

Gram positive organisms isolated from neonatal septicaemia

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Abstract

Introduction: Neonatal septicaemia constitutes an important cause of morbidity, mortality and fatality amongst Indian neonates. A remarkable feature of the clinical manifestation of neonatal septicaemia is non-specificity of symptoms, which creates difficulty in diagnosis of infection in the early stage.

Materials & Methods: 1-10 ml of blood collected and inoculated 10ml of Brain-Heart infusion broth. Sub culture on Blood agar, chocolate agar after 24 hrs with sterile inoculation loop (4mm) again after 48 hrs subculture on same culture plates and every day for five days. The organisms were identified by using different characteristic tests like, colony morphology, Gram's stain, coagulase tests (both slide and tube) along with serological test procalcitonin test.

Results: Neonatal septicaemia was seen in 82 cases, in that 53 cases were males and 29 cases were females. 45 cases (male) were isolated in early sepsis and 07 cases (females) were isolated in late sepsis. Procalcitonin test positive were in 67 cases in which 56 cases were positive for both blood culture and Procalcitonin test, 11 cases were positive to Procalcitonin test only and negative for blood culture. The organisms isolated in this study were Gram positive bacteria like *Staphylococcus aureus*, Coagulase negative *Staphylococci* (CONS) and few resistance strains of *Staph. aureus* like MRSA.

Conclusion: A positive blood culture and PCT test are the only definitive and full proof methods of confirming the septicaemia. Hence, we conclude that in our study the best combination of tests in diagnosis for confirming neonatal septicaemia shows a high degree of sensitivity, specificity and positive predictive accuracy.

Keywords: Neonatal Septicaemia, Early Sepsis, Late Sepsis, Cons, PCT.

Introduction

Neonatal sepsis is a bacterial infection in blood which is found in infants during the first month of life also called sepsis neonatorum. Neonatal septicaemia constitutes an important cause of morbidity, mortality and fatality amongst Indian neonates especially in rural areas with history of home deliveries and non-institutional deliveries that too without proper antenatal checkups. The WHO estimates that 4 to 4.5 million children die each year under one month of age under one month of age and that nearly all (98%) of deaths occur in developing countries.⁽¹⁾ Males are noticed to be infected more than females, the ratio being 2:1.

Neonatal sepsis can be classified into two major categories depending upon the onset of symptoms.⁽²⁾

- 1. Early onset sepsis:** Presents within the first 24-72 hrs of life. At birth some neonates were symptomatic in severe cases. The risk factors are seem to be prematurity, prenatal asphyxia, prolonged labour, low birth weight, preterm rupture of membranes.^(2,3)
- 2. Late onset of sepsis:** Presents after 72 hrs of age. Factors are prematurity, invasive procedures, mechanical ventilation, parenteral fluids administration, low birth weight, poor hygiene, poor umbilicalcord care, bottle feeding.

Infected amniotic fluid is a major source of neonatal septicaemia. Several obstetrical complications place the mother at high risk for infection of the

amniotic fluid. After birth bacterial organisms may be acquired in the delivery room or in the new born nursery via respiratory and gastrointestinal route. And also skin, umbilical cord are major routes for the bacterial entrance into systemic circulation and leading septicaemia.

A remarkable feature of the clinical manifestation of neonatal septicaemia is non-specificity of symptoms, which creates difficulty in diagnosis of infection in the early stage. High degree of suspicious and keen observation can help to save child.⁽⁹⁾ Providing clean birth environment and treating the pregnant women with any bacterial infections, previous history of complete or incomplete abortion and immediate conception and also those who have given birth with sepsis previously. Otherwise neonatal sepsis is a serious condition that can put infants at increased risk of death/or long term disability.

The organisms isolated in this study were Gram positive bacteria like *Staphylococcus aureus*, Coagulase negative *Staphylococci* (CONS) and few resistance strains of *Staph. aureus* like MRSA.

Aim

To know the incidence of neonatal septicaemia in this area, isolate the organism and to evaluate various screening tests for the detection of septicaemia.

Materials and Methods

This study was conducted from Dec-2015 to Dec-2016 in and around KBN medical college, Gulbarga. A total number of 82 samples collected from the neonates who were 0-30 days old, suspected on clinical grounds and evaluated.

1-10 ml of blood collected and inoculated in 10ml of Brain-Heart infusion broth. Accordingly the growth was processed and subcultured on Blood agar, chocolate agar after 24 hrs & 48 hrs respectively and every day for five to seven days. The organisms were identified by using different characteristic tests like, colony morphology, Gram's stain, coagulase tests (both slide and tube) along with rapid serological test procalcitonin test. Coagulase negative staph were confirmed by tube coagulase test and MRSA was detected by Methicillin resistance and cefoxitin sensitivity.

Results

Neonatal septicaemia was seen in 82 cases, in that 53 cases were males and 29 cases were females. 45 cases (male) were isolated in early sepsis and 07 cases (females) were isolated in late sepsis. About 10 female were positive in early sepsis and 09 were in late sepsis. Procalcitonin test positive were in 67 cases in which 56 cases were positive for both blood culture and Procalcitonin test, 11 cases were positive to Procalcitonin test only and negative for blood culture. The organisms isolated in this study were Gram positive bacteria like Staphylococcus aureus, Coagulase negative Staphylococci (CONS) and few resistance strains of Staph. aureus like MRSA as shown in Table 4.

Table 1: Total No. of cases and sex distribution for Neonatal septicaemia

Sex	Total No. of cases (82)	Percentage
Male	53	64.63 %
Female	29	35.36 %

Table 2: Total No. of cases isolated from early sepsis and late sepsis in Neonatal septicaemia

Cases	Total (82)	Early sepsis	Late sepsis
Male	53	45(84.90%)	07(13.21%)
Female	29	20(68.96%)	09(31.03%)

Table 3: Total No. of Procalcitonin positive cases in Neonatal septicaemia

Total cases	Total PCT positive cases	Blood culture and PCT positive cases	Blood culture negative and PCT positive cases
82	67(81.71%)	56(83.58%)	11(16.41%)

Table 4: Organisms isolated from early sepsis and late sepsis in Neonatal septicaemia

Name of the organism	Early sepsis	Late sepsis	Total (82)
Staphylococcus aureus strains (MRSA)	24	28	52 (63.42%)
CONS	12	18	30 (36.58%)

Discussion

Septicaemia is a clinical syndrome and it happens to be common in neonates. Early isolation of bacteria will go long way in decreasing the mortality rate in neonates. Blood culture is the gold standard for the confirmation of Sepsis. Neonatal bacteraemia is estimated to occur in 1-8 infants per 1000 live birth.⁽⁵⁾

In the present study we found out 83.58% cases were blood culture positive. Khatua. et al.⁽⁶⁾ in his study showed 59.8% cases as culture positive, Namedo et al.⁽⁷⁾ showed 50% positivity, P.P. Sharma et al.⁽⁸⁾ reported 56% positivity.

In our study Septicaemia was seen in to be more common in males (65%) as compared to females (35.36%). Schaffer et al., reported that septicaemia was more common in males than in females.⁽⁹⁾ Seigel J.D et al., Singh M. et al. also showed similar findings in their respective studies.^(10,11) The exact reason was not known with certainty but probably the factors regulating the synthesis of gamma globulins were situated on the X- chromosome. In male infant presence of X-chromosome extend to less immunologically protective compared to females.

Karlowicz et al. reported that Gram positive organisms caused 73% of bacterial sepsis.⁽¹²⁾ Shrestha p, Das BK et al. reported Staphylococcus aureus and CONS at the commonest isolates in both early and late sepsis.⁽¹³⁾

The isolates found in blood culture were also confirmed by Procalcitonin tests (PCT) in our study. Total no. of positive isolates confirmed by PCT test alone was 67 from 82 total cases. Out of which 56 cases were positive to both blood culture and PCT test and 11 cases were positive only to PCT.

Yadolla Zahedpasha et al. have also reported similar results in their study.⁽¹⁴⁾ Boo N Y et al. concluded that the PCT test kits are moderate sensitivity for early diagnosis of neonatal septicaemia.⁽¹⁵⁾

Conclusion

A positive blood culture is the only definitive and full proof method of confirming the septicaemia but a culture test requires a minimum period of 48 hrs which is a crucial time in making a decision in the treatment of sepsis in newborn. Rapid diagnosis was done by using PCT test gives a reasonable degree of accuracy in diagnosing neonatal septicaemia.

Hence, we conclude that in our study the best combination of tests in diagnosis for confirming neonatal septicaemia shows a high degree of sensitivity, specificity and positive predictive accuracy.

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