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Original Article

Clinical and Bacteriological Profiles of Early Onset Infection in Hospital Delivered Babies

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ABSTRACT:
Background: Neonatal septicemia is a common cause of morbidity and mortality in developing countries. A wide variety of bacteria may be responsible for early onset septicaemia in neonates. Prompt identification of bacteria and instillation of appropriate antibiotic therapy can result in good prognosis. The objective of this study was to identify the clinical and bacteriological profile in early onset septicaemia in neonates. **Materials and Methods**: This study included 300 neonates delivered in hospital set up. Their clinical profile was assessed, blood cultures were taken and antibiotic sensitivity was done. CSF samples were taken and radiological examination was done and various features were recorded. **Results**: Amongst the clinical features, skin lesions, hemorrhagic tendency, hepatosplenomegaly, abdominal distension, convulsions and sclerema were found only in infected newborns. Overall gram positivecocci were in 25% and gram negative bacilli in 75% cases. Mortality from early onset septicemia is 60.4% and death was mostly due to Kleibsella sepsis (94.4%). **Conclusion**: Bacteriological profile in early onset septicaemia in neonates is imperative for institution of right antibiotic therapy. Early onset hospital – acquired sepsis in neonates due to Klebsiella should be an area of concern and further study on larger sample size can validate the results.
Keywords: Antibiotic sensitivity, Bacteria, Infection, Neonate

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INTRODUCTION

It has been estimated by World Health Organization that more than 1 million neonatal deaths worldwide annually are caused by severe infections. Out of which approximately 1 million deaths are a result of neonatal sepsis or pneumonia alone. [1] In developed nations, the incidence of neonatal sepsis varies from 1 to 5 cases per 1,000 live births whereas it ranges from 49 to 170 per 1,000 live births in developing countries. [2]

Neonatal sepsis is a condition in which bacteria leads to signs and symptoms of illness in newborns. This occurs during first 28 days of life and is called early onset sepsis (EOS). Widespread infection may result when pathogenic bacilli gain access to blood and further spread to different parts of body. [3]

Risk factors for this condition are premature low birth weight and asphyxia. Both Gram positive and Gram negative bacteria along with yeasts are the microorganisms responsible for neonatal sepsis. EOS results from increase in infection occurring due to rupture of membranes or when the baby passes through the infected birth canal. Group B Streptococci and Escherichia coli are the major pathogens involved in EOS. [4]

It is a standard practice to advocate early empirical antibiotic treatment of neonates in whom septicemia is suspected. But improper and unnecessary exposure to antibiotics increases the risk of development of drug resistance by bacteria and may thus be associated with poor prognosis. [5] Thus it is important to attain early and confirmatory diagnosis of septicaemia in neonates to reduce the morbidity. Blood culture is the gold standard for diagnosis. Definitive diagnosis of early onset septicaemia depends on positive blood culture and recognition of the responsible bacteria. This is important to start with appropriate antibiotic therapy and install a good outcome. [6]

MATERIALS AND METHODS

A prospective hospital based study was conducted on 300 neonates in the nursery of MY Hospital, Department of Paediatrics, MGM Medical College, Indore, Madhya Pradesh. After obtaining informed consent from the parents, neonates born with the risk of sepsis were enrolled for the study This study was approved by the Ethics Committee of the Hospital. The inclusion criteria were: Babies were required to have ≥1 of the following risk factors of sepsis mentioned below, premature rupture of membranes, Amnionitis, Meconium stained liquor, low birth weight (LBW) (<2.5 kg) 3 per vaginal examinations during labour, preterm infants, active resusitation required in the labor room, mother having temperature of ≥38°C, urinary tract infection in the mother. Preterm (<37 weeks). The exclusion criteria were: Babies born to mothers who had received antenatal antibiotic therapy within 48 h prior to the delivery or had major congenital anomaly.

Blood culture:

Samples were collected within 24 hours of birth. There was no antibiotic administration before collection of samples. Culture were taken with full aseptic precautions, child was placed in supine position and area was cleaned with 70% ethanol swab in one direction only, 50 mm area is cleaned, hen finally povidone iodine was applied and part was dried. The sample of blood was taken by 22 gauge needle. 10 ml. of glucose broth was used for one ml. blood culture.

A broth was kept in incubator for 24 hours. Blood films were made from broth mixture and stained with grams stain. Nutrient agar plates or blood agar or Mac Conkeys medium were inoculated by successive strokes with a charged loop depending upon the organisms seen in the gram's stain. The inoculated media were incubated at 37^0 C for 24 hours. After this plates were examined for colony characters, gram stained smears for the type of organism. Single isolated colony was picked up and complete sugar set inoculated which included glucose, lactose, maltose, sucrose, xylose, Indol, reaction was done with the peptone water having the colony suspended in it. If no test result was obtained after 24 hours incubation blood broth was incubated for 48 hours and the same test was repeated. When growth seen or even not seen subculture was done on enriched media e.g. blood agar, chocolate agar and MacConkey agar. Blood agar and MacConkey agar incubated aerobically while chocolate agar incubated anaerobically. Then culture was examined for likely organism by gram staining and specific tests were applied for identification of gram positive and gram negative bacteria.

Antibiotic Sensitivity:

Organism were isolated in pure culture and sub-cultured in peptone water. It is kept for 24 hours in the incubator to multiply. Agar plates were used for study of bacterial sensitivity by Sensitivity disc method. Commercially prepared discs of 6mm in diameter were used, anti-microbial content of discs for various antibiotics were ampicillin 10 µg, methicillin 5µg, amikacin 30µg, netilmycin 30 µg, erythromycin 5µg, vancomycin 30µg, ciprofloxacin 1µg. Plates were incubated for overnight in air at 35-37^0C. The zone of inhibition was measured by millimeter rule. The diameter of clear zone was measured. After measuring the diameter of zone organism was labeled as sensitive, resistant or intermediate by comparing the sizes of zone with control strain. Sensitive labeled when size of zone of the test strain was more than or equal or not smaller than 3 mm of control. Resistant were labeled when zone size was less than 2 mm. Intermediate was labeled when test zone size was equal to 2mm but it was > 3 mm smaller then controls.

C.S.F. analysis:

A lumbar puncture was done under strict aseptic precaution by a 20 or 22 number disposable needle. C.S.F. was collected in two autoclaved vials, one of them sent for the bacteriological examination and other specimen was examined biochcmically and microscopically. 3-5 ml of CSF was taken in test tube and reported for various features.

Physical Appearance:

It was reported as clear, turbid, hemorrhagic and yellowish. Precipitates were noted by centrifuging the CSF.

Glucose Determination:

It was done by glucose oxidase test.

Proteins estimation:

It was done by spectrophotometery

Pandey's test:

It was done by 2-3ml of phenol with 2-3 drops of CSF in it positive Pandey's were considered when turbidity appears.

Radiological Examination:

Foetal ingestion and inhalation at infected amniotic fluid may lead to aspiration pneumonia, particularly early onset group 'B' streptococcal infection may present in this way making no gross distinction with R.D.S. 30 – 50 % of newborns may show gross features of pneumonitis on radiological examination. Increased linear markings, pneumonic patches, cardiomegaly, hyper-aerated lung field in ski-gram of chest, while in plain x-ray abdomen, finding consistent with paralytic ileus and dilated stomach were noticed.

RESULTS

The results from the data obtained were as follow

TABLE-1 VARIOUS CLINICAL FEATURES OF EOS

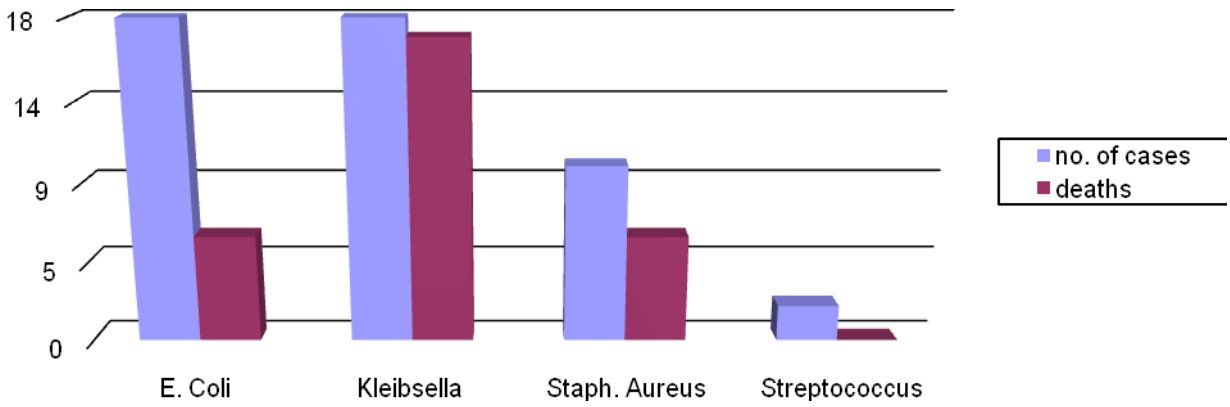
Signs/symptoms	No. of patients	Culture positive
Vomiting/regurgitation	78(26%)	48(61.5%)
Tachypnea/grunting	72(8.6%)	36(50%)
Poor feeding	60(20%)	36(60%)
Dull/lethargic	60(20%)	42(70%)
Hypothermia	48(16%)	42(87.5%)
Irritable	30(10%)	18(60%)
Hyperthermia	10(3.33%)	6(60%)
Skin mottling	30(10%)	24(80%)
Sclerema	30(10%)	30(100%)
Pallour	36(12%)	30(83.3%)
Cyanosis	36(12%)	18(50%)
Abdominal distension	18(6%)	18(100%)
Icterus	24(8%)	18(75%)
Seizures	18(6%)	18(100%)
Hepatosplenomegaly	18(6%)	18(100%)

78% cases had vomiting/ regurgitation and 61.5% out them proved to be septic. Tachypnea or grunting was present in 72% and only 36% of them were blood culture positive. 60% cases presented with poor feeding and out of them 36% were septic. Hypothermia was present in 16% cases and 87.5% cases out of them proved to be septic. Hyperthermia was present in 3.3% cases and out of which 60% cases became septic. Irritability and skin mottling were present in 10% cases with incidence of infection in 60% and 80% respectively. 8% cases presented with icterus and 75% had septicemia. Pallour and cyanosis was the presenting feature in 12% of newborns with incidence of infection in 83.3% and 50%.

Out of above clinical features, skin lesions, hemorrhagic tendency, hepatosplenomegaly, abdominal distension, convulsions and sclerema was found only in infected newborns. Table shows that there was gross intermingling of clinical features due to various causes other than infection which lead to blurring of an early diagnosis

TABLE-2 ISOLATED BACTERIA IN VARIOUS CULTURES

Bacteria	No. of patients	Death
E.Coli	18(37.5%)	6(33.33%)
Kleibsella	18(%37.5)	17(94.4%)
Staph.aureus	10(20.8%)	6(60%)
Streptococci	2(4.1%)	nil
Total	48	29(60.4%)



This study revealed streptococci in two cases, staph. Aureus in 10 cases, Kleibsella in 18 cases and E. coli also in 18 cases. Overall gram positivecocci were in 25% and gram negative bacilli in 75% cases. Mortality from early onset septicemia is 60.4% and death was mostly due to Kleibsellasepsis(94.4%).

DISCUSSION

Septicemia can only be confirmed by a positive culture. In recent years methods of rapid diagnosis are becoming popular because of their greater sensitivity and less requirement of time and better correlation with clinical diagnosis of septicemia. But in the present study, we accepted the infective etiology only in the presence of a positive culture. All 300 newborns were investigated for bacteriological positivity of blood. Out of 300 blood cultures done in study group 48 were bacteriologically positive, and all of them developed clinical manifestations.

Namdeo et al found gram negative septicemia more common in sepsis occurring within first week. [7] In Placzek series, there was a gram negative bacteriological predominance. [8] Same pattern was noted by Sathyamurthi et al., Chugh et al. and Gupta A et al. [4, 9, 10] Less incidence of gram positive septicemia amongst newborns is due to enrichment of newborn by placental transfer of IgG, mostly effective against gram positive organisms (1/2 life 7-8 days). It is also hypothesized that relative lack of IgM may be predisposing for gram negative early onset septicemia as most of the bactericidal antibodies to gram negative organisms belong to IgM class.

In this study over all gram negative bacteria predominated in infected newborns (Kleibsella in 18 cases and E. coli also in 18 cases). Staphylococci had been isolated from 10 newborns. Staphylococcal epidermidis is a common organism of newborns, was considered benign previously but in recent years it has been isolated from septic newborns and superficial lesions. 8 In 2 newborns, streptococci were isolated. Group B Streptococci may normally be present in mother's canal.

In this study, E.Coli were most sensitive to ciprofloxacin 75% and least sensitive to cotrimaxazole 5%, sensitivity to cefotaxime was 37%, toamikacin was 39%, which were most commonly used prophylactically in babies admitted in our nursery. Kleibsella was most commonly sensitive to Amikacin 65% followed by Netilmycin 52%, least sensitive to ampicillin and cotrimoxazole 4% each.The Gram-negative organisms showed good sensitivity to piperacillin-tazobactam and ciprofloxacin, while the Gram-positive organisms showed good sensitivity to vancomycin in a study done by Sathyamurthi. [4]

Mortality from early onset septicemia was 60.4% and death was mostly due to Kleibsella sepsis (94.4%). This was similar to results of study done by Sathyamurthi et al. and Khante SV et al. [4, 11] Infections are the big challenge in the field of perinatology. Incidence of early onset septicemia was found in 16% of cases in present study.

CONCLUSION

With the help of early diagnosis and appropriate therapy, mortality due to neonatal infections can be decreased. The right choice of antibiotics is important and may minimize the emergence of multidrug resistant bacteria in neonatal units. A study on larger sample size may provide more insight into the bacterial profiles in early onset septicaemia in neonates and can help in administration of proper antibiotics.

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