

# Frequency and Susceptibility of Organisms Causing Neonatal Sepsis

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## ABSTRACT

**Objective:** To determine the frequency and susceptibility of organism of bacterial agents responsible for neonatal sepsis.

**Patients and methods:** This cross-sectional descriptive study included 209 patients and done in Nursery Bolan Medical Complex Hospital Quetta between July 2012 to December 2012. The patients any indicative of sepsis like drowsiness, refusal to feed, respiratory distress, temperature instability, cyanosis, seizure or neonates born to mother with maternal peripartum fever 38°C, premature rupture of membranes >18 hours, foul smelling or meconium stained liquor or frequent >3 unclear vaginal examinations were included. The neonates with major congenital anomalies like spina bifida, cleft palate, Down's syndrome were excluded.

**Results:** The mean age of the patients was 10.3 days and male to female ratio was 1.1:1. The significant symptoms were poor feeding which was present in 88.5%, lethargy in 83.3%. The frequency of organisms isolated in blood culture was Pseudomonas 29.7%, Klebsiella 10.5%, E Coli 18.7%, Staph Aureus 29.2%, Enterococcus 16.4% and Streptococcus Pneumoniae 2.4%.

**Conclusion:** The spectrum and susceptibility of organism causing neonatal sepsis is changing and physicians ought to remain on guard.

**Key words:** Frequency, Susceptibility, Organism, Neonatal sepsis

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## INTRODUCTION

Neonatal infection is an important cause of morbidity and mortality. Neonatal infection surveillance networks are necessary for defining the epidemiology of infections and monitoring changes over time.<sup>1</sup> Sepsis is a major cause of morbidity and mortality among newborns in resource-poor countries<sup>2,3</sup>. The organisms responsible for neonatal sepsis vary across geographical boundaries and with the time of illness thus periodic bacteriologic surveillance is a necessity<sup>4</sup>. Widespread use of intrapartum antimicrobial prophylaxis has significantly reduced the incidence of early-onset neonatal infection (EONI); however, little is known about the effects of increased maternal exposure to antibiotics on late-onset neonatal infection (LONI)<sup>5</sup>. Late onset sepsis is a frequent complication of prematurity associated with increased mortality and morbidity<sup>6</sup>. There were many reports of longitudinal changes in the causative organisms of neonatal sepsis in Western countries

but few in Asia<sup>7</sup>. Organisms causing early-onset neonatal sepsis (EONS) have consistently changed over time. The distribution of organisms in EONS helps to influence the appropriate type of antibiotic prophylaxis strategy during labor and the antibiotics used in neonates with suspected sepsis<sup>8</sup>. Neonatal mortality in developing countries is usually due to an infectious cause. The gold standard of investigation in developing countries is a positive blood culture<sup>9</sup>.

## PATIENTS AND METHODS

This was a hospital based cross sectional descriptive study done in Nursery Bolan Medical Complex Hospital Quetta from July 2012 to December 2012. The number of patients included in this study was 209, selected by non probability purposive sampling. Following patients were included in this study: neonates of any gestational age with clinical symptoms/signs indicative of sepsis like drowsiness, refusal to feed, respiratory distress, temperature instability, cyanosis, seizure or neonates born to mother with maternal peripartum fever 38°C, premature rupture of membranes >18 hours, foul smelling or meconium stained liquor or frequent >3 unclear vaginal examinations. The following patients were excluded from the study: neonates with major congenital anomalies like spina bifida, cleft palate, Down's syndrome etc as these conditions predispose

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to infections with particular pathogens and inclusions of these cases would have resulted into bias. Informed consent was obtained for all the included cases. After inclusion three samples of blood, 5 ml each was drawn and sent to laboratory for culture and susceptibility. After arrival of the culture and susceptibility reports, all this information was entered into a Performa. Percentages were calculated for Quantitative variables like symptoms, maternal fever, premature rupture of membranes, organisms causing neonatal sepsis and their susceptibility to commonly used drugs. These percentages were then compared with other regional and international studies to determine the differences and similarities.

**RESULTS**

A total of 209 patients were enrolled in this study during study period. The mean age of enrolled participants was 10.3 days. There were 110 (52.6%) males and 99 (47.4%) females with male to female ratio was 1.1:1. The significant symptoms were poor feeding which was present in 88.5%, lethargy in 83.3%, fast breathing in 60.8%, hyperthermia in 50.6%, convulsions in 12.09%, irritability in 16.7% and hypothermia in 12%. The maternal factors predisposing to sepsis were maternal fever in 29.20%, Premature rupture of membranes in 25.8%, foul smelling vaginal discharge in 17.20 and unclear vaginal examination >3 23.8%. The frequency of organisms isolated in blood culture was as follows: Pseudomonas 29.7%, Klebsiella 10.5%, E Coli 18.7%, Staph Aureus 29.2%, Enterococcus 16.4% and Streptococcus Pneumoniae 2.4% (Table 1).

Table 1: Antimicrobial sensitivity Gram negative pathogens

Name of organism	Klebsiella pneumoniae (n=22)	Pseudomonas (n=62)	Escherichia coli (n=39)
Ampicillin	100% R	Not tested	78% S
Gentamicin	89% R	87% S	76% S
Cefotaxime	56% R	88% S	75% S
Ceftazidime	100% S	98% S	89% S
Ciprofloxacin	100% R	100% S	78% S
Vancomycin	100% R	77% S	71% S
Tobramycin	100% S	85% S	91% S
Amikacin	89% R	97% S	76% S
Meropenem	56% R	88% S	75% S
Imipenem	100% S	98% S	89% S
Piperacillin	100% R	100% R	78% R

Key: R = Resistant S = Sensitive

**DISCUSSION**

The gender ratio in this study was found to be 1.1:1, whereas a study conducted in Ayub Medical College found the gender ratio to be 1.3:1<sup>10</sup>. This could be explained by the cultural pattern in tribal Balochistan

where male are brought earlier, but this is still less than in Khyber Pashtoonkhwa. A Chinese study found the ratio to be 1.4:1 which is also higher than in his study.<sup>11</sup> Thus our results were similar to national and international studies.

In this study 88.5% were presented with poor feeding, 83.3% with lethargy, 60.87% with fast breathing, 55.5% hyperthermia, 16.7 with irritability and 12% presented with convulsions. The most prevalent clinical features of sepsis were hypothermia (84.8%), respiratory distress (72.8%), failure to feed (71.5%) and lethargy (30.1%). In contrast to this study, in an Ethiopian study it was reported that the most common clinical feature was lethargy (80.7%) followed by respiratory distress (57.6%) and feed intolerance (53.8%)<sup>12</sup>. These differences may be due to racial uninvestigated factors.

Maternal fever accounted for 29.2% cases followed by premature rupture of membrane 25.8% and >3 unclean vaginal examination in 25.3% cases. Fever was the most common symptom in a study conducted in Chile<sup>13</sup> while it was 9% in a Brazilian study<sup>14</sup>. The overall rate of PPROM was 1.3% in a Chinese study<sup>15</sup> and 18% in a Brazilian study<sup>14</sup>. The differences for these studies could be best ascribed to lack of obstetric care in our patients in this part of the world.

Pseudomonas (29.7%) was the most common organism isolated from blood cases followed by staphylococcus aureus (29.2%) and E Coli (18.7%). A study conducted in Nepal found the frequency of Klebsiella (47.83%), Pseudomonas sp. (17.39%), Methicillin Resistant Staphylococcus Aureus (MRSA) 3(13.04%).<sup>16</sup> On the other hand colleagues from Karachi found that the commonest pathogen was coagulase-negative Staphylococcus, 339(35.7%), while Klebsiella was the most common gram-negative infection, 178 (18.8%). Escherichia coli, Enterococcus and Enterobacter spp were each responsible for 6% of all infections.<sup>17</sup> Similarly in a study regarding microorganism causing neonatal sepsis reported that Gram negative bacteria constituted 97.8% of the total isolates, of which Klebsiella pneumoniae was the predominant pathogen (36.7%), followed by Pseudomonas species (30%)<sup>18</sup> In Iran Pseudomonas aeruginosa and Staphylococcus aureus were the most common isolates from true bacteremia, and Staphylococcus epidermidis and diphtheroids were the most common contaminants.<sup>19</sup> An Indian study found that Gram negative species represented 90.8% of culture isolates. Pseudomonas (33.2%) and Klebsiella (31.4%) were common among them<sup>20</sup>. Our results showed the spectrum of bacterial infections were quite different to other studies. There are several possible reasons for the implications of these

organism in early onset sepsis as in the developing countries most (75-90%) of the deliveries occur at home with the help of traditional birth attendants. Poor obstetric practices, prolonged and complicated deliveries, lack of aseptic measures, increasing incidence of premature and low birth weight babies, increased handling and postnatal acquiring of infection from environment, all contribute to neonatal sepsis.

## CONCLUSION

The spectrum of organisms causing neonatal sepsis differs in different regions and hospitals, and the susceptibility to commonly used drugs is changing. Pediatricians ought to educate themselves from time to time regarding this.

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