Print ISSN: 2321-6379
Online ISSN: 2321-595X
DOI: 10.17354/ijss/2016/560

Original Article

Observational Study on Neonatal Septicemia

D Madhusdan Reddy[1], P Ramesh[2]

[1]Assistant Professor, Department of Pediatrics, Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana, India, [2]Associate Professor, Department of Pediatrics, Mahatma Gandhi Memorial Hospital, Kakatiya Medical College, Warangal, Telangana, India

Abstract

Introduction: Neonatal septicemia is a life-threatening disease. Early diagnosis and prompt treatment are essential. Isolation of pathogenic organism from blood provides definite diagnosis. Nut culture takes 24-48 h for confirmation of diagnosis. Hence, a number of bedside laboratory tests have been devised to facilitate the early diagnosis of septicemia.

Materials and Methods: The material for this study comprised 65 neonates who were clinically diagnosed as neonatal septicemia from the Neonatal Intensive Care Unit at M.G.M Hospital, Warangal. The period of study spread over a period of 1-year from June 2015 to May 2016.

Results: In 24 cases, blood culture has grown an organism. In 33 cases, blood culture is sterile and they are having clinical features of septicemia and C-reactive protein (CRP) is positive. In 8 cases where blood culture could not be done, septicemia is diagnosed basing on clinical features and CRP positivity.

Conclusion: Significantly, number of babies with septicemia are from rural domicile. This is more indicative of the kind of population seeking Government Hospital services rather than indicative high incidence of septicemia in rural babies because generally rural patients predominate in all diseases in M.G.M Hospital.

Key words: Neonatal, Septicemia, Meningitis

INTRODUCTION

When compared to developed countries, the incidence of neonatal septicemia is very high in developing countries. In India, it is in between 10.8% and 14.28%.[1] The manifestations of neonatal septicemia are variable and confusing, so the diagnosis is difficult. Neonatal septicemia is a life-threatening disease. Early diagnosis and prompt treatment are essential. Isolation of pathogenic organism from blood provides definite diagnosis. Nut culture takes 24-48 h for confirmation of diagnosis. Hence, a number of bedside laboratory tests have been devised to facilitate the early diagnosis of septicemia.

Micro-erythrocyte sedimentation rate (ESR), band cell count, band cell/neutrophil ration, gastric aspirate for polymorphs, Sr. IgM, C-reactive protein (CRP), alpha-haptoglobin, and Sr. Fibrinogen levels are helpful for the screening of neonatal septicemia. Positive CRP was found to be the single most sensitive specific test in the diagnosis of neonatal septicemia.[2] The choice of antibiotic in the neonatal sepsis is governed be the knowledge of the prevalent bacterial flora of a particular newborn nursery and their sensitivity pattern to various available antibiotics.[3] Hence, another aim of this study is to know the bacteriological pattern of neonatal septicemia in our neonatal unit and choice of antibiotic combination which will be suitable for our unit.

Access this article online

www.ijss-sn.com

Month of Submission : 09-2016
Month of Peer Review : 10-2016
Month of Acceptance : 10-2016
Month of Publishing : 11-2016

MATERIALS AND METHODS

The material for this study comprised 65 neonates who were clinically diagnosed as neonatal septicemia from the Neonatal Intensive Care Unit at M.G.M Hospital, Warangal. The period of study spread over a period of 1-year from June 2015 to May 2016.

Clinical diagnosis of neonatal septicemia was based on well-established criteria such as depressed activity, lethargy,

Corresponding Author: Dr. Madhusudhan Reddy, H.No. 2-1-125/3, Road No. 4, Madhavanagar Colony, Gopalpur Road, Hanamkonda, Warangal, Telangana, India. E-mail: doctormadhusudhan@gmail.com

poor sucking, hypothermia, apneic spells, abdominal distention, episodes of cyanosis, and respiratory distress. Information was recorded on a prepared pro forma by questionnaire method. Detailed antenatal, natal and post-natal history was recorded for any evidence of antenatal infection, difficult labor, premature rupture of membrane or abnormal delivery, jaundice, convulsions, cyanotic spells, and birth asphyxia.

Beside clinical examination, the investigation like blood total leukocyte count (TLC), differential count, hemoglobin, blood group, micro-ESR, CRP by latex agglutination, test ratio of band forms "O" neutrophil count in the blood were performed. Blood cultures were taken from the peripheral veins under aseptic conditions before starting of antibiotics.

Prehaparinized microhematrocrit tube (75 mm length, 1.1 mm internal diameter, and 1.5 mm outer diameter) was used for determination of micro-ESR, by filling them completely with capillary blood and one end of the tube being closed with plasticin. They were fixed vertically using plaster and fall in 1 h was measured accurately to the nearest millimeter.[4]

CRP latex agglutination kit was used for the estimation of CRP; CRP kit consists of one vial of CRP latex antigen, one vial of positive control, one vial of negative control, glass slide disposable droppers (0.05 ml) drop size, and mixing sticks. The neonates serum is used for testing. The serum was diluted to 1: 16 with 0.9% saline before testing (0.5 ml of serum + 0.75 ml of 0.9% saline). All the reagents were brought to room temperature. With the plastic dropper provided, one drop of diluted test serum, positive and negative control sera are placed on the glass side in each of the three rectangular areas, respectively. Then, the latex antigen and the test sera, positive and negative controls are mixed well the plastic mixing sticks and mixture is spread on the each of the rectangular areas of the slide. The slide tilted gently back and forth. If the agglutination occurs on or before 1 min after mixing, it indicates the presence of CRP and considered as positive. If there is no agglutination by 1 min, after through mixing it indicates a negative test result.

$$\text{Concentration of CRP} = \text{Tire} \times \text{CRP sensitivity } (\mu m/ml)$$
$$= 16 \times 0.33\ \mu m/ml.$$
$$= 5.28\ \mu m/ml.$$

A CRP concentration of equal or more than 5.28 μm/ml was taken as positive.

About 5 ml of blood was drawn from a peripheral vein before starting of antibiotics.

Every precaution has been taken to prevent contamination of the specimen. 2 ml of the blood collected in glucose broth glass bottle containing 10 ml of medium. Remaining blood was used for band cell to neutrophil count and CRP test. Inoculated blood culture bottles are incubated at 37° centigrade. The cultures are incubated for 24 h and subculture was done when the growth is suspected in suitable media.

Swabs for culture and sensitivity were taken from the conjunctiva, umbilicus superficial skin lesions, whenever indicated before administering antibiotics. Lumbar puncture (LP) was done only in symptomatic babies and cerebrospinal fluid (CSF) sent for cell count, biochemical analysis, culture and sensitivity.

RESULTS

Table 2 shows sex distribution of the babies with septicemia; out of 65 cases, 40% are female babies and 60% are male babies.

In 42.1% cases, blood culture is positive, out of 57 cases in which blood culture is done (Table 3).

In 8 cases, blood culture could not be done.

In 24 cases, blood culture has grown an organism. In 33 cases, blood culture is sterile and they are having clinical

Table 1: Frequency of area of residence of septicemia babies

Residence	Frequency (%)	Cum percent	95% confidence limits
Rural	54 (83.1)	83.1	71.7-91.2
Urban	11 (16.9)	100.0	8.8-28.3
Total	65 (100.0)	100.0	

83.1% of septicemia babies are coming from rural households

Table 2: Sex distribution

Residence	Frequency (%)	Cum percent	95% confidence limits
Rural	26 (40.0)	40.0	28.0-52.9
Urban	39 (60.0)	100.0	47.1-72.0
Total	65 (100.0)	100.0	

Two-sided *P*: 0.035

Table 3: Frequency of blood culture positivity

Residence	Frequency (%)	Cum percent	95% confidence limits
Positive	24 (42.1)	42.1	29.1-55.9
Nagative	33 (57.9)	100.0	44.1-70.9
Total	57 (100.0)	100.0	

Table 4: Frequency of blood culture pattern

Residence	Frequency (%)	Cum percent	95% confidence limits
Coagulase negative *Staphylococcus*	1 (1.5)	1.5	0.0-8.3
Escherichia coli	13 (20.0)	21.5	11.1-31.8
Klebsiella	4 (6.2)	27.7	1.7-15.0
Staphylococcus aereus	6 (9.2)	36.9	3.5-19.0
Sterile (Clinical + CRP)*	33 (50.8)	87.7	38.1-63.4
Not done (Clinical + CRP positive)*	8 (12.3)	100.0	5.5-22.8
Total	65 (100.0)	100.0	

*Septicemia diagnosis basing on clinical features and CRP

features of septicemia and CRP is positive. In 8 cases where blood culture could not be done, septicemia is diagnosed basing on clinical features and CRP positivity (Table 4).

DISCUSSION

Significantly, number of babies with septicemia are from rural domicile ($\tilde{\chi} = 7.37$, $P = 0.001$). This is more indicative of the kind of population seeking Government Hospital services rather than indicative high incidence of septicemia in rural babies because generally rural patients predominate in all diseases in M.G.M. Hospital.

In this study, it is found that the incidence of neonatal septicemia is higher in males than in females ($P = 0.035$). The same was reported by several other workers.[5]

Among the 65 neonates 43% of the septicemia babies are admitted at 1 day of postnatal age. 75% of the babies are below 5 days of postnatal age. Hence, early septicemia is seen in 70% of our cases. Early septicemia is common in both male and female babies.

About 49.2% (32) of septicemia babies are of low birth weight (LBW), and 49.8% (33) are of normal birth weight. Although there is no statistical difference between LBW and normal birth weight, clinically this is of relevance, 49.2% of septicemia babies being LBW gives indication of probability of high burden of LBW babies in this population. However, more concerning is predominately normal birth weight babies are also seen with septicemia (49.8%). It requires further studies in this population to know the exact prevalence of LBW babies and more importantly to know the neonatal care practices contributing to neonatal septicemia in both LBW and normal birth weight babies.

The mean birth weight of female and male septicemic babies is not statistically different (2.2 kg in both groups. Sex of the baby is not associated with LBW.

Positive blood culture positive in our study *Escherichia coli* grown in 20% *Staphylococcus aureus* grown in 9.2% *Klebsiella* grown in 6.2% and coagulase negative *Staphylococcus* grown in 1 case.

Gram-negative organisms isolated more in cultures than Gram-positive organism. This finding is correlates with the study of Chowday *et al.* (1975)[5] who observed Gram-negative organisms in 68.7% of cases and Gram-positive organisms in 31.3% of cases.

There is no sex predilection in blood culture positive septicemia cases though males are predominate in total septicemia cases. This can be further clarified by improving the blood culture sample size.

Blood culture positive septicemia is have equal chance in both rural and urban septicemia babies.

In nearing 63% of cases, septicemia is diagnosed basing on clinical findings and CRP positivity. This shown that practical difficulty of proving neonatal septicemia by blood culture in routine clinical practice settings.

CRP test is positive in 82% of cases. Sing *et al.* (1987)[6] found that CRP to be the single most sensitive (90%) and specific test in distinguishing infected from non-infected group. Chandna *et al.* (1988)[7] found CRP to be positive in 83% of cases of neonatal septicemia. Gupta *et al.* (1987)[8] found CRP to be 90.9% sensitive in diagnosing infection when it is present. The sensitivity to CRP in this study closely correlating with the observation of Chandna *et al.* (1988).[7]

- When a baby having blood culture positive the chance of having meningitis is high compared to culture negative septicemia
- Other laboratory parameters like micro-ESR TLC are not associated with blood culture positivity. Hence does not seem to be useful
- Other laboratory parameters like micro-ESR TLC are not associated with blood culture positivity. Hence does not seem to be useful
- Band cell count percentage significantly more in Blood culture positive cases
- Pneumonia is found in significant no. of blood culture positive septicemia cases (37.4) ($P = 0.008$). It shows the need to take routine X-ray chest in neonatal septicemia as it is difficult to diagnose pneumonia clinically in the neonatal period.

CONCLUSION

Magnitude of septicemia like other illness is high in rural population. Male babies are having high chance of getting neonatal septicemia. Early septicemia is found in significant number of babies. Blood culture methodology needs improvement as this is the gold standard to diagnose septicemia. Other lap parameters such as CRP, TLC, neutrophil count, and micro-ESR though believed to help in neonatal septicemia we found them not useful. Band cell count is to some extent useful in the diagnosis of neonatal septicemia. Pneumonia is to be identified in neonatal septicemia by routine X-ray chest especially when blood culture is positive. 15.4% of cases are having meningitis by examining the CSF. In blood culture positive cases meningitis evidence is found in 80%. Hence, routine LP needs to be done in blood culture positive septicemia cases. In blood culture, sterile cases LP can be done depending on clinical need.

REFERENCES

1. Guha DK, Jaspal D, Das K, Guha AR, Khatri RL, Kumar RS. Outcome of neonatal septicemia: A clinical and bacteriological profile. Indian Pediatr 1978;15:423-7.
2. Singh M, Narang A, Bhakoo ON. Evaluation of a sepsis screen in the diagnosis of neonatal sepsis. Indian Pediatr 1987;24:39-43.
3. Steigbigel RT, Johnson PK, Remington JS. The nitroblue tetrazolium reduction test versus conventional hematology in the diagnosis of bacterial infection. N Engl J Med 1974;290:235-8.
4. Namedo UK, Singh HP, Rajput VJ, Kushwaha JS. Haematological indices for early diagnosis of neonatal septicemia. India Pediatr 1985;22:287-91.
5. Choudhury P, Srivastava G, Aggarwal DS, Saini L, Gupta S. Bacteriological study of neonatal infection. Indian Pediatr 1975;12:459-63.
6. Singh MA, Narang ON. Bhakoo evaluation of a sepsis screen in the diagnosis of neonatal sepsis. Indian Pediatr 1987;24:39-43
7. Chandna A, Rao MN, Srinivas M, Shyamala S. Rapid diagnostic tests in neonatal septicemia. Indian J Pediatr 1988;55:947-53.
8. Gupta SK, Sharma U, Gupta ML, Sharma DK. Acridine orange stain – A rapid method for diagnosis of neonatal septicemia. Indian Pediatr 1989;26:153-5.

How to cite this article: Madhusdan RD, Ramesh P. Observational Study on Neonatal Septicemia. Int J Sci Stud 2016;4(8):21-24.

Source of Support: Nil, **Conflict of Interest:** None declared.