

A STUDY OF NEONATAL SEPTICEMIA IN A TERTIARY CARE HOSPITAL IN KALABURAGIPreeti M. Huggi¹, Sanjeev B. Navadagi²**HOW TO CITE THIS ARTICLE:**

Preeti M. Huggi, Sanjeev B. Navadagi. "A Study of Neonatal Septicemia in a Tertiary Care Hospital in Kalaburagi". Journal of Evolution of Medical and Dental Sciences 2015; Vol. 4, Issue 69, August 27; Page: 11957-11963, DOI: 10.14260/jemds/2015/1726

ABSTRACT: BACKGROUND: Neonatal septicemia refers to generalized bacterial infections documented by a positive blood culture in the first 4 weeks of life. It remains a significant cause of morbidity and mortality in the newborns. Neonates are particularly vulnerable to infection because of weak immune barrier. **OBJECTIVES:** To study the distribution of cases of neonatal septicemia at a tertiary care hospital in Kalaburagi. **MATERIALS AND METHODS:** Blood samples were collected aseptically from 200 clinically suspected cases and inoculated into BHI broth and incubated at 37^o C for 7 days. Repeated subcultures were made on 1st, 3rd and 5th days onto Blood agar & Mac Conkey agar. Any growth was identified by colony characteristics & appropriate biochemical tests. **RESULTS:** Of the 200 cases, 31.5% were found to be culture positive. Of these culture positive cases, 53.97% were males and 46.03% were females. A higher number of culture positivity was noted in low birth weight babies i.e. 68.25%. Majority, 90.48% belonged to first week of life. A higher percentage of culture positivity was seen in Pre-term neonates (61.9%) as compared to term and Post term neonates. The proportion of culture positives was higher among neonates delivered by spontaneous vaginal route. (76.2%). Most common neonatal risk factor was Prematurity 58.5%, followed by low birth weight 53.5%. Early onset septicemia was seen in 90.47% cases as compared to 9.53% cases in late onset septicemia. **CONCLUSION:** It is therefore necessary to generate hospital data on distribution of cases according to risk factors involved, so that measures can be taken to prevent neonatal septicemia.

KEYWORDS: Neonatal septicemia, Neonates, Low birth weight.

INTRODUCTION: Neonatal septicemia is a clinical syndrome characterized by systemic signs of infection and accompanied by positive blood culture in first month of life.¹ It is one of the four leading causes of neonatal mortality in India.² Neonates are particularly vulnerable to infection because of weak immune barrier.³ Neonatal septicemia is caused by variety of Gram positive and Gram negative organisms⁴. The local microbial flora causing neonatal septicemia needs to be studied in each setting to guide more effective and rational utilization of antimicrobial agents. Moreover the organisms isolated are often resistant to multiple antimicrobials which make the treatment difficult and grave sequelae ensue.^{3,4} Microbiological pattern of early onset neonatal sepsis is different from late onset sepsis and its association with several perinatal risk factors.⁵

AIMS AND OBJECTIVES

1. Study of neonatal septicaemia in a tertiary care Hospital, Kalaburagi.
2. To study various factors associated with Neonatal Septicaemia.

MATERIALS AND METHODS: Source of Data: The present study was done by taking samples from 200 clinically diagnosed cases of neonatal septicemia in Neonatal intensive care unit at tertiary care

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Hospital, Kalaburagi for a period of one year from Jan 2012 to Dec 2012. Detailed history and clinical findings were recorded.

Inclusion Criteria: Neonates admitted with the clinical diagnosis of neonatal septicemia were included in the study as per the criteria by Vergnono et al⁶ i-e on the basis of H/O maternal fever, H/O prolonged labour, Birth asphyxia, convulsions, symptoms of respiratory distress, temperature >37.7°C or <35.5°C, refusal of feeds, lethargy.

Exclusion Criteria:

1. OPD patients,
2. Neonates on antibiotic therapy.

Sample Collection: The skin of venipuncture site was disinfected with 70% alcohol and 1% iodine. Starting in the centre of the circle povidine iodine was applied in widening circles until the entire circle has been saturated with iodine and allowed to dry for at least a minute.

Blood Culture: Brain heart infusion broth was prepared using the commercially available ready to use powder supplied by Hi-Media Laboratories, Mumbai. The broth was distributed into 10ml quantity in McCartney bottles and sterilized by autoclaving at 121°C for 15 min. 1ml of blood was drawn and immediately inoculated in 10ml of Brain Heart Infusion broth, thus making dilution of 1 in 10 to nullify the natural bacteriostatic or bactericidal activity of blood. After inoculation, the blood culture bottles were incubated at 37°C under aerobic conditions and carefully examined for any macroscopic evidence of growth like turbidity, hemolysis etc. every day for 7 days. The first subculture was done after 6-17 hrs. Thereafter on the third day and finally on the fifth day subsequently. Subcultures were done onto Mac Conkey agar, Blood agar, Nutrient agar and chocolate agar plates. The inoculated plates were incubated at 37°C for 24 hours and observed for any growth. Cultures that did not yield any growth following three subcultures were reported as negative after 7 days. Positive growth was identified on the basis of colony characteristics, gram's staining, hanging drop preparation and other standard biochemical tests.

RESULTS: The study was carried out at a tertiary care Hospital in Kalaburagi by taking samples from 200 clinically diagnosed cases of neonatal septicemia admitted in NICU, for a period of one year from Jan 2012 to Dec 2012. Of the 200 cases, 63(31.5%) were found to be culture positive. Of these 63 culture positive cases, 34(53.97%) were males and 29(46.03%) were females. Males were higher than females in culture positivity with a ratio of 1.17:1. Among the 63 culture positive cases, 43 (68.25%) were low birth weight compared to normal birth weight 20(31.75%). A higher number of culture positivity was noted in low birth weight babies i.e. 68.25%. Out of 63 culture positive cases, 57 (90.48%), 4(6.34%), 1(1.59%), 1(1.59%) belonged to 1st, 2nd, 3rd and 4th weeks respectively. Majority of the culture positive cases, 57(90.48%) belonged to first week of life. Among the 200 clinically suspected cases, 117(58.5%) were Preterm, 71(35.5%) were Term and 12(6%) were Post term neonates. Among the 63 culture positive cases, 39(61.9%) were Preterm, 22(34.9%) were Term and 2(3.2%) were Post term neonates.

A higher percentage of culture positivity was seen in Pre term neonates (61.9%) as compared to term and Post term neonates. Among the 200 clinically diagnosed cases, 151(75.5%) had been delivered by spontaneous vaginal delivery, 46(23%) by caesarian section, 3(1.5%) by assisted instrumental vaginal delivery. The proportion of culture positives was higher among neonates delivered by spontaneous vaginal route. (76.2%). The above table shows that most common neonatal

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risk factor was Prematurity 117(58.5%), followed by low birth weight 107(53.5%), Neonatal resuscitation 51(25.5%), umbilical sepsis 22(11%), Meconium aspiration 13(6.5%).Of the 200 clinically suspected cases, 63(31.5%) were culture positive and 137(68.5%) were culture negative. Of the 63 culture positive cases, early onset septicemia was seen in 57(90.47%) cases and late onset septicemia was seen in 6(9.53%) cases.

DISCUSSION: Neonatal septicemia remains a challenging problem even with modern drug therapy. It is associated with considerable morbidity and mortality. The timely detection of bacteremia can have a profound influence on the final clinical outcome .In the present study, an attempt has been made to know the various etiological agents responsible for neonatal septicemia, study of bacteriological profile and their changing pattern of antibiotic sensitivity.

Onset of Septicemia: In the present study, proportion of culture positive cases were higher among early onset septicemia cases (90.47%) compared to late onset septicemia (9.53%). The percentages of EOS and LOS in various studies. Our results differed from that of Kuruvilla et al.,⁸ (76%), Shrestha P et al⁹ (66.9%) who reported a higher rate of LOS than EOS. This could be due to the fact that they defined EOS as <48 hours and LOS as >48 hours.

Gender: In the present study, males were 57.5% compared to females 42.5%. The percentage of culture positive cases was higher among males 53.97% compared to females 46.03% with a male to female ratio of 1.17:1.These results are comparable to the results obtained by Tallur et al ¹⁰ where they obtained percentage of males to be (63.6%), Uddin Ahmed et al (63.0%).¹¹ Shrestha P et al (75%),⁹ (55.03%). Our results differed from that of Betty Chacko et al.,¹² who observed an equal proportion of cases among both males and females. This may be because their study involved only EOS cases. The male preponderance in neonatal septicemia may be linked to the X-linked immunoregulatory gene factor resulting in the host's susceptibility to infections in males.¹³

Gestational Age: In our study, the proportion of culture positive cases was higher among Preterm neonates (61.9%), compared to term neonates (34.9%) and Post term neonates (3.2%).Our results were comparable to the results obtained by Uddin Ahmed et al,¹¹ (50%), Betty Chacko et al.,¹² (80.6%), who observed a high proportion of cases among Preterm neonates compared to term neonates. The results differed from that conducted by Tallur et al¹⁰ (60%), A H Movahedian et al¹⁴ (55.9%) and Shrestha P et al,⁹ (72.8%) , who observed a higher proportion of cases in term neonates. These differences may be attributed to variations in the population characteristics and occurrence of predisposing factors among them.

Birth Weight: In the present study, the proportion of culture positive cases was higher among the low birth weight (68.25%) compared to normal birth weight (31.75%).Our results are comparable to the results obtained by Seyyed Mohammad Hassan Aletayeb et al,¹⁵ who showed a higher proportion in low birth weight (73.3%) compared to normal birth weight (26.7%), Tallur et al¹⁰ (54.55%), Khatua et al,¹³ (52.33%), reported higher prevalence in the very low birth weight neonates.

Mode of Delivery: In the present study, maximum proportion of culture positive cases were found to be delivered by spontaneous vaginal delivery (76.2%) followed by Caesarean section (20.63%),

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Instrumentation (3.17%). The results are comparable to that obtained by Kuruvilla et al,⁸ (48.51%), Shrestha P et al,⁹ (73.8%), Tallur et al,¹⁰ (91%), who observed a higher proportion of cases among neonates born by spontaneous vaginal delivery. Home deliveries are significantly related to birth asphyxia, which in turn associated with an increased risk of neonatal infection.

Maternal Risk Factors: Infection of the mother at the time of birth, particularly genital infection, is the principal pathway of maternal transmission and can play an important role in the development of infection in the neonate. Transplacental hematogenous infection during or shortly before delivery is also a possibility. In our study the maternal pyrexia was seen in 16.5% of cases. In the present study, 20.5% of cases had history of Premature rupture of membranes >24 hours which is comparable to results reported by Roy et al,³ (28.9%), Hussain et al,⁷ (29.2%), Kuruvilla et al,⁸ (12.8%).

Neonatal Risk Factors: In the present study, prematurity was seen in 58.5% of cases which is comparable to the results reported by Ahmed et al⁷ (50%), Movahedian et al,¹⁴ (44.14%). Present study reports LBW in 53.5% of cases which is comparable to the studies done by Khatua et al¹³ (79.3%), Kaushik et al,¹⁶ (57.8%), Movahedian et al,¹⁴ (65%). In the present study Neonatal resuscitation was seen in 25.5% of cases. Neonatal resuscitation with contaminated equipment in the delivery room has been linked to outbreaks of neonatal infections. In the nurseries, epidemics of septicemia have been traced to improperly sterilized suction catheters and contaminated water of isolates and humidity tents. Superficial skin infection including umbilical sepsis was seen in 11% of cases in our study. After birth skin and umbilical cord become important alternative routes for the entrance of bacteria into the systemic circulation. The umbilical stump is frequent site for cutaneous infection leading to septicemia.

Clinical Presentation: In the present study, the usual mode of presentation were irritability 184(92%) followed by refusal of feeds 183(91.5%), respiratory difficulties 153(76.5%), jaundice 147(73.5%), fever 63(31.5%), convulsions 29(14.5%), redness around the umbilicus 22(11%), bulging fontanel 17(8.5%). Most common signs and symptoms in different studies are shown in the following table

Signs and Symptoms in different studies;

Symptoms	N K Anand et al, ¹⁷	Ahsan Ahmed et al, ⁷	Shrestha P et al, ⁹	Present study
Refusal feeds	77.5	33	42.7	91.5
Fever or hypothermia	-	46	41.7	31.5
Irritability and lethargy	77.5	37	14.6	92
Jaundice	-	21	41.7	73.5
Convulsions	-	18	21.4	14.5
Respiratory difficulties	-	39	29.2	76.5
Redness around the umbilicus extending to the skin	-	-	-	11
Bulging fontanel	-	-	-	8.5

Table 1

Blood Culture: In the present study, blood culture positivity in neonatal septicemia cases was 63(31.5%). Our results are comparable to the studies by Kaushik et al,¹⁶ (36.7%), Uddin Ahmed et al,¹¹

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(35%), Ahsan Ahmed et al.,⁷ (32%). The studies conducted by Mathur et al¹⁸ (24.88%), Agnihotri et al¹⁹ (19.2%) showed a very low positivity rate. While study conducted by Roy et al (47.5%),³ Betty Chacko et al.,¹² (43.1%)¹², Tallur et al.,¹⁰ (64.87%), Khatua et al.,¹³ (59.8%), showed high culture positivity rate. Variations might be due to the fact that most of the blood cultures are sent after the institution of antibiotics. The negative cultures may also be due to over diagnosing the bacteremia as a prelude to avoid the risk of missing any true bacteremia.

CONCLUSIONS: Neonatal septicemia is one of the leading causes of infant mortality and morbidity. Maternal risk factors like maternal pyrexia, premature rupture of membranes and neonatal risk factors like low birth weight, prematurity, neonatal resuscitation play an important role in the etiology of neonatal septicemia.

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Gender	Clinically Suspected		Culture Positive	
	No	%	No	%
Males	115	57.5	34	53.97
Females	85	42.5	29	46.03
Total	200	100	63	100

Table 1: Distribution of Cases According to Gender

Birth Weight	Culture Positive	
	No	%
Low Birth Weight (<2500 gm)	43	68.25
Normal Birth Weight (>2500 gm)	20	31.75
Total	63	100

Table 2: Distribution of Cases According to Birth Weight

Age (Days)	Culture Positive	
	No	%
1-7 (1 st Week)	57	90.48
8-14 (2 nd Week)	4	6.34
15-21 (3 rd Week)	1	1.59
22-28 (4 th Week)	1	1.59
TOTAL	63	100

Table 3: Distribution of cases according of age of the Neonates

Gestational Age	Clinically Suspected		Culture Positive	
	No	%	No	%
Preterm (<37 weeks)	117	58.5	39	61.9
Term (37-41 weeks)	71	35.5	22	34.9
Post Term (>41 Weeks)	12	6.0	2	3.2
Total	200	100	63	100

Table 4: Distribution of Cases According to Gestational Age

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Mode of Delivery	Clinically Suspected		Culture Positive	
	No	%	No	%
VAGINAL				
▪ SPONTANEOUS	151	75.5	48	76.2
▪ INSTRUMENTAL	3	1.5	2	3.17
CAESARIAN SECTION	46	23.0	13	20.63
TOTAL	200	100	63	100

Table 5: Distribution of Cases According to Mode of Delivery

Risk Factors	Number of septicemic neonates	
	No	%
Low birth weight	107	53.5
Prematurity	117	58.5
Meconium aspiration	13	6.5
Neonatal resuscitation	51	25.5
Lack of breast feeding	26	13
Superficial skin infections including umbilical sepsis	22	11

Table 6: Neonatal Risk Factors for Neonatal Septicemia

(Due to multiple symptoms the total percentage exceeds 100)

Blood culture results	EOS	LOS	Total
Positive	57 (90.47%)	6 (9.53%)	63 (31.5%)
Negative	73 (53.3%)	64 (46.7%)	137 (68.5%)
Total	130 (65%)	70 (35%)	200

Table 7: Results of Blood Culture

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FINANCIAL OR OTHER

COMPETING INTERESTS: None

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Date of Submission: 22/08/2015.
Date of Peer Review: 24/08/2015.
Date of Acceptance: 25/08/2015.
Date of Publishing: 26/08/2015.