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Study of sofa score for predicting the outcome of patients admitted in ICU at BTGH

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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 favourable 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 SOFA on admission and also in their due course may help in predicting outcome. *Objectives:* 1) To study correlation between SOFA score and outcome in critically ill patients admitted in ICU. 2) To study and investigate the performance of SOFA score in predicting mortality in ICU admitted patient. 3) To study the discriminatory capacities of an increase in SOFA score by 2 or more for outcome in patients who are critically ill patients admitted in ICU. *Materials and Methods:* The study was carried out in the period of November 2017 to April 2019 and 75 patients were included in the study. The detailed history, clinical examination and all the relevant laboratory investigations were done. 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 SOFA score. We have analyzed 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 75 patients with sepsis with MODS was studied. There were 42 males and 33 females in this cohort. In this study, 25 patients died and 50 patients survived with mortality rate of 33.33%. SOFA score has been validated extensively for prognosticfication. 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 (9.40 v/s 7.72, p=0.023). However, the most significant difference was observed on all days. The SOFA score was very high among non-survivors as compared to survivors which was statistically very significant (13.11 v/s 1.84, p<0.001). *Conclusion:* Serial measurement of SOFA score during first week is a very useful tool in predicting the outcome. The trend of SOFA score was progressively declining in survivors while non-survivors had a stable higher score during the first week.

Keywords: Sepsis, MODS, SOFA Scoring.

Introduction

Sepsis with multiorgan dysfunction syndrome (MODS) is a common cause of Intensive Care Unit (ICU) mortality and morbidity [1]. The primary cause; infectious or non infectious, triggers an uncontrollable inflammatory response. Sepsis can be reversed, but as sepsis progresses to severe sepsis and septifc shock the mortality rate substantially increases [2].

Multiorgan dysfunction syndrome is well established as the final stage of the continuum [3]. Due to the high mortality associated with sepsis and its complications it is necessary to rapidly diagnose and treat the underlying cause. Various clinical biochemical and haematological parameters in septic patients serve as indicators of organ dysfunction and hence can be used to define the prognosis in a patient with sepsis [4].

Patients admitted to the ICU need aggressive supportive management as well as detailed investigations to reverse the cause [5]. Early initiation of appropriate effective antimicrobial

therapy is essential for a favourable outcome in the patient with sepsis [6-7]. There is evidence that failure to initiate appropriate therapy correlates with increased morbidity and mortality [8].

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. Hence guidelines recommend empirical broad spectrum antibiotics that will cover all likely pathogens, as well as supportive care, early recognition and treatment of complications, and intensive monitoring to prevent worsening of sepsis [5]. In more than one third of the patients aetiology is never determined even till death or discharge [3].

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 [9]. Due to their varied presentation, multi system involvement and lack of clinical diagnostic criteria these tropical infections are often undiagnosed. There is a need to identify the common tropical infections contributing to mortality in ICU. Studies in India have focussed on patients with sepsis due to established causes like malaria, leptospirosis or rickettsial infections.

Material and Methods

A prospective study was undertaken at BTGH, Kalaburagi after the approval from Ethics Committee. The study was carried out in the period of November 2017 to April 2019 and 75 patients were included in the study. 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 SOFA score. The minimum SOFA score was 0 and maximum of 24. Simple Random Sampling, Prospective Observational Study. The statistical data compiled using SPSS for windows(VERSION 18.0).Results analysed by calculating percentage Mean value, Chi-Sqauretest, T- test and p value(<0.05) used for significance.

Inclusion Criteria: Patients with HTN, T2DM, Cardiac disease, Cerebrovascular accidents, Pulmonary TB, Renal disease, Malignancy, Liver disease, Monsoon related illness, COPD, Pneumonia. Patients with evidence of sepsis and MODS on admission.

Exclusion Criteria: Patients who is on treatment with immunosuppressive agents. Patients with retroviral infection. Polytrauma and operated patients.

Results

Table-1: Evaluation of GCS with survivors and non-survivors patients studied

GCS	Non Survived Mean ± SD	Survived Mean ± SD	P value
D1	10.44±5.32	14.40±1.70	<0.001*
D2	10.78±5.03	14.18±1.93	<0.001*
D3	11.79±4.77	14.91±0.42	<0.001*
D4	9.95±5.31	14.30±1.74	<0.001*
D5	10.20±4.85	14.62±1.31	<0.001*
D6	8.93±5.14	14.68±1.25	<0.001*
D7	8.21±5.26	14.77±1.07	<0.001*

Inference: Statistically significant difference was observed between the groups for GCS scores at all days

Table-2: Evaluation of Serum Creatinine (mg/dl) with survivors and non-survivors patients studied

Creatinine	Non survived Mean ± SD	Survived Mean ± SD	P value
D1	2.35±2.54	2.25±0.66	0.875
D2	1.64±0.94	2.66±2.16	0.026*
D3	1.97±1.01	2.63±1.88	0.127
D4	2.24±0.86	2.09±1.36	0.653
D5	2.18±1.01	2.00±1.36	0.633
D6	2.19±1.39	1.99±1.32	0.634
D7	2.12±1.56	1.70±1.25	0.320

Inference: Statistically significant difference was observed between the groups for Creatinine at Day 2.

Table-3: Evaluation of platelet count with survivors and non-survivors patients studied			
Platelet	**Non survived Mean ± SD**	**Survived Mean ± SD**	**P value**
D1	8.67±4.59	13.33±4.85	0.051
D2	1.44±1.88	1.09±1.12	0.323
D3	1.37±1.77	1.08±1.12	0.412
D4	1.19±1.71	1.17±0.98	0.951
D5	1.76±2.15	1.27±0.92	0.206
D6	1.31±2.09	1.42±0.86	0.755
D7	1.41±1.73	1.71±0.89	0.393

Inference: No Statistically significant difference was observed between the groups for platelet count.

Table-4: Evaluation of serum bilirubin with survivors and non-survivors patients studied			
Bilirubin	**Non survived Mean ± SD**	**Survived Mean ± SD**	**P value**
D1	2.49±1.54	1.19±0.45	0.006*
D2	2.18±1.55	2.56±2.19	0.437
D3	2.19±1.49	2.30±1.97	0.811
D4	2.65±2.11	2.21±2.36	0.476
D5	2.65±2.30	1.81±1.71	0.129
D6	2.82±2.57	1.58±1.48	0.028*
D7	2.85±2.44	1.37±1.25	0.004*

Inference: Statistically significant difference was observed between the groups for Bilirubin at day1

Table-5: Evaluation of SOFA score with survivors and non survivors patients studied			
SOFA	**Non survived Mean ± SD**	**Survived Mean ± SD**	**P value**
D1	9.40±3.56	7.72±2.61	0.023*
D2	10.70±4.45	7.86±2.52	0.001*
D3	12.26±3.99	6.32±2.81	<0.001*
D4	9.67±3.37	5.36±3.23	<0.001*
D5	11.07±4.89	3.77±3.07	<0.001*
D6	10.85±6.12	2.71±2.56	<0.001*
D7	14.00±3.84	2.24±2.34	<0.001*
D8	13.11±3.37	1.84±2.22	<0.001*

Inference: Statistically significant difference was observed between the groups for SOFA scores at all days.

Discussion

The clinical profile of 75 patients with sepsis with MODS was studied. There were 42 males and 33 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. Even in our study, most patients were in fourth to fifth decade. Comorbidities were present in 37 patients with diabetes mellitus being present in 17 patients. All patients had fever with pain abdomen and cough being the next predominant symptom observed in 22 patients. Even decreased urine output was observed in 04 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.

The mean SOFA score on the day of admission was 9.40 suggesting there was significant organ dysfunction in all patients. In our study, 16 patients required ventilator support, 43 patients required inotropes, 37 patients required dialysis. This again suggests significant organ dysfunction. The mortality recorded in this study is 33.3%. In large clinical trials, the mortality associated with severe sepsis and septic shock ranges between 13% and 50%. Finding the cause was not the main objective of the study. However, 14 cases of dengue were identified. 4 cases of leptospirosis was observed. In 4 cases of UTI, organisms were isolated: 3 were caused by Escherichia coli, 1 being Klebsiella species. 1 sputum culture revealed Streptococcus pneumonia 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. About 17 patients had lower lobe pneumonia. However, only 1 sputum C/S revealed Streptococcus pneumonia species and others had no growth

Clinical predictors of mortality: In our study, 25 patients died and 50 patients survived. The mean age among survivors was little high

compared to non survivors (46.48 v/s 46.28) which was not statistically significant (p=0.961). 7 patients among non-survivors and 13 patients among survivors had breathlessness which was statistically similar (p-0.854). Presence of pallor, icterus are statistically similar in non-survivors and survivors group with p=0.597. The non-survivors had a higher pulse rate (mean 122.40 v/s 120.08 p=0.370) and a lower blood pressure and therefore a greater requirement for inotropes compared to survivors. In our study, mortality rate among septic shock patients. Septic shock is associated with a higher mortality as shown with studies in Europe.

The respiratory rate was high in survivors than non survivors (27.56 v/s 26.72) which was not statistically significant (p=0.370). Leukocytosis and leukopenia is often associated with mortality and normal white blood cell counts are associated with survival. In our study however non-survivors had a mean total count of 15,280/ µL and survivors had a mean total count of 20, 522 /µL at admission. The difference was not statistically significant. In our study, the mean GCS among non survivors was low compared to survivors on all days (day1, 10.44 v/s 14.40) and was statistically very significant (p<0.001). In our study, mean serum creatinine did not significantly differ among non-survivors and survivors on day 1 and also on initial few days (day1, 2.35 v/s 2.25, p=0.101). Even mean serum bilirubin was significantly different among survivors and non-survivors (day 1, 1.19 v/s 2.49, p=0.006).

In our study, 7 out of 25 among non-survivors required ventilator support whereas 9 out of 50 among survivors required ventilator support suggesting significant respiratory system involvement among non-survivors (p=0.319). It may be attributable to early death among non-survivors and early recovery among survivors. In our study, 21 out of 25 among non-survivors required inotropic support whereas 22 out of 50 among survivors required inotropic support suggesting statistically significant hypotension among non-survivors (p=0.001). However, dialysis was required more among survivors than non-survivors (21% v/s 16%, p=0.072) but was not statistically very significant. SOFA score has been validated extensively for prognostification. In our 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 low among survivors which was statistically significant (9.40 v/s 7.72, p=0.023). 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 (12.26 v/s 6.32, p<0.001). The SOFA score on day 3 was better compared with SOFA score on day 1 as the tool for outcome prediction.

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 SOFA score on day of admission was reliable and was very effective in predicting the mortality rate.

Limitations of the study: With a sample size of 75 patients this model requires external validation. The time of admission to ICU for each patient is different. Lead time bias is possible. Nosocomial complications and socio economic constraints are difficult to model in studies. History of prior antibiotic usage could not be ascertained by history.

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