Incidence and Antibiogram of Acinetobacter Causing Neonatal Sepsis Among Hospitalised Patients

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Abstract

Background: *Acinetobacter species are typical nosocomial pathogens causing infections and high mortality, almost exclusively in compromised hospitalized patients. Multidrug-resistant Acinetobacter spp. blood infection in the neonatal intensive care unit patients create a great problem in hospital settings. The study was done to detect prevalence of acinetobacter spp. as the causative agent of neonatal sepsis with its antibiogram.*

Materials and methods: *A total of 100 clinically suspected neonatal sepsis cases was enrolled in the study. Bacteriological profile and antibiotic sensitivity pattern of acinetobacter spp. were done accordingly.*

Results: *Among the 100 suspected neonatal sepsis cases, 28% were culture positive and 72% were culture negative. Klebsiella species was the predominant isolated bacteria which was 53.58% followed by Acinetobacter spp. (14.28%) E. coli(10.72%) Pseudomonas spp. (7.14%) S. aureus (7.14%) & Candida (7.14%). Acinetobacter spp. showed 100% resistant to ampicillin, ciprofloxacin, gentamycin, amikacin, ceftazidime, cefotaxime & cefepime, 75% resistant to meropenem & 50% sensitive to levofloxacin.*

Conclusion: *It is essential to conduct periodic bacteriological profile along with routine antimicrobial sensitivity testing time to time for effective management of neonatal sepsis.*

Key words: Multidrug resistant; Acinetobacter species; Culture sensitivity.

INTRODUCTION

Acinetobacter, once considered as opportunistic pathogen of low virulence, has recently been emerged as an important nosocomial pathogen worldwide, mostly involving patients with impaired host defence, especially in intensive care units, neonatal units, and surgical wards[1,2].

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection with or without accompanying bacteremia in the first month of life[3]. Incidence of neonatal bacterial sepsis varies from 1-4 per 1000 live birth in developed countries, with considerable fluctuation over time and with geographic variations[4]. Around one million deaths every year throughout the world are due to neonatal sepsis. In Bangladesh, currently, the neonatal mortality rate is 18.4 per 1000 live births which accounts for 60% of under five deaths[5]. Neonatal sepsis accounted 40.7% of total admitted cases and attributed about 19.0% of total neonatal death in Special Care Neonatal Unit of Chattogram Medical College Hospital[6].

The uncertainty surrounding the clinical approach to treat neonatal sepsis can be minimized by periodic epidemiological survey of etiological agents and their antibiotic sensitivity pattern leading to recognition of the most frequently encountered pathogens in a particular neonatal setting. Micro-organisms implicated in neonatal sepsis have developed increased drug resistance to commonly used antibiotics and thus making treatment extremely difficult.

Along with other organisms such as Klebsiella spp, E. coli, Staphylococcus aureus, Pseudomonas spp, and Salmonella spp, Acinetobacter species are gaining importance as potential pathogens in neonatal septicemia because of their frequent isolation and multi-drug resistance[7]. The present study highlights Acinetobacter spp. as an important pathogens in neonatal blood stream infection.

MATERIALS AND METHODS

This hospital based observational study was carried out in Special Care Neonatal Unit (SCANU) of Chattogram Medical College Hospital during the period of January-December 2015.

Inclusion criteria[4]:

Any neonate having clinical signs/symptoms of sepsis according to Integrated Management of Childhood Illness (IMCI) and World Health Organisation (WHO).

Exclusion criteria[8]:

i) Neonates having extreme prematurity (Less than 30 weeks of gestational age)

ii) Birth weight less than 1000 gm.

iii) Gross congenital anomalies.

Blood samples were taken from 100 suspected neonatal sepsis cases after taking both written and verbal consents from the attendants of the patients. Under all aseptic precautions, at least 3 ml of blood from each neonate was collected. Blood was introduced in the blood culture bottle containing 10 ml of trypticase soy broth. The blood culture bottles were then transported immediately to the laboratory of the department of microbiology, Chattogram Medical College for culture and antibiotic sensitivity testing[9].

RESULTS

Among the 100 suspected neonatal sepsis cases, 28% were culture positive and 72% were culture negative.
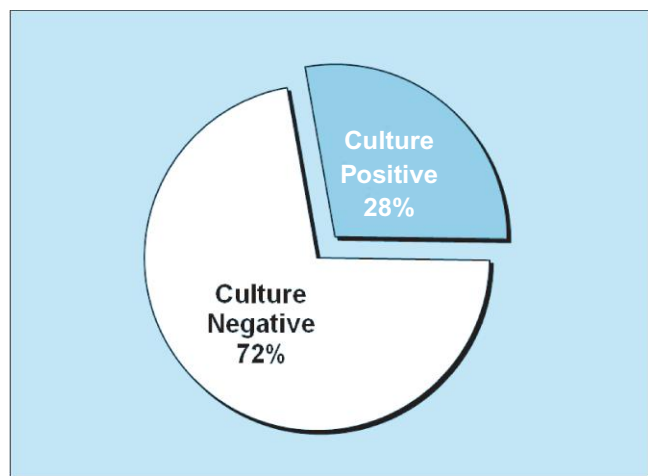

Figure 1 : Distribution of the culture proven sepsis

Distribution of isolates among the culture proven sepsis showed Klebsiella spp. (53.58%) was predominant isolated organisms in the study, followed by Acinetobacter spp. (14.28 %) E. coli (10.72%) Pseudomonas spp. (7.14%) Staph. aureus (7.14%) & Candida spp. (7.14%) respectively.

Table I : Distribution of causative organisms

Name of organisms	Number	Percentage
Klebsiella spp.	15	53.58
Acinetobacter spp.	04	14.28
E. coli	03	10.72
S. aureus	02	7.14
Pseudomonas spp.	02	7.14
Candida spp.	02	7.14
Total	28	100.0

Antibiotic sensitivity pattern of isolated bacteria of neonatal sepsis showed that acinetobacter spp. was 100% resistant to ampicillin, ciprofloxacin, gentamycin, amikacin, ceftazidime, cefotaxime & cefepime, 75% resistant to meropenem & 50% sensitive to levofloxacin.
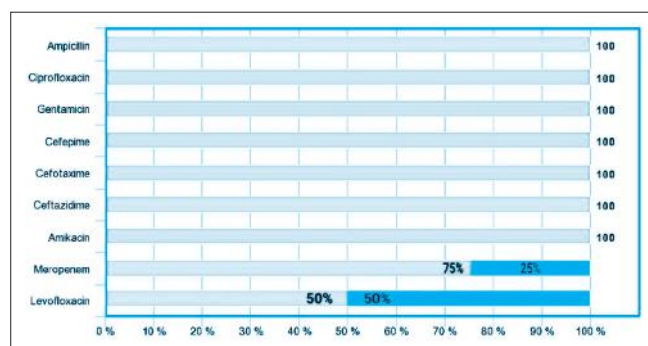
Figure 2 : Sensitivity pattern of acinetobacter spp. against different antimicrobial agents

DISCUSSION

Neonatal sepsis is one of the major health problems in developing countries including Bangladesh. Early diagnosis of neonatal sepsis is primarily based on clinical evaluation but it requires clinico-pathological & microbiological correlation[10]. In our study, among the 100 suspected neonatal sepsis cases, culture proven sepsis was 28% and culture negative sepsis was 72%. Similar to our study, Barua et al. showed blood culture positivity to be 32% in their study done in the same institute[11].

A number of organisms is associated with neonatal sepsis and bacterial pathogens may vary from one country to another and within a country from one hospital or region to another. These organisms may even vary at different times within the same place. In developed countries Group B streptococcus (GBS) E. coli and Listeria monocytogenes are the most common causes of neonatal sepsis, however, in developing countries these bacteria are replaced by gram-negative bacilli, Coagulase-Negative Staphylococcus (CONS) and others[12].

Among the isolates from blood culture, Klebsiella spp. (53.58%) was the predominant isolaeted organism in our study followed by Acinetobacter spp. (14.28%) E. coli (10.72%) Pseudomonas spp., Staph. aureus & Candida was 7.14% each. Acinetobacter spp was second most isolated organism in our study which is in accordance with the study done by Jayashima

et al. (23%)[13]. Incidence of neonatal sepcicaemia by acinetobacter spp in study done by Barua et al. was 14.58% and by Begum & Fatema was 10.8%[11,14]. The prevalence of acinetobacter spp. varies somewhat by country and by specimen site but has generally increased worldwide in the past two decades. Although there are significant differences in acinetobacter antimicrobial resistance pattern according to species, country of isolation, and region, the overall trend is one of increasing resistance[15].

Searching antibiotic sensitivity pattern, we found that acinetobacter spp. was 100% resistant to ampicillin, ciprofloxacin, gentamycin, amikacin, ceftazidime, cefotaxime & cefepime, 75% resistant to meropenem & 50% sensitive to levofloxacin. Similar to us Mannan et al. found acinetobacter spp., 100% resistant to ampicillin, gentamycin, cefotaxime & piperacilin-tezobactam but highly sensitive to colistin (86%), followed by imipenen/meropenem (57%), amikacin (29%) and ciprofloxacin[16].

The occurrence of acinetobacter spp. in neonatal sepsis is of great concern. The presence 45 resistance genes in acinetobacter spp. was recently described, some of the genes had not previously been reported to be associated with acinetobacter and resistance of this organism may be due to presence of multidrug resistance efflux pump, alteration in antibiotic targets, production of antibiotic altering enzymes like cephalosporinases, carbapenemases, aminoglycosede modifying enzymes, limited antibiotic entry like porin mutations, limited porin production etc. Acinetobacter should be added to the list of organisms causing severe nosocomial infection in neonatal intensive care units. Multi-drug resistant nosocomial Acinetobacter septicemia may cause severe clinical disease in neonates that is associated with a high mortality[15].

CONCLUSION

The increase in the infection rate due to a particular pathogen may be due to lapses in infection-control measures, resulting in an increase in cross-transmission between patients. Therefore, continuous bacteriological surveillance, implementation of infection control policies, careful disinfection of intensive care equipment, and rational antibiotic use are required to control such infections. Effective therapy must be individualized to reflect these differences in regional, local and specific hospital resistance patterns.

DISCLOSURE

All the authors declared no competing interest.

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