ORIGINAL RESEARCH PAPER

Clinical Microbiology

BLOOD STREAM INFECTIONS AND ANTIBIOTIC SUSCEPTIBILITY PATTERN IN KONASEEMA DISTRICT OF COASTAL ANDHRA PRADESH.

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ABSTRACT

In the present paper an attempt has been made to blood stream infection (BSI) is a major public health burden worldwide, with high mortality. Patient outcome is critically influenced by delayed therapy, and fast and accurate pathogen diagnostics decisively improves the care of patients. During the past two decades' major improvements have been made in the diagnostic performance of blood culture diagnostics through actions on pre-analysis and time to result Konaseema ecological zone of Amalapuram Mandal of West Godavari District of Andhra Pradesh.

INTRODUCTION

Blood stream infections (BSI) are the major cause of morbidity & mortality among patients admitted in Intensive care units & surveillance of etiological agents in these infections are important for their prevention & Treatment. In most bacteremia situations, however, only a small number of bacterial cells gain entry and no symptoms develop because the transients are rapidly removed by immune blood cells. When more cells enter the bloodstream than can be effectively removed, septicemia develops in which the infectious agent spreads through the bloodstream. Septicemia can result from a local infection in the body (such as pneumonia) or from surgery on infected tissue. For reasons that are not completely understood, sepsis arises if the body's immune response to the infection becomes unregulated, resulting in physiological, biochemical, and pathological abnormalities. Septic shock brings about overwhelming circulatory, cellular, and metabolic abnormalities. It is one of the most dangerous killers in hospitals, yet one of the least understood medical conditions. Globally, septic shock is a leading cause of mortality, taking the lives of 18 million people every year. Septic shock then refers to those cases of sepsis that are likely to have poor outcomes due to the collateral damage inflicted by the immune system response and that are at greater risk of mortality.

Unfortunately, many doctors miss the early signs of septic shock. It has been said, "For every hour delay in giving antibiotics, there is about a 7% increase in risk of death". The culture of blood is one of the most important procedures performed in the clinical microbiology laboratory. Blood stream infection is the infection that requires one or more cultures positive for a bacteria or a fungus of blood samples obtained in the presence of fever(>38°C) not attributable to other causes (based on US Centre of Disease control & prevention). Community acquired Bacteremia was defined if the first positive blood culture was obtained before or within 48 hours of hospitalization and without a hospital stay in the 30 days prior to admission. Blood stream infections are considered to be nosocomial if signs & symptoms of these infections become evident after 48 hours following hospital admission and/or if the patient had been hospitalized during the 2 weeks before the current admission.

The patients with BSI manifest clinically with systemic signs of infection such as Fever, Leukocytosis, and raised inflammatory markers. The most common bacteria isolated from patients in ICU are Gram positive aerobic bacteria (S. aureus, Enterococcus) and Gram negative aerobic bacteria (Enterobacteriaceae, Pseudomonas aeruginosa) & the common fungi include Candida albicans in both immune competent & immune compromised patients. CONS-which was previously considered as contaminants have increased in clinical importance & are now recognized as pathogen. They are the etiologic agents of catheter associated bacteremia in patients with vascular & other prosthesis. So judging its clinical significance is very challenging. Blood cultures are the most important laboratory test performed in the diagnosis of serious infection and leads to a definitive diagnosis against the causative organisms. So the Blood culture is considered as the gold standard for the detection of bacteremia.

This study was taken in our institution to evaluate the prevalence of Septicemia in ICU patients in our setup in relation to their source of infection (14), It is done to ascertain the importance of Blood culture examination for the detection of BSI in ICU patients that helps in treating and decreasing is the morbidity & mortality due to Community acquired & Nosocomial Blood stream infections.

MATERIALS & METHODS

Ethical clearance was obtained from the institutional ethical committee and the study was commenced after obtaining informed consent from the patients. a prospective Cross sectional study analysis, patients in all age groups with signs and symptoms of Blood Stream Infections- fever with or without chills, diaphoresis, tachypnea, tachycardia, leukocytosis and leucopenia. collected 2.5 ml of blood was drawn from the 101 patients with the help of sterilized syringe then the blood is directly poured into the blood culture bottles. Blood sample were collected from patients attending the outpatient department and from those patients admitted in the hospital wards of Konaseema Institution of Medical Sciences and Research Foundation, Amalapuram

After that culture bottle should be sent to the Microbiological Laboratory. Culture bottle can be incubated into these culture machine at 37°C for 24 hours to 7 day. Positive culture bottle taken out after end to end mixing nearly one number of sample should be taken these culture bottle with the help of a sterile syringe. Then prepare Blood Agar and MacConkey Agar and same time we should prepare a Smear Slide we should do a Gram Stain also. Broths were examined for turbidity and subcultures were done in MacConkey agar and blood agar plates at 48 hours and at 72 hours. The blood culture was considered negative if no growth occurred even on the 7th day of subculture i.e final subculture. Any growth which occurred during the 7 day period of incubation was identified based on GRAM STAIN.

RESULTS AND DISCUSSION:

Table-1 Incidence of Blood Stream Infection (BSI)

Total Number Of Specimens Investigation	Culture Positive		Culture Negative	
Total	Number	Percentage (%)	Number	Percentage (%)
101	18	18%	83	82%

Table-2 Gender Wise Incidence of Blood Stream Infection (BSI)

Males		Females	
1	Percentage %	Number	Percentage %
8	44%	10	56%

The percentage(%) incidence is more in females. The Blood Stream Infection in males & females is in the ratio 1:2 respectively

Table – 3 Distribution of Micro Organisms in Blood Stream Infection (BSI)

Table-5 Distribution of Organism In Relation To Gender & Age Group

TOTAL	Staphylococcus Species	Klebsiella Species	Acinetobacter Species
18	16 89%	01 5.5%	01 5.5%

It is obvious from table-5 that Staphylococcus species is the most Predominant organism encountered in this investigation with a percentage of 89%.

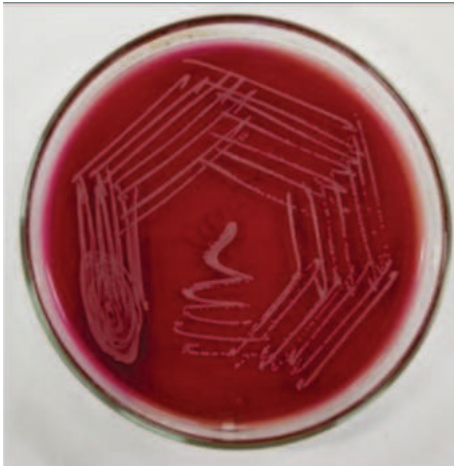**Table – 4 Spectrum & Incidence of Bacterial Species**

Gram Positive			Gram Negative		
Organism	Number	%	Organism	Number	%
Staphylococcus Species	16	89%	Klebsiella Species	01	5.5%
			Acinetobacter Species	01	5.5%
Total	16	89%		02	11%

Organism	Male Groups							Female Groups						
	0-10	11-20	21-30	31-40	41-50	50 Above	Over All	0-10	11-20	21-30	31-40	41-50	50 Above	Over All
Staphylo coccus Species	1 14%	-	1 14%	1 14%	1 14%	3 44%	7 100%	3 33%	-	-	-	2 23%	4 44%	9 100%
Klebsiella Species	-	-	-	-	-	-	-	-	-	-	-	-	1 100%	1 100%
Acineto Baxter Species	-	-	-	-	-	1 100%	1 100%	-	-	-	-	-	-	-

Table – 6 Results of Invitro Sentivity, Intermediate, Resistance of Organisms to Drugs

S No	ANTIBIOTICS	STAPHYLOCOCCUS SPECIES				KLEBSIELLA SPECIES				ACINETOBACTER SPECIES			
		T	S	I	R	T	S	I	R	T	S	I	R
1	AMOXYCLVE (AMC)	16	8 50%	3 19%	5 31%	1	-	-	1 100%	1			1 100%
2	AZITHROMYCIN (AZM)	10	6 60%	2 20%	2 20%								
3	CEFAPERAZONE + SULBACTUM (CFS)	5	2 40%	1 20%	2 40%	1	-	1	-	1	-	-	1 100%
4	CEFOXITIN (CX)	16	2 13%	2 12%	12 75%								
5	CEFTRIAXONE (CTR)	6	2 33%	2 33%	2 34%	1	-	-	1 100%	1	-	-	1 100%
6	CEFTAZIDIME (CAZ)					1	-	-	1 100%	1	-	-	1 100%
7	CEFTAZIMIDEAVIBAC (CZA)					1	-	-	1 100%	1	-	-	1 100%
8	CLINDAMCYCIN (CD)	8	2 25%	3 38%	3 37%								
9	CO-TRIMOXAZOLE (COT)					1	-	-	1 100%				
10	DOXYCYLIN (DO)	10	9 90%	-	1 10%								
11	GENTAMYCIN (GEN)	16	11 69%	4 25%	1 6%					1	-	-	1 100%
12	LEVOFLOXACIN (LE)	1	-	-	-	1 100%	-	-	1 100%	1	-	-	1 100%
13	LINEZOLID (LZ)	16	12 75%	3 19%	1 6%								
14	MEROPENEM (MRP)	16	3 19%	11 69%	2 12%					1	-	-	1 100%
15	TETRACYCLINE (TE)					1	-	-	1 100%	1	-	-	1 100%
16	VANCOMYCIN (VA)	13	2 15%	11 85%	-								

Where As ; T = Total S = Sensitivity I = Intermediate R = Resistance

Colonies of Staphylococcus Aureus on Blood Agar Plate

Colonies of Klebsiella Pneumonia on MacConkey Agar Plate

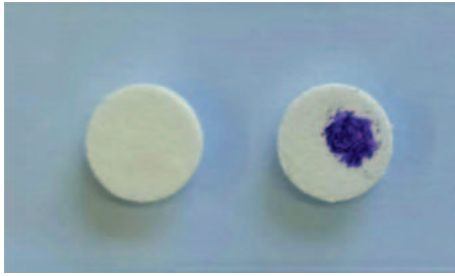**Biochemical Test for Urease Negative & Positive**
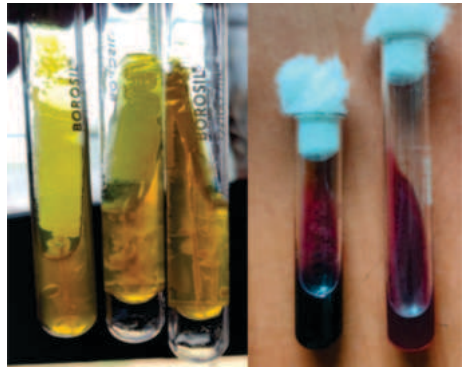
Biochemical Test for Triple Sugar Ion (TSI)
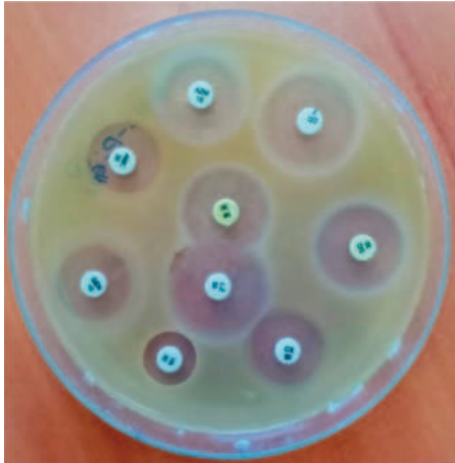

Biochemical Test for Citrate Negative & Positive
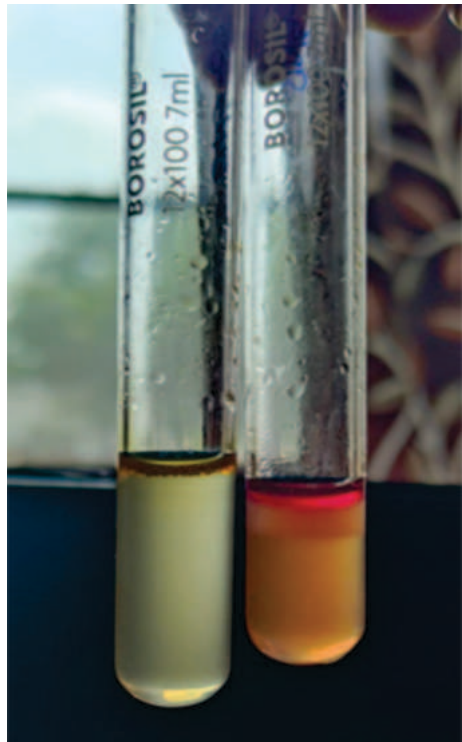
Biochemical Test for Indole Negative & Positive

Biochemical Test for Oxidase Negative & Positive

Antibiotics Sensitivity Pattern of Staphylococcus Aureus

DISCUSSION

Blood stream Infections (BSI) are a major cause of morbidity and mortality among patients in Intensive care units. Reports on the incidence of BSI vary significantly, reflecting differences in individual risks, based on institutions, type of patients, comorbidities and the length of stay. Out of the 101 blood samples taken up for study, 18 (18.8%)were positive by blood culture. This correlated with the study of Matteo Basetti et al (2016) were observed in 15% of the infected patients. In another study Vincenzo Risotto et al (2017) 22% developed in BSI. The cause of BSI infection is multifactorial and the consequences depend on pathogens associated, source of infection in ICU, underlying risk factors, timely intervention and appropriate treatment received. Hence this study was done to determine the bacteremia in critical care set up, their source of infection and to determine the antimicrobial susceptibility patterns of isolates from blood culture. This study included 54 male patients (53.4%) and 47 female patients (46.5%) . Males out-numbered the female patients, similar findings were also observed in study of Shurbi khurana et al (2018). In another study done by Van Gestel et al (2004) , the majority of the patients belonged to the age group of 64±15 years and the male to female ratio in this study is 1.7:1.

In the present study, the majority of the patients admitted in IMCU with clinical signs of sepsis (under SIRS criteria) were in the age group of 41-50 years(44%). These results correlated with the study of Shurbi khurana et al (2018), in which the range of patients were between 24 & 54 years during the study. Similar findings were observed in a study by Prowle et al (2007) in which the majority of patients were from 49-73 years and the mean age is 61. In the culture confirmed Blood Stream Infection samples, Intravenous catheter device (18%) was found to the major source of infection,Similar findings were observed in a study by A.Gowthami in (2018). Out of the total isolates 18, 2 (12%) isolates were Gram negative and 16(88%) isolates were Gram positive. Out of the Gram negative isolates, Klebsiella pneumoniae (6%) and Acinetobacter Baumannii (6%) (Table-3).Among Gram Positive Isolates,Staphylococcus Aureus (88%).In a study by Anil k Saxena , Bodh R.Panthotra et al (2005) among Gram

Positive cocci Staphylococcus Aureus is the predominant Organism observed in Blood Stream Infection. In our overall Blood Stream Infection study we observed 88% Gram Positive Stain Identified as Staphylococcus Aureus .Additionally we found that 12% of Blood Stream Infection was Gram Negative Bacterial ,Among 12% of Gram Negative Bacteria was 50% Klebsiella pneumoniae and 50% Acenitobacter Baumannii respectively.

In the present study , Most of the Gram Positive Organisms are Sensitive to Amoxicillin 50%, Azithromycin 60%, Cefoperazone 40%, Cefoxitin 13%, Ceftriaxone 33%, Clindamycin 25%, Doxycycline 90%, Gentamicin 69%, Linezolid 75%,Meropenem 19%,Vancomycin 15%.

CONCLUSION

In this study, among 101 Blood Stream Infection suspected blood samples blood culture positivity was 18% (18/101).The incidence of Blood Stream Infection is predominant in the age group between Above 50 ± 15years 39%. 43% of the patients involved in this study were males and 57% were females. Out of the 18 culture confirmed BSI 16 (89%) patients were culture positive with Gram positive organisms, 2 (11%) patients were culture positive with Gram negative organisms. In our overall Blood Stream Infection study we observed 88% Gram Positive Stain Identified as Staphylococcus Aureus. Additionally we found that 12% of Blood Stream Infection was Gram Negative Bacterial, Among 12% of Gram Negative Bacteria was Klebsiella pneumoniae and Acenitobacter Baumannii respectively.

Blood Stream Infections (BSI) are among the leading causes of infections in ICU patients and might be the causes. Resistant bacteria in the ICU setting cause an increasing number of BSIs. The clinician should be aware of the risk factors for BSIs caused by resistant bacteria, common resistant mechanisms and the global management of critically ill patients, from surveillance measures to source control and appropriate antibiotic treatment.

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