

# Bacterial Pathogens in Neonatal Sepsis and Their Sensitivity to Antibiotics

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## ABSTRACT

**Aims:** To determine the frequency of underlying pathogens in neonatal sepsis and to determine the sensitivity of these pathogens to commonly used antibiotics.

**Place of Study:** Neonatal Unit, Department of Pediatrics, Services Hospital Lahore.

**Study Design:** It was a cross sectional survey.

**Duration:** From: January 2012 to December 2012.

**Method:** 100 neonates were enrolled in the study. Sample for Blood culture was taken under aseptic measures by standardized techniques and were saved in culture bottle. It was collected and transported to the Hospital laboratory by single person and inoculate & incubated there. The growth of the pathogen was observed for next 5 days and sensitivity pattern was checked by using different antibiotic discs. Culture and sensitivity pattern as shown by blood culture report was noted.

**Results:** Frequency of bacterial pathogens were 33(33%) Klebsiella, 25(25%) Pseudomonas, 19(19%) E.Coli and Staphylococcus 23(23%), while frequency of antimicrobial sensitivity reveals 79% Ciprofloxacin, 81% Amikacin, 17% Penicillin and 11% Gentamicin for Staphylococcus Aureus. Sensitivity for Pseudomonas was 56% Ciprofloxacin, 59% Amikacin, 1% Penicillin, Imipenem (79%) and 35% Gentamicin. For pathogens Klebsiella it was 43% Ciprofloxacin, 33% Amikacin, and 8% Impineum while Ciprofloxacin 47%, Amikacin 52% and Imipenem 76% for E.Coli.

**Conclusion:** We concluded that Klebsiella and Pseudomonas are the leading pathogens in neonatal sepsis and the most commonly used antibiotics using in our setup are highly resistant with them which may be used when culture reports are awaiting.

**Keywords:** Neonatal sepsis, pathogens, antibiotics, resistance

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## INTRODUCTION

Neonatal sepsis may be categorized as early or late onset. Early onset sepsis has onset in the first 3 days of life and late onset sepsis is sepsis occurring during 4-90 days of life<sup>1</sup>. The organisms most commonly associated with early-onset infection include Group B Streptococcus (GBS), Escherichia coli, coagulase - negative Staphylococcus, Haemophilus influenzae, and Listeria monocytogenes<sup>2</sup>. These organisms are acquired from the mother during birth. Late-onset sepsis is acquired from the environment. Organisms that have been implicated in causing late-onset sepsis syndrome include coagulase-negative staphylococci, Staphylococcus aureus, E coli, Klebsiella, Pseudomonas, Enterobacter, Candida, GBS, Serratia, Acinetobacter and anaerobes.<sup>3</sup> Incidence of Neonatal sepsis in clinically diagnosed cases is 170/1000 live births, and in cases confirmed by blood culture the incidence is 5.5/1000 live births<sup>4</sup>.

Neonatal Sepsis is one of the main cause of mortality and morbidity in neonates especially in the developing countries. In Pakistan neonatal mortality

rate is 47.3 per 1000 live births; 23% of the deaths being the results of infections<sup>5</sup>. According to a study conducted in Pakistan, cases of culture proven sepsis were 54%; 42% being early onset sepsis and 58% late onset sepsis<sup>6</sup>. Percentage of various pathogens in early onset sepsis is Klebsiella species (25%), Escherichia coli (15%), and Staphylococcus aureus (18%), Group B streptococcus (7%) and in late onset sepsis is Staphylococcus aureus (14%), GBS (12%), Streptococcus pneumoniae (12%), and nontyphoidal Salmonella species (13%)<sup>7</sup>.

Neonatal sepsis (NS) may have subtle, diverse and nonspecific symptoms and signs; moreover, a delay in the diagnosis and commencement of treatment results in a high morbidity and mortality<sup>8</sup>. In our county pre-existing data on both early and late onset sepsis has shown great diversity in the changing pattern of the organism and their sensitivity patterns<sup>9</sup>. Most of the bacterial agents are resistant to amoxicillin/ampicillin and third generation cephalosporins<sup>10</sup>.

We planned this study with the view that the resistance of bacterial pathogens to commonly used antibiotics is emerging and therefore sensitivity of these pathogens to antibiotics is changing. So it was the need of time to reassess the frequency of

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bacterial organisms and the recent sensitivity pattern as it is changing due to emerging antibiotic resistance. This data will give guideline for empirical use of antibiotics when culture reports are awaited.

**MATERIAL AND METHODS**

A total of 100 Neonate (1 to 28 days) both male and females from Nursery of Services Hospital Lahore were included in the study and neonates having life threatening co morbid illness i.e. Birth Asphxia (Negative Blood Culture) and Meconium Aspiration Syndrome (Negative Blood Culture) were excluded from the study. Informed consent was taken from the parents. Demographics like name, age, sex and address were noted. Sample for Blood culture was taken under aseptic measures by standardized techniques and were saved in culture bottle. It was collected and transported to the Services Hospital Lahore laboratory by single person and inoculate & incubated there. The growth of the pathogen was observed for next 5 days and sensitivity pattern was checked by using different antibiotic discs. All this was done in same laboratory so that results are not altered. Culture and sensitivity pattern as shown by blood culture report was noted. Information regarding data of the patient, type of the pathogen in culture and its susceptibility to antibiotics were entered in a proforma.

The data was entered and analyzed by using SPSS 10 computer system. Descriptive Statistics was applied in the form of frequencies and percentages for qualitative variables like gender, bacterial pathogens and their antimicrobial sensitivity. Mean±standard deviation for quantitative variables like age of the neonate.

**RESULTS**

Age distribution of the patients was done, majority of the patients were recorded between 11-20 days i.e., 53(53%), 34(34%) between 1-10 days and 13(13%) between 21-28 days, while mean and sd was calculated as 18.54±8.76 days. Gender distribution of the patients was done in Table 2, where 45(45%) were male and 55(55%) females.

Frequency of bacterial pathogens were recorded 33(33%) Klebsiella, 25(25%) Pseudomonas, 19(19%) E.Coli and Staphylococcus 23(23%).

Frequency of antimicrobial sensitivity was done for pathogens which reveals 79% Ciprofloxacin, 81% Amikacin, 17% Penicillin and 11% Gentamicin for Staphylococcus Aureus. Sensitivity for Pseudomonas was 56% Ciprofloxacin, 59% Amikacin, 1% Penicillin, Imipenum(79%) and 35% Gentamicin. For pathogens Klebsiella it was 43% Ciprofloxacin, 33% Amikacin,

and 8% Impineum while Ciprofloxacin 47%, Amikacin 52% and Imipenum 76% for E.Coli. (Table 1)

Table 1: Frequency of Antimicrobiol Sensitivity (n=100)

Pathogens	Sensitivity
Staphylococcus Aureus	Ciprofloxacin(79%), Amikacin(81%), Penicillin(17%), Gentamicin(11%)
Pseudomonas	Ciprofloxacin(56%), Amikacin(59%), Penicillin(1%), Gentamicin(35%) Imipenum(79%)
Klebsiella	Ciprofloxacin(43%), Amikacin(33%), Imipenum(86%)
E.coli	Ciprofloxacin(47%), Amikacin(52%), Imipenum(76%)

**DISCUSSION**

Neonatal sepsis is an important and common cause of neonatal morbidity and mortality. The incidence of<sup>11</sup> neonatal sepsis in the developed countries is 1-10/1000 live births, where as it is roughly three times more in developing countries like Pakistan.<sup>12</sup> This high incidence is mainly due to poor antenatal care and lack of trained staff to conduct deliveries. There is a strong association between maternal urinary tract infection, pyrexia, vaginal discharge & unclean vaginal examination during labour and early onset neonatal sepsis<sup>13</sup>.

We planned this study to determine the frequency of underlying pathogens in neonatal sepsis and to determine the sensitivity of these pathogens to commonly used antibiotics as the resistance of bacterial pathogens to commonly used antibiotics is emerging and therefore sensitivity of these pathogens to antibiotics is changing.

The findings of study<sup>7</sup> are in agreement with a study where Klebsiella species was (25%), Escherichia coli (15%), and Staphylococcus aureus (18%) while the findings of Dias E<sup>14</sup> regarding sensitivity of Pathogens i.e., Staphylococcus, Pseudomonas, Klebsiella and E.Coli were in agreement with the findings of the current study.

Another study by Hassan A Al-Shamahy and workers<sup>15</sup> was undertaken to investigate the organisms causing sepsis and recorded Klebsiella pneumoniae as the predominant pathogen (36.7%), followed by Pseudomonas species (30%) and recorded most of isolates highly resistant to the majority of other antibiotics tested. The findings of the study are in agreement with the findings of the current study.

However, we revealed that the resistance of bacterial pathogens to commonly used antibiotics are resistant. The results further give us guideline for empirical use of antibiotics when culture reports are awaited.

## CONCLUSION

The results of the study reveal that Klebsiella and Pseudomonas are the leading pathogens in neonatal sepsis and the most commonly used antibiotics using in our setup are highly resistant with them which may be used when culture reports are awaiting.

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