USEFULNESS OF SEQUENTIAL ORGAN FAILURE ASSESSMENT (SOFA) AND ACUTE PHYSIOLOGY AND CHRONIC HEALTH EVALUATION II (APACHE II) SCORE IN ANALYSING PATIENTS WITH MULTIPLE ORGAN DYSFUNCTION SYNDROME IN SEPSIS

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ABSTRACT: BACKGROUND: Sepsis with multiple organ dysfunction syndrome (MODS) is a common cause of Intensive Care Unit (ICU) mortality and morbidity. Early initiation of appropriate effective antimicrobial therapy is essential for a favorable outcome in the patient with sepsis. Cultures and serology are available only after 24 to 48 hours. In the crucial hours which determine the prognosis of the patient the physician has to depend on clinical symptoms and demographic data to aid in diagnosis and management. Using scores like APACHE II at the admission and SOFA on admission and also in their due course may help in predicting outcome. Though there are some studies on sepsis in India but use of APACHE II and SOFA scores in India have been rare. **OBJECTIVES:** To assess morbidity and mortality of patients with multi-organ dysfunction syndrome in sepsis. To prognosticate the patients by using defined scores like SOFA and APACHE II scores. **MATERIALS AND METHODS:** The study was carried out in the period of November 2010 to September 2012 and 50 patients were included in the study. The detailed history, clinical examination and all the relevant laboratory investigations were done including blood culture. In the present study the conditions were defined according to standard practice and based on relevant literature. All the patients of sepsis admitted to ICU/ emergency ward were prognosticated on the basis of APACHE II score and SOFA score. We have analysed various profiles between two groups; survivor group which include the patients who are successfully discharged after recovery and non-survivor group which include the patients who died. **RESULTS:** The clinical profile of 50 patients with sepsis with MODS was studied. There were 28 males and 22 females in this cohort. In this study, 18 patients died and 32 patients survived with mortality rate of 36%. In this study, though APACHE II score was high among non survivors than survivors (23.28 v/s 18.75), it was of just statistically significantly with P=0.068+. SOFA score has been validated extensively for prognostication. In this study, extensive study of SOFA score was done from day 1 to the last day. The SOFA score on day 1 was high among non survivors and survivors which was statistically significant (10.17 v/s 7.94, p=0.014). However the most significant difference was observed on Day 3. The SOFA score was very high among non survivors as compared to survivors which was statistically very significant.(13.42 v/s 6.84, p<0.001). **CONCLUSION:** Serial measurement of SOFA score during first week is very useful tool in predicting the outcome especially on the day 3. The trend of SOFA score was progressively declining in survivors while non-survivors had stable higher score during the first week. The APACHE II score on day of admission, though reliable, was not effective in predicting the mortality rate in our set up.

KEY WORDS: APACHE II, SOFA, MODS, SURVIVORS, NON-SURVIVORS

INTRODUCTION: Though the term sepsis is linked closely to modern intensive care, the medical concept is rather old. The word sepsis is derived from the Greek word sipsi meaning: "make rotten".[1]

The cause for sepsis was found only in recent times. It was Ignaz Semmelweis (1818-1865) who first deducted that fever was caused by decomposed animal matter that entered the blood system.[2] Louis Pasteur (1822-1895) soon identified microbes as single celled organisms that cause putrefaction.

One of the first attempts to establish a set of clinical parameters to define patients who have severe sepsis came in 1989 when Roger Bone and colleagues proposed the term ''sepsis syndrome.''[3]Following on from the sepsis syndrome; in 1991, the American College of Chest Physicians/Society of Critical Care Medicine Consensus Panel developed definitions of the various stages of sepsis.[4]

Bacteremia	Presence of bacteria in blood, as evidenced by positive blood Cultures
Septicemia Presence	Presence of microbes or toxins in blood
Systemic Inflammatory Response syndrome (SIRS)	Two or more of the following conditions: 1. fever (oral temperature >38°C) or hypothermia (<36° C) 2. tachypnea (>24 breaths/min); 3. tachycardia (heart rate >90 beats/min); 4. leukocytosis (>12, 000/µL), leukopenia (<4, 000/µL), or >10% bands; may have a noninfectious etiology
Sepsis	SIRS that has a proven or suspected microbial etiology
Severe sepsis (similar to "sepsis syndrome")	Sepsis with one or more signs of organ dysfunction—for example: 1. Cardiovascular: Arterial systolic blood pressure ≤ 90 mm Hg or mean arterial pressure ≤ 70 mm Hg that responds to administration of intravenous fluid 2. Renal: Urine output<0.5 mL/kg per hour for 1 hour despite adequate fluid resuscitation 3. Respiratory: PaO2/FIO2 250 or, if the lung is the only dysfunctional organ, ≤200 4. Hematologic: Platelet count <80, 000/µL or 50% decrease in platelet count from highest value recorded over previous 3 days 5. Unexplained metabolic acidosis: A pH 7.30 or a base deficit 5.0 mEq/L and a plasma lactate level >1.5 times upper limit of normal for reporting lab. 6. Adequate fluid resuscitation: Pulmonary artery wedge pressure 12 mm Hg or central venous pressure 8 mm Hg
Septic shock	Sepsis with hypotension (arterial blood pressure

	<90 mm Hg systolic, or 40mmHg less than patient's normal blood pressure) for at least 1 hour despite adequate fluid resuscitation; or need for vasopressors to maintain systolic blood pressure ≥90 mm Hg or mean arterial pressure ≥70 mm Hg
Refractory septic Shock	Septic shock that lasts for >1 hour and does not respond to fluid or pressor administration

Sepsis definition

In India tropical infections causing multiple organ dysfunction add to the burden of sepsis in ICU. Most patients present with acute undifferentiated fever with clinical syndromes like such as fever–myalgia, fever–arthralgia, fever–icterus, fever–rash, or acute encephalitic syndrome.[5]Due to their varied presentation, multi system involvement and lack of clinical diagnostic criteria these tropical infections are often undiagnosed. The lack of sensitive tests to identify these infections, high cost and non availability of isolation techniques, add to the diagnostic dilemma.[6]

There is a need to identify the common tropical infections contributing to mortality in ICU. Studies in India have focused on patients with sepsis due to established causes like malaria, leptospirosis or rickettsial infections. There are very few studies done to study the clinical course in patients presenting with acute undifferentiated fever.[7] When a patient is admitted in ICU the aetiology is usually not established. The intensivists have very little data to treat such patients in the first 24 to 48 hours which are crucial in reversing the process of sepsis and multi organ dysfunction. There are many scoring systems which are helpful in prognosticating the severity and outcome. But our study focuses on mainly Acute Physiology and Chronic Health Evaluation II (APACHE II) and Sequential organ failure assessment (SOFA) scores.

OBJECTIVES:

- To assess morbidity and mortality of patients with multi-organ dysfunction syndrome in sepsis.
- To prognosticate the patients by using defined scores like SOFA and APACHE II scores.

MATERIALS AND METHODOLOGY:

INCLUSION CRITERIA

- Patients above 18 years of age
- Patients with evidence of sepsis and MODS on admission

EXCLUSION CRITERIA

- Patients who is on treatment with immunosuppressive agents
- Patients with retroviral infection
- Pregnant patients
- A prospective study entitled “USEFULNESS OF SOFA AND APACHE II SCORE IN ANALYSING PATIENTS WITH MULTIPLE ORGAN DYSFUNCTION SYNDROME IN SEPSIS” as undertaken at KIMS Hospital, Bangalore

- The study was carried out in the period of November 2010 to September 2012 and 50 patients were included in the study.
- The patients with sepsis as defined by the American College of Chest Physicians/Society of Critical Care Medicine (ACCP/SCCM) Consensus Committee in 1992 were included in the study.
- The detailed history, clinical examination and all the relevant laboratory investigations were done including blood culture. In the present study the conditions were defined according to standard practice and based on relevant literature.
- All the patients of sepsis admitted to ICU/ emergency ward are being prognosticated on the basis of APACHE II score and SOFA score.
- APACHE II is calculated on day of admission. The predicted mortality rate was calculated on the basis of this score.
- To assess sequential involvement of organ we calculated SOFA score on every day. This gave us idea whether involvement of number of organ was increasing or decreasing and if the severity of particular organ was increasing.
- The minimum SOFA score was 0 and maximum of 24.
- We are analyzing various profiles between two groups; survivor group which include the patients who are successfully discharged after recovery and non-survivor group which include the patients who died.
- SOFA and APACHE II charts are as follows

Physiologic Variable	High Abnormal Range					Low Abnormal Range				
	+4	+3	+2	+1	0	+1	+2	+3	+4	Points
Temperature - rectal (°C)	≥41°	39 to 40.9°		38.5 to 38.9°	36 to 38.4°	34 to 35.9°	32 to 33.9°	30 to 31.9°	≤29.9°	
Mean Arterial Pressure - mm Hg	≥160	130 to 159	110 to 129		70 to 109		50 to 69		≤49	
Heart Rate (ventricular response)	≥180	140 to 179	110 to 139		70 to 109		55 to 69	40 to 54	≤39	
Respiratory Rate (non-ventilated or ventilated)	≥50	35 to 49		25 to 34	12 to 24	10 to 11	6 to 9		≤5	
Oxygenation: A-aDO2 **or** PaO2 (mm Hg) a. FIO2 ≥0.5 record A-aDO2 b. FIO2 <0.5 record PaO2	≥500	350 to 499	200 to 349		<200 PO2>70	 PO2 61 to 70		 PO2 55 to 60	 PO2<55	
Arterial pH (preferred) Serum HCO3 (venous mEq/l) (not preferred, but may use if no ABGs)	≥7.7 ≥52	7.6 to 7.69 41 to 51.9		7.5 to 7.59 32 to 40.9	7.33 to 7.49 22 to 31.9		7.25 to 7.32 18 to 21.9	7.15 to 7.24 15 to 17.9	<7.15 <15	
Serum Sodium (mEq/l)	≥180	160 to 179	155 to 159	150 to 154	130 to 149		120 to 129	111 to 119	≤110	
Serum Potassium (mEq/l)	≥7	6 to 6.9		5.5 to 5.9	3.5 to 5.4	3 to 3.4	2.5 to 2.9		<2.5	
Serum Creatinine (mg/dl) Double point score for acute renal failure	≥3.5	2 to 3.4	1.5 to 1.9		0.6 to 1.4		<0.6			
Hematocrit (%)	≥60		50 to 59.9	46 to 49.9	30 to 45.9		20 to 29.9		<20	
White Blood Count (total/mm3) (in 1000s)	≥40		20 to 39.9	15 to 19.9	3 to 14.9		1 to 2.9		<1	
Glasgow Coma Score (GCS) Score = 15 minus actual GCS										
A. Total Acute Physiology Score (sum of 12 above points)										
B. Age points (years) ≤44=0; 45 to 54=2; 55 to 64=3; 65 to 74=5; ≥75=6										
C. Chronic Health Points (see below)										
Total APACHE II Score (add together the points from A+B+C)										

APACHE II

C chronic health points:

If the patient has a history of severe organ system insufficiency or is immunocompromised assign points as follows:

a. For nonoperative or emergency postoperative patients – 5 points
b. For elective postoperative patients – 2 points

Chronic Diagnosis/ organ system insufficiency includes biopsy proven cirrhosis and documented portal hypertension; past upper GI bleeding attributed to portal hypertension; prior hepatic failure; prior hepatic encephalopathy; NYHA class IV; chronic restrictive, obstructive, or vascular lung disease resulting in severe exercise restriction; documented hypoxemia or hypercapnia; secondary polycythemia; severe pulmonary hypertension (>40 mm Hg); ventilator dependence; chronic hemodialysis.
Chronic Diagnosis also includes immunosuppression from chemotherapy, radiation therapy, long-term or recent high-dose steroids, immunodeficiency (eg, leukemia, lymphoma, AIDS).

SOFA score

	SOFA Score				
Variables	0	1	2	3	4
Respiratory Pao_2/Fio_2, mm Hg	>400	≤400	≤300	≤200†	≤100†
Coagulation Platelets $\times 10^3/\mu L$‡	>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	Mean arterial pressure <70 mm Hg	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 Glasgow Coma Score Scale	15	13-14	10-12	6-9	<6
Renal Creatinine, mg/dL or urine output, mL/d‖	<1.2	1.2-1.9	2.0-3.4	3.5-4.9 or <500	>5.0 or <200

*Norepi indicates norepinephrine; Dob, dobutamine; Dop, dopamine; Epi, epinephrine; and Fio_2, fraction of inspired oxygen.
†Values are with respiratory support.
‡To convert bilirubin from mg/dL to μmol/L, multiply by 17.1.
§Adrenergic agents administered for at least 1 hour (doses given are in μg/kg per minute).
‖To convert creatinine from mg/dL to μmol/L, multiply by 88.4.

Statistical Methods: Descriptive and inferential statistical analysis has been carried out in the present study. Results on continuous measurements are presented on Mean ± SD (Min-Max) and results on categorical measurements are presented in Number (%). Significance is assessed at 5 % level of significance. The following assumptions on data is made.

Assumptions: 1. Dependent variables should be normally distributed, 2. Samples drawn from the population should be random, Cases of the samples should be independent.

Student t test (two tailed, independent) has been used to find the significance of study parameters on continuous scale between two groups Inter group analysis) on metric parameters. Leven1s test for homogeneity of variance has been performed to assess the homogeneity of variance. Chi-square/ Fisher Exact test has been used to find the significance of study parameters on categorical scale between two or more groups.

RESULTS

- The study was carried out in the period of November 2010 to September 2012 and 50 patients were included in the study.
- In the present study subjects were in the age group of 18 to 90 years.
- In the present study out of 50 cases of sepsis with MODS, 28 were male and 22 were females.
- Out of 50 patients, all 50 had fever, with breathlessness present in 16 patients.
- Co-Morbidities observed were diabetes, hypertension and COPD.

Table 1: Distribution of symptoms of patient studied

Symptoms & signs	Number of patients n=50)	%
1.Fever	50	100.0
2.Headache	4	8.0
3.Cough	13	26.0
4.Breathlessness	16	32.0
5.Altered Sensorium	2	4.0
6.Vomiting	12	24.0
7.Jaundice	4	8.0
8.Decreased Urine output	16	32.0
9.Abdominal Pain	16	32.0
10.Chest pain	3	6.0
11.Loose stools	5	10.0

Table 2: Comparison of comorbidities with survivors and non survivors of patients studied

Comorbidities	Survived			
	Non survived (n=18)		Survived (n=32)	
	No.	%	No.	%
Nil	8	44.4	18	56.2
Present	10	55.5	14	43.7
• Diabetes	6	33.3	8	25.0
• Hypertension	5	27.8	3	9.3
• Paraplegic	1	5.6	0	0.0
• COPD/IHD	2	11.1	1	3.1

Comorbidities are statistically similar in two groups with p=0.423

Table 3: Comparison of systemic disease with survivors and non survivors of patients studied

Systemic disease	Survived				p value
	Non survived (n=18)		Survived (n=32)		
	No.	%	No.	%	
RS	9	50.0	21	65.6	0.279
CVS	1	5.6	2	6.2	0.921
CNS	10	55.6	7	21.8	0.0169*

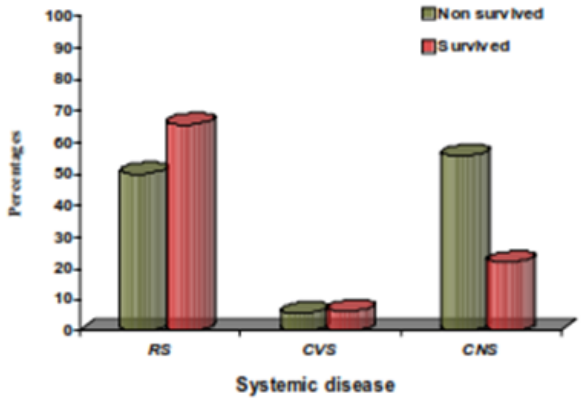


Table 4: Evaluation of study variables with survivors and non survivors of patients studied

Variables	Non-survived	Survived	p value
Age in years	51.06±19.59	46.84±15.77	0.411
Temperature	102.48±1.06	102.61±1.01	0.658
Pulse rate	123.44±13.51	117.63±5.04	0.033*
Respiratory rate	27.22±5.54	26.5±5.47	0.658
Hemoglobin	11.14±4.02	10.89±2.04	0.770
Total count	15827.78±8423.69	22893.75±24048.53	0.236
Serum sodium	132.83±4.79	130.53±3.92	0.072+
Serum potassium	4.24±0.67	3.96±0.85	0.236
PH	7.24±0.13	7.24±0.1	0.989
Serum amylase	20.56±11.55	17.69±5.97	0.251
Haematocrit	37.54±9.67	38.58±4.39	0.605

Table 5: Evaluation of GCS with survivors and non survivors of patients studied

GCS	Non survived	Survived
Day 1	10.06±5.57	14.19±1.99
Day 2	10.5±5.22	13.84±2.26
Day 3	9.23±5.18	14.03±2.09
Day 4	9.33±5.02	14.41±1.6
Day 5	8±5.63	14.5±1.55
Day 6	7.38±5.63	14.63±1.35
Day 7	8.2±4.66	14.92±0.41
Day 8	8.2±4.66	15±0
Day 9	8.8±4.82	15±0
Day 10/last day	8.67±5.13	13.75±4.33

GCS among survivors and non survivors were as follows.GCS among survivors was high and statistically significant. It independently predicted the outcome and also added its value to SOFA score for prediction.

Table 6: Evaluation of serum creatinine with survivors and non survivors of patients studied

Serum Creatinine(mg/dl)	Non survived	Survived
Day 1	1.76±1.06	2.77±2.43
Day 2	2.15±1.14	2.75±2.1
Day 3	2.28±0.89	2.23±1.48
Day 4	2.36±1.22	2.13±1.41
Day 5	2.54±1.8	2.17±1.46
Day 6	2.49±1.97	1.94±1.42
Day 7	1.88±1.02	1.77±1.12
Day 8	2.4±1.12	1.58±0.86
Day 9	2.48±1.19	1.46±0.73
Day 10/last day	2.58±1.56	1.26±0.5

Serum creatinine among survivors and non survivors were as follows. Though, serum creatinine wasn't statistically significant between the groups, it added its value to SOFA score for prediction

Table 7: Comparison of ventilator support, dialysis, inotropic support and duration of ICU stay with survivors and non survivors of patients studied

	Non survived (n=18)	Survived (n=32)	P value
Ventilator support	16(88.9%)	14(43.8%)	0.002**
Dialysis	2(11.1%)	8(25.0%)	0.295
Inotropic support	13(72.2%)	15(46.9%)	0.083+
Duration of ICU stay	3.72±3.08	3.75±2.02	0.969

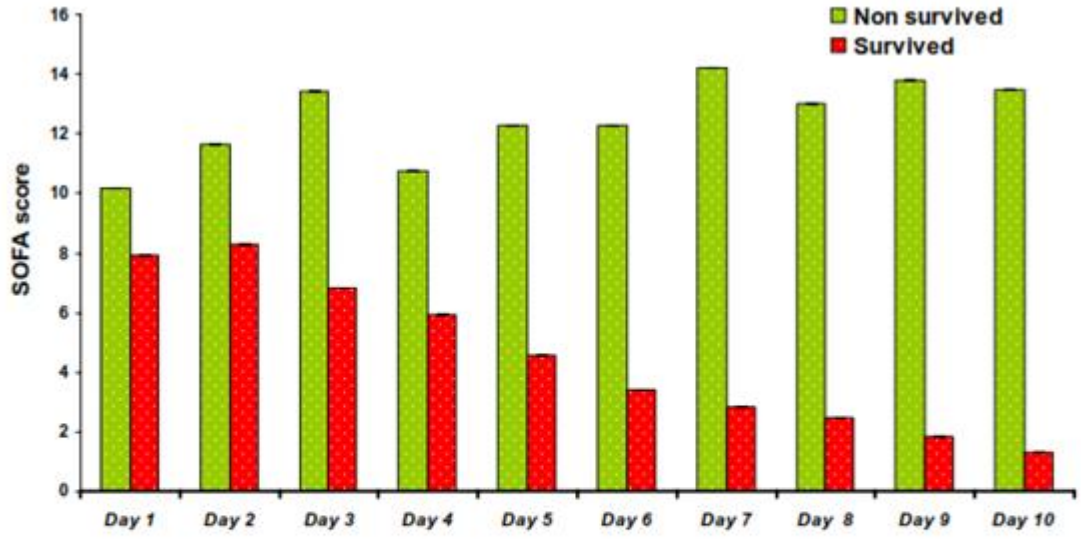
16 out of 18(88.9%) among non survivors required ventilator support whereas 14 out of 32(43.8%) among survivors required ventilator support suggesting significant respiratory system involvement among non survivors (p=0.002). The mean duration of ICU stay did not vary between non-survivors and survivors (3.72 v/s 3.75).

13 out of 18 (72.2%) among non-survivors required inotropic support whereas 15 out of 32(46.9%) among survivors required inotropic support suggesting statistically significant hypotension among non-survivors (p=0.083). However, dialysis was required more among survivors than non-survivors (25% v/s 11.1%, p=0.295) but was not statistically very significant.

Serum creatinine among survivors who underwent dialysis varied between 6mg/dl to 10 mg/dl

Table 8: Comparison of SOFA score with survivors and non survivors of patients studied

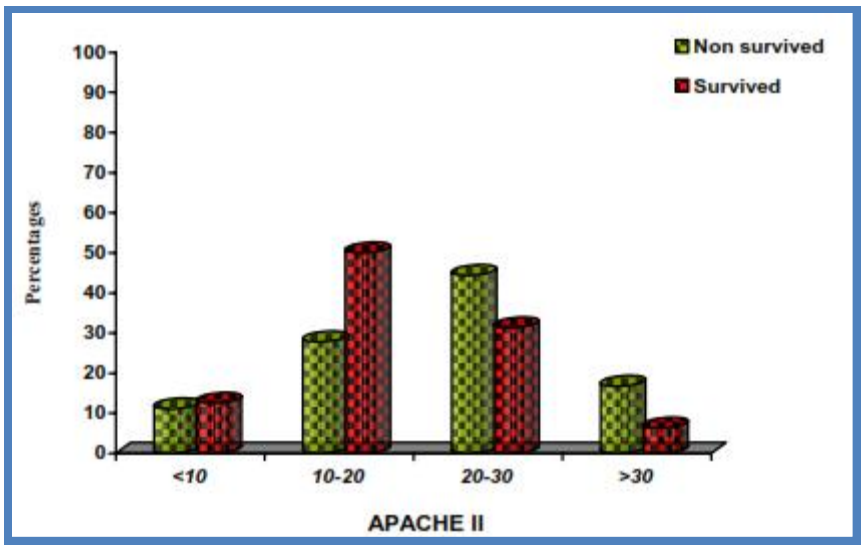
SOFA score	Non survived	Survived	p value
Day 1	10.17±3.45	7.94±2.64	0.014*
Day 2	11.63±4.33	8.28±2.62	0.002**
Day 3	13.42±4.06	6.84±2.96	<0.001**
Day 4	10.78±3.77	5.94±3.41	0.001**
Day 5	12.25±4.8	4.55±3.27	<0.001**
Day 6	12.29±6.1	3.39±2.77	<0.001**
Day 7	14.2±3.9	2.82±2.61	<0.001**
Day 8	13±3.39	2.45±2.5	<0.001**
Day 9	13.8±4.09	1.81±1.72	<0.001**
Day 10/last day	13.5±5.69	1.33±1.23	<0.001**



Out of 50 patients studied, SOFA score was significantly low especially on day 3 (6.84±2.96) in survivor group as compared to non survivor group whose mean day 3 value being (13.42±4.060).

Table 9: Comparison of APACHE II score with survivors and non survivors of patients studied

APACHE II	Non survived	Survived
<10	2(11.1%)	4(12.5%)
10-20	5(27.8%)	16(50.0%)
20-30	8(44.4%)	10(31.3%)
>30	3(16.7%)	2(6.3%)
Total	18(100.0%)	32(100.0%)
Mean ±SD	23.28±9.65	18.75±7.34



APACHE II score is significantly more in non survived patients with p=0.068+.

DISCUSSION: The clinical profile of 50 patients with sepsis with MODS was studied. There were 28 males and 22 females in this cohort. The age of patients varied from 18 years to 90 years. The mean age was 48.36 years. Similar studies in India have shown male preponderance with most patients in the fourth to fifth decade.[8]Even in this study, most patients were in fourth to fifth decade. Co-morbidities were present in 24 patients with diabetes mellitus being present in 14 patients.

All patients had fever with breathlessness being the next predominant symptom observed in 16 patients. Even decreased urine output was observed in 16 patients accounting for acute kidney injury. Among the several disorders encountered in sepsis, acute kidney injury (AKI) is one of the most important because it is a life-threatening condition, increases the complexity and cost of care, and is an independent risk factor for mortality.[9]

The mean SOFA score on the day of admission was 8.74 and the mean APACHE II score on the day of admission was 20.14 suggesting there was significant organ dysfunction in all patients. In this study, 30 patients required ventilator support, 28 patients required ionotropes, 10 patients required dialysis. This again suggests significant organ dysfunction. The mortality recorded in this study is 36%. In large clinical trials, the mortality associated with severe sepsis and septic shock ranges between 13% and 50%.[10]

Finding the cause was not the main objective of the study. However, 9 cases of dengue were identified. 2 cases of leptospirosis was observed. There was not a single case of malaria in this study. In 4 cases of UTI, organisms were isolated: 3 were caused by Eschieria coli, 1 being klebsiella species. 1 case of H1N1 was identified. 1 special case in which anti- HAV was positive. It was not sure whether hepatitis A caused sepsis or it was an incidental finding.

Clinical predictors of mortality: In this study, 18 patients died and 32 patients survived. The mean age among non survivors was little high compared to survivors (51.7 v/s 46.84) which was not statistically significant (p=0.411). 7 patients among non-survivors and 9 patients had breathlessness which was statistically similar (p-0.532). Even co-morbidities are statistically similar in two groups

with P=0.423. Presence of pallor, icterus are statistically similar in non-survived and survived group with P=0.830.

The non survivors had a higher pulse rate (mean 123.44 v/s 117.63 p=0.033) and a lower blood pressure and therefore a greater requirement for ionotropes compared to survivors. Septic shock is associated with a higher mortality as shown with studies in Europe.[11]Degoricija et al recorded a mortality rate of 72.1% in patients with septic shock in Croatia.[12]Studies in India have recorded a mortality of 59.26% in patients with severe sepsis and septic shock.[8]

The respiratory rate was high in non survivors than survivors (27.22 v/s 26.5) which was not statistically significant (p=0.658). Leukocytosis and leukopenia is often associated with mortality and normal white blood cell counts are associated with survival.[4, 13] In this study however no survivors had a mean total count of 15, 827/ µL and survivors had a mean total count of 22, 893 /µL at admission. The difference was not statistically significant.

Studies have shown that the Glasgow coma scale at admission is an independent predictor of mortality.[14, 15] In this study, the mean GCS among survivors was high compared to non survivors on all days (day1, 14.19 v/s 10.19) and was statistically very significant (p<0.001).

In this study, serum creatinine did not significantly differ among non survivors and survivors on day 1 and also on initial few days (day1, 1.76 v/s 2.77, p=0.101). Even serum bilirubin was significantly different among survivors and non survivors (day 1, 2.19v/s2.78, p=0.375).

In this study, 16 out of 18(88.9%) among non survivors required ventilator support whereas 14 out of 32 (43.8%) among survivors required ventilator support suggesting significant respiratory system involvement among non survivors (p=0.002). The mean duration of ICU stay did not vary between non survivors and survivors (3.72 v/s 3.75). It may be attributable to early death among non survivors and early recovery among survivors.

In this study, 13 out of 18 (72.2%) among non survivors required inotropic support whereas 15 out of 32(46.9%) among survivors required inotropic support suggesting statistically significant hypotension among non survivors (p=0.083).However, dialysis was required more among survivors than non survivors (25% v/s 11.1%, p=0.295) but was not statistically very significant.

Many studies have shown that high APACHE II score at the time of admission was associated with high mortality. In this study, though mean APACHE II score was high among non survivors than survivors(23.28 v/s18.75), it was of just statistical significance(p=0.068+)

SOFA score has been validated extensively for Prognostication.In this study, extensive study of SOFA score was done from day 1 to the last day. The SOFA score on day 1 was high among non survivors and survivors which was statistically significant (10.17 v/s 7.94, p=0.014).

However the most significant difference was observed on day 3. The SOFA score was very high among non survivors as compared to survivors which was statistically very significant. (13.42 v/s 6.84, p<0.001). This was similar to many studies that have been done. Vosylius et al in their study on 117 ICU patients with sepsis showed that the changes in the severity of organ dysfunction were closely related to the outcome of the patients admitted to ICU. The SOFA score on day 3 was better compared with SOFA score on day 1 as the tool for outcome prediction.[14] Vincent et al in their study in 40 ICU's in 16 countries showed that the total SOFA score increased in 44% of the nonsurvivors but in only 20% of the survivors.[16]Saulius Vosylius, Jurate Sipylaite[17] in Vilnius, Lithuania observed that SOFA score on day 1 and day 3 was significantly higher in non-survivors than those in survivors. Flavi Lopez Fereria; Daliana PeresBota[18] in Belgium found initial SOFA score

up to 9 predicted a mortality of less than 33% while an initial SOFA score of greater than 11 predicted a mortality rate of 95%.

Studies have shown that in the SOFA scores; cardiovascular, neurological, and respiratory, renal, haematological and hepatic dysfunctions were independent risk factors for mortality.[14, 16] In our study also the same have been observed as described above for respiratory, cardiovascular and neurological variables. However renal and hepatic parameters did not vary much among non survivors and survivors

CONCLUSION:

- Serial measurement of SOFA score during first week is very useful tool in predicting the outcome. The trend of SOFA score was progressively declining in survivors while non survivors had stable higher score during the first week.
- The APACHEII score on day of admission, though reliable, was not very effective in predicting the mortality rate in our set up

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