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Original Research Article

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

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Abstract: Neonatal septicemia remains one of the main causes of mortality and morbidity. Early treatment and appropriate use of antibiotics would minimize the risk of its severity. This study was conducted to determine the profile and antibiotic sensitivity pattern of bacterial isolates from blood cultures of neonates with septicemia admitted in our neonatal unit. About 256 datas were taken from medical record of neonates from 1 January - 31 Desember 2013. The bacterial were isolated using VITEK 2. 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* (22, 3 %), followed by *Klebsiella pneumoniae* (19,1%) and *Staphylococcus epidermidis* (10,6%). Vancomycin, imipenem and gentamicin have high susceptibility to gram-positive bacteria. Amikacin, meropenem and ertapenem have highly sensitivitas to gram-negative bacteria. As the conclusion *Staphylococcus haemolyticus* is the most frequent gram-positive bacteria causing neonatal sepsis.

Keywords : Neonatal sepsis, Bacteria, Antibiotic

Introduction:- Banjarmasin is the capital city of South Kalimantan, one of province in Indonesia. Ulin General Hospital is located in Banjarmasin. It is the referenced hospital in Kalimantan where other provinces send their patient to this hospital if they cannot treat them.

Neonatal Sepsis can be defined as any systemic bacterial infection confirmed by a positive blood culture in the first month of life [1,2,3]. Neonatal septicemia remains one of the main causes of mortality and morbidity despite the progress in hygiene, introduction of new and potent antimicrobial agents for treatment and advanced measures for diagnosis. Up to 10%, infants have infections in the first month of life, the matter which results in 30-50% of total neonatal deaths in developing countries [1].

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Epidemiological data from developing countries shows differences in the incidence, risk factors, pattern and antimicrobial sensitivities of pathogens and mortality from that of developed countries. In developed countries; the Europe and North America, group B streptococcus and E-coli contribute to 70%-75% of cases of neonatal septicemia [4,5]. In most of developing countries, Gram negative organisms remain the major cause of neonatal sepsis [4,6]. The pattern of organisms causing sepsis also varies from place to place and can change in the same place over a period of time [4,5]. This is due to the changing pattern of antibiotic use and changes in life style. These organisms have developed multi-drug resistance over the last two decades due to indiscriminate use of antibiotics, over the counter sale of antibiotics, lack of legislation to control their use and ineffective infection control in maternity services[4].

There are no pathognomic features of neonatal sepsis. Clinical presentation of neonatal sepsis can vary[7]. 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 (tacypnea), grunting, temperature $>37.7^0$C or $<35.5^0$C (hypothermia), lethargic or unconscious, not able to sustain sucking, tachycardia, and convulsion[8]. Another study said the sign of neonatal sepsis such as the reluctance to feed, lethargy, fever, Jaundice, tachypnea, chest retraction, hypothermia, septic umbilicus, pallor, diarrhea, seizure, cyanosis & abdominal distension[9].

Prompt diagnosis and effective treatment is necessary to prevent deaths and complications due to septicemia. Physical signs and symptoms are useful in identifiying neonatal sepsis. These clinical characteristic can be good predictors for positive blood culture but they have limited specificity and sensitivity[7]. The gold standard for diagnosis of septicemia is the isolation of bacterial agent from blood culture but the results of blood culture takes hours to day[6,7,10].

Early treatment and appropriate use of antibiotics would minimize the risk of severe morbidity and mortality in sepsis, and reduce the emergence of multi-drug resistant organisms in intensive care units by rational antibiotic use. For the success of early empiric treatment, periodic review of cases to assess any changing trends in the infecting organisms and their antimicrobial susceptibility is important[4,6]. This study was conducted to determine the profile and antibiotic sensitivity pattern of bacterial isolates from blood cultures of neonates with septicemia admitted in our neonatal unit.

Materials and Metohds

This was a cross sectional retrospective study. Data were taken from medical record of neonates from 1 January until 31 Desember 2013 who admitted to the Division of Neonatology, Department of Child Health, Lambung Mangkurat University Faculty of Medicine/Ulin General Hospital, Banjarmasin. All samples for microbiological assessment were collected from neonates that were diagnosed as having neonatal sepsis. The samples and bacterial isolates were treated in the Medical Microbiology Laboratory of the Hospital using instrument that is called VITEK 2; an automated systems from Biomeriux. Inclusion criteria were neonates with features of sepsis and had positive blood culture. Exclusion criteria, if the data was not completed.

Results and Discussion

During one-year study periode starts from 1 January to 31 Desember 2013, there were 256 samples. The most common pathogens causing neonatal sepsis were *Staphylococcus haemolyticus* (22,3 %), followed by *Klebsiella pneumoniae* (19,1%) and *Staphylococcus epidermidis* (10,6%) (Table 1).

Table 1. Microorganisms causing neonatal sepsis

Bacteria	**N**	**%**
Staphylococcus haemolyticus	57	22,3
Klebsiella pneumonia	49	19,2
Staphylococcus epidermidis	27	10,6
Serratia marcescens	18	7,0
Enterobacter cloacae	12	4,7
Staphylococcus hominis	12	4,7
Acinetobacter baumanii	10	3,9
Serratia liquefaciens	8	3,1
Pseudomonas aeroginosa	6	2,3
Enterobacter aerogene	6	2,3
Eschericia coli	6	2,3
Others	45	17,6
Total	256	100

Antibiotic sensitivity in all Gram-negative microorganisms causing neonatal sepsis is shown in Table 2. Amikacin, meropenem and ertapenem have highly sensitivitas to these microorganisms. *Klebsiella pneumonia*, Amikacin has 73.5%, Ertapenem 71.4 % and meropenem 69.4%. The low sensitivitas shown in ampicillin and gentamicin. However *Serratia liquefaciens* and *Acinetobacter baumanii* were susceptible to imipenem and gentamicin, less susceptible to amikacin. Piperacillin has highly sensitivitas to *Enterobacter sp* and *pseudomonas aeroginosa*.

In table 3 shows that in all gram-positive microorganisms include the three most pathogens causing neonatal sepsis, vancomcin, imipenem and gentamicin have highly percentage of sensitivitas. For *Staphylococcus haemolyticus*, vancomicin has 61.4 %, imipenem 17.5 % and gentamicin 17.5 %.

Table 2. Antibiotic sensitivity of gram-negative microorganisms

Antibiotics	Bacteria (%)						
	Klebsiella pneumonia	*Serratia marcescens*	*Enterobacter cloacae*	*Acinetobacter baumanii*	*Serratia liquefaciens*	*Pseudomonas aeroginosa*	*Enterobacter aerogenes*
Ampicillin	0	0	0	0	0	0	0
Gentamisin	6.1	27.8	33.3	45.4	12.5	33.3	16.7
Ampicillin -Sulbactam	10.2	0	0	54.5	12.5	0	0
Piperacillin	28.6	72.2	58.3	27.2	25	66.7	50
Ceftazidime	4.1	27.8	0	9.1	12.5	33.3	16.7
Ceftriaxone	2	22.2	8.3	0	12.5	0	0
Imipenem	34.7	22.2	41.7	54.5	87.5	0	50
Meropenem	69.4	72.2	58.3	63.6	50	33.3	50
Ertapenem	71.4	77.8	58.3	0	12.5	0	66.7
Amikacin	73.5	77.8	58.3	27.2	12.5	83.3	66.7
Trimetropim Sulfametoxazole	28.6	83.3	33.3	63.6	75	0	66.7

Tabel 3. Antibiotic sensitivity of gram-positive microorganisms

Antibiotic	Bacteria (%)		
	Staphylococcus haemolyticus	Staphylococcus epidermidis	Staphylococcus hominis
Ampicillin	0	0	0
Gentamicin	17.5	14.8	66.7
Ampicillin-Sulbactam	3.5	14.8	25
Cefotaxime	3.5	3.7	0
Ceftazidime	3.5	7.4	0
Ceftriaxone	0	3.7	0
Imipenem	17.5	25.9	25
Meropenem	0	3.7	0
Ertapenem	0	3.7	0
Vancomycin	61.4	66.7	75

Varying pattern of bacterial isolates causing neonatal sepsis warrants the need for continuous ongoing review of causative organisms and their antibiotic sensitivity pattern[4]. In this study gram positive was the most common bacteria causing neonatal sepsis which is similar to other reports from South India and Western Nigeria. Deepa et al reported that *Staphylococcus epidermidis* was the commonest isolate, 36.98% followed by *Klebsiella sp*, 22.45% and *Escherichia coli*, 19.45%[11]. 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% [12].

In contrast, Mutlu et al have reported predominance of Gram negative septicaemia : *Serratia marcescens* (16,4%) in Turki[13]. Mohavedian et al from Iran reported *Pseudomonas aeruginosa* (36%) as the most frequent pathogen, followed by Coagulase negative *Staphylococci* (CoNS) (20,7%), dan *Klebsiella* spp (17%)[14].

Bacterial organisms causing neonatal sepsis may differ among countries, however, in most developing countries, Gram-negative bacteria remain the major source of infection. 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[12]. Bizzaro et all said that the improvement of neonatal intensive care changes microorganisms's pattern. The Gram-positive is more dominant than gram-negavie [15].

In this study almost all the gram-negative were best sensitive to amikacin. Good sensitivity of organisms to amikacin has been found by other researches (Ramesh et al, Aurangzeb et al, and Tallur et al)[5,16,17]. Followed by the third generation cephalosporins ertapenem and meropenem. Ampicillin and gentamicin as first line antibiotic have less sensitivity. Tallur et al reported that most isolates were resisten to ampicillin, gentamicin and cotrimoxazole[17]. Meropenem sensitivity was tested since 2003. Gram negative organisms were universally susceptible to meropenem[18].

The gram-positive bacterias that found in this study were susceptible to vancomycin, imipenem and gentamicin. This study is similar to Mustafa et al[10]. Richards et al reported all CoNS were sensitive to vancomycin[19]. Other studies reported CoNS that treatment with vancomycin appears to be associated with a satisfactory outcome and no adverse effects [20].

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[12]. 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 shows that *S. haemolyticus* is the most common Gram-positive bacteria while *Klebsiella Pneumonia* is the commonest Gram-Negative bacilli associated with neonatal sepsis in Neonatology Room of Ulin general Hospital, Banjarmasin. The gram-positive bacteria have high susceptible to vancomycin. Whereas all the gram-negative were best sensitive to amikacin.

References

1. Naher .H.S. and Khamael .A.B. 2013. *Neonatal sepsis: the bacterial causes and the risk factors*. Int Res J Medical Sci. 1(6): 19-22.
2. Muhammad. Z., Ahmed. A., Hayat. U., Wazir. M. S., Rafiyatullah, and Waqas. H. 2010. *Neonatal sepsis: Causative bacteria and their resistance to antibiotics*. JAMC. 22(4) : 33-36
3. Marchant. E. A., Boyce. G. K., Sadarangani. M., and Lavole. P. M. 2013. *Neonatal sepsis due to coagulase-negative Staphylococci.* CDI. 2010: 1-10
4. Aftab. R. and Iqbal. I. 2009. *Changing pattern of bacterial isolates and their antibiotik sensitivity in neonatal septicemia: a hospital based study*. NMJ. 1(1) :3-8.
5. Ramesh. B. Y., Lewis. L. E. S., and Vandana. K. E. 2011. *Bacterial isolates of early onset neonatal sepsis and their antibiotic susceptibility pattern between 1998 and 2004: and audit from a center in india.* Italian Journal of Pediatrics. 37(32) : 1-6
6. Sivanandan. S., Soraisham. A.S., and Swarnam. K. 2011. *Choice and Duration of Antimicrobial Therapy for Neonatal Sepsis and Meningitis*. Int.Journal of Pediatrics. 2011 : 1-9
7. Kayange. N., Kamugisha. E., Mwizamholya. D. L., Jeremiah. S., and Mshana. S. E. 2010. *Predictors of positive blood culture and deaths among neonates with suspected neonatal sepsis in a tertiary, Mawanza- Tanzania*. BMC Pediatrics. 10 (39): 1-9
8. Vergano .S., Sharland .M., Kazembe .P., Mwansambo .C., and Heath .P. 2005. *Neonatal Sepsis: An International Perspective*. Arch. Dis. Child Fetal Neonatal. 90 : 220-224.
9. Ibraheem .M.F. 2011. *Neonatal bacterial sepsis: risk factors, clinical features, and short term outcome*. J Fac Med Baghdad. 53(3): 261-264.
10. Mustafa. M., and Ahmed .S. L. 2014. *Bacteriological profile and antibiotic susceptibility patterns in neonatal septicemia in view of emerging drug resistance*. J Med Allied Sci. 4(1) : 02-08.
11. Deepa .S., Amruta .K. B., and Venkatesha .D. 2010. *Increasing trends of methicillin resistant coagulase negative staphylococcus in neonatal septicaemia-a study in a tertiary care hospital, mysore, South India*. Online Journal of Health and Allied Science. 9(4): 1-3.
12. Awoniyi .D. O., Udo .S. J., and Oguntibeju. O. O. 2009. *An epidemiological survey of neonatal sepsis in a hospital in western Nigeria*. African Journal of Microbiology Research. 3(6): 385-9.
13. Mutlu .M., Aslan .Y., Saygin .B., Yilmaz. G., Bayramoglu. G., and Koksae. I. 2011. *Neonatal sepsis caused by gram-negative bacteria in a neonatal intensive care unit: a six years analysis.* HK J Pediatri. 16: 253-257.
14. Mohavedian .A. H., Moniri. R., and Mosayebi. Z. 2006. *Bacterial culture of neonatal sepsis.* Iranian J Publ Health. 35(4): 84-89.
15. Bizzaro. M. J. Raskind. C. Robert. S. Baltimore. And Gallagher. P. G. 2005. *Seventy-Five Years of Neonatal Sepsis at Yale: 1928-200.* American Academy of Pediatrics. 116 (3) : 595-602
16. Aurangzeb. B., and Hammed. A. 2003. *Neonatal sepsis in hospital-born babies : bacterial isolates and antibiotic*

susceptibility patterns. J Coll Physicians Surg Pak. 13 : 629-632

17. Tallur. S. S., Kasturi. A. V., Nadgir. S. D., and Khrisna. B. V. S. 2000. *Clinico-bacteriological study of neonatal septicemia in Hubli*. Indian J Pediatr. 67: 169-174
18. Ahmed. N. U., Chowdury. M. A., Hoque. M., and Darmstadt. G. L. 2002. *Clinical and Bacteriological profile of neonatal septicemia in a tertiary level pediatric hospital in Bangladesh*. Indian Pediatric. 39 : 1034-1039
19. Richads. K. and Banerjee. S. 2011. *Treatment of suspevted neonatal sepsis with a central line in-situ-do we always need vancomycin?*. Arch Dis Child Fetal Neonatal. 96: 40-42
20. Linder. N., Lubin. D., Hernandez. A., Amit. L., and Ashkenazi. S. 2013. *Duration of vancomycin treatment for coagulase-negative Staphylococcus sepsis in very low birth weight infants*. BJCP. 76(1) : 58-64