Abstract

Background: Neonatal sepsis is recognized as an important public health problem with a high morbidity and mortality, mostly occurring in developing countries. Treatment of neonatal sepsis has become a challenge with the emergence of carbapenemase producing bacteria. The study was done to evaluate the sensitivity pattern of bacterial isolates against meropenem causing neonatal sepsis.

Materials and methods: A total of 100 clinically suspected neonatal sepsis cases was enrolled in the study. Bacteriological profile and meropenem sensitivity pattern was done.

Results: Among the 100 suspected neonatal sepsis cases, 28% were culture positive and 72% were culture negative. Klebsiella species was the predominant isolated bacteria. Searching meropenem sensitivity pattern, 42.31% bacterial isolates were found to be sensitive and 57.69% were resistant to meropenem. Klebsiella spp. showed 40.00% sensitive to meropenem, whereas Acinetobacter spp. 25.00%, E. coli 66.67%, Staph. aureus 50.00% & Pseudomonas spp. 50.00% sensitive.

Conclusion: Meropenem is the drug of choice for serious infections but bacterial resistance against it is increasing day by day.

Key words: Meropenum; High morbidity and mortality; Neonatal sepsis.

Introduction

Neonatal sepsis is a clinical syndrome characterized by signs and symptoms of infection with or without accompanying bacteremia in the first month of life. Neonatal infections are unique in several ways; infectious agent can be transmitted from mother to fetus and newborn infant by diverse mode. 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.

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. 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. Micro-organisms implicated in neonatal sepsis have developed increased drug resistance to commonly used antibiotics and thus making treatment extremely difficult. Prevalence of bacterial agent and their sensitivity pattern in an area provide guidance to start empirical treatment which is the cornerstone in the management of sepsis. Local epidemiology of neonatal sepsis should be constantly updated to detect changes in the pattern of pathogens and their susceptibility to various antibiotics.

Carbapenems (Imipenem, meropenem, ertapenem, and doripenem) are the latest developed β-lactam antibiotics that possess exceptionally broad spectrum of activity against gram-positive and gram negative bacteria. These agents are primarily used in hospitals as an empiric therapy for the treatment of life threatening infections. Carbapenems are often one of the few therapeutic options available for the treatment of multi-drug resistant bacterial infections. Nevertheless, in the recent past, reports were accumulating on the emergence of carbapenem (Meropenem) resistance all over the world limiting its usage.

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:
- Any neonate having clinical signs/symptoms of sepsis according to Integrated Management of Childhood Illness (IMCI) and World Health Organisation (WHO).
Exclusion criteria:
- Neonates having extreme prematurity (Less than 30 weeks of gestational age)
- Birth weight less than 1000 gm
- Gross congenital anomalies.

Laboratory procedure
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.

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

Table I shows distribution of isolates among the culture proven sepsis showed Klebsiella spp. (53.58%) as 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 II shows sensitivity pattern of different bacterial isolates against meropenem. Out of 26 bacterial isolates only 11(42.31%) were found to be sensitive and Klebsiella spp. showed 06(40.00%) sensitive to meropenem, whereas Acinetobacter spp. 01(25.00%) E. coli 02(66.67%) Staph. aureus 01(50.00%) & Pseudomonas spp. 01(50.00%) showed sensitive.

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. 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.

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.

Among the isolates from blood culture, Klebsiella spp. (53.58%) was the predominant isolated organism in our study followed by Acinetobacter spp. (14.28%), E. coli(10.72%) Pseudomonas spp., Staph. aureus & Candida was 7.14% each. Similar to our study, Tasneem also found Klebsiella spp. (24.4%) as predominant isolates followed by Salmonella, Serratia, Acinetobacter spp.
& E. coli. Begum et al. found similar finding with Klebsiella spp. predominance in their study. Our findings were also in concordance with the results of Barua et al where Klebsiella spp was 54.17% followed by Pseudomonas spp. (16.67%) Acinetobacter spp. (14.58%) S. aureus & E. coli. The high occurrence of Klebsiella spp. in neonatal sepsis is of great concern and resistance of this organism may be due to the presence of capsule that gives some level of protection to the cells, presence of multidrug resistance efflux pump, easy spreading nature, pathogenic & efficient at acquiring and disseminating resistance plasmid.

Of all available anti-microbial agents, carbapenems are the most sensitive and reliable treatment options for bacterial infections. The emergence of resistance to carbapenem (Meropenem) is an important growing threat to public health, since it is the final therapeutic option currently available for the treatment of life-threatening infections.

Searching meropenem sensitivity pattern, we found that out of 26 bacterial isolates only 11(42.31%) were found to be sensitive and rest 15(57.69%) were resistant. Among the Klebsiella spp. 40% showed sensitive to meropenem whereas 60% were resistant. Acinetobacter spp. showed 25 %, E. coli 66.67%, Staph. aureus and Pseudomonas spp. both were 50% sensitive to meropenem. Another study done in the same institute showed that Staph. aureus was 60% sensitive to meropenem followed by Acinetobacter spp. 55% & Klebsiella spp. 45% respectively. Other study done in Bangabandhu Sheikh Mujib Medical University, Dhaka showed Staph. aureus was 100% sensitive to meropenem followed by Klebsiella spp. 91.20%, Pseudomonas spp. 80% & Acinetobacter spp. 57.1%. This variation on sensitivity pattern might be due to the number of isolates studied, variation in different institutes and also geographic locations.

Conclusion
Carbapenem (Meropenem) resistance of the causative organisms of neonatal sepsis is a rapidly emerging & potentially disastrous problem worldwide, has become a serious health problem in hospitals and the community. In fact, the situation is worst in developing countries because of the lack of control of the use of the antibiotics, the non-existence of legislation on antibiotic prescription. However, we need to keep in mind that the carbapenem (Meropenem) must be kept in reserve for life-threatening infections.

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Contribution of authors
SSHM : Conception, intial design, acquisition of data, interpretation of data, manuscript writing and final approval.
AHMSKC : Acquisition of data, data analysis, critical revision of the version and final approval.

Disclosure
Both the authors declared no competing interest.

References


