

# ANALYSIS OF BLOOD CULTURE ISOLATES FROM HOSPITALIZED NEONATES IN NAPAL

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**Abstract.** Clinically suspected 77 cases of neonatal septicemia admitted to the pediatric ward of BP Koirala Institute of Health Sciences, Dharan, Nepal, were evaluated by blood culture. The blood culture was positive for bacterial growth in 46 (59.7%) cases. Gram-negative bacteria were isolated in 33 (71.7%) cases, the most common being *Escherichia coli*, followed by *Klebsiella* spp, *Enterobacter* spp. *Staphylococcus aureus* was the most common Gram-positive bacteria. The bacterial isolates were most sensitive to gentamicin (74.5%) and ciprofloxacin (74.5%) followed by chloramphenicol (59.9%). They were most resistant (78.8%) to ampicillin. This study for the first time underlines the pattern of bacterial isolates and their sensitivity pattern to antibiotics in this part of Nepal.

## INTRODUCTION

Neonatal septicemia is an important cause of morbidity and mortality in neonates, both in the developed and developing countries (Polin and Geme, 1992; Kumari and Tandon, 1994; Kameswaran *et al*, 1993). It's incidence is reported to vary between 0.1-0.8% in western countries to about 1% of all live births and 25-40% of all nursery admissions in India (Vaidya *et al*, 1991). The definitive diagnosis of the neonatal septicemia is made by isolation of the organisms in the blood.

Neonatal septicemia is also a recognized problem in Dharan, eastern part of Nepal. However identification of the bacteria responsible for the condition and their antibiotic sensitivity in this part of the country are lacking. Therefore, the aim of the present study was to determine the bacterial causes of neonatal septicemia and to study their antibiotic susceptibility pattern in this hospital.

## MATERIALS AND MATHODS

A total of 77 neonates, who were admitted in pediatric ward of BP Koirala Institute of Health Sciences, Dharan, Nepal was included in this study. Of the total of 77 cases, 50 (64%) were males and 27 (35.1%) were females. History of all the neonates including age, sex and symptoms were re-

corded and provisional diagnosis noted.

About 1-1.5 ml of venous blood was collected from each following strict aseptic precautions. Blood culture was carried out by inoculating aseptically in the pediatric blood culture bottle containing Brain Heart Infusion (BHI) broth as per the recommended procedure (Colle *et al*, 1989). Briefly, blood culture bottles were incubated at 37°C and all the specimens were blindly subcultured after 18 hours and 48 hours on blood agar and MacConkey agar, incubated aerobically and in 5% CO<sub>2</sub> in a candle jar for 24-48 hours. The bacterial colonies grown on either of the media were identified as per the standard methods (Gram stain, motility and biochemical tests). The blood culture specimens which did not show any growth were re-incubated up to 7<sup>th</sup> day, at the end of which final subculture was carried out. The culture specimens not showing any growth after the final subculture were reported as sterile and discarded. Antibiotic sensitivity tests of the bacterial isolates were carried out on Mueller-Hinton agar plates following the method of Kirby-Bauer.

## RESULTS

Out of the 77 blood cultures from neonates, 46 (59.7%) culture specimens showed bacterial growth. Of the positive cases, 32 (69.5%) were males and 14 (30.5%) were females. *Escherichia coli* was the most common bacteria isolated in 11 (23.9%) cases followed by *Klebsiella* spp, *Enterobacter* spp and other pathogens (Table 1). The organisms were most sensitive to ciprofloxacin (76.1%) and gentamicin (76.1%) followed by chloramphenicol. They were most resistant to ampicillin (78.3%) (Table 2).

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Table 1  
Bacteria isolated by blood culture.

S/N Bacteria	No. of bacteria (%)
1 <i>Escherichia coli</i>	11 (23.91)
2 <i>Klebsiella</i> spp	10 (21.74)
3 <i>Enterobacter</i> spp	8 (17.39)
4 <i>Staphylococcus aureus</i>	5 (10.87)
5 Coagulase-negative staphylococci	5 (10.87)
6 Micrococci	2 (4.35)
7 <i>Citrobacter</i> spp	2 (4.35)
8 Others (Gram-positive diplococci, Gram-negative non-fermenters, <i>Providencia</i> spp)	3 (6.52)
Total	46 (100)

Table 2  
Antibiotic sensitivity pattern of the isolated bacteria from blood culture.

S/N Drug	Sensitivity (%)	Resistance (%)
1 Ampicillin	10 (21.7)	36 (78.3)
2 Gentamicin	35 (76.1)	11 (23.9)
3 Ciprofloxacin	35 (76.1)	11 (23.9)
4 Chloramphenicol	28 (60.8)	18 (39.2)

## DISCUSSION

The incidence of neonatal septicemia in the developing countries has been reported variably (Guha *et al*, 1978; Chaturvedi *et al*, 1989; Khatua *et al*, 1986). In the neighboring country India, a positivity of 30-75% has been reported in neonates by different workers (Guha *et al*, 1978; Chaturvedi *et al*, 1989; Khatua *et al*, 1986). Results of our study show a higher positivity rate of 59.7% in neonates admitted in the hospital.

Neonatal septicemia is a life threatening condition that requires prompt treatment and management. Isolating the bacteria and determining their antibiotic susceptibility pattern, which would help to administer proper antibiotic to neonates, can do this. In the present study, Gram-negative bacteria (*Escherichia coli*, *Klebsiella* spp, *Enterobacter* spp) were the most common pathogens isolated followed by other bacteria (Table 1). Similar pattern of Gram-negative bacteriaemia has been observed in related studies (Guha *et al*, 1978; Chaturvedi *et al*, 1989;

Khatua *et al*, 1986; Chugh *et al*, 1988). In our study, group B streptococci and *Listeria* were not isolated. Reports from India (Kishore *et al*, 1996) shows that it is not that common species, although these bacteria, particularly the former have been found to be common species causing neonatal septicemia in the studies reported from western countries (Kerpuch *et al*, 1984; Winchester *et al*, 1977; Freedman *et al*, 1981; Baker, 1978).

In our study, bacterial pathogens were equally sensitive to gentamicin and ciprofloxacin. Gentamicin showed a higher sensitivity of 76.1%, unlike the results of similar studies, which have shown a low sensitivity of 23-30% in recent years. In this study, the strains showed a high degree of resistance to ampicillin (78.3 %) and moderate degree of resistance to chloramphenicol (39.2%).

When analyzed by sex, a higher incidence was found in males (69.5%) with male: female ratio 2:3 as found by others (Kerpuch *et al*, 1984; Winchester *et al*, 1977; Freedman *et al*, 1981). This is probably related to single X chromosome in males (De *et al*, 1995).

Strict asepsis and high degree of clinical suspicion are needed to prevent neonatal sepsis. Apart from this, there is a need for continuous evaluation of local microbial pathogens and their antibiotic susceptibility pattern to formulate rationale use of antibiotics. This will go a long way to reduce the morbidity and mortality due to neonatal septicemia as well as to prevent rapid onset of resistance against commonly used antibiotics.

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