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Isolation and Identification of Some Bacterial Species from Dialysis Unit in Basrah

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Abstract: This study aimed to investigate the occurrence of some bacterial growth in dialysis system unit. It was found that out of 50 samples which were collected from different sites of dialysis system, 18 (36%) revealed positive bacterial growth while 32 (64%) recorded as negative culture. The highest percent of those bacterial species belong to *Staph aureus* (52.2%) followed by both *Staph epidermides* and *E. coli* (17.4%) (P<0.05). Both of *Staph aureus* and *Staph epidermides* were also identified in nasal and hand swabs obtained from males and females of nursing staff. In conclusion there is a frequency of bacterial contamination in dialysis unit that might be belong to the measure of prevention and controlling bacterial growth and precautions that had been followed by all health care workers. In spite of that the occurrence and emerging of the resistant bacteria as a contaminant or a source of infection to those immunosuppressed patients must not be neglected.

INTRODUCTION

The patients of chronic renal failure whom on dialysis are more susceptible to infection which is the second leading cause of their death besides being as the frequent common reason of hospitalization. Bacterial infection is among the most contributor microorganisms that responsible for 95% of infection in hospitals, in which the resistant bacterial species are the most prominent one [1]. Patients on chronic hemodialysis mostly suffer complication due to increasing possibility of getting infection on dialysis. Comparing to those patients with arteriovenous fistula or graft, hemodialysis patients using a catheter have a possibility 2-3 times greater risk of hospitalization due to infection and death [1].

Chronic renal dysfunction patients are more liable to infections as the immune system undergo many abnormalities that arise as a direct result of uremia and its metabolic dysfunction [2]. These immune system abnormalities include decrease neutrophile action, monocytes and B and T lymphocytes, resulting in impairment of production of antibodies, processing of antigens and cell mediated immunity which consequently affect incidence of microbial infections [2, 3].

The water that used in kidney machine if untreated well with disinfections will be a source of variety of bacterial, chemical and toxic contaminants that might be transmitted to patients, since each patient on dialysis machine is exposed to large quantity of water reaching up to 36,000 L in one year [4].

Annual death rates are higher among dialysis patients compared with general population. Gram negative bacteria, especially *Pseudomonas aeruginosa* have become a real concern in hospital acquired infections, so trying to identify and eliminates the cause is important and significant [4].

This study was conducted to have its objective to identify bacterial isolates from dialysis machines and nursing staff in dialytic ward in Basrah.

MATERIALS AND METHODS

Over a period of approximately two months (March, 2019 to April, 2019), this study was conducted in the dialysis center of Basrah General Hospital and Al-Sadr Teaching Hospital. A total of 70 swab samples were taken from both Dialysis system (N=50) and Health Care Workers of dialysis unit (N=20). Samples were transferred to the laboratory of department of microbiology in College of Medicine/ Basrah University for cultivation and identification. Different culture media were used for cultivation that include: Blood agar, Mannitol Salt Agar and MacConkeys Agar, (Himedia). Culture media then incubated at 37°C for 24–48h. Macroscopic, biochemical tests and further diagnostic tests were done for each plate that revealed bacterial growth [5, 6].

RESULTS

In this study, out of 70 samples that were collected from dialysis unit, the occurrence of bacterial growth as shown in Table-1, was 18 (36%) revealed positive bacterial growth while 32 (64%) recorded as negative culture since they never shown any bacterial growth.

TABLE 1. Occurrence of bacterial growth in dialysis unit

Sources	Positive growth N (%)	Negative growth N (%)
Swabs from equipments (N=50)	18 (36)	32 (64)
Swabs from health care workers (N=20)	10 (50)	10 (50)

*P> 0.05, Non- Significant present between the groups

The highest percent of these bacterial species belong to *Staph aureus* (52.2%) followed by both *Staph epidermidis* and *E. coli* (17.4%). Besides that, *Pseudomonas* spp, *Proteus* and *Bacillus* were also detected from these samples (P<0.05) (Table-2).

TABLE 2. Bacterial species contaminated dialysis water system (N=50)

Bacterial types	Frequency	Number	(%)
<i>Staphylococcus aureus</i>	12		(52.17)
<i>Staphylococcus epidermidis</i>	4		(17.39)
<i>E. coli</i>	4		(17.39)
<i>Pseudomonas spp</i>	1		(4.3)
<i>Proteus spp</i>	1		(4.3)
<i>Bacillus subtilis</i>	1		(4.3)
Total	23		

*P> 0.05, Significant present between the groups

As another source of bacterial isolates in the dialysis unit, both of nasal passages and hands of nursing staff were swabbed. Bacterial growth was recorded according to source of samples (P>0.05) and both of *Staph aureus* and *Staph epidermidis* were identified in these samples in both males and females as shown in table-3.

TABLE 3. Bacterial species isolated from nursing staff

Bacterial species	Male N(%)	Female N(%)	Total N(%)
<i>Staph. aureus</i>	2 (33.3)	4 (66.6)	6 (100)
<i>Staph. epidermidis</i>	1(33.3)	2 (66.6)	3 (100)
Negative	1	10	11
Total	4 (20)	16 (80)	20 (100)

*P> 0.05, Non- Significant present between the groups

The present study also found that there is no significance difference between bacterial growth in the two hospitals (P>0.05) as shown in table-4. The majority of samples recorded no growth in both Basrah General Hospital and Al-Sadr Teaching Hospital (62.96 %, 60%) respectively. The measures that used in both hospitals for monitors and treatment of dialysis system is seemed to be similar as compared in table 5.

TABLE 4. Bacterial growth in dialysis system according to the hospitals

	Al-Sadr H. N (%)	Basrah General H N (%)	Total
Positive	9 (39.13)	10 (37.03)	19
Negative	14 (60)	17 (62.96)	31
Total	23 (46)	27 (54)	50(100%)

*P> 0.05, Non- Significant present between the groups

TABLE 5. Some parameters of dialysis system unit

	Basra General H	Al-Sadr Teaching H
Treatment of used water	100%	100%
Types of disinfection	Chemical and rinse	Chemical and rinse
Routine microbiological test	Once a year	Never
patient with pyogenic reaction and septicaemia	0	0

DISCUSSION

Infection is a frequent cause of re-hospitalization and the second leading cause of death in chronic renal patients on hemodialysis [7]. Both of Gram positive and Gram-negative bacteria are a common cause of infections and the most common causative pathogens are gram positive bacteria, *Staphylococcus aureus* and coagulase-negative staphylococci [8]. *Staphylococcus aureus* was found to be the dominant in different sources of isolation [9,10, 11]. In this study the results showed bacterial growth in both hospitals and the majority of this bacterial growth refers to *Staph aureus* followed by *Staph epidermidis* and *E. coli*. Also, *Pseudomonas* species which might be a source of bacterial infections for patients subjected to dialysis was recorded. MRSA and multi resistant *Pseudomonas*

aeruginosa associated with many fatality rates in hospitalized patients so minimizing the possibility of getting infection is the first priority in prevention infection in such unit.

The source of infection in dialysis unit might be from a health care personal as many studies reported that the main source of transmission of infection is came from the transiently contaminated hands of health care workers [12,13]. In this study the percent of occurrence of bacterial growth was 36% despite the precautions and methods of disinfection that they depend on. So the possibility of the arising of resistant pathogens in clinical settings is a current problem. For that reason, precautions that should be taken by health professionals and efficient quality control measures are intended for reduction horizontal transmission of these pathogens in hospital environments. Also, in addition to standard precautions in dialysis unit it was recommended to use stricter measures [14] as that of CDC and WHO guidelines [15,16]. These measures include but not restricted on hand hygiene, personal protective equipment, cleaning and disinfection of both environmental surfaces and external surfaces of hemodialysis machines. The quality and purity of water that used in dialysis machines also affect patient's safety and lead to reduction in mortality [17].

CONCLUSION

In conclusion there is a frequency of bacterial contamination in dialysis unit that might be belong to the measures of prevention and controlling bacterial growth and precautions that had been followed by all health care workers. The occurrence and emerging of the resistant bacteria as a contaminant or a source of infection to those immunosuppressed patients must not be neglected.

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