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Evaluation of the Sofa Score in Predicating Outcome of Sepsis Patients Admitted to a Tertiary Care Center in Nepal

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Abstract:-

- ***Background***

Sepsis is a major health burden with life-threatening conditions, which leads to a high rate of mortality in patients. The Sequential Organ Failure Assessment (SOFA) score, which assesses organ dysfunction across multiple systems, has been considered a reliable indicator of the severity of critical illness. We have carried out this study to evaluate the predictive value of the SOFA score in assessing the mortality of patients with sepsis on admission.

- ***Methods***

Our study was a cross-sectional, descriptive study carried out in patients with sepsis who were admitted to the medical ICU of Chitwan Medical College from December 15, 2021, to December 14, 2022. Patient sampling was done based on a non-probability convenience sampling technique.

- ***Results***

In a study of 130 patients, 54.6% were male and 45.4% were female. The mean SOFA score was 7.1, with a median of 7. 38.5% (50 patients) died due to sepsis. The mean SOFA score was higher among deceased patients (9.3) than survivors (5.8). Higher SOFA scores were associated with increased mortality. 46% of patients required inotropes/Vasopressor support for shock. Patients requiring vasopressor support had a significantly higher mortality rate (53.3%) compared to those who did not need support (25.7%). 13.1% of patients required mechanical ventilatory support, and the majority of these patients (70.6%) had mortality.

- ***Conclusion***

SOFA score is a valuable tool to assess organ dysfunctions and it can predict the outcome of patients admitted with sepsis.

Keywords:- *Assessment Score, Mortality, Sepsis, Sequential Organ Failure.*

I. INTRODUCTION

Sepsis is defined as "life-threatening organ dysfunction caused by a dysregulated host response to infection."[1] Septic shock is defined as "a subset of sepsis in which particularly profound circulatory, cellular, and metabolic abnormalities are associated with a greater risk of mortality than with sepsis alone. Patients with septic shock can be clinically identified by a vasopressor requirement to maintain a mean arterial pressure of 65 mm Hg or greater and serum lactate level greater than 2 mmol/L (>18 mg/dL) in the absence of hypovolemia."[1]

Sepsis and septic shock pose significant challenges in healthcare, affecting millions of individuals worldwide annually, with a mortality rate ranging from one in three to one in six of those affected. Enhancing early recognition and implementing suitable interventions within the initial hours following the onset of sepsis can improve patient outcomes.[2]

Although a large portion of the world's population is not studied, based on available data it is expected that around 20.7 million cases of sepsis and 10.7 million severe sepsis cases each year in a world with 7.2 billion people. The data from the last ten years showed that there could be as many as 31.5 million sepsis cases 19.4 million severe sepsis cases and about 5.3 million deaths worldwide each year.[3] Sepsis has a significant global health burden, with millions of new cases each year. In 2017 alone, there were approximately 48.9 million incident cases of sepsis, resulting in 11.0 million sepsis-related deaths. This accounted for 19.7% of all deaths worldwide. This underscores the urgent need for improved sepsis prevention, recognition, and treatment strategies worldwide.[4] In 2013, septicemia imposed a tremendous economic price on the healthcare system in the United States. With a cost of $23.7 billion, it constituted 6.2 percent of the total expenses incurred for all hospitalizations. This underscores the substantial financial burden associated with sepsis management, emphasizing the need for effective prevention and treatment strategies to mitigate its impact on both healthcare budgets and patient well-being.[5]

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One meta-analysis in which 30 studies were analyzed showed that in worldwide 26.7% to 41.9% of patients who were admitted for sepsis died because of it. The occurrence of sepsis cases requiring hospital treatment significantly increased after 2008, showing a 46% rise compared to the entire period before.[6] Large studies about the incidence and mortality of sepsis and septic shock are not available in Nepal, one study shows that the mortality rate of sepsis and septic shock is found to be 39.3% and 47.8% respectively. [7]

It is not clear why some patients have an effective immune response to combat infections, while others descend into an uncontrolled state of illness. Researchers have studied various cellular agents, particularly tumor necrosis factor-a and interleukin-1, which can replicate sepsis symptoms when administered externally. Initially, it was believed that sepsis resulted from an overwhelming release of these agents, a phenomenon known as a cytokine storm. However, subsequent research has revealed that alongside these proinflammatory agents, there are also anti-inflammatory agents at play. Furthermore, lipopolysaccharide (LPS) from outside can damage the endothelium, causing the endothelial glycocalyx to shed. In this condition, the initial response to the pathogen triggers an exaggerated inflammatory and immune reaction, affecting various pathways such as endothelial, hormonal, bioenergetic, metabolic, and immune systems, among others. These responses, in turn, result in disruptions to the circulatory and metabolic functions, ultimately leading to organ dysfunction.[8]

The healthcare system in Nepal lacks sophistication and development. Large proportions of patients with sepsis fail to reach to tertiary centers for treatment. There is a vast number of patients not studied and mortality due to sepsis is unknown. This could be much higher than what we have seen in data from hospitals which showed a mortality rate of 36.5%. The research study documented a higher rate of patient mortality in cases of severe sepsis and septic shock, underscoring the need for further efforts. Enhancing patient outcomes could be achieved through hospital initiatives aimed at educating, raising awareness, and providing training for healthcare professionals in early recognition and adherence to treatment protocols.[9]

The Sequential Organ Failure Assessment or SOFA score was created to evaluate the immediate morbidity and mortality associated with critical illness on a broader scale and has been extensively verified as a valuable tool for this purpose in various healthcare contexts. It comprises six distinct scores, one for each of the respiratory, cardiovascular, hepatic, coagulation, renal, and neurological systems. Each of these scores ranges from 0 to 4, with a higher score indicating a more severe level of organ dysfunction.[10] A shift of 2 or more points in the SOFA score is now considered a defining feature of the sepsis syndrome. Furthermore, the European Medicines Agency has acknowledged that a change in the SOFA score also serves as an acceptable indicator of effectiveness in new therapeutic substances for sepsis.[11]

Low-income nations face a significant shortage of ICU beds, with over half of these countries lacking any published data regarding their ICU capacity. Although most ICUs in low-income countries are typically found in major referral hospitals within urban areas, the high costs associated with trained healthcare personnel, infrastructure, and medical supplies have hindered the expansion of intensive care units in these regions. The burden of critical illness, particularly among sepsis patients, is substantial in low-income countries, and it is likely to increase due to factors such as urbanization, emerging epidemics, and improved access to hospitals. Therefore, the utilization of the SOFA score is crucial as it aids in the identification and prognostication of sepsis patients, facilitating timely recognition and ultimately contributing to a reduction in associated mortality.[12]

The Sequential Organ Failure Assessment (SOFA) score is a widely utilized tool in critical care settings to assess the severity of organ dysfunction in patients. Understanding the potential of the SOFA score to predict patient outcomes, particularly in the context of hospital admissions, is of paramount importance for healthcare practitioners and decision-makers. Despite the increasing recognition of the SOFA score's utility, there remains a critical gap in the literature concerning its robustness and accuracy in predicting the outcomes of patients admitted to hospitals.[10]

ICU services are emerging in Nepal, yet critical care medicine remains nascent. The lack of comprehensive sepsis data, limited awareness, and resource constraints in Nepal hinder effective sepsis management. Addressing these challenges, it is essential to improve sepsis diagnosis, treatment, and outcomes in the country.[13]

II. HIGHLIGHTS

- The SOFA score was validated as an effective tool for predicting outcomes in septic patients.
- Mortality rates differed significantly between resource-rich and resource-limited countries.
- Higher mortality was observed in patients requiring mechanical ventilation or vasopressor support.
- The study found that higher SOFA scores were strongly linked to increased mortality rates.

III. MATERIAL AND METHODS

➢ *Study Design and Population*

This study is a prospective cross-sectional study. The study was performed on Patients who were admitted to the Medical ICU of Chitwan Medical College with sepsis. The study evaluates the usefulness of SOFA score for predicting the outcome of patients with sepsis. Ethical approval was taken from the Institutional Review Committee of Chitwan Medical College with code (CMC-IRC/078/079-207).

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➢ *Sample Size Calculation*

- Sample size calculation for the finite study population was done using a sample size calculator (openepi.com) using the following variables:
- Confidence interval = 95%
- Precision = 5%
- Expected study population = 152 (based on hospital data of last year)

At 95% confidence interval, the sample size was 101.

➢ *Data Collection*

Data collection was done during the admission of the patient or stay at the medical ICU of Chitwan Medical College after informed consent. Patients meeting inclusion and exclusion criteria were selected. The examination was done during the admission of the patient. Necessary investigations were sent. ABG was done by withdrawing blood from the radial or femoral artery and using an ABL800 FLEX automated blood gas analyzer machine. The PaO2 was obtained directly from the ABG report generated by the ABL800 FLEX analyzer. Platelet count was done via an automated cell counter machine BeneSepheraTM-51, Hematology analyzer. The total bilirubin level was determined by using Jendrassik and Grof method. Creatinine level was assessed with the Jaffes Kinetic/Alkaline Picrate method. Data collection was then done in proforma. Data entry and analysis were done using SPSS software version 26.

IV. RESULT

This study was done among one hundred and thirty patients with sepsis admitted to Chitwan Medical College, medical ICU during the study period. Among the patients total of 130 admitted to the Medical ICU highest number of patients were from the age of range 40 to 59 years 43 (33.1%), lowest number of patients were from the age group of more than 80 years and above 8 (6.2%). The patient's average age was 51.23 ± 19.45. The youngest was 18 years old and the eldest was 90 years old. In the current study, there were a greater number of male patients than female. 71 patients (54.6%) were male and 59 patients (45.4%) were female respectively. The ratio of men to women was 1.2:1.

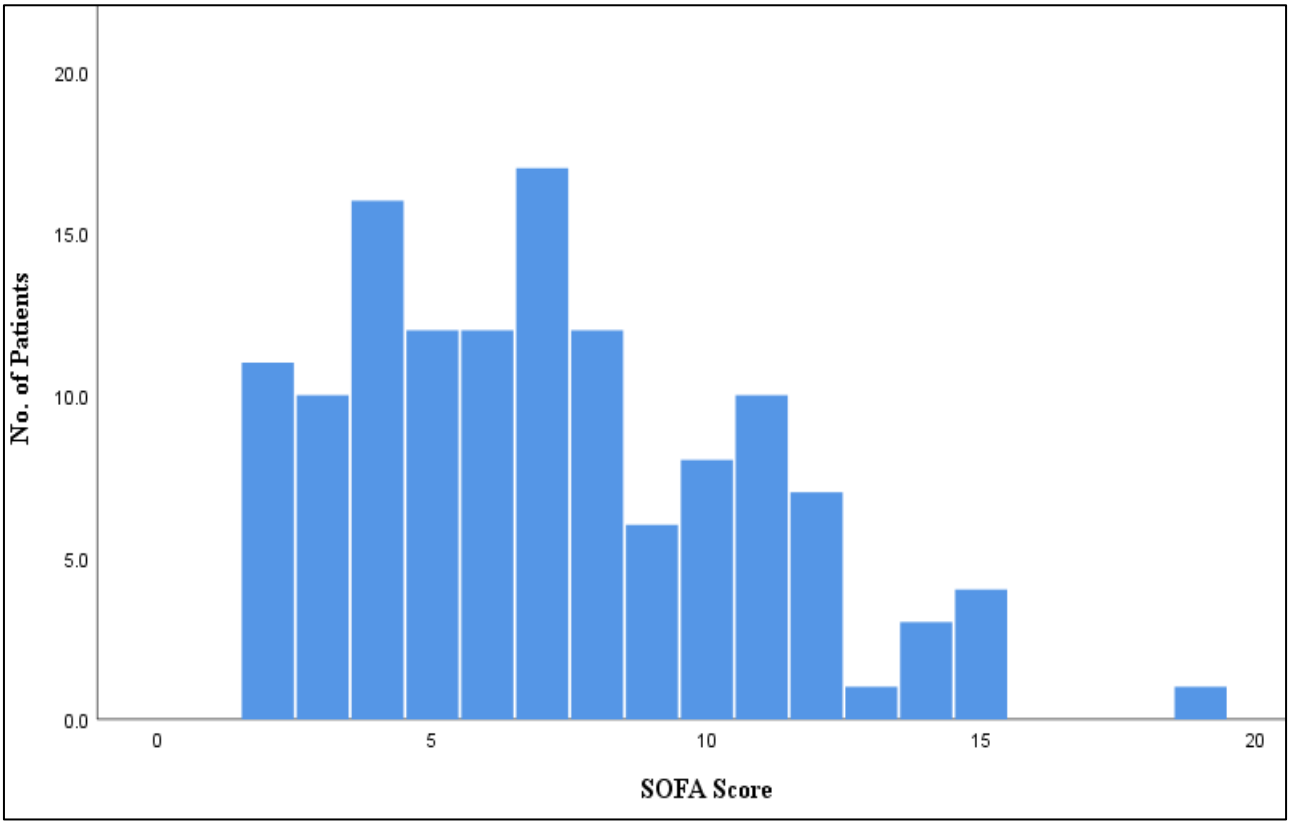

Fig 1. SOFA Score of Patients

Among total patients of 130 most of patients 90 (69.2%) had SOFA Score less than 9. Fewer patients had higher SOFA scores of more than 13. The overall Mean SOFA Score was 7.12 with a median of 7. The maximum score was 19 while the minimum was 2. There were a total of 60 patients (46%) among 130, who were in shock and requiring inotropes/Vasopressor support, whereas most of the patients 70 (54%) were normotensive. In this study of 130 patients 17 (13.1%) had required mechanical ventilatory support whereas the remaining patients 86.9% didn't require or were not kept in mechanical ventilatory support. Among 130 patients in my study, 50 patients died because of sepsis in hospital admitted to ICU which was 38.5%. whereas the majority of patients 61.5% (80%) survived.

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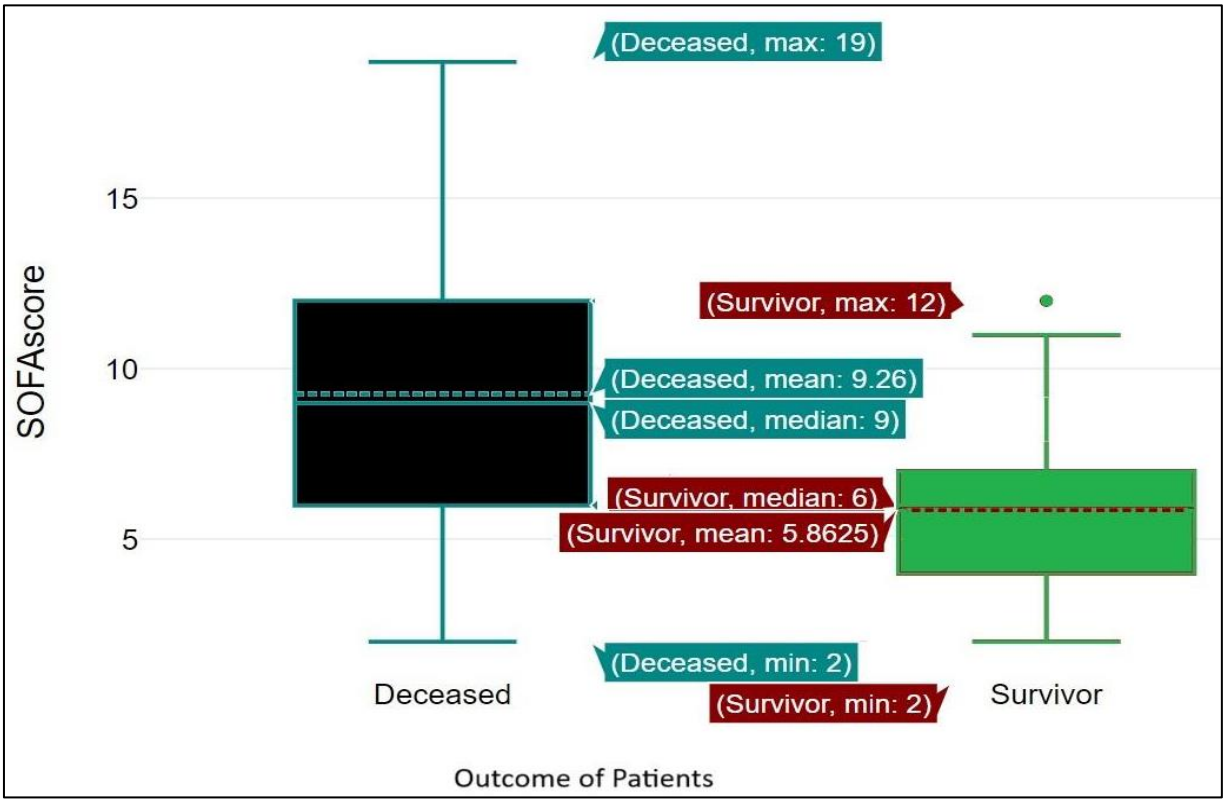

Fig 2. SOFA Score Distribution among Patients Deceased and Survivals

The mean SOFA score among Deceased patients was 9.26 which was higher than survivals with a mean score of 5.8. The maximum score in deceased patients was 19 where whereas in survival patient was 12. This chart clearly shows SOFA score is less among survival patients and high among deceased patients.

Table 1. Association between Age of Patient and Mortality (n=130)

Age in Years	Deceased	Survivor	Chi-Square Value	P value
18-39 years	13	27	4.554	0.2
	32.50%	67.50%		
40-59 years	20	23		
	46.50%	53.50%		
60-79 years	16	23		
	41.00%	59.00%		
80 years and above	1	7		
	12.50%	87.50%		

In this study it is seen that highest percent of mortality had occurred in age of patient between 40 and 59 years and least is seen in above 80 years of age with p value of 0.2 which is more than 0.05, shows that in my study there is no association of age with mortality seen.

Table 2. Outcome of Patients with Sepsis Who Required Vasopressor/Inotropes Support for Shock and Patients Who are Not in Shock

Outcome of Patient	Deceased	Survivor	Chi-Square Value	P Value
Patient in Shock requiring inotropes/ vasopressor support	32	28	10.412	0.001
	53.3%	46.7%		
Patient not in Shock	18	52		
	25.7%	74.3%		

In this table, it is seen that among 130 patients 60 patients needed support for low blood pressure among them 32 (53.3%) patients died whereas 70 patients didn't need vasopressor support among them 18 died (25.7%). The P value is 0.001 which is less than 0.05, hence there is a significant association between shock and mortality of patients with sepsis.

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Table 3. Outcome of Patient with Sepsis Based on Mechanical Ventilatory Support (n=130)

Outcome of Patient	Deceased	Survivor	Chi-Square value	P value
Patient requiring mechanical ventilator support	12	5	8.529	0.003
	70.60%	29.40%		
patient not requiring mechanical ventilator support	38	75		
	33.60%	66.40%		

Among the patients requiring mechanical ventilator support, 70.60% of them did not survive, while 29.40% survived. Among the patients not requiring mechanical ventilator support, 33.60% of them did not survive, while 66.40% survived. the table suggests that there is a significant association between the patient's outcome and the use of mechanical ventilator support. Specifically, a higher percentage of patients requiring mechanical ventilator support did not survive, whereas a higher percentage of patients not requiring mechanical ventilator support survived.

Table 4. SOFA Score Among Patients Who were Deceased and Survived with Sepsis

SOFA Score	Deceased	Survivor	Chi-Square Value	P Value
2-4	7	30	31.817	0.001
	18.90%	81.10%		
5-7	9	32		
	22.00%	78.00%		
8-10	13	13		
	50.00%	50.00%		
≥11	21	5		
	80.80%	19.20%		

The table categorizes patients into four groups based on their SOFA scores: 2-4, 5-7, 8-10, and ≥11. The patients are further categorized into two outcomes: Deceased and Survivor, based on the patient's in-hospital clinical outcome. For patients with SOFA scores 2-4, 18.90% did not survive, while 81.10% survived. In patients with scores of 5-7, 22.00% of patients did not survive, and 78.00% survived. On a score of 8-10, there is 50.00% mortality. Patients with SOFA scores ≥11 had the highest mortality rate, with 80.80% not surviving and only 19.20% surviving.

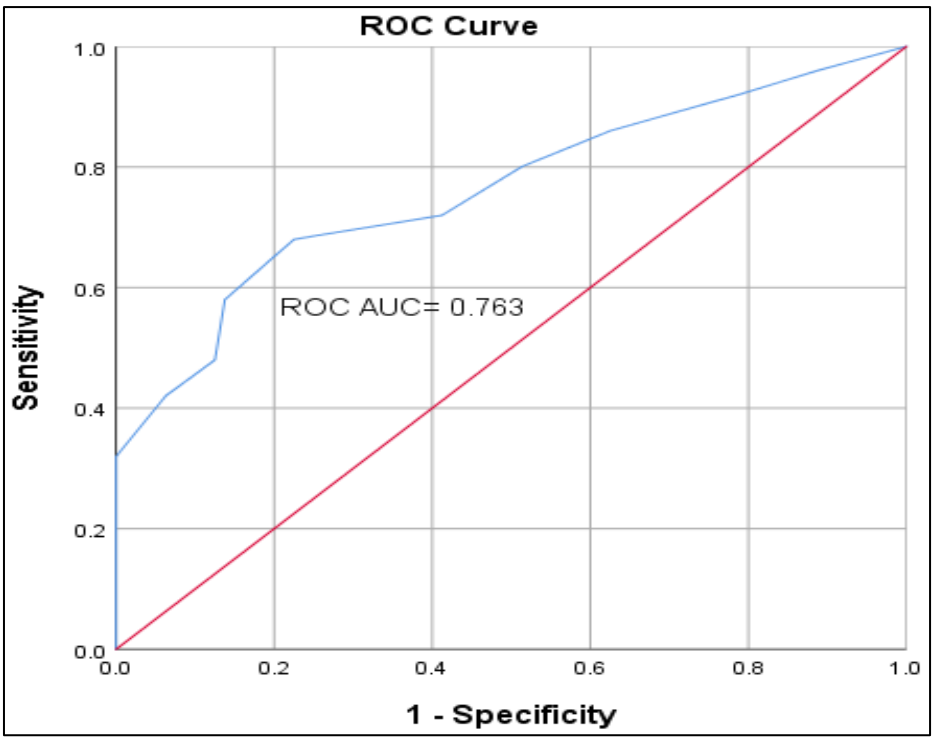

Fig 3. Receiver Operating Characteristics Area Under the Curve

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Receiver operating characteristic (ROC) curves were utilized to assess the predictive capability of Sequential Organ Failure Assessment (SOFA) scores for hospital mortality. The analysis revealed an area under the curve (AUC) of 0.763.

V. DISCUSSION

In this study were total of 130 patients included, among them there was male predominance with 54.6% where whereas 45.4% of patients were female, who were admitted to ICU due to sepsis. It was found to be similar in a study conducted by Safari et al where there was male predominance with 53.5%,[14] and it was similar in other studies.

The mean age of the patients was 51.23 ± 19.45, ranging from 18 to 90 years. The majority of the patients among 130 admitted to the Medical ICU were aged between 40 and 59 years (33.1%, n = 43), while the fewest patients were 80 years or older (6.2%, n = 8). In a similar study carried out by Kamath et al in India Mean age of patients was 48.3 years and the majority of the patients were in the 4th and 5th decade of life.[15] Another study done in Nepal by Lamichhane et al had a mean age of patients 47.67±17.52 which showed a similar age distribution.[9]

In this study, among 130 patients enrolled, the SOFA Score spanned from a minimum of 2 to a maximum of 19, showing a central tendency with a mean value of 7.12 and a median of 7 with a substantial majority (approximately 69.2%) exhibiting a SOFA Score below 9. The study done by Safari et al in Turkey involved 140 patients, with a mean SOFA score of 7.13 (range 2-16). Most patients (84.12%) had a SOFA score below 10, which was quite similar to my study.[14] In another study conducted in Finland by Polkki et al showed a mean SOFA score of 6.[16]

In my study involving 130 patients, 50 patients lost their lives due to sepsis during their ICU stay, representing an overall mortality rate of 38.5%. In contrast, the majority of patients, 80 accounting for 61.5% survived. It was found similar mortality rate of 36.47% in a study conducted in Nepal by Lamichhane et al among 85 patients admitted in ICU.[9] Similarly a research paper published by Kamath et al from India showed an overall mortality of 33.3 % of patients admitted to the ICU with sepsis.[15] The large study done in Finland by Polkki et al found that the overall mortality rate in ICU was only 10.7%.[16] Another study done in the USA resulted in ICU mortality of 27%.[17] Among sepsis patients. There seems to be a difference in mortality among patients of resource-rich and resource-limited countries because of the easy availability of health facilities, intervention, and quality of advanced health services in developed countries compared to resource-limited countries.[12]

In our research, we observed the highest mortality rate among patients aged between 40 and 59 years followed by 18 to 39 years. Conversely, the lowest mortality rate was observed in individuals aged above 80 years. The statistical analysis, indicated by a p-value of 0.2, which exceeds the significance threshold of 0.05, suggests that there is no statistically significant association between age and mortality in our study. However in different studies done in the past by Weng et al. in China, Wardi et al. in the USA, and Yang et al in Singapore, it was seen that increasing age is an independent risk factor for sepsis-related outcomes. Mortality was significantly increased in patients more than 60-65 years of age and sharply increased in age more than 80 years.[18-20] In our study age was not seen as an independent risk for mortality in sepsis, it may be due to that age distribution was different in our study most patients were below 60 years of age, it could also be due to that patient with old age if the outcome seems to be poor patient party may take them home before any outcome occurred in the hospital.

In our study, 60 patients, constituting 46% of the total were in septic shock and required ionotropic or vasopressor support. The remaining 70 patients, accounting for 54% of the total, maintained normal blood pressure levels. In many studies, there is a wide range of incidence and prevalence of septic shock. A study done by Basnet et al. in Nepal showed that there was a presence of 23.1% shock during admission to ICU.[21] Another study done in the Netherlands showed that the overall prevalence of shock among patients of sepsis ranges from 10.1 to 23.4% in different hospitals.[22] It showed that there is higher incidence of shock in our study as compared to other it could be due to difference in geographical location and as being a referral center our hospital could have admitted selected and serious patients.

In our analysis of 130 patients, 17 individuals (13.1%) needed mechanical ventilatory support, while the remaining 86.9% (113) either did not require support or were not placed on mechanical ventilation. There are varying incidences of mechanical ventilation seen in sepsis in different studies. One study shows that there was an overall incidence of 8.8% of mechanical ventilation needed in admission due to sepsis.[22] Another study showed that 27.1% of patients were ventilated for lung protection in the ICU.[23] There are various differences seen in different studies it could be due to varying geographical locations, time of research, different age distribution, and prevalence of different diseases in different parts.

Our study revealed that out of 130 patients, 60 required inotropes support due to shock. Among these, 32 patients (53.3%) passed away. On the other hand, 70 patients did not require vasopressor support, and among them, 18 patients (25.7%) were deceased. Mortality is high in patients with septic shock i.e. 53.3%. The statistical analysis, with a p-value of 0.001 (below the threshold of 0.05), indicates a significant association between shock and mortality in patients with sepsis. A similar mortality rate was seen in other studies done previously. One study done in Kathmandu by Lakhe et al. showed a 47% mortality rate of septic patients who were in shock.[7] A systemic review and meta-analysis done in North America and Europe by Vincent et al. shows a mean mortality rate of 37.3% in septic shock which is similar but lower than our study.[24]

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In the group of 17 patients who needed mechanical ventilator support, a significant majority (70.60%) did not survive, with a smaller fraction (29.40%) only survived. Conversely, in the group of patients who did not require mechanical ventilator support, there was a relatively lower percentage (33.60%) of mortality, while a higher percentage (66.40%) did survive. The data from our study strongly indicates an association between increased mortality when a patient needs mechanical ventilator support. In-hospital mortality was seen in 56.9% of patients in a study done by Oh et al. in South Korea.[25] Systemic review and meta-analysis done by Gu et al. showed that patients who were in sepsis had mortality up to 40% after endotracheal intubation and mortality significantly became higher if patients were in shock.[26] The mortality of patients with sepsis who required mechanical ventilation had a higher mortality rate but it was seen as much higher in our study. This could be due to associated comorbidities in patients which could have affected outcome.

In our study analysis, it was found that of patients who had SOFA scores 2-4, 18.9% of them didn't survive, whereas patients with scores 5-7 had a mortality of 22%, when a score is 8-10 there was 50% mortality rate, once SOFA score is 11 or higher the mortality rate was 80.8 %. This result indicates that as the SOFA Score increases, the likelihood of mortality significantly rises. Patients with higher SOFA Scores (8-10 and ≥11) had a notably higher mortality rate compared to patients with lower scores (2-4 and 5-7). This suggests that the SOFA Score is a reliable predictor of patient outcomes, with higher scores correlating with a higher risk of mortality. The Chi-Square analysis of the relationship between SOFA Score and patient outcome (deceased or survivor) produced a significant result with a Chi-Square value of 31.817 and a p-value of < 0.001, which is below the typical significance threshold of 0.05. This suggests a strong association between the SOFA Score and patient outcomes.

A study done in India by Kamath et al. SOFA score was calculated on the day of admission, they observed a statistically significant difference in SOFA scores between survivors and non-survivors, with non-survivors exhibiting higher scores (mean SOFA score of 9.40) compared to survivors who had lower scores (7.72) with a overall mortality rate of 33.3 % which was similar to our study.[15]

The ROC AUC was used in our study as a statistical measure to assess the accuracy and discriminative power of SOFA score for the prediction of mortality of patients with sepsis admitted to the ICU. AUC value came to be 0.763 means that the SOFA score can effectively discriminate between patients who are likely to survive and those who are likely to experience mortality in the ICU. Hence, SOFA score can be a valuable tool in helping clinicians assess the likelihood of ICU mortality. It provides useful information for making decisions about patient care, treatment plans, and resource allocation.

A study done by Minne et al. for the evaluation of SOFA score for predicting mortality in the ICU which was a systemic review showed that ROC AUC 0.72 which was similar to our study and proves SOFA score to be an effective tool for the prediction of mortality of patients with sepsis.[27] Another study done by ones et al. in which they had calculated SOFA score at the time of presentation and analyzed SOFA score for predicting outcomes is patients with sepsis, it was found that ROC AUC 0.750. SOFA score was a good tool to predict outcome of patients with sepsis which was similar to our study.[28]

VI. CONCLUSION

Sequential Organ Failure Assessment Score (SOFA) Score plays as an important tool for health care professionals for early detection of organ dysfunction, as well as risk stratification of patients, predicting outcome of patients.

The study provides evidence of the critical role of the Sequential Organ Failure Assessment (SOFA) Score in predicting patient outcomes, particularly in the context of mortality in septic patients. It can clearly be said that as the SOFA Score increases, the risk of mortality significantly rises. Patients having higher SOFA Score exhibit a notably elevated mortality rate, whereas those with lower scores show a significantly higher survival rate.

SOFA score can effectively predict between patients who are likely to survive and those who are likely to have a high risk of mortality in the ICU. Hence, this statistically significant association between the SOFA Score and patient outcomes helps us to conclude that it is a useful clinical tool to access septic patients to predict outcomes.

ETHICAL APPROVAL

This study was approved by the Institutional Review Committee of Chitwan Medical College with code (CMC-IRC/078/079-207).

- *Consent*
  Patient was not mandated for this study

- *Sources of Funding*
  We did not receive any funds for this research.

- *Conflicts of Interest Disclosure*
  The authors declare no conflicts of interest.

- *Research Registration Unique Identifying Number (UIN)*
  This study was registered with the code (CMC-IRC/078/079-207) at Chitwan Medical College after the approval of the Institutional Review Committee.

- *Guarantor*
  Birendra Kumar Yadav.

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➢ *Data Availability Statement*

Data are available upon reasonable request. All data generated or analyzed during this study are included in this article.

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REFERENCES

[1]. Singer M, Deutschman CS, Seymour C, Shankar-Hari M, Annane D, Bauer M, et al. The third international consensus definitions for sepsis and septic shock (sepsis-3). Vol. 315, JAMA - Journal of the American Medical Association. American Medical Association; 2016. p. 801–10.

[2]. Doi K, Estenssoro E, Ferrer R, Hodgson C, Møller MH, Jacob S, et al. Bin Du 28 Charles Gomersall 31 Mark Nunnally 47 Charles L. Sprung 57. Vol. 49. 2021. Available from: www.ccmjournal.org

[3]. Fleischmann C, Scherag A, Adhikari NKJ, Hartog CS, Tsaganos T, Schlattmann P, et al. Assessment of global incidence and mortality of hospital-treated sepsis current estimates and limitations. Am J Respir Crit Care Med. 2016 Feb 1;193(3):259–72.

[4]. Rudd KE, Johnson SC, Agesa KM, Shackelford KA, Tsoi D, Kievlan DR, et al. Global, regional, and national sepsis incidence and mortality, 1990–2017: analysis for the Global Burden of Disease Study. The Lancet. 2020 Jan 18;395(10219):200–11.

[5]. Torio CM, Moore BJ. National inpatient hospital costs: the most expensive conditions by payer, 2013: statistical brief 204. Healthcare cost and utilization project (HCUP) statistical briefs. 2006;2006–16.

[6]. Fleischmann-Struzek C, Mellhammar L, Rose N, Cassini A, Rudd KE, Schlattmann P, et al. Incidence and mortality of hospital- and ICU-treated sepsis: results from an updated and expanded systematic review and meta-analysis. Vol. 46, Intensive Care Medicine. Springer; 2020. p. 1552–62.

[7]. Lakhey S, Karki B, Shrestha B, Shakya S, Pandey SB. Sepsis: a private hospital experience in Nepal. Journal of Institute of Medicine Nepal. 2007 Jan 8;28(1):12–5. Available from: https://www.nepjol.info/index.php/JIOM/article/view/428

[8]. Font MD, Thyagarajan B, Khanna AK. Sepsis and Septic Shock – Basics of diagnosis, pathophysiology and clinical decision making. Vol. 104, Medical Clinics of North America. W.B. Saunders; 2020. p. 573–85.

[9]. Lamichhane S, Manandhar N, Dhakal S, Shakya YL. Management and Outcome of Severe Sepsis and Septic Shock Patients. J Nepal Health Res Counc. 2018 Jul 3;16(2):165–71.

[10]. Vincent JL, Moreno R, Takala J, Willatts S, De Mendon~a A, Bruining H, et al. The SOFA (Sepsis.related Organ Failure Assessment) score to describe organ dysfunction/failure. Vol. 22, Intensive Care Med. Springer-Verlag; 1996.

[11]. Lambden S, Laterre PF, Levy MM, Francois B. The SOFA score - Development, utility and challenges of accurate assessment in clinical trials. Vol. 23, Critical Care. BioMed Central Ltd.; 2019.

[12]. Murthy S, Leligdowicz A, Adhikari NKJ. Intensive care unit capacity in low-income countries: A systematic review. PLoS One. 2015 Jan 24;10(1).

[13]. Acharya SP. Critical care medicine in Nepal: where are we? Vol. 5, International health. 2013. p. 92–5.

[14]. Safari S, Shojaee M, Rahmati F, Barartloo A, Hahshemi B, Forouzanfar MM, et al. Accuracy of SOFA score in prediction of 30-day outcome of critically ill patients. Turk J Emerg Med. 2016 Dec 1;16(4):146–50.

[15]. Kamath AC, Harsoor S. original article Study of sofa score for predicting the outcome of patients admitted in ICU at BTGH. 2020.

[16]. Pölkki A, Pekkarinen PT, Takala J, Selander T, Reinikainen M. Association of Sequential Organ Failure Assessment (SOFA) components with mortality. Acta Anaesthesiol Scand. 2022 Jul 1;66(6):731–41.

[17]. Gupta T, Puskarich MA, DeVos E, Javed A, Smotherman C, Sterling SA, et al. Sequential Organ Failure Assessment Component Score Prediction of In-hospital Mortality From Sepsis. J Intensive Care Med. 2020 Aug 1;35(8):810–7.

[18]. Weng L, Zeng X ying, Yin P, Wang L jun, Wang C yao, Jiang W, et al. Sepsis-related mortality in China: a descriptive analysis. Intensive Care Med. 2018 Jul 1;44(7):1071–80.

[19]. Wardi G, Tainter CR, Ramnath VR, Brennan JJ, Tolia V, Castillo EM, et al. Age-related incidence and outcomes of sepsis in California, 2008–2015. J Crit Care. 2021 Apr 1;62:212–7.

[20]. Yang Y, Yang KS, Hsann YM, Lim V, Ong BC. The effect of comorbidity and age on hospital mortality and length of stay in patients with sepsis. J Crit Care. 2010 Sep;25(3):398–405.

[21]. Basnet B, Bhandari R, Moore M. Initial resuscitation for Australasian Triage Scale 2 patients in a Nepalese emergency department. Emergency Medicine Australasia. 2012;24(4):430–4.

[22]. Van Vught LA, Klouwenberg PMCK, Spitoni C, Scicluna BP, Wiewel MA, Horn J, et al. Incidence, risk factors, and attributable mortality of secondary infections in the intensive care unit after admission for sepsis. JAMA. 2016;315(14):1469–79.

[23]. Fuller BM, Mohr NM, Dettmer M, Kennedy S, Cullison K, Bavolek R, et al. Mechanical ventilation and acute lung injury in emergency department patients with severe sepsis and septic shock: An observational study. Academic Emergency Medicine. 2013 Jul;20(7):659–69.

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[24]. Vincent JL, Jones G, David S, Olariu E, Cadwell KK. Frequency and mortality of septic shock in Europe and North America: A systematic review and meta-analysis. Crit Care. 2019 May 31;23(1).
[25]. Oh Y, Roh J, Lee J, Chung HS, Lee K, Lee MK. Sequential Organ Failure Assessment score as a predictor of mortality in ventilated patients with multidrug-resistant bacteremia. Acute and Critical Care. 2020 Aug 1;35(3):169–78.
[26]. Gu WJ, Wang F, Tang L, Liu JC. Single-dose etomidate does not increase mortality in patients with sepsis: A systematic review and meta-analysis of randomized controlled trials and observational studies. Chest. 2015 Feb 1;147(2):335–46.
[27]. Minne L, Abu-Hanna A, de Jonge E. Evaluation of SOFA-based models for predicting mortality in the ICU: A systematic review. Vol. 12, Critical Care. 2008.
[28]. Jones AE, Trzeciak S, Kline JA. The Sequential Organ Failure Assessment score for predicting outcome in patients with severe sepsis and evidence of hypoperfusion at the time of emergency department presentation. Crit Care Med. 2009;37(5):1649–54.