VOLUME - 11, ISSUE - 12, DECEMBER - 2022 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Microbiology

PREVALENCE, ETIOLOGY AND ANTIBIOGRAM OF NOSOCOMIAL BLOODSTREAM INFECTIONS IN TERTIARY CARE HOSPITAL

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ABSTRACT BSI's cause substantial morbidity and mortality in vulnerable population. The frequency of these infections, epidemiology and invading organisms have changed in parallel with the evolution of medical care; particularly with the emergence of an increasingly ill and immunocompromised population of hospitalized patients who are often heavily dependent on medical support and indwelling devices. Currently >50% of BSI's are hospital acquired.

Materials And Methods: Hospital records of 100 patients of all ages with symptoms of bacteremia from various wards were retrospectively analyzed. Their blood culture and sensitivity (by conventional methods) reports were also analyzed from laboratory records. **Results:** Out of 100 patients, culture positivity rate was 60%. The predominant pathogens were Gram negative bacilli(37) with Klebsiella pneumonia(14) followed by Pseudomonas aeruginosa(8), E. coli(7), Klebsiella oxytoca(5), Acinitobacter(2) and Enterobacter aerogenes(1). Among the Gram positive isolates(23); CONS (12) were the leading pathogens, followed by Staphylococcus aureus(6) and Streptococcus spp(5). Both GPC and GNB showed good sensitivity to Piperacilin-Tazobactam followed by Imipenem, Meropenem for GNB and Vancomycin, linezolid for GPC. Males were in greater proportion than females. Majority of sample load came from Medicine ward and ICU followed by Pediatrics, NICU, PICU. Surgical and OBG ICU's were also hub of nosocomial BSI's.

Conclusion:
Preventive strategies should be targeted at vulnerable population including
(I) adherence to guidelines on insertion and care of central venous catheters.
(ii) improved compliance with hand hygiene and appropriate use of PPE's
(iii) adherence to AST report for treatment to prevent antimicrobial resistance.

KEYWORDS : nosocomial, bloodstream infections, bacteremia,blood culture, AST.

INTRODUCTION.

Bloodstream infections cause substantial mortality and morbidity in vulnerable population.[1]

The frequency of these infections, their epidemiology and the invading organisms have changed in parallel with the evolution of medical care, particularly with emergence of an increasingly ill and immunocompromised population of hospitalized patients who are often dependent on medical support and indwelling devices.[2]

'Nosocomial' or 'healthcare associated infections' (HCAI) appear in a patient under medical care in the hospital or other health care facility which was absent at the time of admission.[3] Currently, >50% of BSI's are hospital acquired.[2]

OBJECTIVES

To study microbial profile and antibiogram of pathogens causing nosocomial BSI's.

To evaluate possible risk factors for developing BSI's.

MATERIALS AND METHODS

One year retrospective study was conducted in a tertiary care hospital (KBNTGH).

Hospital records of 100 patients of all ages with symptoms of bacteremia from various wards were analyzed. Their blood culture and AST reports were also analyzed from laboratory records.

Specimen collection - Before antibiotic treatment. For adults; 10 ml blood and children 5 ml was collected aseptically in two bottles; one in BHI broth/ bile broth and second in anaerobic(RCM) broth. Aerobic sub cultures were made on blood agar and MacConkey's agar on alternate days for 7days. Upon culture positivity, the first step is to perform gram stain on culture smear. If microbes are present, the morphology provides a first hint on the etiology of the infection. The microbe identification can be achieved using biochemical tests.

AST was done by Kirby-Bauer standard disc diffusion technique on Muller- Hinton agar according to CLSI guidelines.

Exclusion Criteria

- Patients with false positive signals(no growth /no organisms in culture).
- Patients not admitted to the hospital.
- Autopsy blood cultures.
- Blood cultures referred from other hospitals.[1]

Definitions

HAI's-

- Infection acquired in hospital by a patient admitted for a reason other than infection in context.
- The infection should not be present at the time of admission.
- The symptoms should appear at least after 48 hrs of admission.[7]

A clinically significant versus a clinically non-significant (contaminant) isolate was defined as follows. Each positive blood culture was critically assessed and categorized as either clinically significant or not significant; taking into account organism identification, clinical signs and symptoms, WBC count, number of positive blood cultures out of the total number drawn, results of other cultures, pathology findings, imaging results and clinical course.[6]

Inclusion Criteria

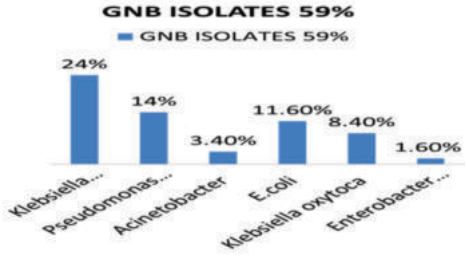
- Infection acquired in hospital but symptoms appear after discharge
- Occupational infection in health care worker.
- Neonatal infection that result while passage through birth canal.

RESULTS

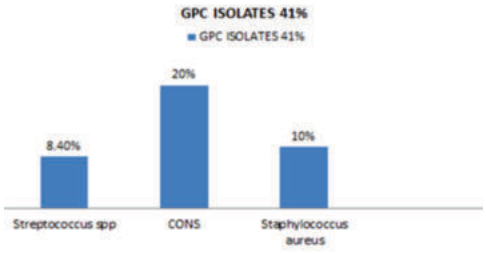
A total of 100 patients participated in this study. Out of the 100 samples, 60 were culture positive and 40 were culture negative. It was observed that most of the culture positive samples came from medicine ICU ,Surgical ICU and paediatric ICU's.

Age And Sex Distribution-

It was seen majority of the cases were at extremes of age i.e 1 to 18 yrs age group and >54 yrs group. 70% of the cases were contributed by adults and 30% were pediatric population. Males(55%) were found to be comparatively higher than females(45%).



Picture 1: % Of Gnb Isolates



Picture 2: % Of Gpc Isolates

Table 1: Antibiotic Sensitivity (%) Of Gram Positive Cocci

ANTIBIOTIC	% SENSITIVITY
Amoxiclav	40%
Ciprofloxacin	32%
Clindamycin	16%
Cotrimoxazole	16%
Doxycycline	36%
Erythromycin	16%
Linezolid	48%
Gentamycin	16%
Cefoxitin	23%
Vancomycin	56%
Teichoplanin	32%
Azithromycin	32%
Tetracycline	44%
Ampicillin	16%
PIT	48%

Table 2- Antibiotic Sensitivity (%) Of Gram Negative Bacilli.

ANTIBIOTIC	% SENSITIVITY
Ampicillin	8.60%
Amikacin	57%
Gentamycin	31.50%
Cefuroxime	8.60%
Ceftazidime	14.30%
Cefotaxime	11.40%
Imipenem	86%
Meropenem	69%
Ciprofloxacin	34%
Amoxiclav	28.50%
PIT	71.50%
CFS	63%
COLISTIN	44%

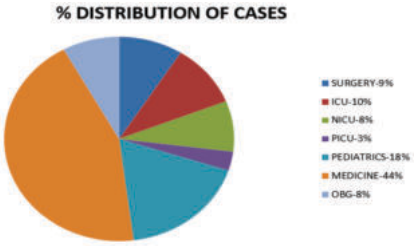


Figure 3: Distribution Of Cases From Various Wards.

DISCUSSION-

It was observed in this study that patients with extremes of ages(0-18 yrs and >54 yrs) were more commonly prone to blood stream infections which is similar to the study conducted by Tian et al.[9]

There were more cases of Gram negative bacteremia (59%) as compared to Gram positive bacteremia (45%) which coincides with the study conducted by Liao et al.[10]

The pattern of organisms was different from those reported elsewhere in the world.[11-13] In this study the highest isolated organism was *Klebsiella pneumonia* (24%), followed by coagulase negative *staphylococci* (20%), *Pseudomonas aeroginosa* (14%), *E.coli* (11.6%), *Staphylococcus aureus* (10%) which is similar to the findings obtained in the study of Dat et al.[8]

The Antibiotic Sensitivity pattern in GNB shows resistance to ampicillin, Gentamycin, Cefuroxime, Ceftazidime and Cefoxitin. GNB shows sensitivity to carbapenems (86%),piperacillin-Tazobactam(71.50%),, Cefperazone-sulbactam(63%), colistin (44%),and Amikacin(57%) which is similar to findings obtained in the study by Shingal et al.[15] Majority of sample load came from Medicine ward and ICU followed by Pediatrics, NICU, PICU. Surgical and OBG ICU's were also hub of nosocomial BSI's.

CONCLUSION

Gram negative bacteremia is more prevalent than Gram positive bacteremia.

In one study it is reported that gram negative bacteremia is associated with higher mortality compared with gram positive bacteremia.[4]

Surgical ICU's, PICU, NICU are also becoming hub of nosocomial infections along with medicine ICU.[5]

Children, elderly, obesity, malignancy and HIV carries more risk for nosocomial bloodstream infections.[4]Nosocomial infections can be controlled by practicing infection control programs, keep check on antimicrobial use and its resistance, adopting antibiotic control policy.[3]

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