



Original Research Article

Neonatal septicaemia due to enterococci species and their antibiotic susceptibility pattern in a tertiary care hospital, Hassan

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ABSTRACT

Introduction: Septicaemia in neonates remains the significant cause of morbidity and mortality in the developing countries. Enterococci species an opportunistic pathogen being normally present in G.I tract of humans are gaining importance as a potential pathogen in neonatal septicaemia because of frequent isolation and multidrug resistance which renders them difficult to treat.

Materials and Methods: A prospective study was conducted over a period of 3 months from April to June 2018. Blood samples from neonates were collected and processed by conventional methods. Swabs from web spaces and nasal area of the NICU staff were also collected and processed. Antimicrobial susceptibility testing was performed by Kirby Bauer's disc diffusion method.

Results: Prevalence of Enterococci was found to be increasing from 26.8% in the month of April to 39.5% in the May. Screening of NICU staff for carrier state revealed 20% isolation rate of Enterococci spp among 16 cases. Antibiotic susceptibility showed maximum resistance to Penicillin (90.6%) followed by Amoxyclav (79.6%), Erythromycin (71.8%). High level Aminoglycoside resistance was observed in (37.2%) isolates.

Conclusion: This study revealed that Enterococci was one of the predominant bacterial pathogen of neonatal septicaemia during the study period and the bacteriological profile of neonatal sepsis keeps changing. Routine screening for the multidrug resistant organisms in the hospital staff and appropriate methods employed to avoid carriers and proper care of NICU to avoid cross infection would help in the reduction of neonatal septicaemia.

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1. Introduction

Septicaemia in neonates remains the significant cause of morbidity and mortality in the developing countries. Neonatal septicaemia continues to be a major problem for neonates in neonatal intensive care units around the world. The reported incidence of neonatal sepsis varies from 7.1 to 38 per 1000 live births in Asia.¹ Neonatal mortality rate is one of the indicators for measuring the health status of a nation.² Incidence varies from country to country, but it is much higher in developing countries than in developed nations.²

The bacteriological profile of neonatal sepsis is constantly under change. Enterococci are opportunistic bacteria that become pathogenic when they colonize niches where they are not normally found. Of recent, they have become major cause of nosocomial infections,³ especially of the bloodstream, urinary tract and surgical sites and are gaining importance in recent years as a potential pathogen in neonatal septicaemia because of frequent isolation and multidrug resistance which renders them difficult to treat.

Of all the species of Enterococci, *E faecalis* and *E faecium* are the commonest human pathogens. Serious Enterococcal infections are often difficult to treat because the organism exhibits intrinsic resistance to various antibiotics including penicillins, cephalosporins, and sometimes to aminoglycosides and clindamycin and

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other lincosamides. The recent emergence of multidrug-resistant (MDR) Enterococci, especially Vancomycin-Resistant Enterococcus (VRE) has provoked the occurrence of several nosocomial outbreaks worldwide. Neonatal infections due to VRE could be by way of vertical transmission from the mother's gastrointestinal tract or skin or vaginal canal or even could be acquired horizontally as cross-infection from the hospital environment.⁴

The changing trend in bacteriological profile of neonatal septicaemia, the rising cause of enterococcal infections and their antibiotic resistance pattern is to be considered and appropriate measures to reduce cross infections to be studied.

The aim of this study was to determine the distribution, aetiology and antibiotic susceptibility patterns of Enterococci strains isolated from neonates and also to correlate with screening culture done on NICU staff.

2. Materials and Methods

The present study was an observational prospective study. This was conducted for a period of 3 months.

2.1. Source of data

Blood samples of new born babies admitted to Neonatal ICU in HIMS, Hassan for a period of 3 months. Pattern of isolates obtained from registers in Department of microbiology.

2.2. Sample collection

The local site was cleansed with 70% alcohol. Blood cultures were done in a brain heart infusion biphasic medium. Approximately, 1ml of blood was inoculated into the brain heart infusion broth and incubated at 37°C. Subcultures were done on sheep blood agar and MacConkey agar at the earliest. After 24hrs of incubation the culture plates were inspected for growth and identified initially by colony characters, haemolysis on blood agar, lactose fermentation, morphology in gram staining, Catalase test, Oxidase test and motility (hanging drop) test. The preliminary identification of potential pathogens, later confirmed up to species level by standard biochemical tests. Blood culture broth that showed no microbial growth within seven days was reported as culture negative, only after result of routine subculture on blood, MacConkey, and chocolate agar.

Swabs from web spaces and nasal area of the NICU staff was collected and processed to Mannitol salt Agar and Blood Agar. Antimicrobial susceptibility testing was performed by Kirby Bauer's disc diffusion method as per CLSI guidelines. Data collected during the study was entered in a master chart and Descriptive statistics was used for analysis.

3. Results

During the study period of 3 months, changing pattern was observed in the bacteriological profile of neonatal septicaemia. Prevalence of Enterococci was found to be increasing from 26.8% in the month of April to 39.5% in the May. The isolation rate of other organisms is described in Table 1. Screening of NICU staff for carrier state revealed 20% isolation rate of Enterococci spp among 16 cases (i.e. among 16 staff screened during the study period 4 of them were found to be carriers of Enterococci spp). Antibiotic susceptibility in our study show maximum resistance to Penicillin (90.6%) followed by Amoxyclav (79.6%), Erythromycin (71.8%). High level aminoglycoside resistance was observed in (37.2%) isolates. Percentage distribution of other antimicrobial agents is shown in Table 2. Vancomycin and Linezolid is considered as reserve drugs. But in our study an increasing rate of Vsancomycin resistance (17.5%) and Linezolid resistance (11.6%) is observed.

Table 1: Distribution of culture positive microbes

Micro organism	April (%)	May (%)	June (%)
Klebsiella	16.1	2	29.16
E Coli	3.2	2	2.5
Enterococci	26.8	39.5	18.3
Staphylococcus	24.7	29	32.5
Acinetobacter	13.9	3.4	0
Streptococci	2	3	2.5
Candida	0	1.3	1.6
No Growth	11.8	18.75	9.16

Table 2: Antimicrobial susceptibility of Enterococcus Isolates

Antibiotics	Enterococcus	
	Sensitive (%)	Resistant (%)
Ampicillin	18.6	81.3
Penicillin	0.09	90.6
Amoxicillin + clavulanic acid	20.9	79.6
Gentamicin	62.7	37.2
Erythromycin	28.2	71.8
Ciprofloxacin	42.5	57.5

4. Discussion

Enterococci are opportunistic bacteria that become pathogenic when they colonize niches where they are not normally found. Of recent, they have become major cause of nosocomial infections, especially of the bloodstream, urinary tract and surgical sites.

In this study we tried to assess the prevalence of Enterococci infections in NICU and also analysed the changing trend in the bacterial profile. We also screened the

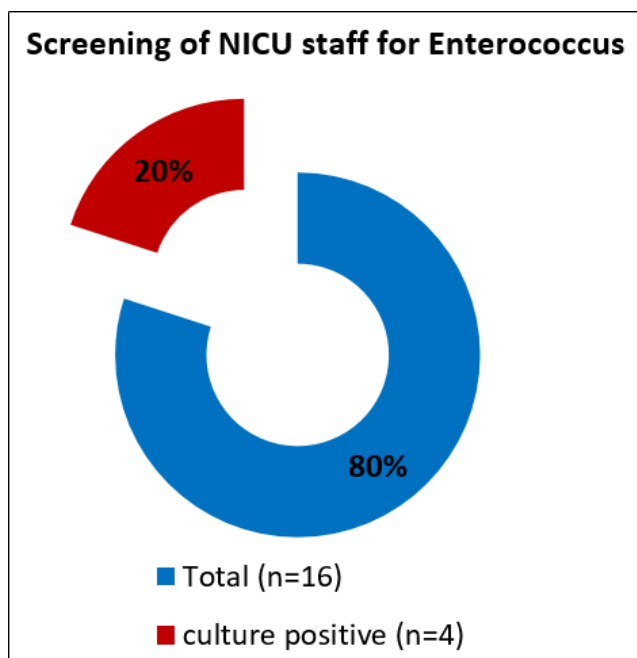


Fig. 1: Screening of NICU staff

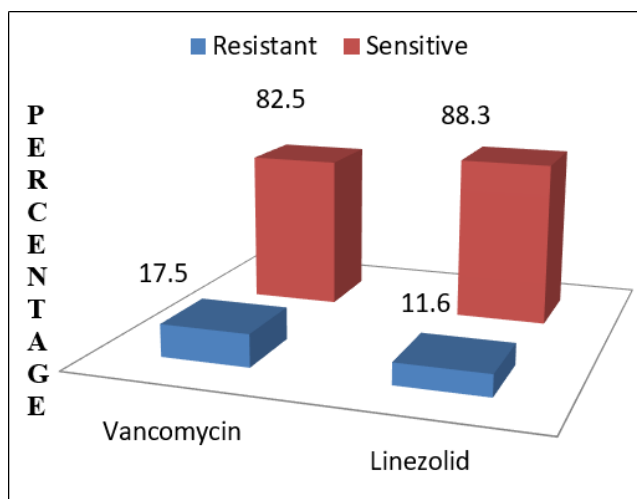


Fig. 2: Antimicrobial susceptibility of *Enterococcus* Isolates to VANCOMYCIN and LINEZOLID

NICU staff to look for the source of Enterococcal infection as they may be considered carriers.

During the study period of 3 months, we found an increased rate of Enterococcal infections with 39.8% isolates, while the rate of Klebsiella decreased to 2% which was 16.1% in the previous month; whereas the very next month staphylococcus showed a higher rate of 32.5%. This indicates that the bacteriological profile of neonatal sepsis is constantly under change.

Similar observation was obtained by Malik et al.⁵ where thirty-three (40.2%) babies became colonized with Vancomycin resistant Enterococci. Luginbuhl et al.⁶

analysed an outbreak in the newborn unit by *Enterococcus faecalis* and reported that they accounted for 8 of 19 (42%) episodes of neonatal bacteraemia during the epidemic period vs. only 8 of 159 (5%) episodes during the remaining 4.5 years (endemic period).

In other studies like Jyothi et al.² *Klebsiella* (30.5%) was the most common isolate in neonatal sepsis. Sreshta et al. identified *Escherichia coli* as the most common organism in neonatal sepsis. This suggests the bacteriological profile varies from region to region and time to time.

Screening of NICU staff revealed 20% of culture positive cases for Enterococci during the study period, which suggests that the NICU staff being the carriers, are responsible for the source of infection and further cross infection among neonates. Similarly Aku et al.⁷ suggests that majority of the infections were transmitted from handling by health care personnel.

Antibiotic susceptibility pattern of Enterococci suggests maximum sensitivity to Linezolid followed by Vancomycin. Least susceptibility was to Penicillin. An increasing resistance to vancomycin was observed. Similar observations are seen in Olawale et al.,³ Aku et al.⁷ Contrary to that in a study done by Fernandez et al. in 1995 reported only a single case of resistance to ampicillin and none to glycopeptides. This concludes that Multidrug resistant Enterococci is increasing in an alarming rate and VRE can spread rapidly among newborns in a regional neonatal intensive care unit. Proper infection control measures should be taken in preventing neonatal septicaemia.

5. Conclusion

As Enterococci is predominantly a gut pathogen, proper hand washing would help in the reduction of enterococcal infections. The source may have been the staff that turned out to be positive in screening cultures. This study concludes that the bacteriological profile of neonatal sepsis keeps changing from place to place and time to time. Routine screening for the multidrug resistant organisms in the hospital staff and appropriate methods employed to avoid carriers and proper care of NICU to avoid cross infection would help in the reduction of neonatal septicaemia.

6. Source of Funding

None.

7. Conflict of Interest

None.

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