

Bacteriological Analysis and Antibiotic Sensitivity Pattern of Blood Culture Isolates in Kanti Children Hospital

Karki S¹, Rai GK², Manandhar R³

¹Dr. Shubhana Karki, MBBS. MD, Registrar, ²Dr. Ganesh Kumar Rai, MBBS, DCH, MD, Associate Professor (NAMS), ³Dr. Rekha Manandhar, MBBS. MD, Pathologist. All from Kanti Children's Hospital, Maharajgunj, Kathmandu, Nepal.

Address for Correspondence: Dr. Suvana Karki, E-mail: suvana.karki@gmail.com

Abstract

Introduction: As antibiotic sensitivity pattern to common pathogen has been changing day by day, so it has been necessary to study about bacteriological analysis and antibiotic sensitivity pattern. Therefore, the purpose of this study was to analyze on data on bacteremia in children, the pathogen involved and sensitivity pattern. **Objectives:** The aim of this study was to determine the bacteriological profile and antibiotic sensitivity pattern of blood culture isolates from Kanti Children Hospital. **Method:** All blood culture reports (n=9856) during one year period (April 2007 to March 2008) included in the study were analyzed and the sensitivity pattern were recorded. In this retrospective study, we reviewed records of patients from Kanti Children Hospital from April 2007 to March 2008. **Results:** The positivity of blood culture was 4.2% (414/9856). Out of them, 269 (65%) were positive for Staphylococcus aureus, 121 (29.3%) E coli, 13 (3.1%) Klebsiella pneumonia, 6 (1.4%) Streptococcus pneumonia and 5 (1.2%) Streptococcus viridens. Staphylococcus aureus was found most sensitive to Chloramphenicol (88.8%) followed by Amikacin (87.5%), Ofloxacin (76.5%), Ciprofloxacin (72%) and least sensitive to Ampicillin, Cloxacillin and Penicillin. E.coli was found most sensitive to Amikacin (74.7%) followed by Ofloxacin (69.9%), Ciprofloxacin (56.4%) and least sensitive to Cephalexin, Gentamycin and Ampicillin. Klebsiella pneumoniae was found most sensitive to Amikacin (91.7%) followed by Ofloxacin (87.5%), Chloramphenicol (81.8%) and least sensitive to Cotrimoxazole and Gentamycin. It is 100% resistance to Ampicillin and Erythromycin. Streptococcus pneumoniae was most sensitive to Penicillin, Chloramphenicol (100%) followed by Ampicillin and Erythromycin (83.3%) and least sensitive to Cotrimoxazole. Streptococcus viridens was most sensitive to Chloramphenicol (100%) followed by Erythromycin (80%), Penicillin (75%) and least sensitive to Cotrimoxazole. **Conclusion:** This highlights the variable nature of antibiotic susceptibility patterns both in time and location around different geographical locations and within the same country as well. Therefore, it is advisable to continuously evaluate the sensitivity-resistance pattern of isolates so as to make a rational use of antibiotics.

Key words: Antibiotic sensitivity, bacteremia, blood culture, neonatal sepsis.

Introduction

Infants and children are among the most vulnerable population groups to contract illnesses. Nowadays the use of antibiotics has become a routine practice¹. The varying microbiological pattern of septicemia in children warrants the need for an ongoing review of the causative organisms and their antimicrobial susceptibility pattern. The incidence of bacteremia in children varies widely. About 20-50% positivity has been reported by

many workers². The isolation of bacteria from patient's blood stream often indicates serious infectious illness with potentially severe morbidity and mortality unless early appropriate therapeutic measures are initiated³. The gold standard for diagnosis is positive blood culture³. The rational and correct use of antibiotics requires understanding of common pathogens and their drug sensitivity pattern in the regions. Due to constantly

evolving antimicrobial resistant patterns there is the need for constant antimicrobial sensitivity surveillance. This will help clinicians provide safe and effective empirical therapies, develop rational prescription programs and make policy decisions and finally assess the effectiveness of all⁴.

As antibiotic sensitivity pattern to common pathogen has been changing day by day, so it has been necessary to study about bacteriological analysis and antibiotic sensitivity pattern. Determination of antibiotic sensitivity patterns in periodic intervals is mandatory in each region for choosing appropriate antibiotic therapy. Therefore, the purpose of this study was to analyze on data on bacteremia in children, the pathogen involved and sensitivity pattern.

Materials and Methods

This study was a retrospective study; records of patients from Kanti Children Hospital from April 2007 to March 2008 were reviewed. Data were collected of all positive blood culture reports of 9,856 children (neonates and children upto 14 years). Following variables were

investigated: age, sex of patients, microbial species (as recorded in blood culture reports) and drug sensitivity pattern. Antibiotic sensitivity testing was performed by kerby-Bauer's disk diffusion technique using on Muller Hinton (MH) agar. Antibiotic disk used in this study included chloramphenical, cefotaxime, ceftriaxone, cotrimoxazole, ciprofloxacin, ofloxacin, cephalaxine, amikacin, ampicillin and ceftazidime.

Results

Among a total of 9856 blood samples cultured; 414 (4.2%) were positive samples. The rate of isolation was highest among newborns (265/414: 64%) followed by 1 -11 months of age (114/414:27.5%). The overall rate of isolation reduced with increasing age and the overall growth positive rate was relatively higher in males 63.3% as compared to females (36.7%). The types of organisms cultured also varied with age. Out of them 269 (65%) were positive for *staphylococcus aures*, 121 (29.3%) *E coli*, 13 (3.1%) *klebsiella pneumonia*, 6 (1.4%) *streptococuss pneumonia* and 5 (1.2%) *streptococcus viridence*.

Table 1: Types of Organisms isolated in Blood Culture

Types of Organisma grown	No. of isolates (n=414)	Percentages (%)
Staph aureus	269	65.0%
E-coli	121	29.3%
Kleb pneumoniae	13	3.1%
Strep pneumoniae	6	1.4%
Strep viridence	5	1.2%

Table 2: Distribution of growth positive cases by sex

Male	Female	Total
262 (63.3%)	152 (36.7%)	414 (100%)

Table 3: Distribution of growth positive cases by age group

Age	No. of isolates (n=414)	Percentages (%)
<1 month	265	64.0
1-11 month	114	27.5
1-5 yrs	26	6.3
6-10 yrs	4	1.0
>10yrs	5	1.2

Table 4: Showing the Types of bacteria isolated according to the age group

	Types of isolates					Total
	<i>Staph aureus</i>	<i>E coli</i>	<i>Kleb pneumonia</i>	<i>Strep pneumonia</i>	<i>Strep viridans</i>	
<1 month	167 (62.1%)	92 (76.0%)	6 (46.2%)	0	0	265
1- 11months	79 (29.4%)	21 (17.4%)	6 (46.2%)	4 (66.7%)	4 (80.0%)	114
1-5 yrs	17 (6.3%)	5 (4.1%)	1 (7.7%)	2 (33.3%)	1 (20.0%)	26
6-10 yrs	3 (1.1%)	1 (0.8%)	0	0	0	4
> 10yrs	3 (1.1%)	2 (1.7%)	0	0	0	5
Total	269	121	13	6	5	414

Escherichia coli, *Staph aureus* and *Klebsiella pneumoniae* were found highly prevalent among the age group below five years of age; however streptococcus groups were isolated only in age group of one month to five years. *Staph aureus* was found to be most sensitive to chloramphenicol (88.8%) followed by amikacin (87.5%), ofloxacin (76.5%), ciprofloxacin (72%) and least sensitive to cloxacillin, ampicillin and penicillin. *E coli* was found to be most sensitive to amikacin (74.7%) followed by ofloxacin (69.9%), ciprofloxacin (56.4%) and least sensitive to cephalexin, gentamycin and ampicillin. *Klebsiella pneumoniae* was found to be most sensitive to amikacin (91.7%) followed by ofloxacin (87.5%), chloramphenicol (81.8%) and least sensitive to cotrimoxazole and gentamycin. It was 100% resistant to ampicillin and erythromycin. *Streptococcus pneumoniae* was found to be most sensitive to penicillin, chloramphenicol (100%) followed by ampicillin and erythromycin (83.3%) and least sensitive to cotrimoxazole. *Streptococcus viridance* was found to be most sensitive to chloramphenicol (100%) followed by erythromycin (80%) penicillin (75%), and least sensitive to cotrimoxazole.

Discussion

The present study included children from the neonatal to 14 years of age. The isolation rate of blood culture positive cases were 4.2% which was different to rates reported in other studies Nigeria⁴ (44.9%), Calabar⁵ (50.6%), Ilorin Africa⁶ (30.8%), Ife Nigeria⁷ (55%) and India³ (22.9%). One important reason for the lower isolation rate in this hospital could be because most of the cases are referred cases who would already have received antibiotics from outside.

In this study, the rate of isolation was found highest among newborns (265/414 i.e. 64%) followed by children of 1-11 months age group (114/414 i.e. 27.5%) and the overall rate of isolation was reduced with increasing age. Similar results were reported in a study done in Nigeria where the rate of isolation was 50.8% among newborns⁴. However the incidence of bacteremia among

the neonates was 33.9% in another study³. The overall growth positive rate was relatively higher in males 63.3% as compared to females (36.7%). Male preponderance was also observed in another study conducted at Nigeria⁴. Sharma M et al³ also reported similar findings.

Our study showed that *staphylococcus aureus* was the most predominant isolates (65%) followed by *E coli* (29.3%). This observation is in accordance with reports from two other developing countries⁸. Similarly in a study conducted by Martin M Meremikwu et al in Nigeria, they found that *Staphylococcus aureus* was isolated in 48.7% and *E coli* in 23.4% as the most frequent isolates⁴. Aziz et al⁹ also reported *Staphylococcus aureus* 25% and *Escherichia coli* 12.1% as the most pathogenic bacteria recovered from the blood samples. This suggests that infections by these agents constitute a significant threat to child survival in developing countries. *Escherichia coli*, *staph aureus* and *klebsiella pneumonia* were found to be highly prevalent among new borns in our study which was similar to some other studies^{4,9,10}. Recent data from Pakistan also revealed that *Staph. aureus*, *klebsiella*, and *E. coli* were the common organisms isolated in neonatal units at Karachi^{11,12}.

This study showed that; *Staph aureus* was found to be most sensitive to chloramphenicol (88.8%) followed by amikacin (87.5%), ofloxacin (76.5%) and ciprofloxacin (72%). *E.coli* was found to be most sensitive to amikacin (74.7%) followed by ofloxacin (69.9%) and ciprofloxacin (56.4%). *Klebsiella pneumoniae* was found to be most sensitive to amikacin (91.7%) followed by ofloxacin (87.5%), chloramphenicol (81.8%). *Streptococcus pneumoniae* was found to be most sensitive to penicillin, chloramphenicol (100%) followed by ampicillin and erythromycin (83.3%). *Streptococcus viridance* was found to be most sensitive to chloramphenicol (100%) followed by erythromycin (80%) and penicillin (75%).

The present study also showed that all the isolated organisms were found to be sensitive with chloramphenicol, quinolones and amikacin, although

amikacin was not tested for *streptococcus pneumoniae*. Similar sensitivity pattern was reported by Aziz Jyapuni et al⁹. A study done by Tayyaba Khawar et al¹³ in Pakistan found *E coli* to be most sensitive to amikacin and quinolones group. Ghanshyam D. Kumhar¹¹ in his study done at India also found *E coli* and *Klebsiella* sensitive to amikacin and quinolones, but *Staphylococcus* was most sensitive to vancomycin. Shrestha P¹⁰ in his study done in Nepal concluded that *S aureus*, CONS, and gram negative organisms (*Klebsiella*, *Enterobacter* and *E. coli*) were the leading cause of neonatal sepsis in Nepal and most of them were sensitive to aminoglycosides and third generation cephalosporins. Martin M Meremikwu, et al⁴ in Nigeria found Cephalosporins and Macrolides sensitive for *S. aureus* and *coliforms* respectively.

Conclusion

This highlights the variable nature of antibiotic susceptibility patterns both in time and location around different geographical locations and within the same country as well. Therefore, it is advisable to continuously evaluate the sensitivity-resistance pattern of isolates so as to make a rational use of antibiotics. These data support the hypothesis that determination of antibiotic sensitivity patterns in periodic intervals is mandatory in each region for choosing appropriate antibiotic therapy. The result of our study also emphasizes the need for continuous evaluation of local antibiotic sensitivity patterns of pathogen for the formulation of a rational antibiotic policy. Studies such as this should provide a useful information base to guide practice and policies on rational use of antibiotics.

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Conflict of Interest: None.

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