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CLINICAL PROFILE AND HAEMATOLOGICAL INDICES OF CLINICALLY DIAGNOSED EARLY NEONATAL SEPTICAEMIA: A STUDY CONDUCTED IN TEACHING INSTITUTE ATTACHED TO RURAL HOSPITAL OF WARDHA DISTRICT

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ABSTRACT

In India, neonatal infections occurs in 10.97 to 27 per thousand live births and is the leading cause of neonatal mortality accounting for one quarter to nearly half of all neonatal deaths. A detailed clinical profile of 155 early onset neonatal infections was carried out prospectively for 12 months. Almost 70% babies had associated risk factors. Refusal to feed, respiratory distress, lethargy, restlessness, irritability, hypothermia and fever were the most common presenting features in that order. Blood culture was positive in 71(68.93%) cases. *Klebsiella pneumoniae* was the most frequently isolated pathogen (61.97%). CRP positivity, increased micro-ESR concentration and associated thrombocytopenia were present in statistically significant number of cases.
It can be concluded from the findings of the study that some routine inexpensive laboratory tests will help in the early diagnosis of neonatal septicaemia.

Keywords: Early onset neonatal septicaemia, Clinical profile, Neonatal infections, Laboratory investigations

INTRODUCTION

Neonatal septicaemia is a clinical syndrome of bacteremia characterized by systemic signs and symptoms in the first month of life, it encompasses systemic infections of newborn including meningitis, pneumonia, arthritis, osteomyelitis and urinary tract infections [1].

In India, neonatal infections occurs in 10.97 to 27 per thousand live births and is the leading cause of neonatal mortality accounting for one quarter to nearly half of all neonatal deaths [2,3].

Early onset neonatal septicaemia (EOS) usually presents within the first 72 hours of life [4,5]. A remarkable feature of the clinical manifestations of early neonatal septicaemia is non-specificity of symptoms which creates difficulty in diagnosis of infections in the early stage [6].

The associated risk factors for early-onset sepsis include low birth weight and prematurity. Resuscitation at birth, particularly if it involves endotracheal intubation, insertion of an umbilical vessel catheter, intravenous fluids,

blood products, and those babies who stay in hospital for more than 48 hours are at increased risk of bacterial infection [7,8].

Blood culture remains an important investigation in diagnosing neonatal septicaemia but it has its limitations. In routine practice minimum of 48 hours are required to isolate, identify and determine antimicrobial susceptibility of bacteria [1].

Changing pattern of organisms causing neonatal septicaemia and the frequent emergence of resistant bacteria are causing difficulty in the treatment [9].

The present study was carried out with objectives of finding out the foetal risk factors, common clinical presentations and laboratory findings in neonates those were admitted in NICU with suspected neonatal infections.

MATERIAL AND METHODS

This is a prospective study done at NICU of Acharya Vinoba Bhave rural hospital, Sawangi (M) Wardha. Study period was from September 2009 to August 2010. 155 neonates in whom clinical diagnosis of early neonatal infections was established were selected for the study. Details of these cases were recorded in a separate proforma including obstetric risk factors, history of labor, birth weight, gestational age, day of onset and subsiding of symptoms, presenting clinical features, complications and duration of hospital stay.

Blood culture, C-reactive protein (CRP) estimation, micro-ESR(erythrocyte sedimentation rate), total leucocytes count, platelet count and peripheral blood smear for toxic granules, band cells, cytoplasmic vacuolations were done in all the cases.

Statistical analysis was done using the statistical software SPSS 13.0

RESULTS

Among 155 neonates with early onset infections, 99 were males whereas 56 were females. Thus male to female ratio in this group was 1.7:1.

Associated risk factors were studied in all the cases. Among 155 neonates 96(61.93%) were preterm, 102(65.81%) were low birth weight. 72(46.45%) neonates had mild to moderate birth asphyxia and required active resuscitation. In 15 (9.68%) cases there was history of instrumentation or invasive procedures. 9(5.81%) cases were on ventilator. Presenting sign and symptoms recorded in all the 155 cases are shown in Table I.

Refusal to feed, respiratory distress, lethargy, restlessness, irritability, hypothermia and fever were the most common presenting features in that order.

Blood culture was positive in 71(68.93%) cases. Among these *Klebsiella pneumoniae* was the most frequently isolated pathogen (61.97%), followed by *Staphylococcus aureus* (11.26%), *Escherichia coli* (8.45%), *Enterobacter species* (7.04%), *Citrobacter freundii* (4.23%), *Acinetobacter species* (4.23%) and *Klebsiella oxytoca* (2.82%).

Blood count and peripheral blood smear findings recorded in all 155 cases are shown in Table II. CRP positivity, increased micro-ESR concentration and

associated thrombocytopenia in early onset neonatal infections were statistically significant findings.

DISCUSSION

Early onset neonatal infections is observed more common in males with male/female ratio ranging from 1.4:1 to 3.1:1[5,7,10,11,12]. The male/female ratio in this study was 1.7:1. In the present study prematurity, low birth weight, birth asphyxia, history of instrumentation and ventilators were observed in neonates with early onset neonatal infections (EOS) whereas similar findings were quoted by *I Roy et al, Shahsanam Gheibi et al* and *Meenu Singh et al* in which they were reported prematurity, low birth weight & birth asphyxia to be the commonest risk factors associated with EOS [13,14,15].

The most common presenting features in the present study were refusal to feed, respiratory distress, lethargy, restlessness, irritability, hypothermia and fever in that order. The same findings were also observed by some researchers [2,8,15,16].

Blood culture positivity in EOS as reported by various reporters ranges from 22.9% to 85.99% [7,9,10,13,17,18,19,20,21] whereas in the present study blood culture positivity rate in EOS was observed in 68.93% cases, this finding correlates well with the findings of *K. Chugh et al, Khanal B et al* and *Nalini Agnihotri et al.*

Various researchers have reported incidence of Klebsiella species between 13-60% in their studies [7,9,13,21]. In the present study *Klebsiella pneumoniae* was the most frequently isolated pathogen (61.97%) which is very close to the findings of *K. Chugh et al* where they reported *Klebsiella sp.* in 77.3% of EOS group [20].

Alistair G. S. Philip et al [22] in the study of 376 cases of neonatal septicaemia reported positive CRP in 64(17.02%) cases, *Pradip Kumar Das et al* [23] reported positive CRP in 251/310(80.9%) cases, *R. S. Jaswal et al* [2] in the study of 50 cases reported positive CRP in 50% cases of EOS, *SS Ahmed et al* [24] in the study of 60 neonates found that 70% cases of EOS were CRP positive, *Mustafa S et al* [25] in the study of 50 cases reported CRP positive in 58 % cases of EOS whereas CRP was positive in 99/210(47.14%) cases in the study of *Reza Ghotaslou et al* [26]. The present study finding of CRP positive in 75/155(48.39%) cases of EOS corroborates with the findings of *R. S. Jaswal et al* and *Reza Ghotaslou et al*. The present study finding of increased micro-ESR in 59(38.06%) in EOS cases correlates well with the finding of *R. S. Jaswal et al* where they reported increased micro-ESR in 48% of cases of EOS. *SS Ahmed et al* reported thrombocytopenia in 63.3% cases, *K.V Shyamala et al* in the study of 103 cases reported thrombocytopenia in 72 (69.9%) cases. *Torkaman M et al* in the retrospective study observed in 56.6% EOS. Thrombocytopenia in the present study i.e. 42 (27.10%) in EOS was present in less number of cases when compared with other researchers. Leukocytosis observed in the present study i.e. 19(12.26%) cases in EOS was present in less number of cases when compared

with other researchers like *SS Ahmed et al* (53.3%) & *Archana Devi & Pushpa et al* (50%). On the other hand present study finding of leucopenia in 13 (8.39%) EOS cases correlates with the finding of *Alistair G. S. Philip et al* (9.84%) and *Jain NK et al* (10%). Band cell count (>20%) or toxic granules or cytoplasmic vacuolation in the present study 11(7.10%) in EOS was present in less number of cases when compared with other researchers *Alistair G. S. Philip et al* (27.39%) and *Jain NK et al* (34.4%).

The present study findings of CRP positivity, increased micro-ESR concentration and associated thrombocytopenia in cases of neonatal septicaemia were statistically significant findings.

SUMMARY AND CONCLUSION

Early onset neonatal septicaemia is more common among males. Prematurity, low birth weight, birth asphyxia was the common foetal risk factors found to be associated with EOS. Commonest clinical presentations were refusal to feed, respiratory distress and lethargy whereas commonest causative agent in the present study was *Klebsiella pneumoniae.* Positive CRP, increased micro-ESR and thrombocytopenia were found in statistically significant number in EOS.

From the above summery it can be concluded that CRP, micro-ESR and platelet count estimations will help in the early diagnosis of neonatal septicaemia. These tests will be of great use in cases where antibiotics are started before collection of blood for blood culture. As these tests are inexpensive and readily available these can be of help in hospitals where blood culture facilities are not available.

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Table I: Various clinical presentations in neonates

Signs and symptoms		Early onset sepsis N=155
General	Lethargy	41(26.45)
	Refusal to feed	92(59.35)
	Restlessness	28(18.06)
	Hypothermia	22(14.19)
	Fever	12(7.74)
Alimentary	Abdominal distension	8(5.16)
	Vomiting	1(0.65)
	Diarrhea / dehydration	0(0.00)
Respiratory	Mild/moderate Respiratory distress	75(48.39)
	Severe respiratory distress	4(2.58)
Neurological	Irritability	27(17.42)
	Convulsions /Seizures	14(9.03)
	Hypotonia	16(10.32)

**Figures in parenthesis indicates percentages*

Table II: Laboratory findings in early onset neonatal infections

Laboratory findings	EOS (n=155)	Remark
Positive C-reactive protein (CRP)	75 (48.39)	Significant
Increased micro- ESR (Increased ≥ 15 mm/ 1st hour)	59 (38.06)	Significant
Thrombocytopenia (Platelet count<100,000/mm3)	42 (27.10)	Significant
Leucocytosis (TLC ≥20,000/mm3)	19 (12.26)	Not significant
Leucopenia (TLC <5000/mm3)	13 (8.39)	Not significant
Band cell count (>20%) or toxic granules or cytoplasmic vacuolation	11 (7.10)	Not significant

**Figures in parenthesis indicates percentages*