



Organisms Isolated and Their Antibiotic Sensitivity Pattern from Renal Transplant Recepients in Kidney Transplant Unit

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Authors' contributions

This work was carried out in collaboration between all authors. Author SN wrote the manuscript, managed the literature searches. Author DA wrote the protocol and managed literature searches. Author BAF designed the study. Author SB managed the analyses of the study. Authors AB, LB and SA managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aim: Despite improvements on immunosuppressive therapy and surgical techniques, infections remain important complication in renal transplant and have been associated with increased morbidity and graft rejection. Role of microbiological cultures in isolating bacteria and formulating their antibiogram has potential benefits with regards to targeted therapy for MDR bacteria. No such study has been conducted previously from this region so we designed this study to find out the organisms causing infections in renal transplant patients and their antibiotic susceptibility pattern.

Materials and Methods: This retrospective study was conducted over a period of 1 year from 2016 to 2017. All samples were sent from Kidney Transplant Unit (KTU) for culture and sensitivity irrespective of duration of post renal transplant. Qualitative culture of other infected body fluids was performed on blood agar, MacConkey agar plate (Hi media, India). Positive cultures were processed for antimicrobial susceptibility testing on Mueller-Hinton agar plates, using the Kirby-

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Bauer disk diffusion method, according to the CLSI guideline.

Results: A total of 81 samples were received from kidney transplant unit for culture, out of which 48 (59.2%) were sterile and 33 (40.8%) were culture positive samples. Urinary tract infection (UTI) (69.6%) was the most common infection followed by wound infection (21.2%) and respiratory tract infection (9.09%). In our study most common organism isolated from UTI was *Escherichia coli* (30.3%), followed by *K. pneumoniae*, (21.2%), MRSA (*Methicillin resistant Staphylococcus aureus*) (18.2%), *Acinetobacter spp.* (9.1%), *Enterococcus spp.* (12.1%), *Pseudomonas aeruginosa* (6.1%), *Streptococcus pyogenes* (3%). Antibiotic susceptibility of different organism isolated during culture showed that all strains of *Escherichia coli* identified were sensitive to amikacin and none of the strains was resistant to it.

Conclusions: To conclude, UTI was the most common infection followed by wound infection and respiratory tract infection. The most prevalent organism in UTI patients was *Escherichia coli* and its in vitro antibiotic susceptibility was highest to amikacin (100%) and resistant to cephalosporin, quinolones. The incidence of MRSA was found to be higher as compared to the other studies and needs to be kept in mind while treating transplant recipients.

Keywords: Urinary tract infection; renal transplant etc.

1. INTRODUCTION

Renal transplantation is the ideal method for treating patients with end-stage renal disease. Despite improvements on immunosuppressive therapy and surgical techniques, infections remain important complication and have been associated with increased morbidity and graft rejection [1,2].

During the first post-transplant month, the most frequent categories of infection are related to technical problems (including surgical site infections), urinary tract infections, vascular access infections, and pulmonary infections.[3,4] During this period, more than 90% of all infections are caused by bacteria and fungi whereas opportunistic infections are unusual [5,6]. The greatest risk of life-threatening infection occurs between 1 and 6 months post transplantation, when the effects of immunosuppressive therapy peak [6,7]. During this period, most common infections are opportunistic agents. These opportunistic infections can occur with minimal epidemiological exposure and are related to the immunosuppressant [5,8]. Usually, infections caused by multi drug resistant (MDR) bacteria are associated with increased morbidity and mortality which entails enhanced healthcare costs [5,7]. Multi-resistant bacterial infections are potentially life-threatening emerging problems. Role of microbiological cultures in isolating bacteria and formulating their antibiogram has potential benefits with regards to targeted therapy for MDR bacteria. The aim of this study was to isolate different microorganisms and study their

antibiotic sensitivity pattern from renal transplant recipients in Kidney transplant unit, KTU as due to the increasing antibiotic resistance it is very important to know the sensitivity pattern and provide targeted therapy for better patient outcome.

2. MATERIALS AND METHODS

This retrospective study was conducted in Department of Microbiology at Sher-i-Kashmir-Institute of Medical Sciences, SKIMS over a period of 1 year from 2016 to 2017. All samples were sent from (KTU) for culture and sensitivity irrespective of duration of post renal transplant were included. Samples which were sent in unsterile container were excluded. Collected samples were sent to the laboratory in less than 2 hours post collection.

Qualitative culture of other infected body fluids was performed on blood agar, MacConkey agar plate (Hi media, India). They were incubated aerobically at 35°C for 18-24 hours. Semi-Quantitative urine cultures were performed and identification of organism was done on chromogenic culture media (Hi media- Hi crome UTI Agar). In case of positive cultures on BA and MAC agar, colony characteristic was seen, Gram staining done and final identification was done by putting up biochemical tests. Cultures were processed for antimicrobial susceptibility testing on Mueller-Hinton agar plates, using the Kirby-Bauer disk diffusion method, according to the CLSI guideline [9]. Cefoxitin was used as surrogate marker for methicillin resistance as per CLSI guidelines. For *Streptococcus pyogenes* no

antibiotic was tested as per CLSI guidelines. The antibiotic discs, beside all the chemicals for biochemical tests and culture media were procured from Hi Media, India.

3. RESULTS AND DISCUSSION

In our study, during a course of one year, a total of 81 samples were received from kidney transplant unit for culture, out of which 48 (59.2%) were sterile and 33(40.8%) were culture positive samples. The nature of the samples received were: urine (n=55), sputum (n=10), pleural fluid (n=2), central line (n=1) and pus (n=13). Out of 33 culture positive, 23(69.6%) were isolated from urine, 7(21.2%) from pus and 3(9.09%) from sputum samples.

Urinary tract infection (UTI) (69.6%) was the most common infection followed by wound infection (21.2%) and respiratory tract infection (9.09%). In our study most common organism isolated was *Escherichia coli* 10(30.3%), followed by *K. pneumoniae* 07(21.2%), MRSA (*Methicillin resistant Staphylococcus aureus* 06(18.2%), *Acinetobacter spp.* 03(9.1%), *Enterococcus spp.* 04(12.1%), *Pseudomonas aeruginosa* 02(6.1%), *Streptococcus pyogenes* 01(3%) (Table 1).

Antibiotic susceptibility of different organism isolated during culture showed that all strains of *E.coli* identified were sensitive to amikacin and none of the strains was resistant to it. *Klebsiella pneumoniae* was resistant to most of the drugs. Among other gram negative organisms isolated were *acinetobacter* and *pseudomonas* both of which were sensitive to amikacin and didn't showed any particular trend of resistance to any of the antibiotics. Among Gram positive organism isolated, *Enterococcus spp* and MRSA highest sensitivity was seen to linezolid and vancomycin (Table 2).

Despite improved surgical techniques, antimicrobial prophylaxis, new immune-suppressive therapies and hygiene measures in the management of transplant patients, infectious complications remain a major cause of morbidity and mortality in solid organ transplantation (SOT) patients, and urinary tract infection (UTI) is one of the most common infectious complication among them [1-5]. The high prevalence of UTI after kidney transplantation could be because of the immunosuppressive drugs.

Urinary tract infection (UTI)—including asymptomatic bacteriuria, cystitis, and pyelonephritis—is the most common form of bacterial infection following renal transplantation [10].

According to study of Soemann and Horl, most of the UTIs (74%) occurred during the first year after kidney transplantation (81.9%), mostly within the first 3 months after surgery. The most common pathogens isolated in urine culture were *E. coli* (29%), *Enterococcus spp.* (24%), *Staphylococcus* (12%) and *Klebsiella spp.* [11]. In, a study carried out in Saudi Arabia in post-renal transplant patients who presented with UTI, *Escherichia coli* was found to be the most common pathogen (53.3%) followed by *Pseudomonas aeruginosa* (20%) [12]. In our study we also found that 69.6% of patients who presented with UTI, *Escherichia coli* was the commonest pathogen grown on culture (30.3%). A broad literature review on etiology of UTI in transplant recipients revealed following results. *E. coli* (29%), *Enterococcus* (24%), *Staphylococcus* (12%) and *Klebsiella* (10%) in the study of Chuang et al. in USA; *Enterococcus faecium* (33%) and *E. coli* (31%) in the study of Valera et al. in Poland; *E. coli* (51%) and *Pseudomonas* (18%) in the study of Iqbal et al. in Pakistan; *E. coli* (31.5%), *Candida albicans* (21.0%) and *Enterococcus spp.* (10.5%) in the study of Rivera- Sanchez et al. in Mexico [13,14,15].

In our study respiratory tract infection was seen in 3 out of 81 cases (3.70%). Respiratory tract comprise 8.9% of all infectious episode after kidney transplantation. An important factor related to pulmonary infection is the presence of reduced renal function in infected than non-infected person [16].

Surgical site infection in our study comprised of a total of 7 out of 33 positive cases. Another important observation in our study was the high prevalence of MRSA in our study which was about 18%. There are few epidemiological studies of MRSA in renal transplant recipients. Oliveira-Cunha M [17] found incidence of 1.2% and Giarola LB [18] an incidence of 12% MRSA in renal transplant patients after surgery. The higher incidence in our population could be because of overuse of antibiotics and is quiet alarming.

Table 1. Organism isolated from different specimens in kidney transplant recipients (n=33)

Gram negative organisms	No.	%
E.coli	10	30.3%
Klebsiella pneumoniae	07	21.2%
Pseudomonas aeruginosa	02	6.1%
Acinetobacter spp	03	9.1%
Gram positive organisms		
MRSA (methicillin resistant Staphylococcus aureus)	06	18.2%
Enterococcus	04	12.1%
Streptococcus pyogenes	01	3.0%
Total	33	100%

Table 2. Different organism isolated with sensitivity pattern to different antibiotic

Organism	E. coli (n=10)		K.pneumoniae (n=7)		Enterococcus spp (n=4)		P.aeruginosa (n=2)		MRSA (n=6)		Acinetobacter spp (n=3)	
	S	R	S	R	S	R	S	R	S	R	S	R
Amikacin	10	0	2	5	-	-	2	0	-	-	3	0
Gentamycin	5	5	2	5	-	-	1	1	-	-	-	-
NFT	8	2	3	4	3	1	-	-	-	-	-	-
CTX	-	-	-	-	-	-	-	-	0	6	-	-
Imipenam	7	3	4	3	-	-	2	0	-	-	1	2
Pip+Taz	5	5	2	5	2	2	1	1	-	-	2	1
Etrapanam	4	6	4	3	-	-	-	-	-	-	-	-
Levofloxacin	-	-	-	-	-	-	-	-	-	-	2	1
Norfloxacin	5	5	5	2	-	-	-	-	-	-	-	-
Cefperazone + Sulbactum	5	5	4	3	-	-	-	-	-	-	2	1
Linezolid	-	-	-	-	4	0	-	-	6	0	-	-
Vancomycin	-	-	-	-	3	1	-	-	6	0	-	-
Amox-Clav	-	-	-	-	2	2	-	-	-	-	-	-
Ampicillin+ Salbactum	-	-	-	-	0	2	-	-	-	-	2	1
Ceftizidime	-	-	-	-	-	-	-	-	-	-	1	2
Ceftriaxone	0	5	-	-	-	-	1	0	-	-	1	2
Ciprofloxacin	6	4	4	3	-	-	1	1	-	-	-	-

4. CONCLUSION

To conclude, UTI was the most common infection followed by wound infection and respiratory tract infection. The most prevalent organism in UTI patients was *Escherichia coli* and its *in vitro* antibiotic susceptibility was highest to amikacin and resistant to cephalosporin, quinolones. The incidence of MRSA was found to be higher as compared to the other studies and needs to be kept in mind while treating transplant recipients.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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