

Pattern of Growth of Micro Organisms in the Blood Culture in Patients of Neonatal Sepsis in a Tertiary Care Centre of Kolkata

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Abstract

Background: It is very important to identify the local bacterial population and their antibiotic sensitivity pattern. This study aims at finding out local bacteria causing positive blood cultures in neonatal sepsis. **Objective:** To identify the pattern of growth of micro organisms in the blood culture in patients of neonatal sepsis in a tertiary care centre of India. **Material and Method:** A prospective randomised study was carried out in the Emergency Department of Peerless Hospital and B K Roy Research Centre Kolkata, India for one year (01/07/2013 to 31/06/2014) **results:** A total of 30 samples were found positive where This study shows that *klebsiella.p* and *candida* is the most common organism causing sepsis in maximum type of samples of neonates in this tertiary care centre of Eastern India. For *Klebsiella.sp* the first choice of antibiotics should be amikacin, colistin, tigecycline. And second choice should be Cefepime and Carbapenams. For *Candida sp* the first choice of antibiotics should be Voriconazole and Flucytocin. Second choice should be Fluconazole and Amphotericin B. Staph was most sensitive to Linezolid(100%), Tigecycline (100%), and Vancomycin(100%) Enterobacter(20%) is most sensitive to Colistin and Tigecyclin(100%) ,than Amikacin, Cefepime, Cefoperazone and Sulbactam,Piptaz and Meropenam all 50% sensitive. **Conclusions:** This study paves a path for future studies to occur.

Keywords: Neonate; Blood Culture; Sepsis.

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Introduction

The pattern of growth of micro organisms varies according to regions. Hence the study of the pattern of their growth is the key to successful treatment of diseases. Due to lack of uniformity of the pattern it is very difficult to fix a uniform protocol for the treatment of a set of disease.

Data of organisms causing the neonatal sepsis is very scarce and hence it is less known to the clinicians as to how to deal with this present problem. The organisms responsible for neonatal sepsis vary across geographical boundaries and with the time of illness thus periodic bacteriologic surveillance is a necessity.

The present study focuses on the pattern of growth of bacteria in blood in a tertiary care centre of Kolkata in India.

Keeping in mind that local epidemiology of neonatal sepsis should be constantly updated to detect changes in the pattern of infection of pathogens and their susceptibility to various antibiotics, this study is conducted to see the pattern of growth and various amounts of resistance to antibacterials in a tertiary care centre of India.

The study is done in a 400 bedded hospital where average daily admission rates fluctuate between 40 to 50 patients per day. The hospital has a running NICU with 24 hours microbiology laboratory facility.

Neonatal sepsis is the constellation of nonspecific symptoms in association with bacteraemia. Early diagnosis, specific antimicrobial therapy and judicious supportive care are the key determinant of positive outcome in this serious paediatric emergency.

Prematurity, Very Low Birth Weight babies, exposure to invasive procedures, receiving parenteral

nutrition with lipid emulsions, alterations in the skin and/or mucous membrane barriers, frequent use of broad-spectrum antibiotics and prolonged hospital stay are the most common risk factors for nosocomial sepsis in newborns.

The dreaded and the most fearsome picture is that this has no uniformity. Hence local patterns should be identified, according to which the protocol for treatment/using antibacterials should be used.

This study would concentrate mainly on a tertiary care centre of Eastern India and hence would prove to be useful for further studies to take place.

The uncertainty surrounding the clinical approach to treatment of neonatal septicaemia can be minimized by periodic epidemiological surveys of aetiological agents and their antibiotic sensitivity patterns leading to recognition of the most frequently-encountered pathogens in a particular neonatal setting.

Gram positive and gram-negative bacteria are highly resistant against commonly used antibiotics. Hence there is a need of constantly conducting these sort of studies at frequent intervals.

Till this date managing sepsis remains a challenge. May be by continuous efforts and studies we can identify the nature and pattern of growth of the organisms and bring a dynamic change in our current practices.

Review of Literature

Sepsis is still one of the common diseases in neonatal period and a significant cause of morbidity and mortality [1]. It contributes up to 13-15% of all deaths during the neonatal period, higher in developing countries where it contributes between 30-50%. It is important to note that 20-30% of the survivors of neonatal sepsis may exhibit neurological sequelae. Sepsis related mortality is however largely preventable with rational antimicrobial therapy and aggressive supportive care [1].

Sepsis neonatorum is a systemic infection of the newborn caused by bacteraemia and clinical symptoms caused by micro-organism and their toxic products. The neonatal sepsis can be of early onset (within first week of life) mainly acquired from pathogens of maternal genital tract, whereas late onset (after first week till 28 days of life)

The neonatal sepsis has considerable contribution in the neonatal mortality and morbidity. Worldwide on average 1.6 millions of deaths are due to neonatal

infection. Of all the neonatal infections bacterial infection is the major cause for neonatal mortality. The spectrum of bacteria most commonly implicated in neonatal sepsis are quite different in industrialized countries compared with middle and low income countries and also the type of organism responsible for sepsis vary greatly depending on the region, its environmental condition, socio economic status, standard of living, mode of delivery and feeding [2].

Neonatal septicaemia is an important cause of morbidity and mortality among neonates in India. An estimated incidence of approximately 4% in intramural live births, poses a definite threat to the community. An early and accurate aetiological diagnosis is not always easy, especially since the disease may start with minimal or non-specific symptoms.

Delayed treatment until clinical recognition of signs and symptoms of sepsis entails risk of preventable mortality, notwithstanding the fact that presumptive antibiotic therapy may result in over-treatment. Of necessity, many more babies are evaluated and treated for sepsis than the number who actually have the condition.

A wide range of bacteria – both aerobic and anaerobic – can cause neonatal septicaemia. To add to it, both regional and temporal differences in etiologic agents exist. The uncertainty surrounding the clinical approach to treatment of neonatal septicaemia can be minimized by periodic epidemiological surveys of aetiological agents and their antibiotic sensitivity patterns leading to recognition of the most frequently-encountered pathogens in a particular neonatal setting [3].

Neonatal sepsis is a life-threatening clinical disease that requires urgent diagnosis and treatment. The incidence of neonatal sepsis is 1-4 per 1000 live births in developed countries. Preterm and low birth weight infants especially very low birth weight (VLBW) has a 3- to 10-fold higher incidence of infection than full term newborns. Prematurity, VLBW, exposure to invasive procedures, receiving parenteral nutrition with lipid emulsions, alterations in the skin and/or mucous membrane barriers, frequent use of broad-spectrum antibiotics and prolonged hospital stay are the most common risk factors for nosocomial sepsis in newborn. The causative agents of neonatal sepsis change from time to time and from region to region. The most common causes of neonatal sepsis are group B streptococci (GBS), *Escherichia coli* (*E. coli*) and *Listeria monocytogenes* in developed countries and gram negative bacteria and coagulase negative staphylococci (CONS) in developing countries. These

organisms have developed increased drug resistance over the last two decades, and management of patients is becoming a major problem. This study was conducted to determine the bacteriological profiles and antibiotic sensitivity patterns of isolates from blood cultures of neonates [4].

Staphylococcus Aureus, Enterococcus Fecalis, Klebsiella pneumonia and Escherichia coli were the commonest pathogens in neonates in a study done in a tertiary care centre Peshawar [2].

Traditional bacterial culture techniques may be failing to identify a substantial fraction of the causal agents of neonatal sepsis. Bacterial cultures are unable to actually delineate the role of maternal versus environmental sources of infection in this setting. Hence, alternative molecular technologies may have a valuable role to play in characterizing the microbial spectra associated with neonatal sepsis, which will be a prerequisite for better treatment and prevention of these infections [5].

Objective

To identify the pattern of growth of micro organisms in the blood culture in patients of neonatal sepsis in a tertiary care centre of India.

Material and Methods

The study would be a prospective one year record assessment based study where in all the positive blood cultures of patients presenting with neonatal sepsis (as identified by their respective paediatricians) would be taken into account. The nature of growth of organisms and their antibiotic response pattern would be studied and analysed. All the positive blood cultures during this period would be taken in account.

Inclusion Criteria

1. Patient must be a neonate (i.e. 0-28 days)
2. Patient must be a diagnosed case of sepsis.

Exclusion Criterion

1. Neonates examined but went to some other hospital during the course of the study or having a blood culture from outside health care facility would be excluded.

Period of Study

01/07/2013 to 31/06/2014

Data Presentation and Comments

Table 1: Blood culture statistics

Drug	No	%
Voriconazole	9	100%
Caspofungin	9	100%
Flucytocine	9	100%
Fluconazole	6	66.66%
Amphotericin B	5	55.55%

Comments: Maximum positive culture was shown by candida (26.67%) and the least growth was observed in E Coli group.

Table 2: Candida sensitivity pattern in blood

Drug	No	%
Voriconazole	9	100%
Caspofungin	9	100%
Flucytocine	9	100%
Fluconazole	6	66.66%
Amphotericin B	5	55.55%

Comments: Candida is most sensitive to voriconazole (100%), caspofungin(100%), fluconazole(66.66%) and amphotericin b(55.55%).

Table 3: Klebsiella sensitivity pattern in blood

Drug	No	%
Amikacin	6	100%
Colistin	6	100%
Tigecycline	5	83.66%
Meropenam	4	66.76%
Cefaparazone+Salbct	4	66.67%
Piptaz	4	66.67%
Cefepime	3	50%
Ciprofloxacin	3	50%
Gentamycine	1	16%
Ampicillin	0	0%
Ceftriaxone	0	0%
Cefuroxime	0	0%

Comments: Klebsiella is most sensitive to amikacin and colistin both 100%,tigecyclin(83%) and magnex, piptaz,meropenam all 66.67%.

Table 4: Mortality

Survived	Expired	Total
27	3	30
90%	10%	100%

Comments: The above says that Neonatal Sepsis with positive blood cultures is very high.

Table 5: Enterobacter sensitivity pattern in blood

Drug	NO	%
Colistin	6	100%
Tigecycline	6	100%
Amikacin	3	50%
Cefepime	3	50%
Cefaparazone+Salbct	3	50%
Ciprofloxacin	3	50%
Meropenam	3	50%
Piptaz	3	50%
Ceftriaxone	0	0%
Cefuroxime	0	0%
Gentamycin	0	0%
Augmentin	0	0%

Comments: Enterobacter(20%) is most sensitive to colistin and tigecyclin(100%) ,than amikacin, cefepim, magnex, piptaz and meropenam all 50% sensitive

Table 6: Staph. sensitivity pattern in blood

Drug	No	%
Linezolid	3	100%
Tigecycline	3	100%
Vancomycin	3	100%
Clindamycin	2	66.67%
Gentamycin	2	66.67%
Teicoplanin	2	66.67%
Ciprofloxacin	1	33.33%
Livofloxacin	1	33.33%
Benzylpenicillin	0	0%

Comments: Staph was most sensitive to Linezolid(100%), Tigecycline (100%), and Vancomycin(100%)

Discussion

This study shows that *klebsiella p.* and *candida* is the most common organism causing sepsis in maximum type of samples of neonates in this tertiary

care centre of Eastern India.

For *Klebsiella.sp* the first choice of antibiotics should be amikacin,colistin,tigecycline. And second choice should be Cefepime and Carbapenams .

For *Candida sp* the first choice of antibiotics should

be Voriconazole and Flucytocin. Second choice should be Fluconazole and Amphotericin B.

Staph was most sensitive to Linezolid(100%), Tigecycline (100%), and Vancomycin(100%)

Enterobacter(20%) is most sensitive to Colistin and Tigecyclin(100%), than Amikacin, Cefepime, Cefoperazone and Sulbactam, Piptaz and Meropenam all 50% sensitive.

It should always be remembered that incidence of mortality in neonatal sepsis is only 3.89%. So outcome of neonatal sepsis is good with proper and early treatment.

There were considerable amount of limitations in this study such as the sample size was thirty which might be could have been increased but then the length of the study should remain constant.

The conclusion might only hold true to the Eastern region of India mainly Kolkata that too in the extreme South.

As told before this study paves the way for future studies to take place.

From the above data we should develop a local antibiotic protocol which should support the treatment against the local bacterial population

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