An observational study on etiology of sepsis patients admitted to ICU

Etiología de la sepsis en los pacientes ingresados en una Unidad de Cuidados Intensivos

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Citación: *Farooq N, Ashraf S, Benazir K. An observational study on etiology of sepsis patients admitted to ICU. Revdosdic [Internet]. 2021 [cited: acces date]; 4(4): e236 [aprox. 6 p.].*

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Editora correctora *Ismara Zamora León* Universidad de Ciencias Médicas de Granma.

Revisado por: *Adrián Alejandro Vitón Castillo* Universidad de Ciencias Médicas de Pinar del Río.

Jimmy Javier Calás Torres Universidad de Ciencias Médicas de Granma.

ABSTRACT

Introduction: despite the fact that sepsis is one of the main causes of death in hospitalized patients, there is a scarcity of data on early predictors of mortality and morbidity. **Objective:** we performed this study to identify the etiology of patients with sepsis in GMC, Srinagar. **Methods:** a prospective longitudinal study was done in our intensive care unit from March 2019 to September 2019. Our study included all 100 adult patients hospitalized to the intensive care unit with signs of sepsis or septic shock. **Results:** in 60 % of the cases, microbiological documentation was available. Gram negative organisms caused the vast majority of illnesses. The respiratory tract was the most common source of infection. The microbial organisms commonly isolated were A. Baumannii in 22 percent of cases, P. Aeruginosa in 17 percent of cases and equal number of cases of Klebsiella and E. coli in 16 percent. **Conclusions:** sepsis is a serious health issue that has a significant mortality rate in the Intensive care unit in the Srinagar, J&K, and the mortality is female dominated.

Keywords: *sepsis; septic shock; Acinetobacter baumannii; Intensive Care Units; Pseudomonas aeruginosa; Klebsiella.*

RESUMEN

Introducción: a pesar de que la sepsis es una de las principales causas de muerte en los pacientes hospitalizados, hay una escasez de datos sobre los predictores tempranos de mortalidad y morbilidad. **Objetivo:** identificar la etiología de la sepsis en los pacientes ingresados en el GMC de Srinagar. **Métodos:** se realizó un estudio longitudinal prospectivo en una unidad de cuidados intensivos desde marzo de 2019 hasta septiembre de 2019. El estudio incluyó a todos los pacientes adultos hospitalizados en la unidad de cuidados intensivos con signos de sepsis o shock séptico. **Resultados:** en el 60 % de los casos se disponía de documentación microbiológica. Los organismos gramnegativos causaron la mayor parte de las infecciones. El tracto respiratorio fue la fuente más común de infección. Los organismos microbianos comúnmente aislados fueron A. Baumannii en el 22 % de los casos, P. Aeruginosa en el 17 % de los casos e igual número de casos de Klebsiella y E. coli en el 16 %. **Conclusiones**: la sepsis es un grave problema de salud que presenta una importante tasa de mortalidad en la unidad de cuidados intensivos de Srinagar, J&K, y la mortalidad está dominada por las mujeres.

Palabras clave: *sepsis; Choque Séptico; Acinetobacter baumannii; Unidades de Cuidados Intensivos; Pseudomonas aeruginosa; Klebsiella.*

Reception: *2021/06/08*
Acceptance: *2021/06/25*
Publication: *2021/10/02*

INTRODUCTION

SEPSIS is an infection-induced syndrome of physiologic, pathologic, and biochemical abnormalities. Sepsis is one of the leading cause of mortality in intensive care units (ICU) [1, 2, 3] . In ICU patients, sepsis and septic shock cause considerable morbidity and death. The fatality rate of sepsis is between 30 and 40 percent [4, 5, 6]. Because the primary treatments for this illness are antibiotics and supportive care, there was no interest about developing more specific diagnostic criteria [7].

According to the recent research, the causal agents of sepsis have shifted from Gram-negative bacteria in the past to Gram-positive bacteria nowadays [8] . Gram-positive and polymicrobial infections were responsible for 30-50 percent, and 25 percent of cases, respectively [9] .

The respiratory tract (40 percent), abdomen (30 percent), and urinary tract (10 percent) are the most common sites of infection. The higher risk of lung infection may be due to the increased prevalence of health care associated infections in critical care units, as well as the frequent and extended use of mechanical ventilation.

Wounds are common sources of sepsis in post-operative and trauma patients. Intravascular catheter related infections are most commonly caused by staphylococcus aureus, streptococci, candida species, and gram-negative rods. Bacterial sinusitis may be an unrecognized source of sepsis in patients ventilated through nasotracheal tubes [10] . Gram-negative bacilli are the most often isolated bacteria from sepsis patients [11] . The lungs, abdomen, and urinary tract are the most common sites for Gram-negative infections [12]. Gram-positive cocci, particularly Staphylococci and Streptococci, are the most prevalent cause of Gram-positive sepsis [13] .

Although sepsis is one of the leading causes of mortality in hospitalized patients, information regarding etiology and early predictive factors for mortality and morbidity is limited. This study was aimed to know the common organisms causing sepsis in adult patients admitted into the ICU in our hospital.

OBJETIVES

To identify etiology and source of sepsis in patients admitted to surgical ICU in GMC Srinagar.

METODHS

This prospective longitudinal study was conducted at SMHS Hospital, after approval by institutional ethical committee. The study included 100 cases of sepsis admitted to surgical ICU of SMHS hospital from March 2019 to September 2019. The subjects with sepsis admitted to ICU, required intensive treatment and monitoring. At the time of admission, all participants over the age of 19 years were screened for sepsis according to the European Society of Intensive Care guidelines [14] .

Vital parameters of patients were recorded at the time of admission and during their stay in ICU, which includes GCS (Glasgow coma score), HR(heart rate), BP(blood pressure), CVP(central venous pressure) and MAP(mean arterial pressure). All base line investigations including ABG(arterial blood gas), CBC(complete blood count), KFT(kidney function test), LFT(liver function test), ECG (electrocardiogram)and X-ray chest were done. Septic profile (blood, urine and endotracheal tube tip cultures) was sent. The patients were followed until they were discharged or died. Demographic information, co-existing diseases, the source of infection, were also noted.

Inclusion criteria

1.Age group 19 years and above.
2.Subjects admitted to surgical ICU with signs of sepsis
3.Patients developing sepsis during their course of stay in surgical ICU

Exclusion criteria

1.Patients who die within a day of admission in ICU.
2.Patients readmitted during the same day.
3. Pregnancy
4. Immunocompromised states (e.g., Malignancy, AIDS, etc.)

SPSS v 21.0 and Microsoft Excel were used for statistical processing. Data descriptive statistics, such as percentages and means, were presented. Bar graphs were used to illustrate the data graphically.

RESULTS

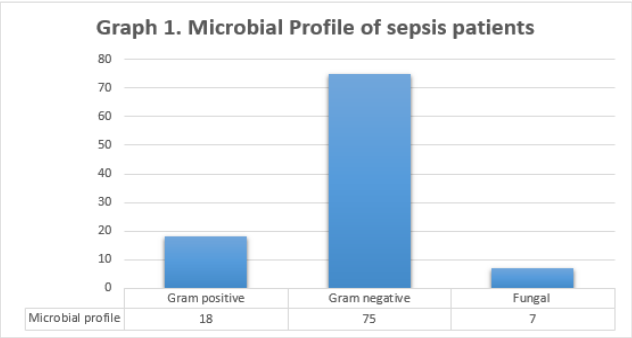
A total of 100 cases were included in this study according to inclusion criteria. The cases included 53

males and 47 females, with male: female ratio of 1.13 :1. Out of these 100 patients, 50 patients (50 %) ultimately died in the ICU. Mortality rate was significantly higher among females compared with males, (67.6% and 37.2%, respectively) ($p<0.05$).

Microbiological documentation was available in 60 percent of cases. The highest number of infections were caused by Gram negative organisms (75 percent); 7 percent of cases were caused due to fungal infections (candidiasis, aspergillosis), whereas 18 percent of sepsis patients were suffering from gram-positive infections. The microbial organisms commonly isolated were A. Baumannii in 22 percent of cases, P. Aeruginosa in 17 percent of cases and equal number of cases of Klebsiella and E. coli in 16 percent. (See, Table 1 and Graph 1).

Table 1. Microbiological profile of sepsis patients.

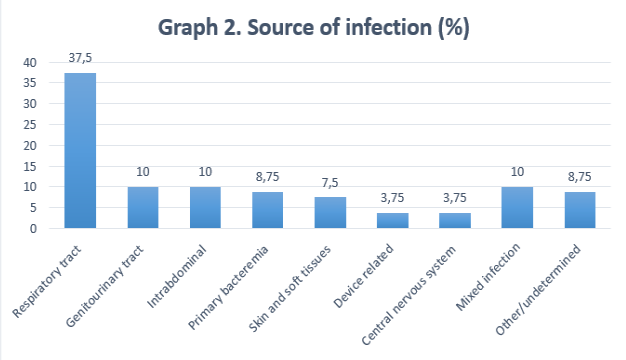
Microbial Organism	Number (%)
Gram Negative Bacteria	**45(75)**
Klebsiella	10(16)
Pseudomonas	10(16)
Acinatobacter	13(22)
E. Coli	10(16)
Others	2(4)
Gram Positive Bacteria	**11(18)**
MRSA	6(10)
Enterococcus	1(2)
Staphylococcus (other than MRSA)	1(2)
Others	3(4)
Fungal organism	**4(7)**
Candida	2(3)
Aspergillus	2(3)



The respiratory system was the most prevalent location of infection (37.5 percent of cases), followed by the urinary tract (10 percent of cases), and intra-abdominal (10 percent of cases). (See, Table 2 and Graph 2).

Table 2. Source of infection.

Infection Site	Percentage (%)
Lungs	37.5
Genitourinary tract	10
Intrabdominal	10
Primary bacteremia	8.75
Cutaneous	7.5
Instrument related	3.75
CNS	3.75
Mixed infection	10
Other/undetermined	8.75



DISCUSION

Sepsis, or the combination of organ failure and infection, is a multifactorial, complicated condition that has a significant health and economic impact on both patients and healthcare systems throughout the world. Liu V et al. mentions "Sepsis as one of the world's leading causes of death and severe illness, with in-hospital mortality rates as high as 25-30 percent in the United States" [15] .

A total of 100 cases were included in this study, which included 43 males (53.75 %) and 37 females (46.25 %), with male: female ratio of 1.13 :1. Our patients comprised an almost equal distribution of males and females, however, the mean age of the entire group was almost a decade less than most reports, especially from the Western countries 16 . The mean age at presentation was 53.0 (± 18.2 SD) years with the range from 19 to 80 years, which was similar to TTS Paary et al. 17 (54 years) and in contrast with previous studies

from Germany (67 years) and Australia (60.7 years) [1, 5]. Maximum number of cases were above 60 years (32.5 %), followed by 46-60 years (28.75 %).

In this study, the death rate was determined to be 51.25 percent. The mortality rates in individuals with sepsis ranged from 13.5 percent to 53.6 percent in studies conducted in Europe and the United States [1, 18, 19] .

The respiratory system was the most prevalent location of infection (37.5 percent of cases) in our study, which was comparable to ANZICS (50.3 percent) [20] and INDICAPS (35 percent) [21]. There is a lot of variation among different studies regarding the sources of infection [1, 5] . Microbiological documentation was available in 60 % of cases, with at least one organism isolated in culture. A similar study by Zanon et al. [22] had reported infectious SIRS of 71.3 %. Majority of the organisms were isolated from respiratory secretions either from the sputum or mini-BAL specimens. Neither blood culture positivity nor isolation of multiple organisms was found to be significantly related to mortality.

In this study, the highest number of infections were caused by Gram negative organisms, similar to Zanon et al. [22] . ANZICS 20 reported that, "Gram positive infection constituted 48.3 % and Gram negative constituted 38.5 % of all infections", as opposed to 18 percent and 75 percent respectively, in our study population. ANZICS 20 reported, "E. coli to be the most common (9.3 %) Gram negative organism, and the methicillin sensitive Staphylococcus aureus to be the most common Gram positive organism", as opposed to A. Baumanni (22 %) and MRSA (10 %), respectively, in our study population.

Limitations: small sample size, although adequately powered to assess the primary objective
Patients were limited to surgical ICU. Future studies should involve much larger patient population and different ICU's (e.g., medical).
Tertiary referral bias that influences the patient profile, particularly severity of disease and microbiological yield due to the abundance of antibiotics used elsewhere.

CONCLUSIONS

Sepsis is a serious health issue that has a significant mortality rate in the ICU in the Srinagar, J&K, and females suffer more than the males. The highest number of infections were caused by Gram negative organisms. The respiratory system was the most prevalent location of infection.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

FUNDING

This research received no external funding

AUTHOR CONTRIBUTIONS

Conceptualization: NF and SA.
Methodology: KB.
Software: KB.
Validation: NF, SA and KB.
Formal Analysis: SA.
Investigation: KB.
Resources: SA.
Data Curation: NF.
Writing - Original Draft Preparation: NF, KB, SA.
Writing - Review & Editing: NF, KB.
Visualization: SA, KB.
Supervision: NF.
Project Administration: KB

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