SYSTEMATIC LITERATURE REVIEW : BACTERIOLOGICAL PROFILE OF SEPSIS IN HOSPITALIZED PATIENTS

Linda Lestari*, Iis Herawati, Gina Khairinisa, and Novie Mauliku
Faculty of Science and Health Technology, Jenderal Achmad Yani Cimahi University
**Corresponding Author: Linda Lestari. Email: Lindawsome@gmail.com*

ABSTRACT

Introduction*: Sepsis is an organ dysfunction due to impaired regulation of the body's response to infection. This disease is one of the world biggest health problem. Sepsis caused by bacterial infection is one of the main causes of high disease morbidity and mortality. Therefore, the management of sepsis must be fast and accurate to improve the prognosis of septic patients. Blood culture prior to the administration of specific antibiotics is one of the managements of sepsis.* ***Research Objective****: This study aims to determine the description and types of bacteria that cause sepsis in hospitalized patients.* ***Methodology****: The research method used is Literature Review. Data collection uses electronic databases, namely Google Scholar and Research Gate where the literature reviewed consists of 2 international journals. Data analysis was carried out by conducting discussions compiled with various supporting literature sources.* ***Research findings****: The results of 2 literatures relating to the description of bacteria that cause sepsis with the same research criteria, namely adult patients >18 years who have 2 or more SIRS criteria, showed the same results, namely the presence of bacterial growth in blood cultures of septic patients.* ***Conclusions****: It was concluded that Gram negative and Gram positive bacteria were found, where Escrichia coli and staphylococcus aureus were the most common types of bacteria found in hospitalized septic patients.*

Keywords*: Bacteria, Blood Culture, Hospital, Sepsis*

1. INTRODUCTION

Infectious diseases are one of the biggest health problems that causing the most death worldwide [1]. Infection is defined as the invasion of organisms in sterile tissue that will trigger inflammation in the body by releasing various chemical mediators. Although the type of tissue that is infected is different, the mediators released remain the same. Inflammation can be local (limited to the site of infection) or widespread with systemic signs and symptoms (systemic inflammation). The clinical manifestation of systemic inflammation is referred to as the systemic inflammatory response syndrome (SIRS). Systemic inflammatory response syndrome (SIRS) is a systemic response to various causes such as massive trauma, burns, pancreatitis, major surgery and infection. systemic inflammatory response syndrome caused by infection is referred to as sepsis [2].

Sepsis is defined as a systemic inflammatory response to a life-threatening infection [3]. Sepsis is a major health problem worldwide. This can be seen from the high incidence, mortality, health costs

required to manage a patient with severe sepsis and septic shock/shock, as well as the increasing incidence from year to year [4]. According to WHO, the global burden of sepsis is difficult to determine, but scientific publications estimate that in 2017 there were 48.9 million cases and 11 million sepsis-related deaths worldwide In addition, the Indonesian Ministry of Health stated that in 2019 there were 703 cases of sepsis which was the cause of death in neonates [4].

The incidence of sepsis is often found in patients treated in the Intensive Care Unit (ICU) with high outcome variability. Septic patients can die due to disease progression to severe sepsis which progresses to septic shock or due to multiple organ failure (MOF) accompanied by decreased immunity [5].

Sepsis caused by bacterial infection is one of the main causes of high morbidity and mortality in both developing and developed countries [6]. Therefore, the management of sepsis must be fast and appropriate to improve the patient's prognosis. The Surviving Sepsis Campaign Bundle in 2018 explained that blood culture is one of the managements of sepsis. Detection of bacteremia by examination of blood cultures plays an important role in the management of sepsis [6]. Although it takes a long time to get the results of the examination. In addition, only about 3-30% of blood culture examinations of patients who clinically show sepsis or systemic infection will get positive results, while about 70-97% of the results are negative. Blood culture has low sensitivity in diagnosing sepsis, but blood culture can help clinicians to determine the etiology of sepsis cases encountered and provide an advantage in the selection of appropriate antibiotics. The high specificity of blood cultures makes blood cultures worthy of being the gold standard for establishing the etiology of infectious diseases and sepsis [7].

2. METHODS

2.1. Journal Search Strategy

In this study the method that will be used is systematic literature review (SLR). The literature search strategy is based on problem analysis (PISCOST) and keywords as well as databases of research topics. As seen in table 1.

Table 1: Picost Method Problem Analysis

NO	Metode PICOST	Problem Analysis
1	Population (P)	Sepsis patients
2	Intervention (I)	There is no treatment
3	Comparation (C)	There is no comparison.
4	Output (O)	Description of Bacteria That Cause Sepsis In Patients Admitted to Hospital
5	Study (S)	Prospective Study
6	Time (T)	2016-2021

The data sources / articles used are nationally reputable journal articles (sinta 1-6) and international journal articles (scropus, Proques, Pubmed, CINHL, Science Direct) in accordance with the theme that has been determined. The keywords used in the literature search are bacteria, sepsis and hospitals. Which is where the search for literature is done through google scholar database and research gate.

The activity is to perform an analysis by looking for similarities (compare), looking for differences (contrast), combining several sources (synthesizes) and giving their own opinions based on the source read (summarize).

2.2. Data analysis

The data obtained from the selected journal will then be entered into a table with the following stages:

2.2.1. Data reduction

At this early stage the author selects, focuses, simplifies, abstractions and transforms raw data written in the journal to be reviewed, which aims to look for findings that will then become the focus in the discussion.

2.2.2. Display data

At this stage the reduced data is then displayed to provide a simpler understanding of the data from the selection journal. From the data obtained, the author then conducts discussions that are combined with various other literary sources so that the final conclusion is obtained in accordance with the purpose of the research.

3. RESULTS

Based on the search results set 2 research sources related to research on the Picture of Sepsis-Causing Bacteria in Patients admitted to hospital as stated in table 2 As follows.

Table 2: Journal That is Willing to Research

No	Author/Researcher and Research Title	Methods	Research findings	Conclusion
1	Debananda Sahoo,Lalatendu Mohanty,S S Panda,S N Mishra Bacteriological analysis of blood culture isolates in patients with sepsis in a tertiary care hospital of eastern India *International Journal of Contemporary Medical Research* 3(12): 3448-3450 (2016)	prospective study, Clinical data from 100 blood samples of sepsis patients	Bacterial growth in positive blood cultures as many as 26 samples with microorganisms *Escherichia .coli* (35%) *Klebsiella* (27%) *Acinetobacter baumannii* (7%) *Staphylococcus aureus* (23%) *Staphylococcus hemolyticus* (8%)	Gram Positive Bacteria 30% and Gram Negative bacteria 70%
2	Rachi Agrawal, K P Ranjan Bacteriological profile of sepsis and their antibiotic susceptibility pattern in adult patients in a tertiary care hospital of Madhya Pradesh, India.	prospective study, Clinical data from 296 blood samples of sepsis patients	*Bacterial growth in positive blood cultures as many as 79 samples with microorganisms E.coli* (17%) *K.pneumoniae*(15%) *K.oxytoca(8%) Citrobacter koseri (5%) Citrobacter freundii* (1%) *Enterobacter aerogenes* (4%) *Pseudomonas aeruginosa* (7%)	Gram Positive Bacteria 32 % and Gram Negative bacteria 68 %

	National Journal of Medical Research, 9(2), 65–69 (2019)	*Acinetobacter baumannii* (10%) *Acinetobacter lwoffii* (1%) *Staphylococcus aureus* (24%) *Staphylococcus negative koagulase* (8%)

4. DISCUSSION

From both journals, there are similarity of the research criteria used, namely blood samples of adult patients (>18 years old) who have two or more systemic inflammatory response syndrome (SIRS) criteria whom blood culture was taken then. In Literature [8], 70% Gram-negative bacteria and 32% Gram-positive bacteria were shown from the result, while in literature [9] 68% Gram-negative bacteria and 32% Gram-positive bacteria were shown. This shows a relatively higher percentage of Gram negative, which is > 68% of all found bacteria. Gram negative bacteria are dominated by Escherichia coli from enterobacteriaceae.

Escherichia coli is bacteria that found in the digestive tract, but when strains acquire additional genetic material, they can become pathogenic and circulate widely throughout the body.

Escherichia coli is divide into three large groups based on its interactions with hosts (humans), namely non-pathogens (commensal), gastrointestinal pathogens, and pathogens outside the digestive tract (extraintestinal). Extracelluler pathogenic E.coli (ExPEC) is a pathogen responsible for the invasion, colonization and induction of diseases in body sites outside the digestive tract such as uropathogenic E.coli (UPEC) (the cause of urinary tract infections), neonatal meningitis (NMEC E.coli) and sepsis (SEPEC E.coli) [10].

In addition to Escherichia coli bacteria, research from both journals also found other Gram negative bacteria such as Klebsiellla Pneumoniae and Acinetobacter baumannii. This is in accordance with the statement of the Minister of Health 2017 where the biggest cause of sepsis is Gram negative bacteria (60-70% of cases) due to the inclusion of lipopolysaccharides (LPS) or endotoxin glycoproteins which are the main components of the outer membrane of Gram negative bacteria that affect the stimulation of proinflammatory mediator expenditure, cause of systemic inflammation during sepsis [4].

The results of both journals showed that Gram Positive was found in blood cultures, but only about 30% of all isolates were grown by the staphylococcus aureus bacteria. There is a slight difference results in literature [9] if viewed based on the type of bacteria that infect in the percentage, in which Staphylococcus aureus 19 isolates out of 79 (24%) more than Escherichia coli 13 isloate than 79 (16%). This can happen because the sample used is relatively more, so the bacteria found are more varied, but if viewed from the group, Gram negative (68%) remains more dominant than Gram positive (31%). This is in accordance with the statement of the Indonesian Minister of Health where Gram positive rarely causes sepsis with an incidence rate between 20-40% of the entire incidence of sepsis.

5. Conclusions

It was concluded that Gram negative and Gram positive bacteria were found, of which Escrichia coli and staphylococcus aureus are the most common types of bacteria found in sepsis patients who are hospitalized.

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