Bacteriological profile along with special reference to rapid diagnosis of Group B Streptococcal Septicemia in Neonates

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ABSTRACT

Aim: to find out the bacteriological profile of neonatal sepsis with special reference about incidence of group B streptococci and its rapid diagnosis by detecting antigen in urine.

Material and methods: 70 selected neonates having clinical manifestation of sepsis were selected for the study. Blood and urine was collected under aseptic condition of these patients. 30 urine samples were subjected to a commercially available latex particle agglutination assay for detection of group B streptococcal antigen. Blood cultures were done on all these samples for finding out the bacteriological profile in neonatal septicemia. Results: Blood culture was positive in 33(47%) cases, sterile in 30(40%) cases, and contaminated in 7(10%) cases. Majority of predominant isolates belong to family enterobacteriaceae, with predominance of Klebsiella pneumonia 10(33.3%), Escherichia coli 5(15.01%), Staphylococcus aureus 5(15.01%), Acinetobacter spp 5(15.01%), Coagulase negative staphylococci 5(15.01%). Group B streptococci was isolated in only 1(3.03%) case. Group B antigen was detected in 2 urine specimens. Conclusion: Members of family enterobacteriaceae are the predominant isolate in cases of neonatal sepsis in our country group B streptococcus is not a common pathogen in neonatal sepsis in our country. Detection of group B streptococci by antigen detection using latex particle agglutination assay is a very simple, rapid, commercially available assay with a high degree of sensitivity and specificity.

1. Introduction

Neonatal sepsis is a frequent cause of morbidity and mortality and is defined as a clinical syndrome characterized by systemic signs of infection and bacteremia in the first month of life. Neonatal infections currently cause about 1.6 million deaths annually in developing countries. It is estimated that up to 20% of neonates develop sepsis and approximately 1% die of sepsis related causes. Various epidemiological data from developing countries shows differences in the incidence, risk factor pattern and antimicrobial sensitivities of pathogen and mortality from that of developed countries.

Group B Streptococcus are known to cause a variety of infections in adults, but clinical interest in this bacteria mainly relates to their ability to cause serious neonatal illness especially meningitis and septicemia. In developed countries GBS are leading cause of neonatal sepsis and meningitis with a case fatality rate of 40-80%. Incidence of GBS septicemia in neonates was reported to be 1.3 to 3 per 100 live births with a mortality of 8.7% 7, however in India the problem has not been adequately studied and only few reports are available.

Current cost effective laboratory procedure for diagnosis of GBS disease falls into two categories identification of bacteria by culture methods or by detecting bacterial antigens in body fluids. Keeping above view the present study was undertaken with objective to detect overall prevalence of GBS septicemia in the community, and early etiological diagnosis by antigen detection. This will provide a better management to the patients.
Observation

Out of the 70 selected neonates, the majority of neonates were of early onset type of septicemia and blood culture was positive in about 33 (47%) cases, sterile in 30 (40%) cases, and contaminated in 7 (10%) cases.

The isolates in the blood culture were Klebsiella pneumonia 10 (33.3%), Escherichia coli 5 (15.01%), Staphylococcus aureus 5 (15.01%), Acinetobacter spp 5 (15.01%), Coagulase negative staphylococci 5 (15.01%), Pseudomonas aeruginosa 1 (3.03%), Group B streptococci 1 (3.03%), and Enterococcus faecalis 1 (3.03%) (chart 1 and 2).

Of these 70 selected cases, 30 urine samples were processed for antigen detection for Group B streptococci. In 2 urine samples of these 30 cases, the latex particle agglutination assay result gave a positive result (picture 1).

Material and Methods

This prospective study was carried out in the department of Microbiology and Pediatrics in Rohilkhand Medical College and hospital Bareilly. Clinically suspected newborn having signs and symptoms suggestive of sepsis were selected. Permission was taken up from institutional ethical committee for conducting this study. Informed consent was taken up from the mothers for participation of their child for this study.

Inclusion criteria: The babies who were born by normal vaginal delivery, normal delivery with episiotomy or forceps, from mothers who had various risk factors like chorioamnionitis, prolonged rupture of membranes and fever.

Exclusion criteria: babies having congenital anomalies were excluded from this study.

Detailed maternal history including maternal age, history of maternal pyrexia, rupture of membrane, any history of antibiotic therapy was noted down. This maternal data gives a clue of transmission of bacteria from mother to fetus.

Blood for blood culture and urine for antigen detection was collected from 70 clinically suspected neonates for the detection of Group Streptococci. The sample was taken under aseptic condition. Urine was collected aseptically by means of suprapubic aspiration.

Blood and urine was collected immediately at the time of admission and before administration of any antibiotics. Blood was inoculated immediately in brain heart infusion broth bottle containing 0.025% sodium polyanethol sulfonate as an anticoagulant and incubated at 37°C for 7 days before giving any negative report. Subcultures on blood agar, MacConkey agar, and chocolate agar were made after 24, 48 hours, 72 hours, and on 7th day. The clinical isolates obtained were identified by colonial morphology, microscopy, and routine biochemical test as per the standard identification procedure.

Urine was stored in deep freezer for antigen detection. Out of these 70 urine samples, 30 urine sample was processed for antigen detection. In 27 neonates the urine was collected during second week of life. Before performing urine latex agglutination the urine samples were heated for 5 minutes in a boiling water bath then allowed to cool-down and centrifuged at 2000 rpm for 10 minutes. The supernatant urine was subjected to a very simple procedure of latex agglutination assay using positive and negative control simultaneously. The wellcogen strep B reagent consists of polystyrene latex particle which have been coated with antibodies specific to the Group B antigen. These latex particles agglutinate in the presence of sufficient homologous antigen. The result was recorded after 3 minutes. Positive reaction showed a visible agglutination within 3 minutes while Negative result showed no visible clumps.
Discussion

Neonatal sepsis continues to be a major cause of morbidity and mortality among neonates around the world. It is an early recognition of group B Streptococcal sepsis is significant importance to the patient as well as the clinician. It helps to initiate an early and specific treatment and reduce mortality, morbidity, and hospital stay. Conventional blood culture remains most specific indicator for the disease but contamination of blood culture, time is consumed in performing the test and non-recovery of the organism is the limiting factor. Bacterial antigen in body fluid provides a rapid, early specific etiological diagnosis. Neonatal sepsis confirmed by culture method in our study was about 47% which is comparable with Roy et al.13 who reported an incidence of 47.5%. In various report from home and abroad the incidence of sepsis vary between 36-55%.[14-17]. In our study the members of family enterobacteriaceae were the prominent isolate in blood culture, Similar result was reported by the various authors.[18,19,20]. Most workers did not isolate Group B streptococcus from positive blood culture of neonates.[13,18,20]. Group B streptococci as evident from National neonatal perinatal network data base report (1999) is not common isolate of neonatal sepsis in our country. Similarly Mahapatra (2002) reported isolation of group B Streptococci in 4.6% cases only. GBS latex particle agglutination test was positive in about 6.6% cases in our study. The Sensitivity of wellcogen Strep B LPA test was reported between 88-100%.[21-23]. In our study out of 2 positive LPA test one was culture proven systemic GBS disease. The rate of false positivity of wellcogen Strep B LPA test ranges from zero.[21] to about Seventeen (22,23) percent. The cause of false positive result are multifactorial and most probably it may be due to gastrointestinal absorption of swallowed amniotic fluid contaminated with group B streptococci may produce false positive urine antigen test 24,25. The result of positive latex particle should be correlated with various maternal factors which indirectly points towards a transmission of GBS bacteria from mother to foetus.

Conclusion

Group B streptococcus is not a major etiological agent in newborn sepsis in our country. In developing countries the organisms belonging to family enterobacteriaceae predominates as the major etiological agents in neonatal sepsis. Blood culture is the gold standard investigation to confirm the diagnosis. Testing of urine for group B streptococcal antigen detection is a rapid, specific and sensitive additional diagnostic tool for etiological diagnosis. The result of antigen test should be correlated with blood culture results, clinical picture, blood counts and various maternal factors which are important in transmission of organism.

References


