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Bacterial Infections in Renal Transplant Recipients

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Abstract

Urinary tract infection (UTI) is considered as one of the important bacterial infections seen among renal transplant recipients. In the present study, bacterial urinary tract infections in renal transplant recipients were investigated. Eighty-seven renal transplant recipients (57 males and 30 females) were included to study the bacterial UTIs. Clean- catch midstream urine specimens were obtained from patients and studied using microscopic analysis and culturing on appropriate bacteriologic media. Bacterial isolates were identified by standard biochemical and serological tests. UTIs were diagnosed in 29 percent of patients (18 males and 11 females). The most common causative bacterial strains were coagulase negative *Staphylococci* (31%) and *Entrobacter* spp (20.7%). The results showed that all of *Proteus* spp*, Pseudomonas* spp*, Klebsiella* spp*,* and *Enterococcus* spp were resistant to most of tested antibiotics, so this research reflects that these multiple resistant bacteria can be accounted as the most cause of UTI in renal transplant recipients.

Keywords: *Urinary tract infections, Renal transplantation, Antibiotic resistance, Iran*

Introduction

Microbial infections are one of the major problems against successful organ transplantation and can cause high morbidity and mortality among transplant recipients. Infections in renal transplant recipients account for 26% of hospitalization days annually and 40% of overall mortalities (1).

In general, urinary tract infection (UTI) refers to the presence of microbial pathogens within the urinary tract. UTI is the most common bacterial infection. It is generally associated with minimal morbidity except among specific subpopulations (2).

In the studies of investigators reported in different countries, UTI is the most prevalence type of infection among transplant recipients (3- 7). In other words, the patients who have undergone renal transplantation are at high risk of developing UTI which is dangerous for both the patient and the transplant kidney. The critical period for the development of the complicated UTIs is from first to third month after transplantation (8).The current yearly incidence of UTIs is 6-31% (average 20%) (9-10).

Although UTIs presenting within the first 3 months post-transplant (early infections) are usually asymptomatic, they are frequently associated with overt pyelonephritis, bacteraemia (approximately 60% of bacteraemias in transplant recipients originate from the urinary tract), allograft dysfunction and a high rate of bacterial relapse following a conventional course of antibiotics (11). The incidence of

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UTIs falls progressively during the first years after transplantation and subsequently does not differ from that of UTIs in the general population (12).

Gram-negative bacilli (primarily *E.coli*) and *Enterococcus* are the most common isolates, although exposure to nosocomial pathogens can result in pseudomonal, staphylococcal and fungal infections (10).

In current study the prevalence of UTIs among renal transplant recipients submitted to different hospitals in Tehran, Iran, were investigated and antibiotic susceptibility test was used for measuring the drug resistance of isolated strains using standard diffusion disc agar method.

Materials and Methods

Specimen collections In this study, urine specimens were obtained from 87 renal transplant recipients whom hospitalized in Immam Khomaini, Shariatti and Hasheminejad hospitals. Ten ml of clean- catch midstream urine specimens were collected in sterile container and transported to the laboratory within 2 hours for microscopic analysis and culturing on appropriate bacteriologic media.

Urine microscopic analysis Five ml of urine specimen was centrifuged in 2500 rpm. Supernatant was removed and sediment used for microscopy analysis. The sediment was transferred on the clean slide and studied for existence of epithelial cells, red cells and casts.

Urine culturing and bacterial identification One ml of diluted (1/1000) urine specimen was used for culturing on Blood, Manitol Salt and MacConkey agar. Cultures were incubated at 37° C for 24-48 h. Specimens with more than 100,000 colony forming unit (CFU) per ml was considered as positive samples.

Finally, bacterial isolates were identified by Gram staining and standard biochemical and serological tests Ewing WH (13).

Antibiogran test Antimicrobial susceptibility test was performed according to the "Kirby & Bauer"method (14) using amoxicillin, chloramphenicol, cotrimoxazole, tobramycin, nitrofurantoin, kanamycin, polymyxin, amikacin, tetracycline, gentamicin, cephalexin, cephalothin, carbenicillin, nalidixic acid and eryth- romycin disks. These antibiotic disks were purchased from Padtan Teb Co., Tehran, Iran.

Results

Of 87 renal transplant recipients, 30 were female (34%).Of these, 18 males (32%) and 11 females (37%) were diagnosed as UTI patients. Sixty five patients had been hospitalized and others referred to local clinics. As shown in Fig. 1, the most common causative bacterial strains were coagulase negative *Staphylococci* and *Entrobacter* spp.

Results obtained from antibiotic susceptibility test showed that all of *Proteus* spp*, Pseudomonas* spp*, Klebsiella* spp*,* and *Enterococcus* spp were resistant to the most of tested antibiotics. In Table 1, complete results obtained from antibiotic susceptibility test are presented.

Fig. 1: Isolation percentage of bacterial species isolated from renal transplant recipients

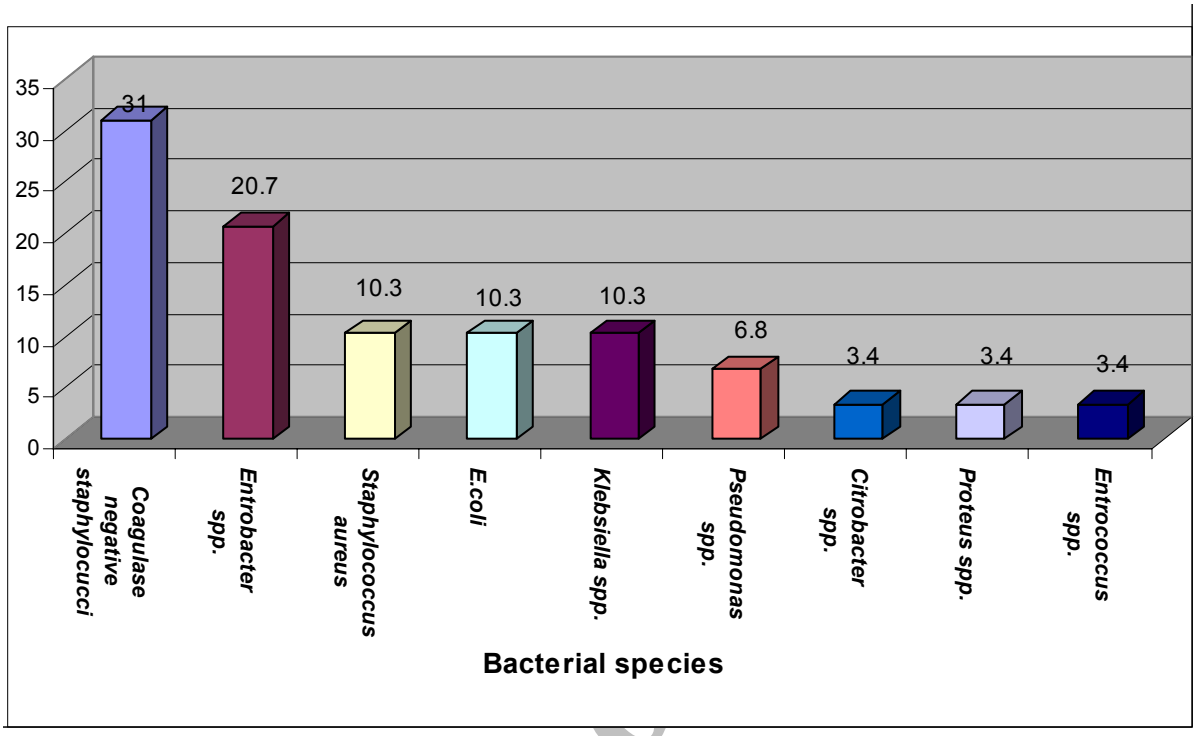

Table 1: Number of resistant bacterial strains isolated from renal transplant recipients

Bacterial strain / Antibiotic	*E. coli* N=3	Coagulase negative *Staphylococci* N=9	*S.aureus* N=3	*Entrobacter* spp. N=7	*Citrobacter* spp. N=1	*Proteus* spp. N=1	*Enterococcus* spp. N=1	*Pseudomonas* spp. N=2
Amoxicillin	3	8	3	6	1	1	1	2
Chloramphenicol	0	5	2	5	1	1	1	2
Cotrimoxazole	2	5	2	6	1	1	1	2
Tobramycin	2	6	2	6	1	1	1	2
Nitrofurantoin	1	4	2	6	0	1	1	2
Kanamycin	0	6	3	5	1	1	1	2
Polymyxin B	1	1	0	0	0	1	0	0
Amikacin	2	7	3	5	0	1	1	2
Tetracycline	2	6	3	6	0	1	1	2
Gentamicin	2	3	3	5	1	1	1	2
Cephalexin	3	7	3	0	0	0	0	2
Cephalothin	2	5	3	6	1	1	1	2
Carbenicillin	3	8	3	6	1	1	1	2
Nalidixic acid	1	4	2	3	0	0	1	1
Erythromycin	3	6	3	5	1	1	1	2

Discussion

UTI refers to the presence of microbial pathogens within the urinary tract. UTIs are considered to be the most common bacterial infection (2).

Although everyone is susceptible to UTI, there are specific subpopulations that are at increased risk of UTI, including infants, pregnant women, the elderly, patients with spinal cord injuries and/ or catheters, patients with diabetes, multiple sclerosis, AIDS/ HIV and patients with underlying urologic abnormalities (2). The patients who have undergone renal transplantation are at high risk of developing bacteriuria which is dangerous for both the patient and the transplant kidney (8).

In renal transplant recipients, UTI may be lead to failure of transplantation and even death. UTI accounted for nearly 7 million office visits and 1 million emergency department visits, resulting in 100,000 hospitalizations in the United States (2).

In this study from 87 studied patients, UTIs was diagnosed in 29 patients. The microbial etiology of urinary infections has for several decades been regarded as well established, reasonably consistent, and of limited interest. In current study which was performed on renal transplant recipients, the most prevalent bacterial spp were coagulase negative *Staphylococci* (31%) and *Enterobacter* spp (20.7%). In a study, the most frequent infections were urinary tract (61%), respiratory tract (8%); intra-abdominal (7%), and *Cytomegalovirus* (8%). *E coli* and *Enterococcus faecalis* were the most frequently isolated microorganisms (15). In another study, the UTI incidence on the 954 transplant recipients was investigated. Various infections were diagnosed in 35% of patients and UTI was the most prevalent infection that observed in 68 patients (4). Also in another study conducted during 1991-1996, UTI was diagnosed in 26% of patients (3).

From a total of 57 men whom studied in present study, UTI was observed in 18 cases (32%) and in 30 studied women, UTI was observed in 11 cases (37%). We did not observe significant variance between sex of patients and the incidence of UTI ($P > 0.05$).

In a study in Japan, among 57 transplant recipients, UTI was diagnosed in 63% of patients (16). UTI was the most prevalent infection and *Escherichia coli* was the most common bacterial isolate in another study (7). Also in an Asian study, *E. coli*, *cytomegalovirus*, and *Candida* were the most common pathogens (1). In our study, the most prevalent bacteria were coagulase negative *Staphylococci* and *Enterobacter* spp.

In Nizze study, from 650 transplant recipient patients, about 106 cases died after a short time, urinary infection was reported as the important factor of death among 45 patients (17).

We also studied the antibiotic susceptibility of bacterial isolates using standard disc diffusion agar method. The results showed that all *Proteus* spp*, Pseudomonas* spp*, Klebsiella* spp*,* and *Enterococcus* spp, were resistant to the most of tested antibiotics, so this research reflected that these multiple resistant bacteria could be accounted as the most cause of UTI in renal transplant recipients.

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