

VASCULAR ACCESS ASSOCIATED BACTERIAL INFECTION IN HAEMODIALYSIS PATIENTS

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ABSTRACT

OBJECTIVE: *Catheter related bacteremia is a major cause of morbidity and mortality among patients on haemodialysis. Bacterial infection of all types seems to be increased in incidence, but there is a particular risk of infections related to vascular access sites or devices in patients on haemodialysis. Many of these infections are due to sepsis, primarily arising from the vascular access site.*

STUDY DESIGN: *Cross sectional.*

PLACE OF STUDY: *Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi.*

PATIENTS AND METHODS: *The study was conducted in Department of Microbiology, Basic Medical Sciences Institute, Jinnah Postgraduate Medical Centre, Karachi. during June 2005 to June 2006 to isolate the bacterial etiological agents in patients on haemodialysis. A total of 250 subjects irrespective of age and gender were included in this study. Intravenous double lumen (DL) catheter were collected from different hospital's Nephrology Department e.g. Jinnah postgraduate Medical Centre, Kidney Centre and SIUT. Samples were inoculated on Chocolate agar and MacConkey agar and culture plates were incubated at 37°C for 24 hours. After 24 hours cultures were examined and gram stained. Antimicrobial sensitivity pattern of all the isolates was done by Kirby baur disc diffusion method.*

RESULTS: *The most common bacterial pathogens isolated were E.coli, Klebsiella, Proteus, Pseudomonas, Staph. epidermidis and Stap. aureus. Among these E.coli was the highest in number (50%) and Klebsiella the second most common bacteria (25%). Out of 250 cases 190 (76%) organisms were isolated. Most frequent organisms were isolated from subclavian vein (93%), internal jugular vein (4.5%) and 2.5% from femoral vein.*

CONCLUSION: *It has been concluded from this study that hemodialysis patients are more prone to infection irrespective of age or sex.*

KEY WORDS: Bacterial infection, Haemodialysis patients, vascular access.

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INTRODUCTION

Catheter related bacteremia is a major cause of morbidity among patients on haemodialysis¹. Bacterial infection of all types seems to be increased in incidence but there is a particular risk of infections related to vascular access sites or devices in patients on haemodialysis. Many of these infections are due to sepsis, primarily arising from the vascular access site. Septicemia alone account for almost 11% of mortality in patients on haemodialysis²

The use of intravenous catheter for vascular access and haemodynamic monitoring has become a central part of modern medicine. Catheter related infection (CRI) remains a leading cause of nosocomial infections especially in intensive care unit and is associated with significant morbidity and mortality.

Bacteremia account for more than 75% of these infectious death. Staphylococcus aureus has previously been the primary etiological agent. Recent studies have reported a great percentage and variety of gram negative bacteria isolated in catheter related infections⁴.

AIMS OF THE STUDY

This research project was planned with the following objectives in view:

1. To isolate bacteria from lip of intravenous Double Lumen (D.L.) catheter used for haemodialysis.

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2. To see antimicrobial sensitivity pattern of isolated bacteria.

PATIENTS AND METHOD

Two hundred and fifty patients irrespective of age and gender were included in this study

that was conducted from June 2005 to June 2006 to isolate the bacterial etiological agents in patients on haemodialysis.

Samples were collected from patients undergoing haemodialysis at Nephrology department, JPMC, The Kidney Centre and Sindh Institute of Urology (SIUT). Intravenous catheters that had been used as a channel for haemodialysis were taken in sterile containers with aseptic precautions. Specimens were brought to the Microbiology Laboratory, BMSI, JPMC and immediately refrigerated at 4-6°C. Inoculation was done on blood agar, chocolate agar and MacConkey agar and incubated overnight at 37°C. Phenotypic characteristics (morphology and haemolysis) were used for presumptive identification of *Staphylococcus*, *E.coli*, *Klebsiella*, *Pseudomonas* and *Proteus*.

Identification of *S.aureus* was made on the basis of positive coagulase and manitol salt agar test. *E.coli* was confirmed on the basis of colonial morphology, lactose fermentation, positive motility and other biochemical tests. *Klebsiella* was identified on the basis of large mucoid colonies, positive lactose but negative motility test. *Proteus* and *Pseudomonas* were confirmed by its pigment production and biochemical test while *Proteus* was further confirmed due to its swarming movement and biochemical reactions.

RESULTS

A total of 250 patients going on haemodialysis were included in this study. 190 (76%) have bacterial infection, 60 (24%) were sterile. (See table No 1)

Number of different isolated bacteria from intravenous (D.L.) catheter tip (See Table 2 and figure 2 shows). The gram positive cocci were recovered from 15 (7.50%) cases and among these *Staphylococcus epidermidis* was isolated from 10 (66.67%) and *Staphylococcus aureus* were isolated from 5 (33.33%). *E.coli* was isolated from 100 (57.142%) and *Klebsiella* from 55 (31.428%), *Proteus* and *Pseudomonas* were recovered from 10 (5.714%) each.

Distribution of positive isolates from intravenous catheter (D.L) Tip from patient on hemodialysis according to age and sex. In 10-19 years age group there were 26 patients out of which 16 were male in which 10 (62.5%) were positive for culture

TABLE 1
DISTRIBUTION OF CASES OF HAEMODIALYSIS PATIENTS
(n=250)

Bacterial isolates	No. of cases	Percentage
Positive cases	190	76.00
Negative cases	60	24.00

FIGURE 1
DISTRIBUTION OF ORGANISMS ISOLATED FROM
HAEMODIALYSIS PATIENTS
(n=250)

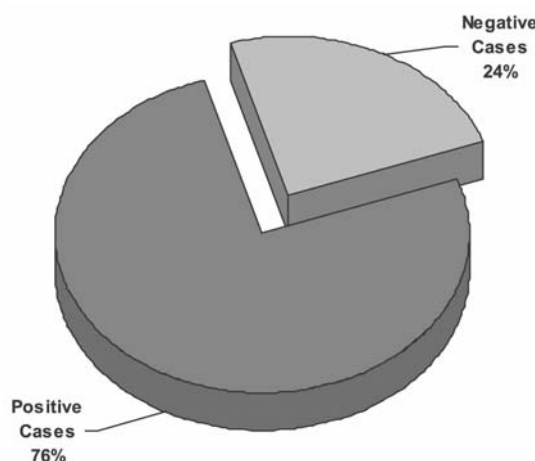


TABLE 2
MICRO-ORGANISMS ISOLATED FROM THE TIP
OF INTRAVENOUS (D.L.) CATHETER
(n=200)

Organism isolated	No. of isolates	Percentage
Gram positive	15	7.50
<i>Staphylococcus epidermidis</i>	10	66.67
<i>Staphylococcus aureus</i>	05	33.33
Gram negative	175	87.50
<i>Escherichia coli</i>	100	57.142
<i>Klebsiella</i>	55	31.428
<i>Proteus</i>	10	5.714
<i>Pseudomonas</i>	10	5.714

TABLE 3
DISTRIBUTION OF POSITIVE ISOLATES FROM THE TIP OF
INTRAVENOUS CATHETER (D.L.) FROM HEMODIALYSIS PATIENTS
ACCORDING TO AGE AND SEX

Age group Years	Male	Positive culture	Female	Positive culture	Positive Total	culture %
10-19	16	10 (62.5%)	10	8 (80%)	18	69.23
20-29	42	34 (80.95%)	26	22 (84.61%)	56	82.35
30-39	38	30 (78.94%)	23	18 (78.26%)	48	78.68
40-49	28	24 (85.71%)	17	14 (82.35%)	38	84.44
50-59	09	7 (77.77%)	06	03 (50%)	10	66.66
60-69	19	17 (89.47%)	12	10 (83.33%)	27	87.09
70 and >	02	02 (100%)	02	02 (100%)	04	100.00

and 10 were females in which 8 (80%) were positive for culture. Total isolated organisms in this group were 18 (69.23%). In 20-29 years age group there were 68 patients out of which 42 were male, out of these male 34 (80.95%) were positive for culture and 26 were female which show 22 (84.61%) positive cultures and total organisms isolated from this group were 56 (82.35%). In 30-39 years age group there were 61 patients among them 38 were male in which 30 (78.94%) were positive for culture and 23 female which had 18 (78.26%) positive cultures. Total organisms isolated from this group were 48 (78.68%). Age group 40-49 years comprised of 45 patients out of which 28 were male in which 24 (85.71%) were positive for culture and 17 female out of which 14 (82.35%) turned positive for culture. Total organisms isolated in this group were 38 (84.44%). Age group 50-59 years comprised of 15 as total cases out of which 9 were male in which 7 (77.77%) were positive for culture and 6 were female which contained 3 (50%) positive for culture. Total organisms isolated from this group were 10 (66.66%). In the age group 60-69 years there were 31 cases out of which 19 were male of which 17 (89.47%) were positive for culture and 12 female out of which culture for 10 (83.33%) turned positive. The total number organisms isolated in this group were 27 (87.09%), where as in the last group i.e. 70 years and above there were total by 4 cases out of which 2 were male and 2 female. All of these 4 (100%) were positive for culture (See Table 3 and figure 2 show)

DISCUSSION

In this study out of 250 culture 190 (76%) bacteria were positive cultures. This is in accordance with the study done by ⁵ in which out of 145 cases, 57 (39%) positive culters were isolated. In present study the frequency of gram positive and gram negative bacteria were also observed and it was noted that gram negative bacteria were high in number i.e. about 175 (87.50%) and gram positive bacteria were less in number i.e. only 15 (7.5%). This is in agreement with the studies done ⁶, they also recovered increased number of gram negative organisms (70%). Where as 24% were gram positive organisms, ⁷ Moreover this study is also supported who isolated 87% gram negative organisms and 15% gram positive organisms. In this study different organisms were recovered. Among them Escherichia coli were isolated in highest numbers (57.142%) and Klebsiella was (31.428%) the second most common organism isolated. Proteus and

FIGURE 2
MICRO-ORGANISMS RECOVERED FROM THE TIP OF INTROVENOUS (D.L.) CATHETER

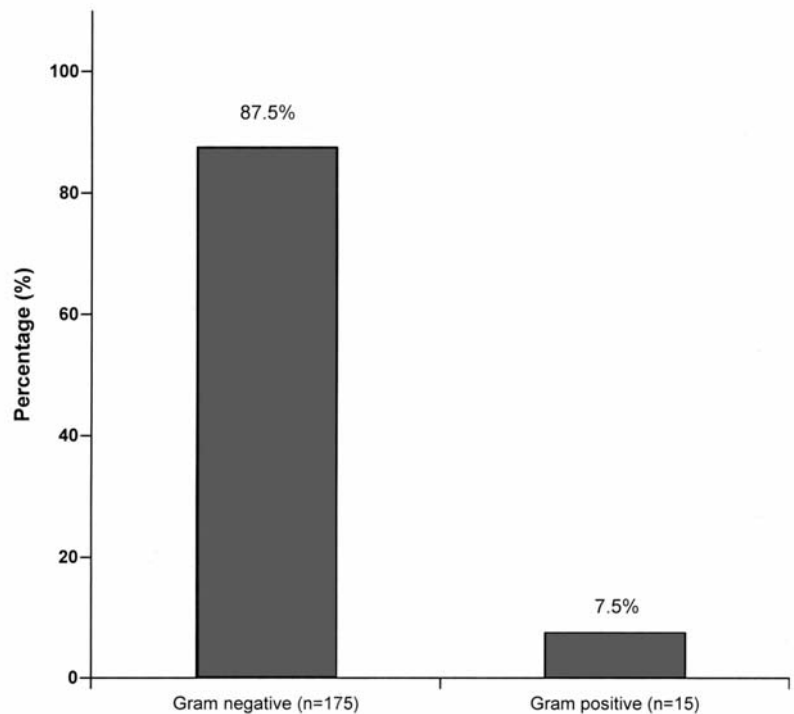
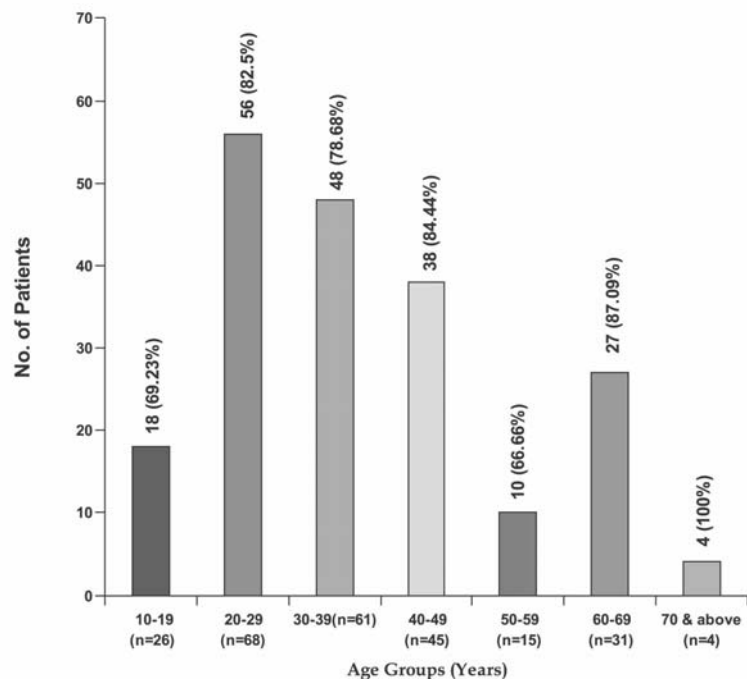


FIGURE 3
DISTRIBUTION OF POSITIVE ISOLATES FROM THE TIP OF INTRAVENOUS CATHETER (D.L.) FROM PATIENTS ON HAEMODIALYSIS ACCORDING TO AGE



Pseudomonas were 5.714% each. Among gram positive organisms Staphylococcus epidermidis was high in number i.e. 10 cases (66.67%) and *Staphylococcus aureus* 5 cases were recovered (33.33%)⁸. (2004) showing highest number of *E.coli* (40%) and *Staphylococcus epidermidis* (10%) respectively. Study carried out by Oncu (2003) mentioning *E.coli* 21%, *Staphylococcus epidermidis* 18% whereas *Pseudomonas aeruginosa* was 19.3%.

CONCLUSION

It has been concluded from the study that hemodialysis patients are more prone to have infection irrespective of age and sex. The results of this study support the use of initial antimicrobial therapy to reduce the spread of infection and other complications. Currently Ciprofloxacin is

regarded as the drug of choice for the treatment of infection caused by gram negative and gram positive bacteria in patients on hemodialysis.

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