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Research Article

TO KNOW THE INCIDENCE AND RISK FACTORS CAUSING CATHETER RELATED BLOOD STREAM INFECTIONS IN HAEMODIALYSIS PATIENTS

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Patients with end-stage renal disease (ESRD) are commonly treated with haemodialysis. Catheter-related bloodstream infections (CRBSI) are significant impediments with a high risk of morbidity and mortality in patients on haemodialysis.

Objective: To conclude the CRBSI incidence in patients on haemodialysis.

Study Design: A cross-sectional study.

Place and Duration: In the Nephrology department of FFH Rawalpindi for six Month duration from June 2018 to Nov 2018.

Method: In 100 patients on haemodialysis, we assessed the CRBSI incidence admitted in Nephrology department of FFH Rawalpindi. Data were obtained from patients' medical records. Through blood culture; CRBSI was confirmed.

Results: Of the 100 patients on haemodialysis selected for the study, 92 were females and remaining were males. 49.7 ± 11.8 years was the mean age. In (64%) of the subjects has positive blood cultures. The staphylococcus coagulase negative was the most usual organism involved (24%). The utmost usual systemic clinical symptoms were chills and fever (92%), localized erythema (50%) and pussy discharge (30%) from catheter site. The duration of catheter indwelling was less than one year in most patients (74%).

Conclusion: Considering high risk of death due to CRBSI in dialysis patients, it is advised that arteriovenous fistula should be made earlier if GFR <15. If catheter placement is necessary, pass tunnelled catheter and avoid femoral site. Staff should wear gloves, patient should maintain hygiene and instillation of gentamycin and heparin in catheters post dialysis to avoid infections.

Key Words: Catheter-related bloodstream infections, haemodialysis, End-stage renal disease.

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INTRODUCTION:

Renal failure is a communal health issue globally. A major part of the health budget is consumed on haemodialysis treatment of individuals with end-stage renal disease and renal insufficiency¹⁻³. Catheter-related bloodstream infections (CRBSI) are the main problems in subjects enduring haemodialysis⁴. CRBSI causes more mortality and morbidity in patients on haemodialysis and increases the cost of medical care and length of hospital stay. Because of quick accessibility and ease, the large vessels are used commonly for haemodialysis. Due to this, these vessels contain common sources of CRBSI (central venous)⁵. In general, the CRBSI and all catheter-related infections (CRI) risk is advanced in patients who are immunocompromised, those with insistent catheter retention, and, lastly, those with a history of CRF have a prevalence ranging from 16% to 37%, CRIs are the utmost impediments of permanent catheters⁶. The 3 usual types of CRIs are site infection, tunnel infection and CRF⁷. The most usual site for CIRs is the catheter placement site. The incidence of CRF and especially sepsis has been associated with mortality rates of hundred to three hundred times greater in patients of haemodialysis than in the general people⁸. Measures during insertion of catheter, routine monitoring of catheter entry site, staff and patients training, handwashing and finally short-term administration of catheters are reducing factors⁹. The fraction of individuals undertaking haemodialysis in different populations is increasing. These subjects often experience hospitalization, which requires high financial costs for patients. In addition, these patients are at risk of exaggerated death and disease due to often catheterization and surgical procedures.

MATERIALS AND METHODS:

This cross-sectional study was held in the Nephrology department of FFH Rawalpindi for Six months duration from June 2018 to Nov 2018. 100 haemodialysis Patients with complete medical records were selected. CRBSI history was evaluated by examining the medical records and interrogating the patients. The data such as sex, age, dialysis duration, and catheter persistence, systemic clinical symptoms (fever and chills), vascular access type, erythema, endocarditis, hemodynamic imbalance and purulent discharge were recorded. At the beginning of the study reviewing the clinical databases. The organisms causing CRBSI were determined by blood samples. The blood culture test was the definite way to confirm diagnosis. The purpose and design of the analysis were clarified to every patient and written approval was taken. Variables were defined using frequency and ratio (for qualitative variables) or standard or mean deviation (for quantitative variables). The chi-square test was used for evaluating the relationships between categorical variables) and Student t-test was used for comparing the tools of quantitative variables between study groups. Statistical significance was accepted as $P < 0.05$. Using SPSS 21 version, the data was analyzed.

RESULTS:

Of the 100 patients on haemodialysis selected for the study, 92 (92%) Female and remaining were male. 49.7 ± 11.8 years was the mean age. In (32)64% of the subjects has positive blood cultures. The staphylococcus coagulase negative was the most usual organism involved (24%). The utmost usual systemic clinical symptoms were fever and chills (92%). The duration of catheter indwelling was less than one year in most patients (74%). The different age groups of patients were given in Table 1.

Table 1: In dialysis patients, distribution of age and underlying diseases among patients on dialysis with central CRIs.

Age	No.	%age
<20	04	04
21-30	08	08
31-40	08	08
41-50	30	30
51-60	36	36
>60	12	12
>70	02	02
Males	08	08
Females	92	92
Underlying diseases		
hypertension	20	20
Diabetes	40	40
Hypertension and Diabetes	22	22
Cardiovascular disease	18	18
Indwelling Catheter duration		
<1 year	82	82
>1 year	18	18

The fever was observed in 92 (92%). In addition, 50 (50%) and 30(30%) patients showed erythema and purulent

discharge at the catheter site of insertion. The catheter indwelling duration in 82% patients was less than 1 year (82%) and 18 patients (18%) > 1 year. Considering their comorbidities, 20 (20%), 40 (40%) and 18 (18%) patients had hypertension, diabetes and cardiovascular diseases, respectively, 22 (22%) had both diabetes and hypertension.

Table 2. The frequency of organisms leading to catheter-related blood stream infection in patients under hemodialysis.

The Organisms	No.	Percent
Coagulase negative staphylococci	32	32
<i>Staphylococcus aureus</i>	15	15
<i>Acinetobacter</i>	12	12
<i>Klebsiella</i>	10	10
<i>Pseudomonas</i>	10	10
<i>Escherichia coli</i>	5	5
<i>Enterobacter</i>	1	1
No growth	15	15
Total	100	100

The causative microorganisms, *Staphylococcus aureus* (15, 15%), coagulase negative staphylococci (32, 32%), *Klebsiella* 10 (10%), *Acinetobacter* 12 (12%), *E. coli* 2 and *Pseudomonas* was 10 and *Enterobacter* 1 (2%) (Table 2). A meaningfully higher CRBSI rate was perceived in older age groups ($P = 0.04$). There was no noteworthy relationship between the duration of the catheter and the CRBSI incidence ($P = 0.09$). However, there was a strong association between the CRBSI incidence and presence of hypertension ($P = 0.03$).

DISCUSSION:

There is insufficient information about quality of care, health outcomes and microorganisms that cause CRBSI in Pakistani patients on haemodialysis. In addition, the antimicrobial susceptibility of microorganisms causing CRBSI differs between altered geographical regions. The prevalence of CRBSI alleviates health results in subjects enduring haemodialysis¹⁰. This analysis was conducted to evaluate the CRBSI incidence in patients on haemodialysis in the nephrology department. In this study, the positive blood cultures prevalence was higher significantly in Females. However, various analyses have testified no differences in the CRBSI incidence compared to men and women. On the other hand, the CRF incidence is greater in women compared to other reports¹¹. According to our results, the highest incidence of CRBSI was observed in patients aged 40 to 60 years. There was no significant difference in the indisposition and catheter-related bacteremia risk in patients on dialysis in various age groups. Access to vascular sites outside the central vein is very difficult in older subjects. In addition, prolonged and repeated administration of the vascular catheter is mostly related with a risk of catheterization failure¹². Therefore, dialysis catheters care is vital to guarantee permanent vascular access. In this paper, the fever and chills were the most common clinical symptoms related with catheterization described by Hemmati *et al*¹³. In another study in Mashhad, the tenderness and inflammation were the most usual symptoms at the catheter insertion site. Our results did not show a significant relationship between CRBSI risk and

duration of stay. However, in another 2016 report, the length of stay and the method of catheterization in haemodialysis patients were associated with CRBSI risk. The most common comorbidity in this study was hypertension. However, this observation did not agree with the Sani *et al* findings. In general, diabetes, hypertension, heart failure and atherosclerosis are the usual comorbidities in patients on haemodialysis. In other analysis, diabetes has been related with high CRBSI risk in patients on haemodialysis¹⁴. One study found no association between the diabetes and CRBSI incidence. In this study, the most common bacteria causing infection was coagulase negative staphylococci. This result was same as of Sani *et al*. In earlier studies, in approximately 64% of haemodialysis patients *S. aureus* was detected. In one analysis, the coagulase negative staphylococci was the usual organism with 50% prevalence. Overall, our results are consistent with earlier studies describing the microorganism's distribution causing CRBSI (2630). In Almuneef *et al* the study of, 49% of haemodialysis subjects developed positive polymicrobial culture and 32% developed gram negative bacteria¹⁵. Current analysis have reported an increase in the gram-negative bacteria incidence. Understanding the epidemiology of microorganisms causing CRBSI is important for empirical antibiotic selection. In our observation, hypertension and advanced age were related with high risk of CRF in patients on haemodialysis. It may help to know the CRF microbial pattern, decrease CRF risk, and quickly pledge proper antibiotic therapy.

CONCLUSION:

Considering high risk of death due to CRBSI in dialysis patients, it is advised that arteriovenous fistula should be made earlier of GFR <15. If catheter placement is necessary, pass tunnelled catheter and avoid on femoral site. Staff should wear gloves, patient should maintain hygiene and instillation of gentamycin and heparin in catheters post dialysis to avoid infections.

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