VOLUME - 10, ISSUE - 03, MARCH - 2021 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Microbiology

BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SUSCEPTIBILITY PATTERN OF BACTERIAL PATHOGENS ISOLATED FROM PATIENTS WITH RENAL FAILURE

Dr. R. Synthia Selvakumari *	Assistant Professor of Microbiology, Government Medical College & ESI Hospital, Coimbatore, Tamil Nadu. *Corresponding Author
Dr. G.Jeyalakshmi	Former Director and Professor of Microbiology, Institute of Microbiology, Madras Medical College & RGGGH, Chennai, Tamil Nadu.
Dr. R. Deepa	Associate Professor of Microbiology, Government Villupuram Medical College, Villupuram, Tamil Nadu.

ABSTRACT The prevalence of renal failure due to Acute and Chronic kidney disease is a serious public health problem. Patients with renal impairment are at high risk of developing infection due to high uremic state, low immunity and needs Hemodialysis as a major part in the treatment. The frequency of hemodialysis is a risk factor for the development of infection. On this background this cross sectional study was aimed to describe the infections caused by Bacterial pathogens in renal failure patients mainly undergoing hemodialysis and its Antimicrobial susceptibility pattern. This cross sectional study was conducted in the Institute of Microbiology in association with Department of Nephrology, Madras Medical College, Rajiv Gandhi General Hospital, Chennai for a period of one year from September 2011- October 2012. **Materials and Methods:** 150 adult inpatients between the age group f 18-65 with acute and chronic renal failure who undergo hemodialysis through central venous catheter, suspected having infection based on the clinical symptoms and signs were taken for the study. Qulitative and Quantitative culture of catheter tip, and Blood culture was done for all the patients. The severity of infections were analysed based on the Age, sex, duration of Hopspital stay, Site of Catherterization, Associated co morbidities and type of bacterial isolates identified. Antimicrobial susceptibility testing was done using standard CLSI guidelines. **Results:** 58.3% and 23.3% of aerobic bacteria were isolated from catheter tip and peripheral blood samples respectively. *Staphylococcus aureus* was the predominantly isolated gram positive cocci from catheter and peripheral venous blood. *Pseudomonas aeruginosa* was the commonest gram negative bacilli isolated from catheter tip. Methicillin resistance was noted among *Staphyloccus aureus* isolates in 27.2% and 31.4% catheter tip and peripheral venous blood isolates. 33.3% MRSA, 16.7% *Pseudomonas aeruginosa* and 50% *Acinetobacter baumannii* isolated from catheter blood. The commonest etiological agent in urinary tract infection was Escherichia coli (72.2%) Among the 37 isolates of MRSA all were sensitive to vancomycin with the MIC of <2. 16.6% of *Klebsiella pneumoniae*, 50% of *Proteus vulgaris*, 33.3% of *Proteus mirabilis* and 37.5% of *Escherichia coli* and 14.2% of *Klebsiella oxytoca* were found to be ESBL producers. All the isolates of *Pseudomonas aeruginosa and Acinetobacter baumannii* showed 100% sensitive to Imipenam.

KEYWORDS : Catheter related Blood stream infection, Catheter related infection, Central venous catheter, Hemodialysis, Antimicrobial susceptibility

INTRODUCTION

In modern medicine, the use of temporary intravascular catheters for vascular access and hemodynamic monitoring has become a central part in Renal failure patients undergoing hemodialysis. Central venous catheters (CVC) have significant benefits in many clinical situations but the major consequence of CVC is colonization of the catheter by microbes mainly bacterias which can lead to catheter related infection (CRI) and serious catheter related blood stream infection (CRBSI) which remain a major cause of nosocomial infections leading to significant patient morbidity, mortality and hospital costs[1,2,3,4]

The risk of developing bacteremia varies with the site of CVC insertion, type of device and duration of CVC in situ.[5,6] CRBSI have increased in incidence during the past few decades. More than three fourth of the nosocomial bacteremias occurring in case clusters are primary bacteremias and the case fatality rate of CRBSI has been estimated about 10-20% and more than 90% of CRBSI are associated with CVC[7,8]. The vascular access devices particularly Internal Jugular Vein (IJV), femoral vein and subclavian vein are major source of infection, causing local and systemic infection like local cellulitis, abscess formation, septic thrombophlebitis, endocarditis and septicemia in the HD patients[9,10]

MATERIALS:

Catheter tip, Peripheral venous blood , Catheter blood (catheter in situ), Swab from infected site of catheter, Urine and Sputum

Ethical consideration:

Approval was obtained from the Institutional ethical committee Informed consent was obtained from the study population.

Inclusion Criteria:

a) Adult inpatients with renal failure undergoing hemodialysis, who develop signs of inflammation at different sites like Jugular, Femoral and Subclavian catheterization after 48 hrs of insertion of catheter.
b) Patients who develop fever, chills, headache, abdominal pain, diarrhea and hypotension and any other signs and symptoms suggestive of infection any time after 48hrs of insertion of central venous catheter during hospitalization.

Exclusion Criteria:

a) Patients who have fever, chills, head ache and signs of inflammation within 48 hrs of insertion of catheter or prior to dialysis
b) Patients in whom blood culture was positive before dialysis

Data collection:

Data collection included name, age, address, date of admission, diagnosis at admission, physical examination finding. Duration of hospital stay, nutritional status, underlying illness like diabetes mellitus, uremia, hypertension, history of previous dialysis, infection during last dialysis, blood transfusion, type of catheter, duration of catheterization and concurrent other infections were recorded.

Sample collection and Processing:
All the samples were collected and processed following the Standard Microbiological techniques before starting Antibiotics

ANTIMICROBIAL SENSITIVITY TESTING:
Antibiotic susceptibility testing was performed by the Kirby Bauer disc diffusion method on Mueller Hinton agar according to Clinical Laboratory Standards Institute protocols. The diameters of zones of inhibition were interpreted according to CLSI standards for each organism. Culture media and antibiotic discs were tested for quality control using standard ATCC strains.

The following standard strains were used
1. Staphylococcus aureus-ATCC 25923
2. Escherichia coli-ATCC 25922
3. Pseudomonas aeruginosa-ATCC 27853

The panel of antibiotics included in the antimicrobial sensitivity testing

Gram negative bacilli
Ciprofloxacin, Cefotaxime, Amikacin, Garamycin, Ofloxacin, Norflox, Nitrofurantoin, Cotrimoxazole, Imipenam, Piprazine Tazobactum, Ceftazidime.

Gram positive Cocci
Cirofloxacin, Cephalexin, Amikacin, Erythromycin, Cotrimoxazole, Oxacillin, Penicillin, Amoxycillin, Cephelexin, Ciprofloxacin. Vancomycin, Amoxycillin clavulinic acid

RESULTS
Majority of the study population were males (52%) and females (48%) with the ratio was 1.8:1. Majority of the patients (67.4%) in the study group belonged to the age group of 21-30 years and highest percentage of cases (41%) seen in males of age group between 21-30 and in females(34.7%) seen in 41- 50 yrs of age group. [Table1]

Hemodialysis was performed through central venous catheters in 70.7% of Chronic kidney diseases (CKD) and 29.3% of Acute kidney injury (AKI) patients.[Table 2] Among the Chronic kidney disease patients Diabetes Mellitus was the predominant underlying cause of catheterization in 35% followed by hypertension 32%, post renal failure 14.2% and end stage renal disease in 7.5%. Less than 5% contributed by anaemia with failure, nephrotic syndrome, hydronephrosis, hemolytic uremic syndrome and systemic lupus erythematosis. In Acute kidney injury medical renal disease less than 3 months contributed 50% followed by 16% diarrhea, 6.8% snake bite, post partum, and post surgical causes.4.6% had history of poisoning and 2.2% had hemolytic anaemia.[Table3]

Catheter tip and peripheral venous blood was collected from all the cases. Central venous catheter blood sample was collected in 9 cases along with the peripheral blood. None of the cases with urinary infection or upper respiratory infection had a positive culture in peripheral venous blood.

58.3% and 23.3% of Aerobic bacteria were isolated from catheter tip and peripheral venous blood samples respectively.[Table4].

Staphylococcus aureus, *Staphylococcus epidermidis*, *Staphylococcus schleiferi* and *Staphylococcus warneri* showed 100% sensitive to Amikacin. 27.2%, 31.4%, 33.3% of MRSA were detected in catheter tip, peripheral venous blood and catheter blood respectively.[Table5, 6]. All the isolates of *Pseudomonas aeruginosa and Acinetobacter baumannii* showed 100% sensitive to Imipenam. No MBL, AmpC producers were detected.[Table 7]. All the members of Enterobacteriaceae were sensitive to Imipinem and Cefoperazone/sulbactam.33.3% of *Proteus mirabilis*, 37.5% of *E-coli*, 16.6% *Klebsiella pneumoniae*, 50% of *Proteus vulgaris* and 14.2% *Klebsiella oxytoca* were ESBL producers .[Table 8] Among the 37 isolates of MRSA all were sensitive to vancomycin with the MIC of <2. .[Table 9] PCDDT-Phenotypic confirmation disk diffusion test, DDST-Double disk diffusion synergy test.16.6% of *Klebsiella pneumoniae*,50% of *Proteus vulgaris*, 33.3% of *Proteus mirabilis* and 37.5% of *Escherichia coli* and 14.2% of *Klebsiella oxytoca* were found to be ESBL producers.[Table10].

Table 1: DISTRIBUTION OF AGE & SEX IN THE STUDY GROUP (n=150)

Age in yrs	Male n =78 (52%)		Female n =72 (48%)		Total no (%)
	No.	%	No.	%	
18-20	2	2.6	4	5.6	6 (8.2%)
21-30	32	41.0	19	26.4	51 (67.4%)
31-40	19	24.4	11	15.3	30 (39.0%)
41-50	15	19.2	25	34.7	40 (53.9%)
51-60	8	10.2	7	9.7	15 (19.9%)
61-65	2	2.6	6	8.3	8 (8.9%)

Table 2: Type of renal disease in the study group (n=150)

Diagnosis	No.	%
Chronic Kidney Disease(CKD)	106	70.7
Acute Kidney Injury(AKI)	44	29.3

Table 3: Indication for HEMODIALYSIS IN THE STUDY GROUP (n= 150)

Acute Kidney Injury	No	%	Chronic Kidney Disease	No	%
Medical renal disease < 3months	22	50.0	Diabetes Mellitus	37	35.0
Acute diarrheal disease	7	16.1	Hypertension	34	32.0
Snake Bite	3	6.8	Post renal transplant failure	15	14.2
Postpartum	3	6.8	End Stage Renal Diseases(ESRD)	8	7.5
Post surgical	3	6.8	Anaemia with Failure	4	3.9
Drug induced	2	4.6	Nephrotic Syndrome	3	2.8
Copper Sulphate poisoning	2	4.6	Systemic lupus erythematosis	3	2.8
Hemolytic Jaundice	1	2.2	Hemolytic uremic syndrome	1	0.9
Hydronephrosis	1	2.2	Renal artery stenosis	1	0.9
Total	**44**	**29.3 %**	**Total**	**106**	**70. 7%**

Table 4: Distribution of samples collected from study group and their culture positivity

Samples	Aerobic Bacteria
Catheter tip (n= 150)	88 (58.3%)
Peripheral venous blood (n= 150)	35 (23.3%)
Central venous catheter blood (n=9)	6 (66.6%)
Swab from Infected Site (n=12)	4 (33.3%)
Urine (n=33)	11 (33.3%)
Sputum (n=15)	6 (40%)

Table 5: Distribution of aerobic BACTERIAL Isolates from various samples

ISOLATE	Catheter (n=88)	Peripheral blood (n=35)	Catheter blood (n=6)	Urine (n=11)	Swab 4	Sputum 6
S.aureus MRSA	24 (27.2%)	11 (31.4%)	2(33.3%)			

MSSA	5 (5.6%)	3 (8.5%)	-	-	1	3 (50%)
S. epidermidis	23 (26.1%)	3 (8.5%)	-	3 (27.2%)		
S.warneri	2 (2.2%)	-	-	-		
S.schleiferi	2 (2.2%)	2 (5.7%)	-	-		
Micrococcus Spp	4 (4.5%)	-	-	-		
Pseudomonas aeruginosa	7 (8.0%)	5 (14.2%)	1 (16.7%)	-		

Acinetobacter baumannii	8 (9.0%)	4 (11.4%)	3 (50.0%)	-		
E.coli	4 (4.5%)	3 (8.5%)		8 (72.2%)	1 (25%)	
K.oxytoca	3 (3.4%)	2 (5.7%)			2 (50%)	
K. pneumoniae	2 (2.2%)	1 (2.8%)				3 (50%)
Proteus mirabilis	2 (2.2%)	1 (2.8%)				
Proteus vulgaris	2 (2.2%)	-				

Table 6: ANTIMICROBIAL SENSITIVITY PATTERNS OF GRAM POSITIVE COCCI (GPC)

Antibiotics	*Staphylococcus aureus* (n=48)										*Staphylococcus epidermidis*(n=29)						*Staphylococcus schleiferi*(n=4)				*Staphylococcus warneri* (n=2)	
	Catheter tip(n=29)		Peripheral venous blood (n=14)		Catheter Blood (n=2)		Sputum (n=3)		Swab (n=1)		Catheter tip(n=23)		Peripheral venous blood(n=3)		Urine (n=3)		Catheter tip(n=2)		Peripheral venous blood(n=2)		Catheter tip(n=2)	
	N	%	n	%	N	%	n	%	n	%	N	%	n	%	n	%	n	%	N	%	N	%
Amikacin	29	100	14	100	2	100	3	100	1	100	23	100	3	100	3	100	2	100	2	100	2	100
Ciprofloxacin	22	75	10	71.4	1	50	3	100	1	100	18	78	2	67	3	100	2	100	1	50	1	50
Cotrimoxazole	21	72	11	100	2	100	2	67	-	-	19	83	2	67	3	100	1	50	1	50	1	50
Cephalexin	22	76	8	57	2	100	1	33	-	-	19	83	1	33	3	100	1	50	1	50	2	100
Ofloxacin	22	76	8	57	2	100	1	33	1	100	19	83	2	67	3	100	1	50	1	50	2	100
Erythromycin	22	76	10	71	1	50	3	100	1	100	18	78	2	67	3	100	2	100	1	50	1	50
Penicillin	-	-	-	-	-	-	3	100	1	100	18	78	2	67	3	100	2	100	1	50	1	50
Amoxycycillin clavulunic acid	24	100	11	100	2	100	3	100	1	100	23	100	3	100	3	100	2	100	2	100	2	100
Cefoxitin	5	17.2	3	21.4	-	-	3	100	1	100	23	100	3	100	3	100	2	100	2	100	2	100

Table 7: ANTIMICROBIAL SENSITIVITY PATTERNS OF GRAM NEGATIVE BACILLI (GNB)

Antibiotic	*Pseudomonas aeruginosa* n=13						*Acinetobacter baumannii* n=15					
	Catheter tip(n=7)		Peripheral Blood(n=5)		Catheter Blood(n=1)		Catheter tip(n=8)		Peripheral Blood(n=4)		Catheter Blood(n=3)	
	N	%	N	%	N	%	N	%	N	%	N	%
Amikacin	7	100	4	80	1	100	5	62.5	4	100	3	100
Gentamicin	6	85.6	4	80	1	100	6	62.3	4	100	3	100
Ceftazidime	7	100	5	100	1	100	8	100	4	100	3	100
Ciprofloxacin	6	85.6	4	80	1	100	7	87.5	4	100	2	66.6
Ofloxacin	7	100	5	100	1	100	8	100	4	100	3	100
Imipenem	7	100	5	100	1	100	8	100	4	100	3	100
Cefoperazone /sulbactam	7	100	5	100	1	100	8	100	4	100	3	100
Pipracillin /Tazobactum	7	100	5	100	1	100	8	100	4	100	3	100

Table 8 : ANTIMICROBIAL SENSITIVITY PATTERNS OF GRAM NEGATIVE BACILLI (GNB)

Antibiotic	*Klebsiella pneumoniae* (n=6)						*Klebsiella oxytoca* (n=7)						*Proteus mirabilis* (n=3)				*Proteus vulgaris* (n=2)	
	Catheter tip(n=2)		Peripheral Blood (n=1)		Sputum (n=3)		Catheter tip(n=3)		Peripheral Blood (n=2)		Swab (n=2)		Catheter tip(n=2)		Peripheral Blood (n=1)		Catheter tip(n=2)	
	n	%	n	%	n	%	n	%	N	%	n	%	n	%	n	%	n	%
Amikacin	2	100	1	100	3	100	3	100	2	100	2	100	2	100	1	100	2	100
Gentamicin	2	100	1	100	3	100	2	66.6	2	100	2	100	2	100	1	100	2	100
Cefotaxime	1	50	-	-	2	66.6	2	66.6	1	50	2	100	1	50	1	100	1	50
Ceftazidime	2	100	1	100	3	100	3	66.6	2	100	2	100	1	50	1	100	1	50
Ciprofloxacin	2	100	1	100	1	100	3	100	2	100	1	100	2	100	1	100	2	100
Ofloxacin	2	100	1	100	3	100	3	100	2	100	2	100	2	100	1	100	2	100
Imipenem	2	100	1	100	3	100	3	100	2	100	2	100	2	100	1	100	2	100
Cefoperazone/sulbactam	2	100	1	100	3	100	3	100	2	100	2	100	2	100	1	100	2	100
Nitrofurantoin	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Norfeox	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Table 8-a: ANTIMICROBIAL SENSITIVITY PATTERNS OF GRAM NEGATIVE BACILLI (GNB)

Antibiotic	*Escherichia coli* (n=16)							
	Catheter tip(n=4)		Peripheral Blood(n=3)		Swab(n=1)		Urine (n=8)	
	n	%	n	%	n	%	n	%
Amikacin	4	100	3	100	1	100	8	100
Gentamicin	4	100	3	100	1	100	8	100

Cefotaxime	2	50	1	33.3	-		4	50
Ceftazidime	2	50	1	33.3	-		4	50
Ciprofloxacin	3	75	1	33.3	-	100	8	100
Ofloxacin	4	100	3	100	1	100	8	100
Imipenem	4	100	3	100	1	100	8	100
Cefoperazone /sulbactam	4	100	3	100		100	8	100
Nitrofurantoin	-	-	-	-	-	-	8	100
Norfeox	-	-	-	-	-	-	8	100

Table 9: MIC of Vancomycin for *Staphylococcus aureus*

Organism	Minimum inhibitory concentration Break Point			
	0.25 □g/ml	0.5 □g/ml	1.00 □g/ml	>2 □g/ml
S.aureus n=37	22	15	-	-

Table 10: Detection of ESBL Producers among the Gram negative bacteria from various samples

	Number of positive isolates					
Pathogens	Screening test		DDST		PCDDT	
Proteus mirabilis(n=3)	2	66.6%	1	33.3%	1	33.3%
Escherichia coli (n=16)	7	43.75%	6	37.5%	6	37.5%
Klebsiella pneumoniae (n=6)	3	50.0%	1	16.6%	1	16.6%
Proteus vulgaris (n=2)	1	50.0%	1	50%	1	50%
Klebsiella oxytoca (n=7)	2	28.5%	1	14.2%	1	14.2%

DISCUSSION

In our study 150 adult inpatients with Renal failure who underwent hemodialysis through the central venous catheter with symptoms and signs of infection were taken. Majority of the study population were males (52%) and females (48%) with the ratio was 1.8:1. Majority (67.4%) were between the age group of 21-30yrs. Hemodialysis was performed through central venous catheters in 70.7% of Chronic kidney diseases (CKD) and 29.3% of Acute kidney injury(AKI) patients. Among the Chronic kidney disease patients(CKD) Diabetes Mellitus was the predominant underlying cause of catheterization in 35% followed by hypertension 32%, post renal failure 14.2% and end stage renal disease in 7.5%.[11,12,13,14] Less than 5% contributed by anaemia with failure, nephrotic syndrome, hydronephrosis, hemolytic uremic syndrome and systemic lupus erythematosis. In Acute kidney injury (AKI) medical renal disease less than 3 months contributed 50% followed by 16% diarrhea, 6.8% snake bite, post partum, and post surgical causes.4.6% had history of poisoning and 2.2% had hemolytic anaemia.[15,16]

Among the gram positive organisms isolated from catheter tip Methicillin resistant Staphylococcus aureus (MRSA) was the predominant organism in (27.7%) followed by Staphylococcus epidermidis (26.1%). Our study correlates with the study of Pooja *et al*[2] who stated that 67% of the CRBSI was due to gram positive cocci(33%) contributed by Staphylococcus aureus and Coagulase negative Staphylococci.[2,17].

Among the gram negative bacteria causing CRI, the predominant isolate was Acinetobacter baumannii (9%). 8% Pseudomonas aeruginosa, 4.5% E.coli, 3.4% Klebsiella oxytoca, 2.2% Klebsiella pneumoniae followed by Proteus mirabilis and Proteus vulgaris 2.25% each. The common bacteria isolated from catheter blood were MRSA(33.3%), Pseudomonas aeruginosa(16.6%) and Acinetobacter baumannii(50%) correates with study of Saxena *et al* [18,19,20]

Gram positive organisms were predominantly isolated in CRBSI namely S.aureus MRSA (31.4%), MSSA(8.5%), S.epidermidis (8.5%)and S.schleiferi (5.7%). Among the gram negative isolated from catheter related blood stream infection (14.2%) due to Pseudomonas aeruginisa, (11.4%) Acinetobacter baumannii followed by E.coli (8.5%),Klebsiella oxytoca(5.7%), Klebsiella pneumoniae (2.8%) and Proteus mirabilis (2.2%). Our study correlates with the study of Pooja *et al*., that E.coli as the predominant gram negative bacteria [2]. Anil *et al* described that in his study 12.8% of CRBSI is due to Acinetobacter baumannii, E.coli (10.4%) Pseudomonas aeruginosa (2.3-15.2%), Klebsiella pnemoniae (6.4%). [11,21,22,23] However Ratnaja *et al* in reported (2-15%) Pseudomonas aeruginosa, (13%) Acinetobacter species in his study. Anil *et al*., also stated that 52-70% of CRBSI was due to gram positive cocci of that Staphylococcus aureus contributed (21.9-60%), Staphylococcus epidermidis (8.8-12%) and MRSA (6-8%) [11]. Ramanathan *et al*, stated 26.7% of infection was due to MRSA [12]. Our study correlates with the study of Abdul Raguman *et al*. stated that (77%) of the CRBSI was caused by gram positive bacteria. [13], Hoen *et al* reported (68%) of CRBSI was due to gram positive organisms. [14]

The predominant organism isolated in urine with bacteriuria > 105 cfu/ml was E. coli (72.7%) followed by (27.2%) S.epidermidis. In patients with respiratory infection the bacteria isolated from sputum was Klebsiella pneumoniae(50%) and MSSA(50%). Among the 12 swabs cultured from infected site MSSA and E.coli were isolated in each 25%. Of the 9 samples of catheter blood drawn for culture the same organism were isolated in corresponding peripheral blood culture also that MRSA(33.3%), Pseudomonas aeruginosa, Acinetobacter baumannii in 16.7% and 50% cases respectively. Our study was similar to the study of Ratnaja *et al* [4], and Anil *et al* who reported that 16-20% polymicrobial growth was identified in patients with CRBSI.[11,24,25,26]

Anti microbial susceptibility testing was done as per CLSI guidelines. Among the Gram positive isolates Staphylococcus aureus and Coagulase negative Staphylococci showed 100% sensitivity to Amikacin and Amoxycillin clavulinic acid. A total of 37 isolates of Methicillin resistant Staphylococcus aureus all were sensitive to Vancomycin within the sensitive range of MIC.

Among the Enterobacteriaceae isolates screened for ESBL production 33.3% Proteus mirabilis, 37.5% of Escherichia coli, 20% of Klebsiella pneumoniae, 50% of Proteus vulgaris and 14.2% of Klebsiella oxytoca were confirmed by Double disc synergy test. All these isolates showed 100% sensitivity to Imipenem and Cefoperazone sulbactum and correlates with study of Vanholder *et al* and Harsha *et al* [27,28]

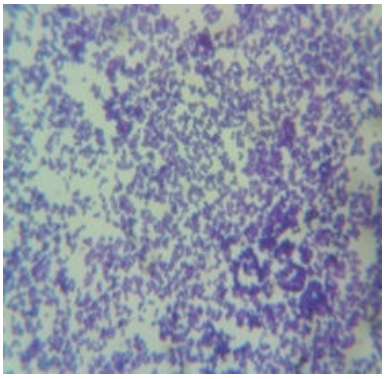
Among gram negative non fermenters Pseudomonas aeruginosa, and Acinetobacter baumannii showed 100% sensitivity to Imipenem and Cefoperazone sulbactum. Among gram negative bacilli, production of extended spectrum beta lactamaces was the mechanism of resistance in them. None of the isolates were found to be MBL producers and Amp C producers. In our study majority of the gram positive and gram negative organisms showed 100% sensitive to Amikacin.

CONCLUSION

The analysis of catheter related sepsis in Renal failure patients needs a careful microbiological evaluation to differentiate between, Colonization Catheter related infection

(CRI) and Catheter related blood stream infection (CRBSI). Early evaluation, Careful monitoring and management of catheter related blood stream infection will in turn reduce the rate of occurrence of nosocomial infection in tertiary care hospitals.

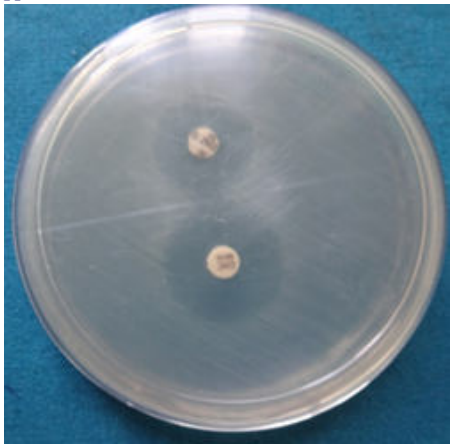
Gram stain



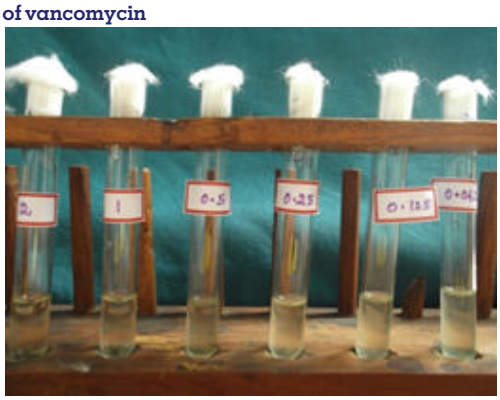
phosphatase TEST- speciation of coagulase negative staphylococci

Double disk DIFFUSION synergy test for ESBL

phenotypic conformatORY DOUBLE DISK TEST



MIC of vancomycin



E-TEST FOR ESBL

REFERENCES:

[1] Kinchen KS, Sadler J, Fink N. The timing of specialist evolution in chronic kidney disease and mortality. *Ann Intern Med* 137:479-486, 2002.

[2] Pooja Gupta, Reena Set, Kalpana Mehta, Jayanthi Shasthri. Incidence of Bactermia Associated with central venous catheter in Patient on Hemodialysis, *International Journal of Pharmacy and Pharmaceutical sciences*. Vol 3; Issue 3, 2011; ISSN-075-1491

[3] Washington Winn, Stephen Allen, William Janda, Elmer koneman, Gary Procop, Paul Schrekenberger, Gail Woods in Koneman's Colour atlas and textbook of Diagnostic Microbiology, Sixth edition Chapter 2, p 100-2. Lippincott Williams and Wilkins.

[4] Ratnaja Katneni and S.Susan Hedayati, Central venous catheter- related bacteremia in chronic hemodialysis patients: epidemiology and evidence – based management may 2007, Vol 3; No.5

[5] Daiane Patricia Cais, Ruth naralia Teresa Turrini, Tania Mara Varejao Strabelli, Infections in patients submitted to hemodialysis: systematic revie w, Rev Bras Ter Intensiva, 2009; 21(3):269-275

[6] Tokars JI *et al*.(2001) A prospective study of vascular access infections at sevan outpatient hemodialysis enters. *Am J Kidney* Dis 37: 1232-40

[7] Mandell, Douglas and Bennett. Bacteremia due to percutaneous intravascular device chapter 281 in Textbook of Infectious Disease by Mandell.7th edition

[8] Yardena Siegnman-IGRA, Anne M. Anglim, David E, Shapiro, Karim A, Adai, Barbara A. Stain and Barry M.Farr, Diagnosis of vascular Catheter – Related Bloodstream Infection: a Meta – Analysis, *Journal of Clinical Microbiology*, Apr.1997, p.28-936

[9] Robert w Schrier, Carl W Gottschalk Diseases of Kidney Vol-II, Section XIII

[10] Chang CF, Kuo BIT, Chen TL, Yang WC, Lee SD, Lin CC. Infective endocarditis in maintenance hemodialysis patient Fifteen years' experience in one medical center. J Nephrol 2004;17:228-35

[11] Anil K, Saxena, Bodb R, Panbotra, Haemodialysis catheter- related bloodstream infections: current treatment options and strategies for prevention, *Review article, Swiss med wkly* 2005; 135:127-138

[12] Ramanathan Paramewaran, jatan B. Shrchan, Muralidhar Varma D, Chiranjay, Mukhopadhyay, Sudha Vidyasagar Intravascular catheter – related infections in an Indian tertiary care hospital. J Infect Dev Ctries 2011; 5 (6):452-458.

[13] Abdulrahman, S.L., Bokhary, H.A., Ladipo, GO (2002) A Prospective study of Hemodialysis associated infection. J Infect Chemother 8: (3) 242-246

[14] Hoen, B., Agnes, P, Kessler, M. (1998) Epibacdial: Risk factors for Bacteremia in chronic Hemodialysis patients J am Soc Nephrol 9: 869-879.

[15] William L.Henrich, Types of Vascular Access Chapter III in Principles and practice of Dialysis.

[16] David L Veenstra, Sanjay Saint, Sean D Sullivan 1999. Cost effectiveness of Antiseptic Impregnated central Venous Catheter for the prevention of Catheter related blood stream infection. *Journal of American Medical Association*. Vo-282 No. 6, Page: 554-460

[17] Saxena AK, PanhotraBR, Naguib M, *et al*, Septicemia in hemodialysis; A focus on bacterial flora and antibiotic access salvage. Saudi J Kidney Dis

Transplant 2002; 13:29-34.
[18] Emilio Bouza, Neisa Alvarado, Luis Alcala, Matilde Sanchez-Conde, Maria Jesus Perez, Patricia Munoz, Pablo Martin-Rabadan and Marta Rodriguez-Creixems, A prospective, Randomized and comparative study of 3 different Methods for the diagnosis of Intravascular catheter colonization. 2005; 40:1096-100
[19] Catheter Related Bacteremia, due Roseomonas gilardil 1997 *Journal of Clinical Microbiology* Vol-35, No.10, Page No. 2712.
[20] Susan Varghese, Padmaja P. Sudha P 1998, Central Venous Catheter related infections. *Journal of Communicable Disease* Vol-146, No.4 page 49 to 482.
[21] Betty Forbes, Daniel Sahm, Alice Weissfeld. Bailey & Scott's Diagnostic Microbiology. Chapter 52- Blood Stream Infections 780-789. Mosby Elsevier publishers
[22] Susan Varghese, Padmaja P. Sudha P 1998, Central Venous Catheter related infections. *Journal of Communicable Disease* Vol-131, No.1, page 1 -4.
[23] De Andrade D, Ferreira V. Central Venous access for haemodilysis: Prospective evaluation of possible complications. *J.Clin Nurse*. 2007; 16 (2): 414-8
[24] Angella Goetz. Victor L, Yu., James E Hanchett 1983. Pseudomonas stustzeri Bactermia associated with hemodialysis. Archives of Internal Medicine Vol: 143 Page 1909-1912.
[25] Kieren A. Mary, Daniel J, Sexton, Pater J Conlon, G. Ralph Corey 1997. Catheter Related Bacteremia and Outcome of Attempted catheter salvage in patients undergoing hemodialysis. Annals of internal medicine Vol-127, Page 275-280.
[26] Stephen J Uman, Caroline E Johnson, aregory J. Beirne 1977 Pseudornonas. Aeruginosa
[27] R. Vanholder, B. Canaud, R. Fluck et al., "Diagnosis, prevention and treatment of haemodialysis catheter-related bloodstream infections (CRBSI): a position statement of European Renal Best Practice (ERBP)," *NDT Plus*, vol. 3, no. 3, pp. 234–246, 2010.
[28] Harsha V Patil, Virendra C Patil, MN Ramteerthkar, RD Kulkarni, Central Venous Catheter – related blood stream infections in the intensive care unit, *Indian Journal of Critical Care Medicine,* 2011, Volume:15, Issue:4, Page:213-223.