

Spectrum of Infection in Patients with End Stage Renal Disease on Maintenance Haemodialysis

Dr. Saurabh Singhal¹, Dr. Surya kirankartikeyanMalik², Dr. Bharat Veer Manchanda³, Dr. Mohit Kumar⁴

¹Associate professor in Dept of Medicine, Subharti Medical College, Meerut

²Senior Resident in Dept of Medicine, Subharti Medical College, Meerut

³Assistant professor in Dept of Medicine, Subharti Medical College, Meerut

⁴Post Graduate in Dept of Medicine, Subharti Medical College, Meerut

Abstract

Aims And Objective: To study the spectrum of infection amongst patients with end-stage renal disease on maintenance haemodialysis in western part of UP.

Material And Method: The study was conducted in Department of Medicine, Chhatrapati Shivaji Subharti Hospital, Meerut, U.P. A prospective study of 100 patients was conducted undergoing maintenance haemodialysis in dialysis unit fulfilling the inclusion criteria were selected for study. These patients were observed for any evidence of infection as per pre-defined criteria. Demographic and clinical information will be collected at base line from the study population including detailed history followed by a complete general physical and systemic examination for all the selected population.

Infection will be categorised as follows:

-Hemodialysis vascular access device associated infection, Pneumonia, Urinary tract infection. And atleast one of the following-

Pyuria-more than 10 WBS's/ml or more than 3 WBC's/HPF, Presence of organism by culture.

The following baseline investigations will be done on each patient:

Hemogram, Blood sugar-Fasting and post prandial, Liver function tests, Renal function tests, Urine routine & microscopic, Urine culture & sensitivity, Ultrasonography whole abdomen, Chest X-Ray P-A View, ECG

Patients Included-

-Patient with ESRD on maintenance haemodialysis who already received 2 or more dialysis.

-Age more than 18 yrs

-Patient giving informed and written consent

Patients Excluded

Patients with health care associated pneumonia

Chronic liver disease

-Hepatitis C

-Chronic obstructive pulmonary disease

-HIV

-Hepatitis B

Result: A total of thirty nine episodes of infections occurred in these 100 patients. The most common infection was urinary tract infection 14(35.89%), followed by pneumonia 11(28.2%), Haemodialysis-catheter related infection 9 (23.07%) and miscellaneous infection 5(12.82%). Gram negative bacilli (Enterobacteriaceae) were the most common organisms isolated followed by kleibseilla.

I. Introduction

End-stage renal disease (ESRD) represent a clinical state or condition in which there has been an irreversible loss of endogenous renal function, of a degree sufficient to render the patient permanently dependent upon renal replacement therapy. The number of patients on maintenance haemodialysis is increasing by 9% per year¹. Infection is a very common cause of morbidity and mortality in patients on haemodialysis. These patients are at a high risk of infection because of impaired immune defense, a high severity of illness and the need for a routine puncture of vascular access site to remove blood for haemodialysis. Three pivotal factors play an important role in the pathogenesis of infection in haemodialysis patients: Host immunity, bacterial virulence and dialysis procedure per se.²

Impaired host immunity: Uremia is associated with alteration in primary host defence mechanisms, which increase the risk of bacterial infection. Haemodialysis patients often have non-renal co-morbid conditions, and are more susceptible to infection because the uremic internal milieu leading to impaired chemotaxis, adherence, reactive oxygen species production and phagocytosis and accelerated apoptosis of granulocytes^{1,2}.

Bacterial virulence and adherence properties: Bacteria can acquire virulence properties when specific conditions are met. In the presence of foreign surfaces such as central venous catheters, biofilm formation is most likely to develop and can potentiate the pathogenicity of the skin bacterial flora. As a result of frequent administration of antimicrobials in this population, antimicrobial resistance has been common in patients undergoing dialysis ².

The hemodialysis procedure: During the normal course of haemodialysis, patient is exposed to several infection risks. Most potential source is skin (through repeated disruption of skin barrier integrity ^{2,4}). In view of these considerations, a prospective study will be done to analyse the burden of infection in end stage renal disease patients on maintenance haemodialysis by analyzing spectrum of infection in this group of population along with microbiological spectrum from their respective site.

II. Result

Table 1. Distribution of various episodes of infection

Site Of Infection	Culture +Ve	Culture -Ve	Total
Uti	9	5	14
Hvai	5	4	9
Pneumonia	5	6	11
Misc	5	0	5
Total	24	15	39

Tuberculosis was responsible for 5 of the miscellaneous infections. All tubercular pleural effusion were diagnosed on pleural fluid analysis.

Fig 1: Distribution Of Various Episodes Of Infection

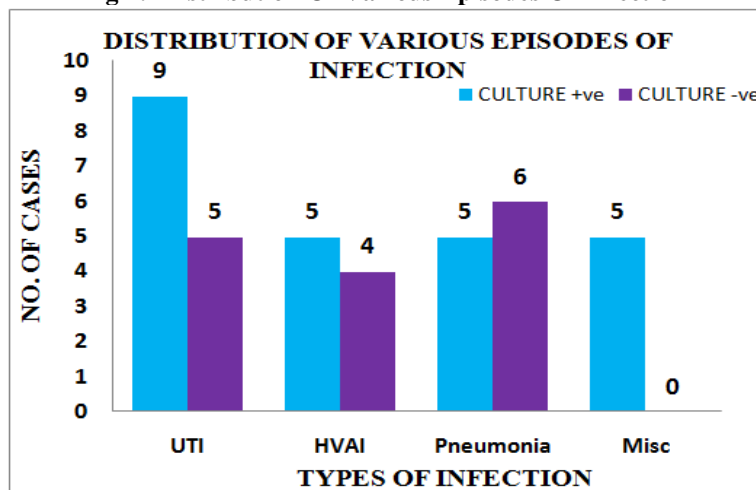


Table 2. Organisms responsible for all types of infection

Pathogenesis	Number Of Infection
E.Coli	5
Staphylococcus Aureus	3
Kleibsiella Spp.	5
Pseudomonas Aeruginosa	4
Acinetobacter Spp.	1
Streptococcus Pneumoniae	1
Mycobacterium Tuberculosis	5

Table 2. shows various organisms responsible for infections in the study group of patients on maintenance hemodialysis. E.coli(5) and kleibseilla spp.(5) were the most commonly isolated organism followed by Pseudomonas and Staphylococcus aureus. And one case of Acinetobacter urinary tract infection was also isolated. As already said, 5 cases of tuberculosis was tubercular pleural effusion diagnosed on a clinical evaluation as well as pleural fluid analysis with raised adenosine deamine level(ADA).

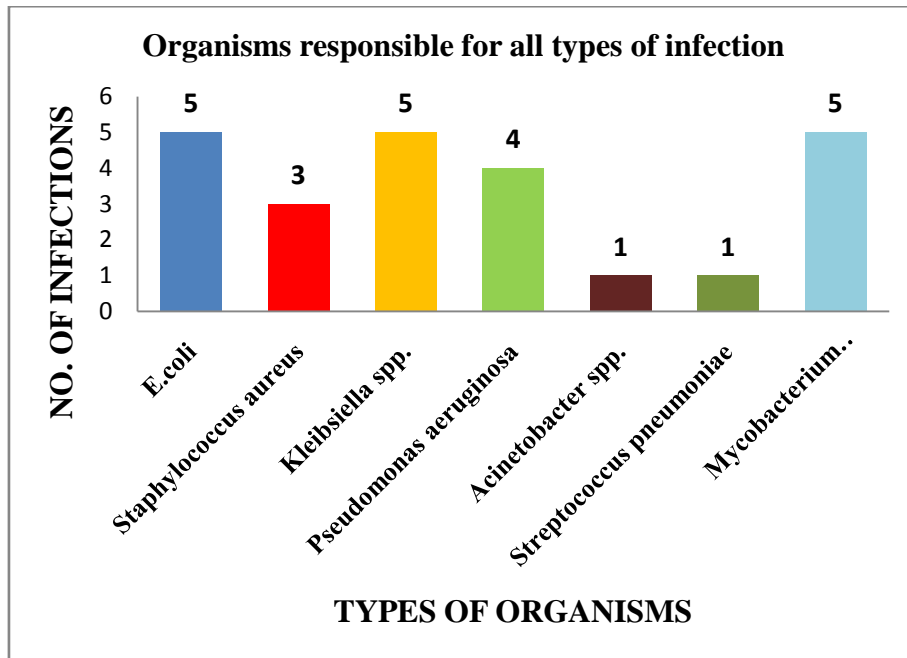


Fig 2a :Organisms responsible for all types of infection

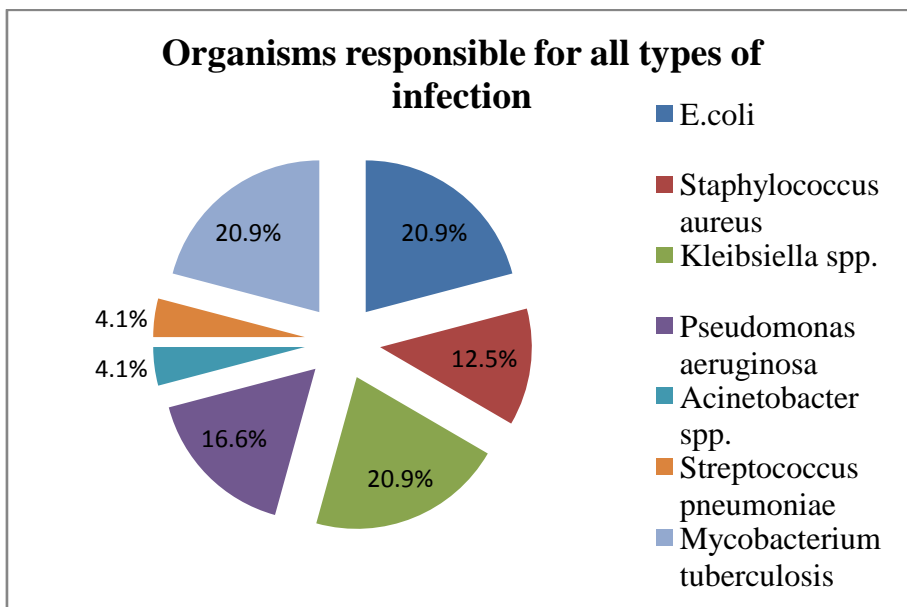


Fig 2b : Organisms responsible for all types of infection

III. Discussion

A very high incidence of 39 per 100 patients was found in our study. This was considerably high comparing with other studies. Study done by Pedro Ponce et al⁴ a prospective multicenter cohort study on 166 hemodialysis patient using a validated database from CDC's Dialysis Surveillance Network Program found that the incidence of infection was 3.7 per 100 patient-months. This discrepancy can be explained by the fact that in the study conducted by Pedro Ponce et al, 60.6% patients were hemodialysed through AV fistula and only 0.5% of patients were hemodialysed through untunnelled catheter. The incidence of infections in patients on untunnelled catheter was infact 19 per 100 patient-months. In our study, catheter in the form of uncuffed and untunelled catheter is most commonly used as vascular access for hemodialysis. Eighty six percent of patients in our study had untunelled catheter asvascular access for hemodialysis.

Of the various infections, urinary tract infection (UTI) was the most common 14 (35.89%) episodes of UTI occur in the study population, followed by pneumonia 11 (28.2%), Hemodialysis-vascular access related infection 9 (23.07%), and miscellaneous infection 5 (12.82%). The urinary tract may not be recognized as an important source of infection among the chronic hemodialysis population in view of minimal urine output in

these patients. The result of this study implies otherwise. UTI was found to be the most common infection among patients on chronic hemodialysis. Similarly, a 30-month cohort study done by D'Agata EM et al⁵ on 365 patients on chronic hemodialysis during 578 admissions observed that UTIs were the most common nosocomial infection among chronic hemodialysis patients, accounting for nearly half the nosocomial infection (47%). However, many other studies^{6,7} on infection in patients on chronic hemodialysis have found that infection associated with hemodialysis vascular access device is the most common cause of infection/septicemia in this vulnerable population. In a study done by Steven J. Berman et al⁶ on 433 patients of chronic hemodialysis who were treated at a single hospital-based dialysis programme who were studied retrospectively for 8 years, it shows that the most common site of infection was dialysis access site and was responsible for 24% of all the 2412 episodes of bacterial infections.

IV. Conclusion

A total of 100 ESRD patients on maintenance haemodialysis were enrolled for evidence of any infection. Clinical evaluation and wherever necessary laboratory investigation including cultures was done and individual proforma maintained for each patient. Patients were given antibiotics as and when required but no prophylactic antibiotic was given during the study period.

- Thirty-nine patients had infection. A very high infection rate compared to studies done in western countries. But considering the fact that 86% of the patients in our study were on temporary haemodialysis vascular access (untunelled), the incidence was comparable with a large scale study of incidence of infection in untunelled dialysis catheter which showed an incidence rate of 19 per 100 patient-months.

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