infection”, and septic shock as a subset of sepsis in which profound circulatory, cellular and metabolic abnormalities are associated with a greater risk of mortality as compared to sepsis alone.^[11,12] Additionally, the Sepsis-3 Task Force explicitly did not examine definitions of infection and did not specify type of infections, leading to life-threatening organ dysfunction, should be considered as cause of sepsis. There is some disagreement within sepsis and infectious disease in communities regarding this issue; for example, various researchers consider malaria to be a potential cause of sepsis, whereas others do not consider it. This disagreement has important implications for comparability of patient populations in research studies and for the clinical application of sepsis treatment guidelines. Hence, present study evaluated causes and outcome of sepsis using the definition of the consensus 3, year 2016.

Aim and Objectives

Evaluation of etiological factors responsible for sepsis and outcomes in terms of organ dysfunction, metabolic dysfunction and patient's recovery and hospital stay.

Material and Methods

This was a Prospective observational study carried out over a period of one year from August, 2016 to September 2017, in Department of Internal

Medicine with collaboration of Intensive Care Unit at King Georges Medical universities U.P. India. After informed consent and ethical clearance from institutional ethics committee total 150 patients were enrolled suffering from sepsis according to third international consensus 2016, sepsis is defined as life threatening organ dysfunction caused by a dysregulated host response to infection^[12] clinical criteria-suspected or documented infection and an acute increase of ≥ 2 SOFA points.^[12] All subjects were evaluated for neurological parameter as per Glasgow Coma Score scale and 5 ml venous blood sample was withdrawn from all patients for haematological and biochemical analysis. Blood culture, urine routine microscopy, culture sensitivity and sputum culture were sent. As per requirement X- rays, ultrasound and other imaging investigations were done. Final outcome was assessed in terms of organ dysfunction, metabolic dysfunction and patient's recovery and hospital stay.

Septic Shock- According to third international consensus 2016, septic shock is a subset of sepsis in which underlying circulatory and cellular/metabolic abnormalities are profound enough to substantially increase mortality.^[12]

Clinical Criteria-Sepsis and vasopressor therapy needed to elevate $\text{MAP} \geq 65$ mmHg and lactate > 2 mmol/litre despite adequate fluid resuscitation.^[12] Organ dysfunction- According to third international consensus 2016, organ dysfunction can be identified as an acute change in total SOFA score ≥ 2 points consequent to the infection.^[12] (Table 1)

Table 1. SOFA Score

Variable	0	1	2	3	4
Respiratory PaO ₂ /FiO ₂ ,mmHg	>400	<400	<300	<200	<100
Coagulation platelets x10 ³ /μl	>150	<150	<100	<50	<20
Liver bilirubin, mg/dl	<1.2	1.2-1.9	2.0-5.9	6.0-11.9	>12.0
Cardiovascular hypotension	No hypotension	MAP<70mmHg	Dop<5 or Dob (any dose)	Dop>5, Epi, <0.1 or Norepi<0.1	Dop>15, Epi>0.1 or Norepi>0.1
Central Nervous system GCS scale	15	13-14	10-12	6-9	<6
Renal creatinine mg/dl or urine output ml/dl ³	<1.2	1.2-1.9	2.0-3.4	3.4-4.9 or <500	>5.0 or <200

We prospectively enrolled adult patients (age≥18 years) who were admitted with a primary diagnosis of suspected or documented infection made by the attending physician, were within 24

hours of hospital admission, Altered mental status was defined as a Glasgow Coma Scale (GCS) score of <15.

Participants flow through the study (n-150)

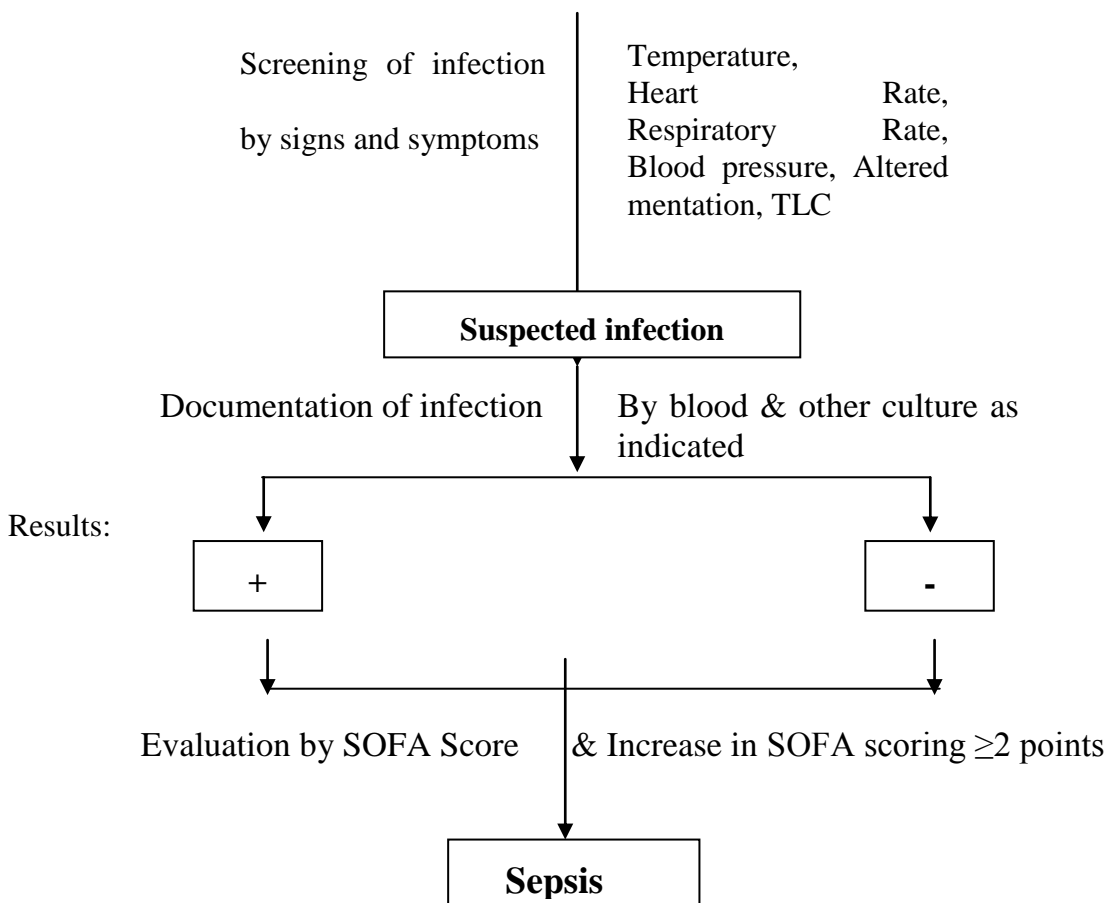


Table 2: Distribution of cases of sepsis according to etiological factors (n=150)

	Total (N=150)	
	No.	%
Pneumonia	99	66.00
Cholangitis	1	0.67
Enteric fever	3	2.00
Gluteal abscess	1	0.67
Intra-abdominal sepsis	10	6.67
Liver abscess	1	0.67
LL cellulitis	2	1.33
MODS	2	1.33
Pancreatitis	4	2.67
Postpartum sepsis	1	0.67
Pyogenic meningitis	1	0.67
Pyomyositis	1	0.67
SBP	2	1.33
Scrub Typhus	1	0.67
UTI	21	14.00

Pneumonia was the most common provisional diagnosis (66.0%) followed by Urinary tract infection (14.0%), Intra-abdominal sepsis (6.67%), pancreatitis (2.67%) and enteric fever (2%). (Table 2)

Table 3: Distribution of co-morbidities in patients with sepsis

	Total (N=150)	
	No.	%
No comorbidity	105	70.00
# Femur	1	0.67
Asthma	2	1.33
CAD	4	2.67
COPD	6	4.00
COPD,CAD	1	0.67
COPD,COR PULM	1	0.67
COPD, HTN	1	0.67
COPD, Pulmonary TB	1	0.67
DCMP	1	0.67
DOE	2	1.33
HTN	7	4.67
HTN, OA	1	0.67
Hypothyroidism, OA	1	0.67
OA	5	3.33
OA, COPD	2	1.33
OA,OSA	1	0.67
Post-op. Hernia	1	0.67
Psychiatric illness	2	1.33
Pulmonary TB	5	3.33

Majority (70.0%) did not have any co-morbidity. Hypertension was in 4.67% followed by COPD 4%. Pulmonary TB, Osteo-arthritis (OA) 3.33%

each and CAD 2.67%. Most common co-morbidities was HTN followed by COPD. (Table 3)

Table 4: Clinical profile of patients (Systolic and Diastolic Blood Pressure, neurological features and use of vasopressure)

	Group II (n=150)	
	Mean	SD
Systolic Blood pressure	95.98	9.14
Diastolic Blood pressure	55.59	8.05
Eye opening (E)	3.93	0.26
Verbal (V)	4.54	0.57
Motor (M)	5.60	0.62
GCS	14.06	1.17
Use of Vasopressure	Total	%
Yes	104	69.33
No	46	30.67

Mean systolic blood pressure among patients was (95.98±9.14 mm Hg) and mean diastolic blood pressure (55.59±8.05). Glasgow Coma Scale score was 14.06±1.17. Eye opening score of GCS was

3.93±0.26, Verbal score 4.54±0.57 and motor score 5.60±0.62. Requirement of vasopressor was found in (104) 69.33% patients. (Table 4)

Table 5: Hematological/Biochemical Variables and Absolute Neutrophil and Lymphocyte count and N/L % among patients

	(n=150)	
	Mean	SD
Hb	10.83	2.43
TLC (thousand)	17.23	4.23
Neutrophils	81.56	8.79
Lymphocyte	14.78	7.57
PLT	1.86	0.95
Na	136.82	8.10
K	3.76	0.73
BIL.TOTAL	1.18	1.41
SGOT	50.21	39.25
SGPT	49.81	68.96
SALP	298.39	168.45
RBS	138.97	53.07
PT	32.48	169.03
INR	1.34	0.87
Abs Neutrophils	14190	3974
Abs Lymphocyte	2503	1412
N/L Ratio %	706	373

Hemoglobin level was (10.83±2.43), Neutrophil counts (81.56±8.79), Lymphocyte counts (14.78±7.57) and platelet counts (1.86±0.95). Absolute neutrophil counts of patients was (14190±3974), absolute lymphocyte counts was (2503±1412) and N/L ratio % was 706 ± 373. (Table 5)

Out of 150 patients who were suffering from sepsis, 38 patients developed acute kidney injury, who were diagnosed on the basis of serum urea and creatinine estimation on day 1, 2 and day 3 of admission.

Table 6: Comparison of S. Urea and S. Creatinine among patients with and without AKI

	With AKI (n=38)		Without AKI (n=112)		Student 't' test	
	Mean	SD	Mean	SD	't'	'p'
S. Urea						
Day 1	38.37	12.81	33.07	13.79	2.081	0.039
Day 2	54.92	22.74	33.71	15.66	6.384	<0.001
Day 3	76.50	25.09	32.32	14.35	13.326	<0.001
S. Creatinine						
Day 1	0.93	0.32	0.94	0.41	-0.142	0.888
Day 2	1.60	0.83	0.87	0.26	8.271	<0.001
Day 3	2.57	1.11	0.86	0.27	15.068	<0.001

Serum creatinine and serum urea levels of patients who developed AKI were statistically

significantly higher as compared to those who did not develop AKI on Day 2 and Day 3. (Table 6)

Table 7: Distribution of SOFA Score, Hospital stay and mortality among septic patients

	No.	Min.	Max	Median	Mean	SD
SOFA score	150	2	7	4.00	3.60	1.04
Hospital stay	150	1	37	6.00	8.37	6.01
		Expired	Alive	Mean±SD		
Mortality rate	150	60 (40.0%)	90 (60.0%)	18.68±1.70		

SOFA score of all patients was Mean±SD (3.60±1.04), duration of hospital stay of all patients 8.37±6.01 days. Out of 150 patients enrolled in the study 60 (40.0%) were expired and (60%) alive and discharged from the hospital. (Table 7)

Discussion

Total hospital admission during study period was 12150 and total death was 980. Out of 12150 patients 150 were suffered with sepsis in which 40% patients were expired during study period. Thus sepsis was the contributing factor responsible for mortality was 6.1% of total mortality.

In our study Pneumonia was the most common cause of sepsis (66.0%), Urinary tract infection (14.0%) and Intra-abdominal sepsis (6.67%), followed by pancreatitis (2.67%) and enteric fever (2%). Another author reported the most common infectious source of sepsis among patients in whom sepsis was the immediate cause of death was pneumonia (100 of 198 [50.5%]), followed by intra-abdominal infections (38 of 198 [19.2%]) and endovascular infections (25 of 198 [12.6%]). Another author reported that severe debilitating

dementia (15 [5.0%]), severe debilitating stroke (12 [4.0%]), or severe chronic lung disease (12 [4.0%]) co-morbidities associated with sepsis.^[13] Similar results were also reported by Abe et al^[14] One study reported sepsis was the immediate cause of death in 181 patients (31.9%; 95%CI, 28.1%-35.9%) and present during hospitalization without immediately contributing to death in another 43 patients (7.6%; 95%CI, 5.5%-10.1%).^[13] In our study reported death was reported in 40% patients with severe sepsis. One authors reported that the most common problems was delay in antibiotics administration (33 [48.5%]), delay in source control (19 [27.9%]), and inappropriate initial empirical antibiotic therapy relative to final culture results (16 [23.5%]).^[13] Similarly, in our institution empirical antibiotics was used before culture reports so, outcome was not very good. Our estimate of the prevalence of sepsis in hospital deaths is similar to prior analyses of studies and clinical databases.^[15,16] In contrast, studies based on death certificate data estimate that only 6% of deaths in the United States are associated with sepsis.^[17,18] In present study sepsis was responsible for 6.1% of the total mortality.

Another studies reported Some of the discrepancy because of death certificates capturing deaths that occur outside the hospital, as national data from 2014 indicate that only 37% of deaths occur in the hospital.^[19] However, if half of hospital deaths are associated with sepsis, this finding still suggests that death certifications are inaccurate and incomplete with respect to coding for sepsis. Sepsis may be particularly susceptible to undercoding the cause of death because some clinicians may document infection alone, rather than sepsis, as the cause.^[8] In present study mean hospital duration was 8.37 ± 6.01 days. Similarly reported by another author where duration of hospital stay was higher in sepsis (18 ± 11) days.^[20] In sepsis kidney is one of the most commonly affected organ almost 47.0% acute kidney injury cases are associated with sepsis.^[21]

Limitations

Our study has important limitations. First, our analysis was a single centre.

Our finding may not be generalizable, particularly to low-resource settings tertiary hospitals. Second, there are no universally accepted definitions for end-stage conditions and terminally ill patients.

Third, our study cohort is a sizable sample drawn from a small population and we reported results using standard statistical procedures without finite sample correction.

Conclusion

In our study sepsis was very important contributing cause of acute kidney injury. Sepsis was associated with various co-morbidities thus this has poor prognosis. Outcome of the patients in terms of hospital stay and mortality was high in septicemic patients.

Conflict of Interest: None

Contributor of Authors: All Authors equally contributed

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