



“A STUDY OF CATHETER RELATED INFECTION IN HAEMODIALYSIS PATIENTS AT A TERTIARY CARE CENTRE”

General Medicine

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ABSTRACT

Background : The kidneys are highly differentiated organs in our body system. They perform a variety of complex process in our body to maintain the normal homeostasis. The kidneys change the concentration of urine, maintain the water balance thereby the acid base balance and electrolytes in our body. Sepsis related death is more common in dialysis patients than the general population. Bacteremia complicates the central venous catheter use in haemodialysis patients. Catheter related infection is suspected based on the clinical profile of the patients like fever, chills, rigor, unexplained hypotension, altered mental status, local catheter site abscess, induration around the exit port site. **Aim And Objectives :** To study the incidence of temporary vascular catheter related infections in haemodialysis patients and to study the bacteriological profile of catheter related infections. **Materials And Methods :** Patients undergoing haemodialysis via central venous catheters in the dialysis unit of Alluri Sitarama Raju Academy of Medical Sciences, a tertiary care centre of south India from 1st September 2020 to 30th August 2021. Patients undergoing dialysis via central venous catheter are included in the study. The patients excluded are those undergoing dialysis via arteriovenous fistula and patients who have cellulitis or other focus of infection. **Results :** Among 75 patients, 56 had catheter insertion in the jugular vein and 19 patients had catheter insertion in the femoral vein. In our study, about 32 patients had local catheter site infection. Among 75 patients, 31 patients had catheter site skin swab culture growth. The organism isolated from pericatheter insertion site were mainly Gram positive organisms. In our study, 23 patients showed growth in the blood culture. The main organisms isolated were *S. aureus* (17.3%), *Klebsiella* (9.31%), and *Pseudomonas* (3.99%). In our study, 23 patients showed growth in the catheter tip culture and remaining 52 showed no growth. The main organisms isolated were *S. aureus* (18.7%), and *Klebsiella* (12%).

KEYWORDS

Chronic Kidney Disease, Aki, Haemodialysis, Central Venous Catheter,

INTRODUCTION:

The kidneys are highly differentiated organs in our body system. They perform a variety of complex process in our body to maintain the normal homeostasis. The kidneys change the concentration of urine, maintain the water balance thereby the acid base balance and electrolytes in our body. The Nitrogenous products from the protein metabolism and other waste products produced in the body are excreted by the kidneys. They also produce hormones like erythropoietin to maintain the haemoglobin concentration and has a major role in mineral metabolism. Added to the above function, kidneys play a significant role in elimination of the toxins and drug metabolites. The most commonly used parameter to assess the renal function is serum creatinine. The correlation between GFR and creatinine is confounded by several factors. Normal GFR range from 90 to 120 ml/min/1.73 sq.m. Acute kidney injury is characterised by sudden and rapid impairment of renal function occurring over a period of hours to days, resulting in accumulation of toxic, nitrogenous substances. Acute Renal Failure term is restricted to patients presenting with acute kidney injury who needs renal replacement therapy.

Chronic kidney disease is a spectrum of pathological process characterised by abnormal kidney function and progressive decline in glomerular filtration. End stage kidney disease results in accumulation of toxic metabolites resulting in uremic syndrome. Renal Replacement Therapy is required when the renal function deteriorates leading to accumulation of metabolic waste products that interfere with the normal homeostasis. Haemodialysis is an extracorporeal procedure to remove extra salt, fluids and toxins through a dialysis machine. The population of patients undergoing dialysis is increasing day by day due to high incidence of chronic kidney disease and AKI. Central venous catheters are frequently used to initiate the dialysis before the arteriovenous fistulas are mature and starts functioning. Sepsis related death is more common in dialysis patients than the general population. Bacteremia complicates the central venous catheter use in haemodialysis patients. Catheter related infection is suspected based on the clinical profile of the patients like fever, chills, rigor, unexplained hypotension, altered mental status, local catheter site abscess, induration around the exit port site. Catheter related blood

stream infection is the most common indication for the catheter removal. Contamination of skin flora, unsterile handling of catheter by the training personnel, malnutrition, Diabetes, malignancy, hypoalbuminemia, increased duration of catheter all predispose to the high chances of catheter related infection.

MATERIALS AND METHODS:

Patients undergoing haemodialysis via central venous catheters in the dialysis unit of Alluri Sitarama Raju Academy of Medical Sciences, a tertiary care centre of south India from 1st September 2020 to 30th August 2021. Patients undergoing dialysis via central venous catheter are included in the study. Patients with symptoms and signs of catheter related infection like fever, chills, hypotension, local catheter site infection are subjected to blood cultures. One from the peripheral vein and the other from the central venous access. Catheter tip were also subjected to semi quantitative analysis in sterile container. Chi-square test was used for univariate analysis for factors in relation to catheter related infections.

Inclusion Criteria :

Patients undergoing haemodialysis via central venous catheter.

Exclusion Criteria :

1. Patients undergoing haemodialysis via arteriovenous fistula,
2. Patients with cellulitis and other focus of infection.

RESULTS :

In our study, 40% of the patients were in the age group of more than 50 years. In our study, about 82.7% of the patients were males and 17.3% of the patients were females. Among 75 patients, 60 patients were suffering from Chronic Kidney disease and 15 patients were suffering from Acute Kidney Injury. Among 75 patients, 56 had catheter insertion in the jugular vein and 19 patients had catheter insertion in the femoral vein. Among 75 patients, 37 patients had central venous catheter for less than 14 days and 38 patients had catheter for more than 14 days. Out of 75 patients with CVCs, 39 patients had fever episodes. In our study, about 32 patients had local catheter site infection. Among 75 patients, 31 patients had catheter site skin swab culture growth. The organism isolated from pericatheter insertion site were mainly Gram

positive organisms. In our study, 23 patients showed growth in the blood culture. The main organisms isolated were *S. aureus* (17.3%), *Klebsiella* (9.31%), and *Pseudomonas* (3.99%). In our study, 23 patients showed growth in the catheter tip culture and remaining 52 showed no growth. The main organisms isolated were *S. aureus* (18.7%) and *Klebsiella* (12%). There is no significant association between Catheter site insertion and blood culture positivity (P value=0.921). Out of 23 patients who are positive for blood culture, 17 patients had catheter more than 14 days (P value<0.007). So there is a significant association between duration of catheter insertion and blood culture positivity. Out of 23 patients who are positive for blood culture, 19 patients had febrile episodes. So there is a significant association between febrile episodes and blood culture positivity. Out of 23 patients who are positive for blood culture, 17 patients had catheter infection in the catheter site (P value=<0.001). So there is a significant association between catheter site infection and blood culture positivity.

Table 1: type Of Organisms:

Type of Organism	Frequency	Percent
<i>S. aureus</i>	14	18.7%
<i>Klebsiella</i>	9	12.0%
Total	23	30.7%

Table 2: Association Between Catheter Site And Culture Positivity In Blood:

Catheter site	Blood Culture		Total
	Positive	Negative	
Femoral	17	39	56
Jugular	6	13	19
Total	23	52	75

Table 3: Association Between Catheter Insertion Duration And Culture Positivity In Blood:

Catheter Duration	Blood culture		Total
	Positive	Negative	
<14days	6	31	37
>14days	17	21	38
total	23	52	75

DISCUSSION:

Haemodialysis catheter related infection is the major cause of mortality and morbidity in haemodialysis. Among 75 patients 60 patients had chronic kidney disease as the indication for dialysis. Regarding the type of venous access, 56 patients had femoral vein catheterization and 19 patients had jugular venous access. 38 patients had catheter duration of more than 14 days. Out of 75 patients, febrile episodes occurred in 39 patients and hypotension in 33 individuals. Local catheter site infection occurred in 32 patients and swab culture from catheter site showed growth in 31 patients. Blood culture from both central venous access site and peripheral vein showed growth of bacteria in 23 patients. The most common organism isolated from the blood culture was gram positive staphylococcus aureus (17.3%) followed by klebsiella (9.37%) and pseudomonas (3.99%). Culture of the catheter tip by semi quantitative method showed growth in 23 patients, among them the common organisms are gram positive. From our study, we come to a conclusion that there is no significant association between the site of catheter insertion and catheter related blood stream infection. Out of 23 patients who are positive for blood culture, 17 patients had catheter infection in the catheter site. (P value <0.007). So there is a significant association between duration of catheter insertion and blood culture positivity. From our study we concluded that, Patients with prolonged duration of catheter, local catheter site infection, and patients with febrile episodes during the haemodialysis has significant association with the blood culture positivity.

CONCLUSION:

Out of 75 patients who were randomly selected based on the inclusion and exclusion criteria, the following results were observed, Blood culture positivity was observed in 23 patients out of 75 patients who had central venous catheter for haemodialysis (30.7% incidence). The incidence of catheter related infection and blood stream infection is 30.7%. The most common organism isolated was Gram positive organisms mainly Staphylococcus aureus followed by Gram negative organisms Klebsiella. Catheter related infection and catheter related blood stream related infections showed significant association with the local catheter site infection and prolonged duration of catheterization.

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