



BACTERIOLOGICAL PATTERN AND ANTIBIOTIC SUSCEPTIBILITY IN NEONATOLOGY WARD ULIN GENERAL HOSPITAL, BANJARMASIN, INDONESIA

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ABSTRACT

The prevalence of bacterial profile of blood cultures and their susceptibility patterns in an area, provide guidance to start empirical treatment which is the cornerstone in the management of neonatal sepsis. This present study was aimed at determining the bacteriological profile and their antimicrobial susceptibility patterns in neonatal septicemia cases. About 346 datas were taken from medical record of neonates from 1 July 2011 - 31 Desember 2012. The bacterial were isolated using API's method (Analytical Profile Index). Inclusion criteria were neonates with features of sepsis and had positive blood culture. Exclusion criteria, if the data was not complete. The result shows that the most common pathogens were *Staphylococcus haemolyticus* (15,3 %), followed by *Klebsiella pneumoniae* (13,3%) and *Serratia marcescens* (12,1%). Almost all microorganisms have high susceptible to imipenem and low susceptible to Ampicillin and Gentamicin. As the conclusion *Staphylococcus haemolyticus* is the most frequent gram-positve bacteria causing neonatal sepsis.

INTRODUCTION

Bacterial sepsis is considered to be an important cause of neonatal mortality (deaths in the first 28 days of life) [1-3]. According to World Health Organization (WHO) estimates, there are about 5 million neonatal deaths a year, 98% occurring in developing countries. Infection, prematurity, and birth asphyxia are the main causes [4,5].

Bacterial organisms causing neonatal sepsis may differ among countries. In developed countries; the Europe and North America, group B streptococcus and E-coli contribute to 70%-75% of cases of neonatal septicemia. In most of developing countries, Gram negative organisms remain the major cause of neonatal sepsis.

Bacteria commonly isolated in the sample included *Klebsiella pneumoniae*, *Eschericia colli*, *Enterobacter spp*,

Pseudomonas aeruginosa, *Staphylococcus aureus*, *Streptococcus ssp*, *Citrobacter ssp*, and coagulase negative *Staphylococcus* (CONS) [6-9]. The composition of pathogens causing neonatal sepsis has also changed dramatically over the last century. This is due to the changing pattern of antibiotic use and changes in life style [10]. Clinical signs of sepsis in neonates are usually nonspecific and often inconspicuous. Like Vergano and colleagues stated that; the clinical signs for diagnosis of neonatal sepsis are any of the following signs; respiratory rate > 60 breaths/min (tachypnea), grunting, temperature >37.7⁰C or <35.5⁰C (hypothermia), lethargic or unconscious, not able to sustain sucking, tachycardia, and convulsion [11], chest retraction, hypothermia, septic umbilicus A different study said the sign of neonatal sepsis such as the reluctance to feed, lethargy, fever, Jaundice, tachypnea, pallor, diarrhea, seizure, cyanosis & abdominal distension [12].

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The gold standar for diagnosis of septicaemia is the isolation of bacterial agents from the blood culture but the result of blood culture takes hours to day [13,14]. The prevalence of bacterial profile of blood cultures and their susceptibility patterns in an area, provide guidance to start empirical treatment which is the cornerstone in the management of sepsis. Therefore, the present study was aimed at determining the bacteriological profile and their antimicrobial susceptibility patterns in neonatal septicemia cases.

MATERIALS AND METHODS

A cross sectional retrospective study was conducted in the Division of Neonatology, Department of Child Health, Lambung Mangkurat University Faculty of Medicine/Ulin General Hospital, Banjarmasin from 1 July 2011 until 31 Desember 2012. All samples for microbiological assessment were collected from medical

record of neonates that were diagnosed as having neonatal sepsis. The samples and bacterial isolates were treated in the Medical Microbiology Laboratory of the Hospital using API’s method (Analytical Profile Index); a manual system from Biomerieux. Inclusion criteria were neonates with features of sepsis and had positive blood culture. Exclusion criteria, if the data was not completed.

RESULTS

A total of 346 culture proven cases of neonatal sepsis were included in this study. The most common pathogens causing neonatal sepsis were *Staphylococcus haemolyticus* (15.3 %), followed by *Klebsiella pneumoniae* (13.3%) and *Serratia marcescens* (12.1%) (Table 1).

Antibiotic susceptibility in top ten microorganisms causing neonatal sepsis is shown in Table 2.

Table 1. Disribution of Various Bacteria causing neonatal sepsis

No	Bacteria	n	%
1.	<i>Staphylococcus haemolyticus</i>	53	15.3
2.	<i>Klebsiella pneumonia</i>	46	13.3
3.	<i>Serratia marcescens</i>	42	12.1
4.	<i>Enterobacter cloacae</i>	21	6.1
5.	<i>Stapylococcus epidermidis</i>	19	5.5
6.	<i>Staphylococcus hominis</i>	16	4.6
7.	<i>Staphylococcus aureus</i>	15	4.3
8.	<i>Pseudomonas luteola</i>	14	4.1
9.	<i>Acinetobacter baumannii</i>	13	3.8
10.	<i>Pseudomonas oryzihabitans</i>	10	2.9
11.	<i>Serratia liquefaciens</i>	9	2.6
12.	<i>Staphylococcus lentus</i>	9	2.6
13.	<i>Staphylococcus xylosus</i>	7	2.0
14.	<i>Staphylococcus saprofiticus</i>	7	2.0
15.	<i>Koccuria varians</i>	7	2.0
16.	<i>Eschericia coli</i>	6	1.8
	<i>Others</i>	52	15.0
	Total	346	100

Table 2. Antibiotic Susceptibility Pattern of the Organisms Isolated from Neonatal Sepsis

Antibiotics	Organisms									
	<i>Staphylococcus haemolyticus</i>	<i>Klebsiella pneumonia</i>	<i>Serratia marcescens</i>	<i>Enterobcter cloacae</i>	<i>Staphylococcus epidermidis</i>	<i>Staphylococcus hominis</i>	<i>Staphylococcus aureus</i>	<i>Pseudomonas luteola</i>	<i>Acinetobacter baumannii</i>	<i>Pseudomonas oryzihabitans</i>
Ampicillin	3.8	0	2.4	0	15.8	0	13.3	0	0	10
Gentamisin	5.7	4.3	4.8	4.8	5.3	37.5	20	14.3	30.8	50
Ampicilin- Sulbactam	18.9	6.5	2.4	0	47.4	37.5	33.3	7.1	46.2	20
Cefotaxime	5.7	4.3	0	4.8	10.5	6.2	20	28.6	0	0
Ceftazidime	0	4.3	7.1	0	10.5	0	0	64.3	0	10
Fosfomycin	60.4	58.7	71.4	52.4	42.1	25	53.3	21.4	7.7	0
Imipenem	41.5	84.8	88.1	90.5	52.6	37.5	46.7	57.1	92.3	80



Among gram-positive and gram-negative bacteria fosfomycin, imipenem and ampicillin-sulbactam have high susceptible to these microorganisms. At *Staphylococcus haemolyticus*, fosfomycin has 60.4%, Imipenem 41.5 % and ampicillin sulbactam 18.9 %. In *Klebsiella pneumoniae*, imipenem is the highest percentage of sensitivity. The low sensitivitas shown in ampicillin and gentamicin as first line antibiotic and also in second line antibiotic (cefotaxime and ceftazidime) except *Acinetobacter baumannii* and *Pseudomonas oryzihabitans* were susceptible gentamicin, less susceptible to fosfomycin.

DISCUSSION

The expectancy of life of neonates is advancing with new life support and new treatment modalities. To overcome neonatal sepsis problem, it is important to know the distribution of etiological agents and their antimicrobial sensitivity [15]. In this study gram positive was the most common bacteria causing neonatal sepsis which is similar to other reports Gujarat, India, Western Nigeria and Urmia, Iran. Sheth et al reported that *Staphylococcus epidermidis* was the commonest isolate, 37,93% followed by *Klebsiella pneumonia*, 22.41% [16]. This also is in concordance with the reports of Awoniyi et al, reported causes of neonatal septicaemia as *Staphylococcus aureus* accounted for 28%, *Klebsiella* and *Pseudomonas* species 13% each, *Proteus* species 10% [17]. In Urmia, Iran, neonatal sepsis was mainly caused by gram positive organisms (CONS) [18].

In contrast, Mutlu et al have reported predominance of Gram negative septicaemia: *Serratia marcescens* (16,4%) in Turki [19]. In Bangladesh, the finding showed that gram-negative organisms were the commonest pathogens causing neonatal sepsis [15] and also in Ciptomangunkusumo Hospital, Jakarta, Rohsiswatmo reported that *Acinetobacter calcoaceticus*

was the most common bacteria found (35.7%), followed by *Enterobacter sp* (7.0%) and *Staphylococcus sp* (6.8%) [20].

In addition, bacterial organisms causing neonatal sepsis have developed increased drug resistance to commonly used antibiotics, making its management a challenge for both the public and private health sectors. Bizzaro et al said that the improvement of neonatal intensive care changes microorganisms's pattern. The Gram-positive is more dominant than gram-negative [21]. The results of antibiotic sensitivity revealed both gram-positive and gram-negative pathogens at this study were best sensitive to imipenem. Good sensitivity of organisms to imipenem has been found by other researches [22]. Ampicillin and gentamicin as first line antibiotic have less sensitivity. Tallur et al reported that most isolates were resisten to ampicillin, gentamicin and cotrimoxazole [23].

Antimicrobial sensitivity patterns differ in studies and at different times. This is due to emergence of resistant strains as a result of indiscriminate use of antibiotics (Awoniyi et al., 2009). The high resistance rates in our study may be associated with frequent use of antibiotics for both prophylaxis and treatment of neonates in hospital. In view of this, we suggest that strategies of antibiotic usage in neonates be reviewed periodically.

CONCLUSION

This study showed that *Staphylococcus haemolyticus* is the commonest Gram-positive bacteria with neonatal sepsis in Neonatology Room of Ulin general Hospital, Banjarmasin. Almost all of bacterias have high susceptible to imipenem. It is vital that local guidelines on antibiotic use in neonatal sepsis should be made and implemented, as judicious use of appropriate antibiotics can markedly decrease the neonatal morbidity and mortality due to sepsis.

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