Scenario of Sepsis in Intensive Care Unit in a Tertiary Care Hospital

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ABSTRACT

Background: Sepsis has been defined as life-threatening organ dysfunction caused by dysregulated host response to infection. Sepsis is an important cause of mortality in intensive care unit worldwide. The study aims to identify the outcome of sepsis patient admitted at tertiary care hospital.

Methods: This is a descriptive cross-sectional hospital based study on 76 adult patients admitted at intensive care unit of Nobel Medical College with diagnosis of sepsis with an objective of estimating mortality of sepsis and identifying associated symptoms with it. Baseline demographics, clinical and laboratory data were collected and analyzed.

Results: Out of 76 patients with sepsis, mean age of the patients was 50.07±18.15 years. Majority of patients 31.6% with sepsis were above age groups >60 years. The most common symptoms among the patients were fever, which was seen in 69 (90.8%) patients. The most common source of infection in those patients was found to be unknown, which was seen in 36.8% of patients. While analyzing the outcome, it was noted that 25 patients with sepsis (32.9%) died during treatment.

Conclusions: Sepsis is related with high mortality. Elderly patients are at more risk. Fever is the commonest presentation and source is not identified in majority of cases.

Keywords: Intensive care unit; mortality; sepsis.

INTRODUCTION

Sepsis is defined as life-threatening organ dysfunction caused by dysregulated host response to infection.[1-2] Similarly mortality rate of sepsis in Nepal found to be 40%, so it is still the leading cause of death.[3] Furthermore majorities of those who survives after the diagnosis of sepsis have poor quality of life.[4-5] Delayed identification and inadequate resuscitation in sepsis and septic shock leads to the high mortality.[6]

One way to accomplish sepsis is the early identification and management. There are lots of studies about sepsis done in developed countries but data are variable in developing countries. [7] The aim of the study was study was to estimate the mortality of sepsis in adult patients admitted at the Intensive Care Unit (ICU) of Nobel Medical College Teaching Hospital (NMCTH).

METHODS

A descriptive cross-sectional was adopted in the department of Internal Medicine of Nobel Medical College, Biratnagar, tertiary health care center, between periods of January 1st to December 31st 2018. The sample size was calculated under the mortality of sepsis 67.5% in a previously reported study, [8] hence sample size become 46 by using the formula $n=z^2pq/d^2$ (z=1.96, p=67.5, q=32.5 & d=13.5) under 95% confidence interval. However, all the patients in the study period who fulfilled the inclusion criteria were enrolled into the study and total number came out to be 76.

Patient above 18 years of age presenting with sepsis and admitted in ICU of NMCTH were enrolled for the study after getting the approval from the Institutional review committee. All the participants had signed the informed consent for the study.

In 2016 SCCM/ESICM task force has defined sepsis as life-threatening organ dysfunction caused by dysregulated

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host response to infection. Organ dysfunction is assessed using qSOFA (quick SOFA) which consist of three components as respiratory rate ≥22/minute, Altered mentation (GCS<15) and Systolic blood pressure ≤100mm of Hg.

If any two of these three components are present then patient is having organ dysfunction. So patients who are suspicious of having infection judged by physician based on their clinical features, biochemical and microbiological laboratory reports, then they can be diagnosed as sepsis. In this study, infection is judged by physician, based on clinical features only. Patients, who were not giving the consent, left against the medical advice during the course of treatment and diagnosed case of chronic systemic disease like HTN, DM, CKD, CLD, Chronic lung disease, Heart failure etc were excluded from the study.

History, demographic features, clinical features and vital signs were recorded according to a predefined proforma. Laboratory investigations like total leukocyte count, platelet count, urea, creatinine, bilirubin, aspartate aminotransferase, alanine aminotransferase, arterial blood pH and PaO2/FiO2 were used and recorded according to a predefined proforma.

Data was entered in Microsoft Excel 2010 and converted into SPSS (Statistical package for social science) 25 for statistical analysis. For descriptive statistics: percentage, mean, standard deviation and median interquartile range (minimum & maximum) were calculated along with tabular and graphical presentation.

RESULTS

The total number of patients diagnosed with sepsis and admitted in ICU of NMCTH during the study tenure was 76. Out of that, 44 were female (57.89%) and 32 were male (42.11%) patients. The mean age of the patients was a 50.07±18.15 year ranging from 18 to 85 years. We have analyzed the patients age wise and found that maximum patients (31.6%) with sepsis were above age groups >60 years. The data for other age group is shown in Table 1. While analyzing the patients of sepsis gender wise, it was noted that there were 44 female (57.89%) and 32 male (42.11%).

Table 1. Age wise distribution of patients with sepsis.

Age groups	Number	Percentage
16-30	15	19.80%
31-45	16	21
46-60	21	27.6
>60	24	31.6
Total	76	100

We have analyzed the clinical symptoms in patients presenting with sepsis and found fever as the most common clinical symptoms in 69 (90.8 %) patients. Then it is followed by dyspnea in 59(77.6%), cough in 50(65.8%), vomiting in 36 (47.4%), headache in 34 (44.7%), abdominal pain in 31 (40.08%), decreased (<500 ml/day) urine output in 27 (35.5%), chest pain in 22 (28.9%), generalized swelling in 18 (23.7), leg swelling in 15(19.7%), altered sensorium in 14 (18.4%), loose motion in 8 (10.5%), dysuria in 7 (9.2%), jaundice in 6 (7.9%) and the least common presentation was joint pain in 5(6.6%) cases as shown in Figure 1.

Sepsis are respiratory system in 35.5%, gastrointestinal system in 18.4%, central nervous system in 11.8%, genitourinary system in 9.2% and more than one system involved in 7.9% of patients as shown in Figure 2. The data for vital signs and laboratory reports of the patients admitted in ICU with sepsis is shown in Table 2.

Table 2. Findings of patients with sepsis.

	Minimum	Maximum	Median	Mean
Total leukocyte count(cmm)	2300	48200	25750	24489.42
Platelet count(cmm)	28000	498000	113000	147984.8
Urea (mg/dl)	25	148	62	71.7
Creatinine (mg/dl)	0.8	5.6	1.5	1.829
Total bilirubin (mg/dl)	0.6	3.6	0.9	1.2
AST(IU/L)	31	400	46	72.96
ALT(IU/L)	31	378	46	74.16
Arterial blood PH	7	7.48	7.31	7.3
PaO2/FiO2	238	466	400	382.53
Pulse rate(/min)	65	148	112.75	110
Mean Arterial Pressure (mm of Hg)	40	73	58.26	53.33
Temperature (F)	94	104	99.79	100
Respiratory rate(/min)	24	52	31.55	30
SpO2 (%)	70	99	88.43	90

In this study, most common foci of sepsis are unknown which is found in 36.8% of patients. Then other foci of Figure 2. Cause of infection in patient with sepsis.
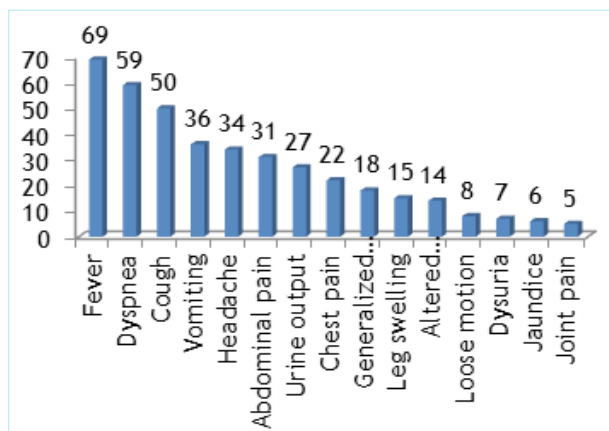

Figure 1.Clinical presentation of patients with sepsis.

During the treatment, 32 patients (42.1%) were kept on invasive mechanical ventilation during admission. While analyzing the outcome of treatment of 76 patients with sepsis in ICU, it was observed that 25 patients (32.9%) expired during treatment and 51 (67.1%) had good recovery as shown in Figure 3.
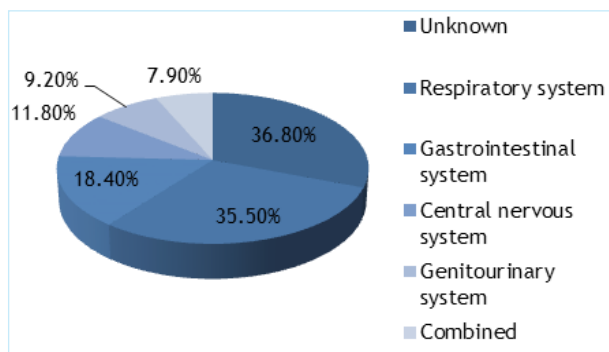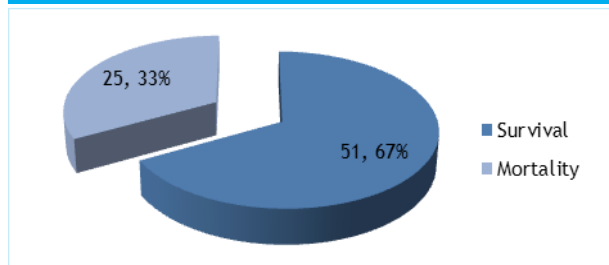

Figure 2.Cause of infection in patient with sepsis.

Figure 3. Outcome of patients with sepsis following treatment.

DISCUSSION

The study revealed that the mortality rate was found to be 32.9%, which is nearly similar to a study conducted in Nepal only by Bhandari et al, [9] which has reported mortality by 30.9%. The reason for the similar report might be because of same geographical location. But the other studies conducted in Kathmandu, Nepal have reported mortality in patients with sepsis by 39.3%[10] and 59.6%,[11] which is higher than our report. It may be because of the small sample size in our set up and inclusion of all the patients with comorbidity in their study. Another reason might be because of difference in referral center that cover wide geographical area and Kathmandu is the referral center from whole country. The mortality rate in patients with sepsis admitted in ICU in our neighbor country India has been reported 56%. [12] In Europe and North America, the mortality rate of patients with sepsis in ICU has been reported as 37.3% in a systematic review and meta-analysis. [13]

Sepsis was found to be more common (31.6%) in patients of age group more than 60 years in this study, however there was no differences in mortality among different age groups. Sepsis was also more common in female (57.9%) as compared to male (42.1%) but mortality is more common on male (47.9%) compared to female (22.7%) whereas a study conducted by Mohamed et al[14] reported that mortality rate was significantly higher in the age group over 60 years which was approximately 80%. Sepsis was found more common on male (71.25%) and mortality was also found more in male (73.7%).This differences of decrease in mortality in our study and similar rate of mortality in all age group might be because of excluding criteria. Patients with comorbidities and diagnosed case of chronic systemic disease are excluded in our study. The difference in mortality among gender might be because of small sample size.

In this study, there is no difference in mean of pulse rate among survival (112.37) and mortality (113.52) group of patients with sepsis. Mean of mean arterial pressure (MAP) in mortality group is 53.52 which is much lowered compared to survival group (60.59) and is found to be statistically significant (<0.001). While study conducted at USA [15] reported that there was increased 28 day mortality with low blood pressure and is statistically significant (p value=0.04) which is similar to present study.

Thirty-two patients (42.1%) were kept on invasive mechanical ventilation during admission among which 53.1% of patients died but only 18.2% of patients without need of invasive mechanical ventilation during admission died which is statistically significant (p value =0.001). Dhital et al[16] study also showed statistically significant (p value <0.001) increased mortality in patients with sepsis

who required invasive mechanical ventilation during admission. Mohamed et al[14] study also showed similar results. So the need of invasive mechanical ventilation in patients with sepsis could be taken as independent predictor of in-hospital mortality in sepsis.

Mean of platelet count was 175504.80 on survival group and much less in mortality group (91844) which is statistically significant(p value<0.001). Mohamed et al[14] study shows the mean platelet count in the survivor group was 240000/ml3 and in the mortality group, it was 97000/mm3 which was statistically significant similar to this study.

The finding of the study is limited by very less sample size. However it provides the glimse of management of sepsis in this part of the country where intensive care services are limited and slowly growing.

CONCLUSIONS

This study showed the mortality rate in patients with sepsis admitted in ICU of NMCTH. Though sepsis is more common in more than 60 years there is no difference in mortality among different age groups. Fever and dyspnea are the commonest mode of presentation. Source of infection is unknown in majority of the case. The study adds to the recommendation that early identification and timely management of sepsis patients are important for reduction of mortality. .

REFRENCES

1. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et. al. The third international consensus definitions for sepsis and septic shock (Sepsis-3). JAMA. 2016 Feb 23;315(8):801-10. PMID: 26903338. [PubMed]

2. Osborn TM, Nguyen HB, Rivers EP. Emergency medicine and the surviving sepsis campaign: an international approach to managing severe sepsis and septic shock. Ann Emerg Med. 2005; 46(3):228-31. PMID: 16126131. [PubMed]

3. Lakhey S, Karki B, Shrestha B, Shakya S, Pandey SB. Sepsis: a private hospital experience in Nepal. Journal of Institute of Medicine. 2006;28(1):12-5. [FullText]

4. Weycker D, Akhras KS, Edelsberg J, Angus DC, Oster G. Long-term mortality and medical care charges in patients with severe sepsis. Crit Care Med. 2003 Sep 1;31(9):2316-23. doi: 10.1097/01.CCM.0000085178.80226.0B. [FullText]

5. Iwashyna TJ, Ely EW, Smith DM, Langa KM. Long-term cognitive impairment and functional disability among survivors of severe sepsis. JAMA. 2010 Oct 27;304(16):1787-94. [FullText]

6. Vincent JL, Abraham E, Annane D, Bernard G, Rivers E, Van den Berghe G. Reducing mortality in sepsis: new directions. Crit Care. 2002 Dec;6(3):S1. [FullText]

7. Jawad I, Lukšić I, Rafnsson SB. Assessing available information on the burden of sepsis: global estimates of incidence, prevalence and mortality. J Glob Health. 2012 Jun;2(1):4. doi: 10.7189/jogh.02.010404. [FullText]

8. Mohamed AK, Mehta AA, James P. Predictors of mortality of severe sepsis among adult patients in the medical Intensive Care Unit. Lung India 2017; 34:330-5. DOI:10.4103/lungindia.lungindia_54_16. [FullText]

9. Bhandari R, Bhandari R, Paudel M, Malla GB. Serum Lactate Level as a Predictor of Outcome in Patients with Septic Shock. Journal of BP Koirala Institute of Health Sciences. 2019 Jul 24;2(1):43-51. DOI: https://doi.org/10.3126/jbpkihs.v2i1.24968. [FullText]

10. Lakhey S, Karki B, Shrestha B, Shakya S, Pandey SB. Sepsis: a private hospital experience in Nepal. Journal of Institute of Medicine. 2006; 28(1):12-5. [FullText]

11. Thapa S, Prasad PN, Shakya YM. Serum Lactate Albumin Ratio as a Predictor of Mortality in Severe Sepsis and Septic Shock at Tribhuwan University Teaching Hospital, Kathmandu. Birat Journal of Health Sciences. 2017 Nov 2; 2(2):191-5. DOI: https://doi.org/10.3126/bjhs.v2i2.18525. [FullText]

12. Chatterjee S, Bhattacharya M, Todi SK. Epidemiology of adult-population sepsis in India: a single center 5 year experience. Indian J Crit Care Med. 2017 Sep; 21(9):573-577. [FullText]

13. 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 Dec; 23(1):196. PMID: 31151462. [PubMed]

14. Mohamed AK, Mehta AA, James P. Predictors of mortality of severe sepsis among adult patients in the medical Intensive Care Unit. Lung India 2017; 34:330-5. [FullText]

15. Tang Y, Sorenson J, Lanspa M. Systolic blood pressure variability in patients with early severe sepsis or septic shock: a prospective cohort study. BMC Anesthesiol. 2017 Dec; 17(1):82. PMID: 28623891. [PubMed]

16. Dhital R, Basnet S, Poudel DR. Predictors and outcome of invasive mechanical ventilation in hospitalized patients with sepsis: data from National Inpatient Sample. J Community Hosp Intern Med Perspect. 2018 Mar 4;8(2):49-52 [FullText]