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Medical Microbiology

BACTERIOLOGICAL PROFILE OF BLOOD STREAM INFECTIONS IN TERTIARY CARE HOSPITALS IN SOUTHERN RAJASTHAN

KEY WORDS: Antibiotics, blood culture, multidrug resistance

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ABSTRACT

Introduction- blood stream infections are caused by wide range of organisms and multidrug resistance is seen in all the isolates.
Aim- The study is conducted to observe the various organisms causing blood stream infection in tertiary care hospital and also the antibiotic sensitivity pattern of various isolates.
Material and Method- 104 samples were tested for blood culture in Brain Heart Infusion agar and further subcultured on for isolates. The antibiotic susceptibility testing was using Kirby Baeur disc diffusion method.
Result- 46 cultures were found to be positive out of which Klebsiella sp was most common followed by CONS and Staphylococcus aureus. Sensitivity of gram positive isolates was maximum to Vancomycin while that of gram negative was to Tetracycline
Conclusion- Antibiotic susceptibility monitoring if blood cultures would help in the treatment as well as control the multidrug resistance in various organisms.

Introduction:

Blood stream infections(BSI) range from self-limiting infections to life threatening sepsis that requires rapid and aggressive antimicrobial treatment. A wide spectrum of organisms has been described that cause blood stream infections and this spectrum is subject to geographical alteration.[1]

Blood culture is the single most important procedure to detect systemic infection due to bacteria. Blood cultures of patients have isolated a wide range of organisms in BSIs. These include Acinetobacter spp., Escherichia coli, Pseudomonas aeruginosa, and Klebsiella pneumoniae among Gram-negative bacteria and Staphylococcus aureus, coagulase-negative staphylococci (CoNS), enterococci and alpha-hemolytic streptococci among Gram-positive bacteria.[2]

Increasing antimicrobial resistance is a worldwide concern. The prevalence of resistance in both out-patients and hospitalised patients with septicaemia is increasing, and it varies in accordance with geographical and regional location. In almost all cases, antimicrobial therapy is initiated empirically before the results of blood culture are available. Keeping in mind the high mortality and morbidity associated with septicaemia, a right choice of empiric therapy is of utmost importance.[3.]

So the present study aims to observe the bacteriological profile of blood stream infection and their antibiotic sensitivity pattern.

Materials and methods:

Blood samples of 104 patients were collected in period of 6 months in M B Hospital, Udaipur.

All the aseptic precautions were taken during blood collection. The samples were tranfered in the blood culture bottles containing brain heart infusion broth and transferred to laboratory within 30 minutes.

5ml sample was collected from adult patients and transferred in 50 ml of media. 1-2 ml sample from infants was taken and transferred to 5-10 ml of media.

The samples were processed further in dept of microbiology, RNT Medical College, Udaipur.

The blood culture bottles were incubated at 37°C for 7 days and subcultured at 3rd day and again at 7th day on 5% sheep blood agar and Mac Conkey agar.

The isolates on blood agar and mac conkey agar are further identified by grams staining, colony morphology and biochemical tests.

Gram positive isolates are further identified using catalase test, coagulase test, novobiocin disc, bacitracin disc, optochin disc and bile esculin test.

Gram negative isolates were identified using biochemical reactions like methyl red, vogas proskauer, indole, citrate, urease, sugar tests and oxidase test.

Antibiotic susceptibility testing was done using Kirby Baeur disc diffusion method on Mueller Hinton agar as per CLSI guidelines.[4] Following antibiotics were tested :

Amikacin, Gentamycin, cephalexin, ceftrioxone, ceftazidime, erythromycin, ampicillin, amoxclave, ciprofloxacin, tetracycline, cotrimoxozole, Oxacillin,Vancomycin.

Results:

104 samples were tested for blood culture received from OPD and IPD out of which 46 (44.2%) samples were positive. Out of 46 isolates 23 isolates were gram positive cocci and 20 were gram negative.

Most common gram positive organism was CONS (10.5%) followed by Staphylococcus aureus (9.5%) and Enterococcus (1.9%).

Most common gram negative organism was found to be Klebsiella (12.5%) followed by Acinetobacter (2.8%), Escherichia coli (1.9%) and Citrobacter sp (1.9%).

Candida sp were isolated in 2.8% of the total samples.
Various isolates are listed in table 1.

Table 1: No of isolates in blood culture.

	Number of isolates (n=46/104)	Percentage
Klebsiella	13	12.5
CONS	11	10.5
S.aureus	10	9.5
Candida	3	2.8
Acinetobacter sp	3	2.8
Escherichia coli	2	1.9
Citrobacter sp	2	1.9
Enterococcus sp	2	1.9

Antibiotic sensitivity in gram positive cocci was found to be maximum with Vancomycin (91.3%) followed by Tetracycline (65.2%). Staphylococcus aureus and Enterococcus were 100% sensitive to Vancomycin while CONS was 81% sensitive.(Table 2.)

Sensitivity in gram negative bacilli was maximum to tetracycline (65%) followed by carbenicillin (50%). The most common isolate i.e. Klebsiella sp was also sensitive to tetracycline(61.5%) followed by carbenicillin(46.1%).(Table 3)

Table 2: Sensitivity pattern of gram positive isolates.

	Staphylococcus aureus	CONS	Enterococcus sp
Gentamycin	70%	63%	Nt
Cephalexin	30%	36.3%	Nt
Ampicillin	0	18%	0
Amoxclave	0	18%	0
Erythromycin	10%	36.3%	0
Ciprofloxacin	30%	63.3%	0
Tetracycline	90%	45.4%	50%
Cotrimoxazole	70%	54.5%	Nt
Oxacillin	20%	18.1%	Nt
Vancomycin	100%	81.1%	100%

Table 3: Sensitivity pattern of gram negative isolates

	Klebsiella sp	Acinetobacter sp	Citrobacter sp	Escherichia coli
Amikacin	23%	66.6%	100%	50%
Gentamycin	7.6%	66.6%	100%	50%
Ceftrioxone	0	33.3%	0	0
Ceftazidime	0	0	0	50%
Ampicillin	Nt	0	0	0
Amoxclave	0	0	0	0
Ciprofloxacin	30.7%	33.3%	50%	100%
Cotrimoxazole	23%	66.6%	50%	50%
Tetracycline	61%	100%	50%	50%
Carbenicillin	46.1%	66.6%	50%	50%

Nt- Not tested

Discussion:

Enhanced detection of blood stream infection needs to be a national priority. Early diagnosis and appropriate treatment can make a difference between life and death. It would reduce the mortality from septicemia, reduce turn around time and improve patient management.[5]

In the present study 104 blood samples from OPD and IPD were tested and 46 samples were found to be positive for blood culture. Out of 46 isolates maximum found isolate was Klebsiella sp (12.5%) followed by CONS (10.5%) and Staphylococcus aureus (9.5%). Similar results were shown by **MP Samaga** [6] with maximum isolates being klebsiella sp and candida. **Khan et al** [7]also isolated Cons (11.1%) and Staphylococcus aureus (11.6%) in blood cultures. In the study conducted by **Gupta et al** [8] Escherichia coli was the predominant isolate followed by klebsiella sp, staphylococcus aureus and CONS.

Antibiotic resistance (ABR) is a major public health problem worldwide and is associated with adverse health and economic consequences. In India, studies have shown a high prevalence of antibiotic resistance among common bacterial pathogens recovered from community and hospital acquired infections.[8]

In our study, multiple drug resistance was observed in both gram positive as well as gram negative isolates. We studied the antibiotic sensitivity pattern of the isolates and found out that maximum gram positive isolates were susceptible to Vancomycin followed by Tetracycline. Similarly studies conducted by **Rajeevan et al**[10] and **Khan et al**[7] show maximum sensitivity to Vancomycin in gram positive isolates.

In our study, multiple drug resistance was observed in gram negative isolates and maximum sensitivity was found to be for Tetracycline. However Citrobacter sp and Escherichia coli isolates were maximum sensitive to aminoglycoside and ciprofloxacin resp. Similar studies conducted by **Gupta et** al and **Sahoo et al** showed multidrug resistance and were highly sensitive to cefaperazone-sulbactum, aminoglycosides and ciprofloxacin.Multidrug resistance was also seen in study conducted by **MP Samaga.**

Conclusion:

The data in the study provides the prevalence of various isolates in blood samples of opd and ipd patients and the current sensitivity trend to commonly used antibiotics. The data would help the physicians to deal with the treatment of patients with blood stream infections and active surveillance will help in monitoring drug resistance.

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