𝗈 OPEN ACCESS

Study of Prevalence of Bacterial Species in Blood Stream Infection and Their Antibiotic Susceptibility Pattern in Tertiary Care Hospital, Bhavnagar

Ravindra Jadeja[1*], Kairavi J. Desai[2]

[1]Associate Professor, Dept. of Microbiology, Govt. Medical College, Bhavnagar- 364001, Gujarat, India
[2]Professor and Head, Dept. of Microbiology, Govt. Medical College, Bhavnagar- 364001, Gujarat, India

Abstract		**Original Research Article**

Background and Objectives: Blood stream infection is very critical infection and Blood culture is very essential investigation in such patient in tertiary care hospital. Study of different bacterial isolates from blood stream infection and its antibiotic sensitivity pattern is very useful guide to clinicians for starting empirical treatment. *Methods*: The study was carried out from Jan 2017 to April 2017 in Microbiology dept. at Sir T Hospital Bhavnagar. Total 1575 samples of blood were cultured by conventional methods and antibiotic susceptibility testing was done by Kirby Bauer disc diffusion method as per CLSI guidelines. *Result*: Out of 1575 blood samples, 351 (22.29%) were positive for bacterial culture, Amongst Gram negative bacteria most common isolates were E. coli 39(11.11%) and Klebsiella spp. 39(11.11%). Amongst Gram positive bacteria most common isolates were Staphylococcus aureus 68(19.37%) and CoNS 148(42.17%). These isolates were sensitive to Gentamycin, Vancomycin, Linezolid, Meropenam and Piperacillin-Tazobactum. *Conclusion*: Most common bacterial isolates from blood stream infection were S. aureus, CoNS, E. coli and Klebsiella spp. The antibiotics that helpful to treat these infections are Gentamycin, Vancomycin, Meropenam and Piperacillin-Tazobactum.
Keywords: BSI- blood stream infection, Co NS – Coagulase Negative Staphylococci spp., PTZ- Piperacillin-Tazobactum, E. coli- Escharechia coli.

INTRODUCTION

Blood stream infection is critical infection in tertiary care hospital. Identification of various bacterial isolates, their prevalence rate and antibiotic sensitivity pattern helps clinician for starting antibiotic therapy. These will also help patient to decrease mortality and morbidity in tertiary care hospital.

There are also periodic changes in presence of bacterial spp. In blood stream infection and so it is very important to know the trend of our hospital for proper management of patient and to decrease hospital stay of patient as well as to decrease cost factor for each patient.

The aim of this study was to know prevalence rate of various bacterial spp and their antibiotic sensitivity pattern in blood stream infection.

MATERIALS AND METHODS

A study was done on blood culture samples, collected from different wards and ICU of Sir T Hospital, Bhavnagar during January 2017 to April 2017. Total 1575 samples of blood were collected from ICU, SICU, NICU and wards. Blood culture testing was done by manual method. Blood samples were collected in Hartely's broth aseptically and transported to Microbiology laboratory without delay. After 24 hrs incubation at 37° C, samples were cultured on blood agar, Nutrient agar and MacConkey agar.

Bacteria were identified by colony morphology, Gram stain, Biochemical reaction like catalase test, coagulase test, indole , methyl red, voges proskauer test, citrate, urease, oxidase test , triple sugar iron test etc. Blood samples were subcultured on media every alternate day for 7 days. After 7 days samples were given negative for bacterial pathogen.

Positive bacterial isolates were further studied for antibiotic sensitivity testing using manual Kirby bauer disc diffusion method using muller hinton agar using CLSI guidelines. The antibiotics used were penicillin (10 µg), erythromycin(15 µg), gentamycin (10 µg), levofloxacin (5 µg), ampicillin+sulbactum (10+10 µg), vancomycin (30 µg), cefoxitin (30 µg), teicoplanin (30 µg), linezolid (2 µg), cefotaxime (30

µg), ceftazidime (30 µg), ciprofloxacin (5 µg), peperacillin+tazobactum (110 µg), meropenam (10 µg) etc.

Escherechia coli (ATCC 25922), Pseudomonas aeriginosa (ATCC 27853) and Staphylococcus aureus (ATCC 25923) were used for reference and quality check for culture as well as for antibiotic sensitivity testing.

RESULTS

This study showed that both gender male and female were equally prone to blood stream infection as 21.37% and 23.32% respectively (Table-2).

Table-1: Prevalence of infection in blood stream.

Total sample	Positive	Negative
1575	351	1224
100 %	22.29 %	77.71 %

Out of 1575 samples of blood, 351 (22.29%) were positive for bacterial culture

Table-2: Prevalence of blood stream infection among different gender

Gender	Positive	Negative	Total
Male	178 (21.37 %)	655 (78.63 %)	833 (52. 89%)
Female	173 (23.32 %)	569(76.68 %)	742 (47.11%)
Total	351 (22.29 %)	1224 (77.71 %)	1575(100 %)

Table-3: Prevalence of different bacteria in blood stream infection

Sr. no.	Name of bacteria	Prevalance (%)
1	E. coli	39 (11.11 %)
2	Klebsiella spp.	39(11.11%)
3	Pseudomonas spp.	9 (2.56 %)
4	S. typhi	4 (1.14 %)
5	Acenatobactor spp.	11 (3.13 %)
6	Staphylococcus aureus	68 (19.37 %)
7	Staphylococcus spp.	148 (42.17 %)
8	Enterococci spp.	33 (9. 40 %)
Total		351 (100 %)

Amongst Gram positive bacteria, most common were Staphylococcus aureus (19.37%) and Coagulase negative Staphylococcus (42.17%). The most frequently isolated gram negative bacteria were Escerichia coli (11.11%) and Klebsiella spp. (11.11%).

Table-4: Antibiotic susceptibility pattern among gram positive bacteria isolated from blood stream infection

Antibiotics	S. aureus	Coagulase negative Staphylococcus spp.
Penicillin	3 (4 %)	4 (3 %)
Ampicillin+sulbactum	29 (43 %)	60 (41 %)
Erythromycin	23 (34 %)	50 (34 %)
Gentamycin	62 (91 %)	136 (92 %)
Levofloxacin	52 (77 %)	114 (77 %)
Cefoxitin	63 (93 %)	121 (82 %)
Vancomycin	66 (97 %)	142 (96 %)
Teicoplanin	53 (78 %)	124 (84 %)
Linezolid	68 (100 %)	147 (99 %)

Coagulase negative Staphylococci and Staphylococcus aureus showed resistant pattern to penicillin and erythromycin (Table-4).

Gram negative bacteria showed resitance pattern to Amoxycillin- clavulanic acid and cephalosporin group (Table-5).

Table-5: Antibiotic susceptibility pattern among gram negative bacteria isolated from blood stream infection

Antibiotic	E. coli	Klebsiella spp.	Pseudomonas spp.	Acenatobacter spp.
Amoxycillin+ clavulinic acid	7 (18 %)	11 (28 %)	1 (11 %)	1 (9 %)
Ceftazidime	20 (51 %)	13 (33 %)	6 (67 %)	3 (27 %)
Cefotaxime	19 (49 %)	12 (31 %)	7 (78 %)	3 (27 %)
Amikacin	30 (77 %)	17 (44 %)	8 (89 %)	8 (73 %)
Gentamycin	26 (67 %)	17 (44 %)	7 (78 %)	8 (73 %)
Ciprofloxacin	21 (54 %)	15 (38 %)	6 (67 %)	3 (27 %)
Levofloxacin	25 (64 %)	21 (54 %)	6 (67 %)	5 (46 %)
Piperacillin+Tazobactum	24 (62 %)	21 (54 %)	7 (78 %)	7 (64 %)
Meropenam	38 (97 %)	38 (97 %)	9 (100 %)	11 (100 %)

DISCUSSION

Blood stream infection is a serious problem in every tertiary care hospital in admitted patients. The bacteria leading to this infection are also resistant to many antimicrobials that heralds further treatment as well as recovery of patients.

Our main focus was to know the most common bacterial spp. which is present in our hospital, which leads to blood stream infection and also to isolate them with antimicrobial susceptibility testing, so we can understand the resistant pattern of bacteria in blood stream infection of our hospital.

Out of 1575 blood samples, we found 351 samples were positive for bacteria that were 22.29 % infection rate in blood stream. Similar result was found with A. Vijaya Devi *et al*. [6] and Mulat Dagnew *et al*. [5].

Our study showed that male (27.18%) and female (23.32%) are equally infected with bacteria; comparable result was observed by Sumita *et al*. [7].

Total 351 bacterial spp. Isolated, amongst them more prominent were gram positive bacteria (249 spp.) then gram negative bacteria (102 spp). This showed same result with Rina Karunakaran *et al*. [1], but differs from A. Vijaya Devi *et al*. [6]. This study showed that gram positive bacteria are more prevalent in our hospital compared to gram negative bactaria.

The resistance pattern among gram positive bacteria showed that Coagulase Negative Staphylococci and Staphylococcus aureus were resistant to Penicillin (97%, 96%), Erythromycin (66%, 66%) and sensitive to Gentamycin (92%, 91%) and Vancomycin (96%, 97%) and Linezolid (99%, 100%) respectively. Similar result was seen with M. S. alam *et al*. [2] and A. Vijaya Devi *et al*. [6].

Amongst gram negative bacteria, the study showed that most common bacteria were Escherichia coli (11.11%) and Klebsiella spp (11.11%). Gram negative bacteria were resistant to Amoxycillin+clavulinic acid 82% and 72% respectively and Cephalosporin group 51% and 69% respectively. E.

coli and Klebsiella spp. were sensitive to Amikacin, Gentamycin Piperacillin+Tazobactum and Meropenam. Similar result was found with M. S. Alam *et al*. [2].

CONCLUSION

Septicamia was an important cause of morbidity and mortality especially for patients who are admitted in ICU, SICU and NICU. Coagulase Negative Staphylococci, Staphylococcus aureus, Escherachia coli and Klebsiella spp. are most common pathogens of blood stream infection in our hospital. They show antimicrobial sensitivity to Gentamycin, Vancomycin, Linezolid, Piperacillin-Tazobactum and Meropenam.

Suitable antimicrobial therapy in early stage of Blood stream infection decreases morbidity and mortality in such patients and helps clinicians for starting early empirical therapy.

REFERENCES

1. Karunakaran R, Raja NS, Ng KP, Navaratnam P. Etiology of blood culture isolates among patients in a multidisciplinary teaching hospital in Kuala Lumpur. Journal of microbiology immunology and infection. 2007 Oct;40(5):432.
2. Alam MS, Pillai PK, Kapur P, Pillai KK. Resistant patterns of bacteria isolated from bloodstream infections at a university hospital in Delhi. Journal of pharmacy & bioallied sciences. 2011 Oct;3(4):525.
3. Jose Orsini, Carlo Mainardi, Geerge Sakonals. Microbiological profile of organism causing Bloodstream Infection in Critically Ill patients, Journal of Clinical Medicine Research. 2012; Dec;4(6):371-377.
4. Prakash KP, Vinod Arora and Geetanjali PP. Blood stream Bacterial Pathogens and their Antibiotic Resistance Pattern in Dhahira Region, Oman. Oman Medical Journal. 2011 Jul;26(4):240-279.
5. Mulat Dagnew, Gizachew Yismaw and Biniam Mathewos. Bacterial Profile and antimicrobial Susceptibility pattern in Septicemia suspected patients attending Gondar University Hospital, Northwest Ethiopia. Biomed Central Research Notes. 2013; 6: 283.
6. Devi AV, Sahoo B, Damrolien S, Praveen S, Lungran P, Devi M. A study on the bacterial profile

of bloodstream infections in Rims Hospital. J Dent Med Sci. 2015 Jan;14:18-23.

7. Rajeevan S, Ahmad SM, Jasmin PT. Study of prevalence and antimicrobial susceptibility pattern in blood isolates from a tertiary care hospital in North Kerala, India. Int J Cur Microbial App Sci. 2014;3:655-2.

8. Bailey and Scott's Diagnostic microbiology. A textbook for isolation and identification of pathogenic microorganisms. 11th edition Edited by Forbes BA, Sahm DF, Weissfeld AS. St. Louis: The Mosby Company. 2002:378-422.

9. Clinical and Laboratory Standards Institute. Performance standards for Antimicrobial susceptibility testing, 21st international supplements. CLSI Document M100-S21. Wayne, Pennysylavania, USA: CLSI. 2011.