

Original Research Article

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## Bacteriological Spectrum of Neonatal Septicemia in Neonatal Intensive Care Unit

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### ABSTRACT

#### Keywords

Bacteriological spectrum, Neonatal septicaemia, Neonatal intensive care unit

#### Article Info

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Neonatal septicemia either acquired from the mother (vertical transmission) or nosocomial (horizontal transmission) is a formidable problem encountered in the neonatal unit and is the commonest primary cause of morbidity and mortality among neonates. The present study was conducted in Department of Microbiology, Dr B R Ambedkar Medical College, Bengaluru, over a period of one year from June 2016 – May 2017. Blood sample were collected from 100 clinically suspected cases of neonatal septicemia admitted in the neonatal intensive care unit. Of the 100 cases studied, 59 were males and 31 were females. Among 34 culture positive neonates 22 were male and 12 were females. Majority i.e. 34% of the isolates were Gram negative organisms, *Klebsiella pneumoniae* being the commonest isolated in 11 of the 34 culture positive cases followed by *Pseudomonas aeruginosa* 07. The other organisms isolated were *Escherichia coli* 01, *Proteus vulgaris* 01, *Citrobacter freundii* 01. Gram positive organisms were obtained in 9% out of 34 cases. Coagulase negative *Staphylococci* 03 was commonest isolate followed by *Staphylococcus aureus* 01 cases. This study concludes that empiric therapy for suspected neonatal septicemia should cover both Gram-negative bacilli and Gram-positive cocci particularly *Klebsiella pneumoniae* and *Staphylococcus aureus*.

### Introduction

Neonatal septicemia either acquired from the mother (vertical transmission) or nosocomial (horizontal transmission) is a formidable problem encountered in the neonatal unit and is the commonest primary cause of morbidity and mortality among neonates. The early and efficient clinical diagnosis of neonatal bacterial sepsis remains a difficult task as the clinical signs and symptoms of septicemia are vague and nonspecific, hence one depends upon the laboratory diagnosis yet, to treat neonates with antibiotics presumptively on

the basis of subtle signs and risk factors alone are likely to result in over treatment.<sup>1</sup>

Traditional methods such as blood culture requires a minimum of 48 hours for the diagnosis to be made, certain rapid diagnostic tests were developed to diagnose bacteremia so that suitable antibiotic treatment can be started at early to prevent morbidity and mortality.<sup>2</sup>

The overall incidence of neonatal septicemia remained fairly constant over the past 4-5 decades with little change. The incidence

varies from one institution to another and in same institution it varies from time to time which depends on various predisposing factors like low birth weight, prematurity, obstetric and nursing practices. A higher incidence is observed by many authors in developing countries than the developed nations. The reasons listed are high rate of home delivery, often overseen by unskilled attendants, unclean environment and limited resources.<sup>3,4,5</sup>

The incidence has been reported to vary between 1-10/1000 live births in developing countries and 1-4/1000 live births in developed countries.<sup>6</sup> Neonatal septicemia continues to be major cause of neonatal morbidity and mortality. Although the incidence of neonatal septicemia has shown a steady decline in west, it continues to be among the four leading causes of neonatal mortality in India accounting for one fourth to nearly half of all neonatal deaths.

The main objectives of this study the bacteriological spectrum of Neonatal Septicemia in Neonatal Intensive Care Unit

### **Materials and Methods**

The present study was conducted in Department of Microbiology, DR B R Ambedkar Medical College, Bengaluru, over a period of one year from June 2016 – May 2017. Blood sample were collected from 100 clinically suspected cases of neonatal septicemia admitted in the neonatal intensive care unit.

### **Inclusion criteria**

All clinically suspected septicemia neonates on the basis of

Maternal fever  
Foul smelling lochia  
Prolong labour

Suspected neonates with signs and symptoms of sepsis

### **Exclusion criteria**

Neonates with gross congenital anomalies and clinical feature suggestive of septicemia receiving antibiotics were excluded from the study.

### **Results and Discussion**

Of the 100 cases studied, 59 were males and 31 were females.

Among 34 culture positive neonates 22 were male and 12 were females

Majority i.e. 34% of the isolates were Gram negative organisms, *Klebsiella pneumoniae* being the commonest isolated in 11 of the 34 culture positive cases followed by *Pseudomonas aeruginosa* 07.

The other organisms isolated were *Escherichia coli* 01, *Proteus vulgaris* 01, *Citrobacter freundii* 01.

Gram positive organisms were obtained in 9% out of 34 cases. Coagulase negative staphylococci 03 was commonest isolate followed by *Staphylococcus aureus* 01 cases.

Of the 100 cases studied, 59 were males and 31 were females. Among 34 culture positive neonates 22 were male and 12 were females. Majority i.e. 34% of the isolates were Gram negative organisms, *Klebsiella pneumoniae* being the commonest isolated in 11 of the 34 culture positive cases followed by *Pseudomonas aeruginosa* 07. The other organisms isolated were *Escherichia coli* 01, *Proteus vulgaris* 01, *Citrobacter freundii* 01. Gram positive organisms were obtained in 9% out of 34 cases. Coagulase negative staphylococci 03 was commonest isolate followed by *Staphylococcus aureus* 01 cases.

These results are comparable with the observations made by Tallur *et al.*, (63.60%), Uddin Ahmed *et al.*, (63.00%), Movahedin *et*

*al.*, (71.2%), Shrestha *et al.*, (75%), Shansanam Gheibi *et al.*, (55.03%), Haider shirazi *et al.*, (59%) and Ramesh Bhat *et al.*, (53.7%).

The study conducted by Anita Sharma *et al.*, (20%), Kenneth C. Iregbu *et al.*, (22%) and Joshi *et al.*, (25.80%) showed a very low

positivity rate, While study conducted by Roy *et al.*, (47.50%), Jaswal *et al.*, (42%), Betty Chacko *et al.*, (43.10%), Tallur *et al.*, (64.87%) and Karthikeyan *et al.*, (51.34%) showed high culture positivity rate (Table 1 and 2).

**Table.1** Age and sex wise distribution of cases

Gender	Clinically Suspected		Culture Positive		Culture Negative	
	No	%	No	%	No	%
<b>Males</b>	59	59	22	<b>22</b>	37	<b>37</b>
<b>Females</b>	31	31	12	12	19	<b>19</b>
<b>Total</b>	<b>100</b>	<b>100</b>	<b>34</b>	<b>34</b>	<b>56</b>	<b>56</b>

**Table.2** Spectrum of bacterial isolates

Bacterial Isolates	Culture Positive	
	Number	Percentage
<b>A) GRAM POSITIVE ISOLATES</b>		
<i>Staphylococcus aureus</i>	01	<b>01</b>
Coagulase negative staphylococci (CONS)	<b>03</b>	<b>03</b>
<b>TOTAL</b>	<b>09</b>	<b>09</b>
<b>B) GRAM NEGATIVE ISOLATES</b>		
<i>Klebsiella pneumoniae</i>	<b>11</b>	<b>11</b>
<i>Pseudomonas aeruginosa</i>	07	<b>07</b>
<i>Escherichia coli</i>	01	<b>01</b>
<i>Proteus vulgaris</i>	01	<b>01</b>
<i>Citrobacter freundii</i>	01	<b>01</b>
<b>TOTAL</b>	<b>34</b>	<b>34</b>

Stoll B J reported a predominance of Gram negative septicemia (21%-85%) over Gram positive septicemia.<sup>7</sup> Tallur *et al.*, (2000) reported an higher incidence of 37.6/1000 live births in their study among hospital born babies and that the incidence was higher among pre mature and low birth weight babies.<sup>8</sup>

Agnihotri *et al.*, (2004) reported that the incidence of Gram negative and Gram positive organisms was 58.5% and 41.5% respectively.<sup>9</sup> Madhu Sharma *et al.*, in their study conducted

at Rohtak observed frequency of 22.9% neonatal sepsis among 4368 neonates.<sup>10</sup>

Rajlakshmi Viswanathan *et al.*, (2011) reported that the incidence of culture proven neonatal sepsis among inborn babies was 14.8/1000 live births. The proportion of culture positive sepsis for out born babies admitted in NICU was 8.3%.<sup>11</sup>

Observation from the past 30 year literature have shown that males had approximately 2-6

fold higher incidence of septicemia compared to females accounting for 59-82% of cases. This may be related to X linked immune regulatory genes that regulate the synthesis of Y-globulins. As males have only one X chromosome, they are immunologically more susceptible to infection than the female. Infections in males were found to be significantly culture positive with predominance of Gram negative bacterial septicemia.<sup>12</sup>

Tallur *et al.*,<sup>8</sup> noted a high incidence of *Staphylococcus* spp in their study, pointing towards its nosocomial origin. All these isolates were 100% susceptible to Vancomycin. In the study by Karthikeyan major isolate was *Staphylococcus aureus* and most of these isolates belonged to early onset septicemia group; 24/59(40.7%).

This study concludes that empiric therapy for suspected neonatal septicemia should cover both Gram-negative bacilli and Gram-positive cocci particularly *Klebsiella pneumoniae* and *Staphylococcus aureus*. An effective infection-control programme, regular antibiotic susceptibility surveillance and evaluation, and the enforcement and periodic review of the antibiotic policy of the hospital as well as the encouragement of rational antibiotic use will reduce the rates of acquiring nosocomial infections and development of bacterial resistance.

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