ISSN: 3065-5196
Research Article

World Journal of Molecular Medicine

The Bacterial Causes Urinary Tract Infection Among Hemodialysis Patients in Khartoum State, Sudan

Husham M Taha Aloob[1*], & Shamsoun khamis kafi[2]

[1]*Department of Microbiology Faculty of Medical Laboratory Sciences, Dongla University, Sudan*
[2]*Department of Microbiology, Faculty of Medical Laboratory Sciences, the national ribat university*

[*]**Corresponding author:** Husham M Taha Aloob, Department of Microbiology Faculty of Medical Laboratory Sciences, Dongla University, Sudan.

Submitted: 01 July 2024 **Accepted:** 09 July 2024 **Published:** 20 July 2024

https://doi.org/10.63620/MKWJMM.2024.1004

Citation: *Aloob, H. M. T., & Kafi, S. K. (2024). The Bacterial Causes Urinary Tract Infection Among Hemodialysis Patients in Khartoum State, Sudan. Wor Jour of Molecu Medicine, 1(2), 01-04.*

Abstract

Renal failure is inability of the kidneys to perform excretory function leading to retention of nitrogenous waste products from the blood. hemodialysis is a procedure that is a substitute for many of the normal duties of the kidneys. Urinary tract infections (UTIs) are common in dialysis patients, associated with increased rate of complications, and may be difficult to diagnose due to often subclinical presentation.

A hospital cross-sectional based study includes 103 Hemodialysis Patients clinically suspected cases of urinary tract infections attended different hospital in Khartoum. Midstream urine samples were collected and pure isolates of pathogenic microorganisms were characterized by colony morphology, gram-stain and standard biochemical procedures.

A standard method of agar disc diffusion susceptibility testing method was used to determine susceptibility patterns of the isolates. The most common pathogens isolated were E. coli, S.saprophyticus, S.aureus, Klebsiella species, E.faecales, P.vulgaris and S.pyogens.

Introduction

Dialysis is the process of removing waste products and excess fluids from the body. There are two types of dialysis: hemodialysis and peritoneal dialysis. In hemodialysis (HD), blood is removed from the body and pumped by a machine outside the body into a dialyzer (artificial kidney). Doctors decide to place a person on dialysis when the person's kidney failure is causing certain conditions such as uremic encephalopathy, pericarditis, acidosis, heart failure, pulmonary edema, and hyperkalemia [1].

For patients with end-stage renal disease (ESRD), renal replacement therapy is achieved by dialysis (hemodialysis or peritoneal dialysis) or kidney transplantation. Although true and complete replacement of renal function is not provided by dialysis, this modality removes metabolic wastes and excess body water, and replenishes body buffers in order to sustain life [2].

Renal failure describes a medical condition in which the kidneys fail to filter toxins and waste products from blood adequately; dialysis including hemodialysis is a procedure that is a substitute for many of the normal duties of the kidneys [3].

The number of patients with end-stage renal disease is increasing by 9% per year, among that undergoing hemodialysis, the majority will require at least one hospitalization every year [4, 5].

Once hospitalized, these patients have an intrinsic susceptibility to developing an infection as a result of numerous is morbid conditions, uremic toxicity, and anemia of chronic renal failure, all of which contribute to an immunocompromised state [6-9].

In addition, chronic hemodialysis patients depend on vascular access, which increases the risk for developing bacteremia, the nosocomial infection with the greatest mortality rate, nosocomial infections contribute directly to a substantial number of hospital deaths and extra hospital days, these infections have not been extensively investigated in chronic hemodialysis patients, even though they are a high-risk population. To develop effective and customized prevention strategies, the epidemiological characteristics of nosocomial infections need to be fully elucidated in this population [10].

Urinary tract infections are the most common bacterial infections in humans, both as community-acquired and healthcare-associated infections. It is the most common nonsurgical nosocomial infection in postoperative patients and the second most common healthcare associated infection [11, 12].

Proliferation of bacteria in the urinary tract is the cause of urinary tract infection. The clinical manifestations of UTI depend on the portion of the urinary tract involved, the etiologic organism(s), the severity of the infection and the patient's ability to mount an immune response to it [13].

Signs and symptoms may include fever, chills, dysuria, urinary urgency, frequency and cloudy or malodorous urine. Infections are almost always ascending in origin and caused by bacteria in the periurethral flora and the distal urethra. These bacteria inhabit the distal gastrointestinal tract and colonize the perineal area. E. coli usually causes a child's first infection [14].

but other gram-negative bacilli and Enterococci may also cause infection. Staphylococcal infections, especially those due to Staphylococcus saprophyticus are common causes of urinary tract infection among female adolescents [15-18].

Materials and Methods

Collection of Urine Samples

Each patient was instructed how to collect a Clean-Catch midstream urine in a sterile tube (4-5 ml) labeled, leak proof, and sterile containers. The specimens immediately transported to the laboratory under aseptic technique.

Data Collection

A structured questionnaire and referring to the patient clinical sheet were being used; demographic data and other Data (clinical symptoms, previous antibiotic, duration of antibiotic used). verbal consent was obtained from each patient enrolled in this study

Isolation and Identification of Organisms

Using calibrated wire inoculating loop (0.001 ml) urine samples were inoculated into Cystine Lactose Electrolyte Deficient medium (Oxoid, Ltd., Basingstoke, Hampshire, England). CLED medium is recommended for diagnostic urinary bacteriology because it supports the growth of both gram positive and gram negative urinary potential pathogens and gives good colonial differentiation. Cultures were incubated in aerobic atmosphere at 37ºC for 24 h. Colonies were counted to check the presence of significant bacteriuria. colonies were selected and characterized on the basis of morphological, cultural and biochemical features.

Results

A total of one hundred and three hemodialysis patients (66.9%) of the patients from Sudanese Kidney Transplant Association Hospital (SKTA) and (33.1%) of patients from Selma center for kidney diseases (table1). The most frequenty age group was (31-40y), followed by the age group (21- 30y).

The rate of urinary tract infection was higher among the age group twenty-one to thirty, followed by age group thirty-one to forty (table2). Regarding the duration of renal dialysis most of them were on hemodialysis for one to two years (table3). Bacterial pathogens were isolated from forty-two (40.7%) urine samples, the rate of urine specimen with significant growth was higher in males than females (figure 1). The most isolated organism was including: E. coli, S. saprophyticus, S. aureus, Klebsiella species, E. faecalis, P. vulgaris and S. pyogens (table4).

Table 1: Distribution of the Participant According to Site of Collection

center	Number	Percentage
SKTA	69	66.9%
Salma center	34	33.1%
Total	103	100%

Table 2: The rate of Specimen with Bacterial Growth According to Age Groups

Age group (years)	Tested	Specimen with bacterial	
		growth	Percentage
10-20	2	1	50%
21-30	16	10	62.5%
31-40	63	25	39%
41-50	20	5	25%
More than 50	2	1	50%
Total	103	42	40.7%

Table 3: Distribution of Patient with Bacterial Urinary Tract Infection according to Duration of Renal Dialysis

Duration of Renal dialysis (years)	Number	Distribution of patient with bacterial growth	
		growth	Percentage
Less than one year	9	5	55.5%
1-2	58	25	43.1%
3-4	25	8	32%

5-6	8	2	25%
More than six years	3	2	66.6%
Total	103	42	40.7%

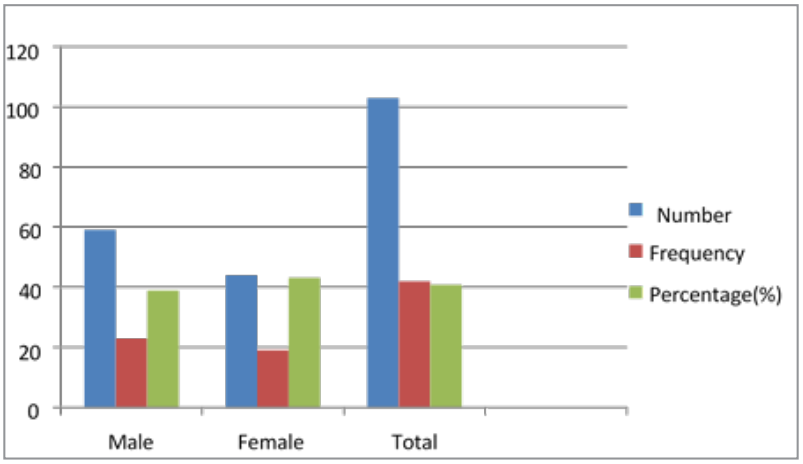

Figure 1: The Rate of Specimen with Bacterial Growth According to Gender.

Table 4: The Frequency of Bacteria Species Isolated from the Urine Specimen

Isolated bacteria	Number	Percentage (%)
S.aureus	7	16.6
S.saprophyticus	8	19
S.pyogens	2	4.7
E.faecales	3	7.1
E. coli	16	38
P.vulgaris	2	4.7
Klebsiella species	4	9.5
Total	42	100

Discussion

A total of one hundred and three urine sample were enrolled in this study. Forty-two (40.7%) revealed significant bacterial growth. This result is nearly in agreement with the (15), reparted that 37% of his patients revealed significant bacterial growth. This study revealed slightly higher rate of urinary tract infection among females (43.1%) than males (38.9%).

Which in disagreement with (16) in which the rate of urinary tract infection was 29.4% and 10.7% among females and males respectively. The rate of urinary tract infection among males (38.9%) was very close to what was observed by (30%). The isolated bacteria that cause urinary tract infection were S.aureus , S.saprophyticus, S.pyogenes , E.faecales, E.coli, P.vulgaris, Klebsiella species, which were found to be the most causative agents of urinary tract infection in other studies.

Conclusion

It is concluded that Gram-negative bacilli (Enterobacteracea) were responsible for urinary tract infections. Drink plenty of water daily, wipe from front to back to prevent bacterial around the anus from entering the vagina or urethra, avoid smoking, clean genital area before sexual intercourse, avoid using feminine hygiene sprays and scented douches which may irritate urethra.

References

1. Beers, M. H., & Fletcher, A. J. (2003). Kidney and urinary tract disorders. The Merck Manual of Medical Information (pp. 833-834). Merck Research Laboratories.
2. Schmidt, R. J., Holley, J. L., Schwab, S. J., & Post, T. W. (2024). Non-access related infections in chronic dialysis patients. UpToDate, 18, 3.
3. Klahr, S., & Miller, S. (1998). Acute oliguria. The New England Journal of Medicine, 338, 671-675.
4. Ad Hoc Committee on Nephrology Manpower Needs. (1997). Estimating workforce and training requirement for nephrologists through the year 8. American Society of Nephrology Journal, 8, S9-S13.
5. National Institutes of Health. (2017). US Renal Data System: USRDS 2016 Annual Data Report. The National Institute of Diabetes, Digestive and Kidney Diseases, 69, A7-A8.
6. Descamps-Latscha, B., & Herbelin, A. (1993). Long-term dialysis and cellular immunity: A critical survey. Kidney International, 43, S135-S142.

7. Miller, T., Ormrod, D., & Collins, J. (1980). Host defense and infection in dialysis patients. In A. R. Nissenson, R. N. Fine, & D. E. Gentiel (Eds.), Clinical Dialysis (pp. 597-613). Appleton & Lange.
8. Goldblum, S. E., & Reed, W. P. (1980). Host defenses and immunologic alterations associated with chronic hemodialysis. Annals of Internal Medicine, 93, 597-613.
9. Van Holder, R., & Ringoir, S. (1992). Polymorphonuclear cell function and infection in dialysis. Kidney International, 38, S91-S95.
10. Emori, T. G., & Ganynes, R. P. (1993). An overview of nosocomial infections, including the role of the microbiology laboratory. Clinical Microbiology Reviews, 6, 428-442.
11. Allegranzi, B., Nejad, S. B., Combescure, C., Graafmans, W., Attar, H., Donaldson, L., & Pittet, D. (2011). Burden of endemic health-care-associated infection in developing countries: systematic review and meta-analysis. The Lancet, 377(9761), 228-241.
12. Gastmeier, P., Kampf, G., Wischnewski, N. A., Hauer, T., Schulgen, G., Schumacher, M., ... & Rüden, H. (1998). Prevalence of nosocomial infections in representative German hospitals. Journal of Hospital infection, 38(1), 37-49.
13. Foxman, B., & Brown, P. (2003). Epidemiology of urinary tract infections: Transmission and risk factors, incidence, and costs. Infectious Disease Clinics of North America, 17, 227-241.
14. Brkic, K. (2017). An overview of traffic sign detection methods. Department of Electronics, Microelectronics, Computer and Intelligent Systems, Faculty of Electrical Engineering and Computing, Unska 6, 1-18.
15. Manhal, F. S., Mohammed, A., & Ali, H. K. (2017). An overview of traffic sign detection methods. Department of Electronics, Microelectronics, Computer and Intelligent Systems, 193-210.
16. Faculty of Electrical Engineering and Computing. (2012). Fac Med Baghdad, 54, 1.
17. Mortazavi, M., Seyrafian, S., Shahidi, S., Abadpour, Z., & Shahbazi, F. (2011). Pyuria as a screening test for detection of urinary tract infection in patients on long-term hemodialysis. Iranian Journal of Kidney Diseases, 5, 50-52.
18. Jaiswal, S., Das, R., Sharma, S., Paudel, P., & Lamichhane, S. R. (2013). Bacteriological study of urinary tract infection in male patients undergoing dialysis due to chronic kidney disease in tertiary care hospitals in Nepal. Research and Reviews: A Journal of Life Sciences, 3, 1-12.