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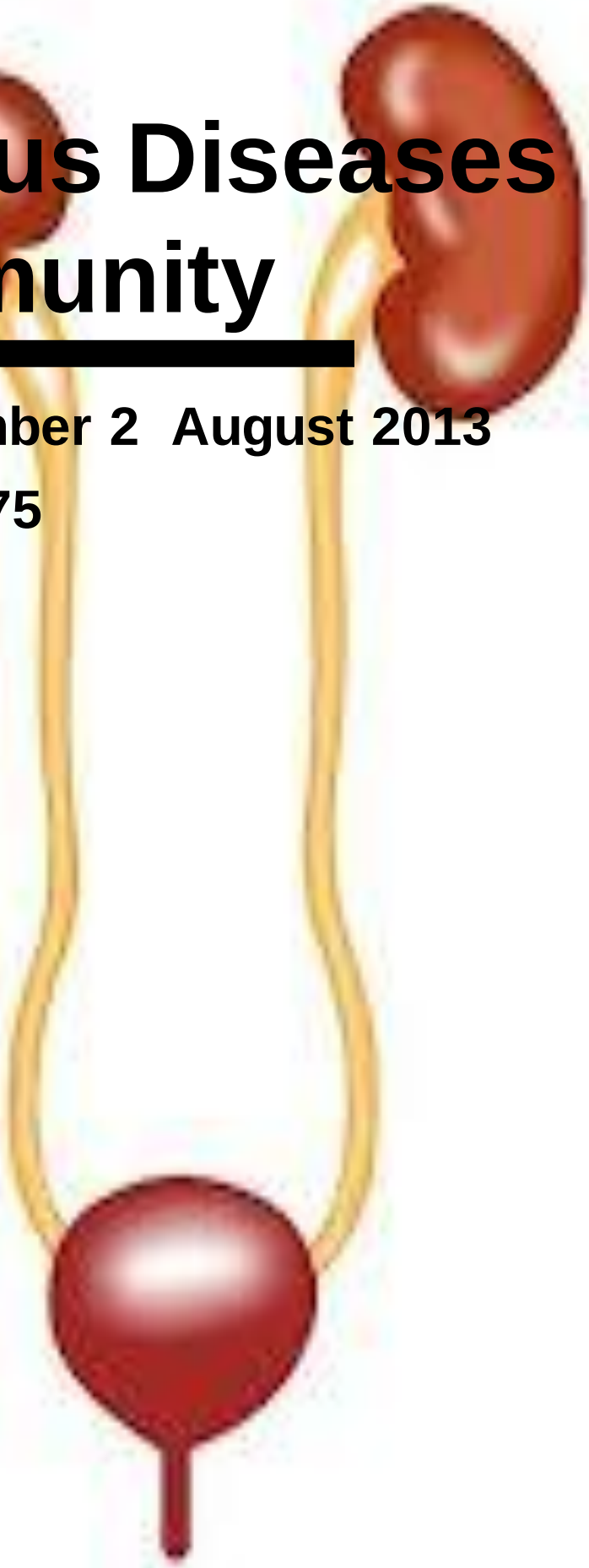

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Pitout JDD, Church DL, Gregson DB, Chow BL, McCracken M, Mulvey M, Laupland KB (2007). Molecular epidemiology of CTXM-producing Escherichia coli in the Calgary Health Region: emergence of CTX-M-15-producing isolates. Antimicrob. Agents Chemother. 51: 1281-1286.

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Table of Contents: Volume 5 Number 2 August 2013

# ARTICLES

## Research Articles

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Journal of Infectious Diseases and Immunity

*Full Length Research Paper*

# Sero-prevalence of malaria, hepatitis b and syphilis among pregnant women in Osogbo, Southwestern Nigeria

**Adeleke, M. A.[1]*, Adebimpe, W. O.[2], Sam-Wobo, S. O.[3], Wahab, A. A.[1], Akinyosoye, L. S.[1] and Adelowo, T. O.[1]**

[1]Department of Biological Sciences, Osun State University, P.M.B 4429, Osogbo, Nigeria.
[2]Department of Community Medicine, College of Health Sciences, Osun State University, Osogbo, Nigeria.
[3]Department of Biological Sciences, Federal University of Agriculture, Abeokuta, Nigeria.

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**Malaria, syphilis and Hepatitis B during pregnancy are detrimental to the life of the pregnant women and the foetus. In this study, we documented the prevalence of the three diseases among pregnant women attending a selected Comprehensive Health Care center in Osogbo, Nigeria using serological kits. Of the 200 participants consented to participate in the study, 26 (13%) were positive for malaria while 6 (3%) were positive for Hapatitis B Virus (HBV). The co-infection of malaria and HBV was found only in two participants (1%) while none of the participants was positive for syphilis. There was no significant difference in the prevalence of malaria and Hepatitis B in relation to age ($p > 0.05$). All the participants had good knowledge that mosquitoes transmit malaria but only 29 (14.5%) claimed to be sleeping under insecticide treated bed-net. About 169 (84.5%) relied solely on insecticide spray of the room and 2 (1%) did not practice any mosquito control measures. The results may suggest the low prevalence of malaria, Hepatitis B virus and syphilis at the study area. However, early surveillance and adequate public health education will be immeasurable in safe-guiding the pregnant women from the detrimental effects of these infections.**

**Key words:** Malaria, syphilis, hepatitis B virus, pregnant women, co-infection, Nigeria.

## INTRODUCTION

Malaria is of considerable public health problem in Africa, with pregnant women and children under five bearing the major burden of the infection. In Nigeria, malaria has been known to account for 11.5% of maternal death (Agomo et al., 2009). *Plasmodium falciparum*, the predominant and most virulent malaria species in Nigeria has been identified as major cause of low birth weight, still births, spontaneous abortion or death of the susceptible pregnant women (Idowu et al., 2006). Syphilis is a sexually transmitted infection (STI) caused by the *Treponema pallidum* spirochete. *T. pallidum* subspecies *pallidum* is a gram-negative, very mobile bac-

*Corresponding author. E-mail: healthbayom@yahoo.com

terium (Eccleston et al., 2008). Hepatitis B is an infectious inflammatory illness of the liver caused by the hepatitis B virus (HBV) that affects hominoidea, including humans. The virus is transmitted by exposure to infectious blood or body fluids such as semen and vaginal fluids (Stamm, 2010; Chang, 2007).

The complications of malaria, syphilis and hepatitis B are more pronounced among immune-compromised patients such as pregnant women and HIV infected individuals. These three infectious diseases cause similar adverse pregnancy outcomes which include spontaneous abortion, still birth or death of the pregnant women (Shafer and Moscick, 2006; Olokoba et al., 2008). Therefore, early diagnosis of these deadly infections through screening among the pregnant women is crucial to the ongoing efforts and campaign on the reduction of maternal and child mortality in Nigeria. This study, thus presents the results of sero-prevalence of malaria, hepatitis B virus and syphilis conducted among pregnant women attending selected primary health facilities in Osogbo, Southwest, Nigeria.

## MATERIALS AND METHODS

### Study area

The study was conducted in Osogbo, the capital of Osun State in Southwestern Nigeria. It lies on the latitude 7° 46 N and Longitude 4° 36 E, and has a population of 156,694.

### Study design

This is a descriptive cross sectional study carried out among the pregnant women attending antenatal session at Ita-Akogun Health Care center in Osogbo, Southwestern Nigeria. All pregnant women who consented to the screening after counseling session carried out by the nurse counselor were enrolled for the study.

### Ethical clearance

Ethical clearance was obtained from the research ethics committee of Osun State University College of Health Sciences. Permission was sought from the Management of the Clinic and informed consent was also sought and obtained from the participants.

### Data collection

Semi structured and pre tested questionnaires were administered to the participants by the researchers to obtain information on the age, occupation, and knowledge on the diseases under study. After the questionnaire administration, sterile disposable syringes were used to collect blood (about 5 ml) from the veno-punctured vein under aseptic conditions. All the specimens were tested for malaria, syphilis and hepatitis B using rapid serological kits for syphilis, malaria and HBV (Global, Germany), according to manufacturer's instructions. The study was conducted between November, 2011 and February, 2012.

### Data analysis

Data was validated through double entry and random checks and analyzed using statistical package for social sciences (SPSS) software (version 17.0) and frequency tables generated. The chi-square test was used to determine association between categorical variables and significant difference in the parameters determine at $P < 0.05$.

## RESULTS

A total of 200 participants consented to be enrolled for the study within the study period. The demographic data of the study participants are presented in Table 1. Most of the study participants were within the age group of 25 to 30 years (40%) followed by 20 to 25 years (32.5%), while age group above 35 constituted the least (2.5%). Majority of participants were traders (39%) with no formal education (74.5%). None of the 200 participants screened was positive for syphilis. However, 26 (13%) were positive for malaria while 6 (3%) were positive for HBV. The co-infection of malaria and hepatitis was found only in two participants (1%) as seen in Table 2. There was no significant difference in the prevalence of malaria and hepatitis B in relation to age ($p > 0.05$) as seen in Table 3. The questionnaire survey showed that only little proportion of the study participants (5%) previously had sexually transmitted infections (STIs). Most of the participants have never had blood transfusion (99%). All the participants had good knowledge that mosquito transmit malaria but only 29 (14.5%) usually claimed to be sleeping under insecticide treated bed net while 169 (84.5%) relied only on insecticide spray of the room, and 2 (1%) did not practice any mosquito control measures as in Table 4.

## DISCUSSION

The results of the present study showed that the prevalence of malaria in pregnancy is higher than hepatitis B while co-infection is extremely low. A prevalence of 13% of malaria was recorded which, albeit, extremely low when compared with high prevalence (72%) earlier reported by Adefioye et al. (2007), for malaria in pregnancy in Osogbo, Nigeria. The difference in the prevalent rate could be associated with many factors among which are diagnostic tool used, period of the study, environmental conditions, improved malaria control activities, and over-diagnosis. Though, only few participants claimed to be sleeping under ITN as revealed by questionnaire survey.

**Table 1.** Demographical data of the pregnant women.

| Demographic information | Frequency | Percentage |
|---|---|---|
| **Age** | | |
| 15-20 | 10 | 5 |
| 21-25 | 65 | 32.5 |
| 26-30 | 80 | 40 |
| 31-35 | 40 | 20 |
| Above 35 | 5 | 2.5 |
| **Occupation** | | |
| Trading | 78 | 39 |
| Civil servants | 52 | 26 |
| Health workers | 33 | 16.5 |
| Others | 37 | 18.5 |
| **Educational status** | | |
| Formal education | 51 | 25.5 |
| Informal education | 159 | 74.5 |

**Table 2.** Prevalence of malaria, syphilis and hepatitis B among the pregnant women.

| Parameter | Syphilis | Malaria | Hepatitis B | Malaria and hepatitis B | Malaria and syphilis | Syphilis and hepatitis B |
|---|---|---|---|---|---|---|
| No positive (%) | 0 (0) | 26 (13) | 6 (3) | 2 (1) | 0 (0) | 0 (0) |
| No negative (%) | 200 (100) | 174(87) | 194 (97) | 198 (99) | 200 (100) | 200 (100) |

**Table 3.** Prevalence of malaria and hepatitis B in relation to age among pregnant women.

| Age group | No screened | No positive for malaria (%) | No positive for hepatitis B (%) |
|---|---|---|---|
| 15-20 | 10 | 1 (10) | 1 (10) |
| 21-25 | 65 | 5 (7.7) | 3 (4.6) |
| 26-30 | 80 | 16 (20) | 2 (2.5) |
| 31-35 | 40 | 4 (10) | 0 (0) |
| 36 and above | 5 | 0 (0) | 0 (0) |

Osogbo metropolis has witnessed tremendous improvement in environmental sanitation in the past one year due to the weekly environmental sanitation exercise declared by Osun State Government. This activity could have led to the elimination of potential breeding sites of malaria vectors. This observation, coupled with the fact that the present study was conducted in the dry season could have culminated in the low prevalence of malaria recorded. Moreover, unlike previous study which used microscopic technique, the present work utilized rapid diagnostic kit which is specific for detection of *P. faciparium* only. Recent studies in Nigeria and other African countries have shown that the high prevalence of malaria reported in some endemic communities using microscopy may be in part, due to over-diagnosis (Agomo et al., 2009; Zurovac et al., 2006). If these observations are sustained, there is need for re-validation of the existing data on malaria in Nigeria, most importantly in areas where high prevalence has been previously reported.

Though, the prevalence of hepatitis B and its co-infection with malaria was low in this study, the co-infection

**Table 4.** Knowledge on STD, sexual activity and malaria prevention among the pregnant women.

| Parameter | Frequency | Percentage |
|---|---|---|
| **Knowledge on STI** | | |
| Yes | 10 | 5 |
| No | 190 | 95 |
| **Sexual activity** | | |
| One sexual partner | 200 | 100 |
| More than one | 0 | 0 |
| **Knowledge on malaria transmission** | | |
| Yes | 200 | 100 |
| No | 0 | 0 |
| **Malaria prevention** | | |
| Insecticide spray | 169 | 84.5 |
| ITN usage | 29 | 14.5 |
| None | 2 | 1 |

of both infectious diseases is detrimental to the life of pregnant women and the un-born baby. Almost 90% of babies delivered with mothers having HVB will become chronically infected with hepatitis B at birth if there is no prevention (Stamm, 2010; Chang, 2007). The usual clinical signs are jaundice, hepatic tenderness, and weight loss (Chang, 2007). The figure obtained from the current study was lower than the previous data on HBV (18.6%) among the pregnant women in a tertiary Institution in Osogbo (Kolawole et al., 2012). This may be due to the difference in diversity of patients attending the tertiary institution as compared to a local comprehensive health centre that is mainly patronized by the people within the community.

According to the Federal Ministry of Health (FMOH), the national prevalence for syphilis among Nigerian pregnant women was estimated as 0.3% (FMOH, 2004). The zero prevalence of syphilis recorded in the present study may indicate extremely low cases of the infection at the study area. Previous studies in different parts of Nigeria have also reported low prevalence (Ozumba et al., 1999; Aboyeji and Nwabuisi, 2003), far less than reported prevalence in some African Countries such as Zambia (12.5%) (Ratnam et al., 1982), Mozambique (18.3%) (Lindstrand et al., 1993), and Malawi (5%) (Kwiek et al., 2008). It is however, not illogical to express that congenital syphilis may not be a major cause of perinatal mortality in the study area.

## CONCLUSION

The results of the study demonstrated the low prevalence of malaria, hepatitis B and syphilis at the study area. Though routine screening for co-infections are rare practices, authors advocates regular surveillance and adequate public health education targeted at these diseases, as it is valuable in safe-guiding these immune-compromised women from the detrimental effects of these infections.

## ACKNOWLEDGEMENTS

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*Full Length Research Paper*

# Urinary tract infections in Saudi renal transplant recipients

**Abdulmalik M. Alkatheri[1,2]***

[1]College of Pharmacy, King Saud bin Abdulaziz University for Health Sciences, Riyadh, 11426, Saudi Arabia.
[2]King Abdulaziz Medical City, National Guard Health Affairs, Riyadh, 11426, Saudi Arabia.

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**Urinary tract infections (UTIs) are common post-renal transplant complications. During the first month post-transplantation, bacterial septicemia due to UTIs is an important cause of morbidity and mortality. The incidence, risk factors and causative bacteria of UTIs were assessed in 27 renal transplant recipients (RTRs). Bacterial UTI was diagnosed based on urine culture that was positive for bacterial growth greater than $10^5$ colony-forming unit (CFU)/ml. The average age of the participants was 41.3±16.2 years, ranging from 16 to 73 years. Male RTRs were 51.9% (N = 14) and females were 48.1% (N = 13). Patients who received kidneys from living-related donors were 63.0% (N = 17) and those who received cadaveric kidneys were 27.0% (N = 10). Incidence of urinary tract infections post-renal transplant was 55.5% (N = 15). Gender (69.2% of the female RTRs developed UTI versus 30.8% of the males) and age (66.7% of the RTRs ≥ 50 years developed UTI) seemed to be risk factors for post-renal transplant UTIs. *Escherichia coli* was the most common pathogen (53.3%, N = 8) followed by *Pseudomonas aeruginosa* (20%, N = 3). Most of the UTIs (73.3%) were detected within one month post-renal transplant. Recurrent infection was observed in 40.1% of the patients. The implication of this study is the need to implement a new prophylaxis regimen that takes into consideration the causative bacteria and its antibiotic sensitivity.**

**Key words:** Urinary tract infection, kidney, transplant, incidence, *Escherichia coli.*

## INTRODUCTION

Renal transplantation is the treatment of choice for patients with chronic renal failure resulting from most causes (Djamali et al., 2006). Urinary tract infections (UTIs) are common post-renal transplant complications (Al-Hasan et al., 2011) and it is the most frequent infection in renal transplant recipients (RTRs) (Fiorante et al., 2011; Mitra and Alangaden, 2011). More than 80% of RTRs experience at least one episode of infection during the first year post-transplantation (Rubin and Tolkoff-Rubin, 1991). Furthermore, bacterial septicemia due to UTIs in the first month post-transplantation is an important cause of morbidity and mortality (Nielsen and Korsager, 1977; Peterson et al., 1982; de Souza and Olsburgh, 2008).

Renal transplant recipients are usually immuno-suppressed and as a result they are at higher risk of developing infections (Ahmed et al., 2008; Giullian et al., 2010). In addition, during the post-operative period, they are exposed to urethral and intra-vascular catheterization and to invasive instruments (Rubin et al., 1981; Rubin and

E-mail: katheria@ngha.med.sa.

**Table 1.** Incidence of UTI among transplant patients according to gender, sources of the transplanted kidney and age.

| Sample | | Developed UTI | Did not develop UTI | Total |
|---|---|---|---|---|
| Gender | Male | 6 | 8 | 14 |
| | Female | 9 | 4 | 13 |
| | Total | 15 | 12 | 27 |
| Source of Kidney | Living-related | 10 | 7 | 17 |
| | Cadaveric | 5 | 5 | 10 |
| | Total | 15 | 12 | 27 |
| Age | < 30 | 4 | 3 | 7 |
| | ≥ 30 and < 40 | 3 | 3 | 6 |
| | ≥ 40 and < 50 | 2 | 3 | 5 |
| | ≥ 50 | 6 | 3 | 9 |
| | Total | 15 | 12 | 27 |

Tolkoff-Rubin, 1991; First, 1993; Alangaden et al., 2006; Guillian et al., 2010). It has been shown that early catheter removal resulted in a reduced incidence of UTI (Rabkin et al., 1998; Crouzet et al., 2007). Other reported risk factors are gender, age and the source of the transplanted kidney. A retrospective cohort study including 213 patients found that the significant risk factors for post-transplant UTI were advanced age, female gender, reflux kidney disease, use of azathioprine and cadaveric donors (Chuang et al., 2005).

Due to the impact of infectious diseases on the survival of the graft and the patient (Dupont et al., 2010), prevention and treatment of the infection play an important role in the overall success of the transplant (Ahmed et al., 2008). Accordingly, this current work is a pilot retrospective study that reports the incidence of UTIs, time of infection and causative organisms of UTIs among Saudi post-renal transplant recipients. This study is considered essential for the proper prevention and treatment of post-renal transplantation UTI's.

## METHODOLOGY

In this retrospective study, 27 adult renal transplant patients' charts at the renal transplant unit, at King Abdulaziz Medical City at the National Guard Health Affairs, were reviewed. The patients' age, gender and whether they received a living-related or a cadaveric kidney were recorded. Bacterial UTI was diagnosed based on urine culture that was positive for bacterial growth greater than $10^5$ CFU/ml and white blood cells (WBCs) count was also obtained. The Infectious Diseases Society of America did not put restriction on the screening or treatment protocols in asymptomatic bacteriuria in renal transplant recipients (Nicolle et al., 2005). All the RTRs received cefazolin 1 g pre-op and norfloxacin 400 mg q.d for four weeks post-op as a prophylaxis. In addition to antibacterial agents, the patients received the following immunosuppressant combination; cyclosporine or tacrolimus, mycophenolic acid and prednisone. Finally, it must be mentioned that the results of the study are presented as descriptive statistics.

### Urine culture

A 0.001 ml (small) calibrated inoculating loop was dipped into the urine sample and then was allowed to drain. A loop full was delivered to the middle of one side of a blood agar/MacConkey biplate making one vertical streak, then a cross streak at 90°. This streaking was repeated for the second side. Then, the plate was promptly incubated at 35 to 37°C aerobically overnight. After 24 h, the number of colonies on the media in each plate was recorded. The species with > 50 colonies in the plates showing potentially significant growth were identified and then were subjected to antimicriobial susceptibility testing. If the species are mixed, the predominant species (>100 colonies) were identified and then were subjected for antimicriobial susceptibility testing. All cultures exhibiting significant growth were identified using VitekII-XL system (BioMarieux, France®).

## RESULTS

The results are summarized in Tables 1, 2 and 3. The mean age of the 27 participants was 41.3±16.2 years, with a range of 16 to 73 years. As seen in Table 1, the gender distribution of the RTRs was 51.9% males and 48.1% females. Of all the RTRs, 63.0% received their kidneys from living-related donors and 27.0% received cadaveric kidneys. More than half of the participants developed post-transplantation UTIs (55.5%) (Table 1). In these RTRs, bacterial counts were > $10^5$ CFU/ml and WBC counts ranged from "0 to 2" to "> 30" WBC/$mm^3$. Female RTRs had a higher incidence of UTI (69.2%) compared to male RTRs (30.8%). Of the 15 RTRs who developed UTIs, 66.6% received their kidneys from living-

**Table 2.** Distribution of UTI in female and male transplant patients according to the source of the transplanted kidney.

| Gender | Source of the transplanted kidney | | Total |
|---|---|---|---|
| | Living-related | Cadaveric | |
| Male | 5 | 1 | 6 |
| Female | 5 | 4 | 9 |
| Total | 10 | 5 | 15 |

**Table 3.** The causative bacteria in transplant patients who developed UTI and the time of infection.

| Causative bacteria | Time of infection | | Number of patients |
|---|---|---|---|
| | < 1 month | > 1 month | |
| *E. coli* | 5 | 3 | 8 |
| *P. aeruginosa* | 3 | 0 | 3 |
| *E. coccus* | 1 | 0 | 1 |
| *E. bacter* | 1 | 0 | 1 |
| Acinetobacter | 1 | 0 | 1 |
| Citrobacter | 0 | 1 | 1 |
| Total | 11 | 4 | 15 |

related donors and the rest received their kidneys from cadaveric donors (Table 1). It is worth mentioning that of the 17 patients who received kidneys from living-related donors, 58.8% developed UTI, while of the 10 patients who received cadaveric kidneys, 50.0% developed UTI, Table 1. With regard to age, 40% of RTRs who developed UTIs were ≥ 50 years of age. Alternatively, it can be seen that 66.7% of patients who are ≥ 50 years of age developed UTIs while the incidence was 40 to 57.2% for other age groups. The average age of the patients who developed UTI was 42.5±18.5 years and those who did not develop UTI was 39.9±13.4 years.

As seen in Table 2, 55.6% female RTRs who developed UTI received kidneys from living-related donors and 44.4% received cadaveric kidneys. On the other hand, 83.3% of the males who developed UTI received kidneys from living-related donors and 16.7% received cadaveric kidneys.

With regard to the causative bacteria, Table 3, *E. coli* was the most common pathogen that caused UTIs among RTRs (53.3%) followed by *P. aeruginosa* (20%) then by *E. coccus*, *E. bacter*, *Acinobacter* and *Citrobacter* (6.7% for each of them). In general, most of the UTIs (73.3%,) were detected within the first month post-transplantation as the majority of infections caused by *E. coli* (62.5%), and all the infections caused by *P. aeruginosa* were detected during the first month post-transplantation. Recurrent infection was observed in 40.1% of the RTRs (39% for females and 40.6% for males) and they occurred 23±13 days after the transplant.

## DISCUSSION

The incidence of post-renal transplantation UTIs is highly variable with reported ranges of 6 to 86% (Säemann and Hörl, 2008; Dupont et al., 2010) to 10 to 98% (de Souza and Olsburgh, 2008). The variability in the incidence rates of post-transplantation UTIs was attributed to variations in study design, local outbreaks, definition and diagnostic criteria. The incidence in the current study is 55.5%, which is well within the previously reported values (Rubin, 1993). This rate is considered substantial and requires attention.

The facts that almost 70% of the females who received renal transplants developed UTIs (compared to 31% of the males) and that 70% of the all RTRs who developed UTIs were females, implies that female RTRs are more prone to UTIs. In general, female recipients are at higher risk than male recipients (Rabkin et al., 1998; Memikoğlu et al., 2007; Csete, 2008; Lorenz and Cosio, 2010). A recent study conducted in Tunisia has found that female gender was the only risk factor for developing UTI in RTRs (Barbouch et al., 2012). Abbott et al. (2004) found that the risk for UTI was the same for either sex during the first 6 months after transplantation; however, females tend to be at higher risk than men beyond that period. The anatomical differences in the urinary tract of males and females has been blamed for the higher incidence of UTIs in females (Foxman, 2010; Barbouch et al., 2012).

The incidence of UTIs was slightly higher in RTRs who received kidneys from living-related donors (58.8%) than in RTRs who received cadaveric kidneys (50%). These

differences might not be statistically significant, especially when the uneven distribution of the source of kidneys in this study sample is taken into consideration. Nevertheless, these results show high incidence of UTI regardless of the source of the transplanted kidney. Within female RTRs, a similar trend was noticed as 55.6% transplanted with living-related kidneys and 44.4% transplanted with cadaveric kidneys developed UTIs. While among male RTRs, 88.3% of the recipients who developed UTIs received kidneys from living-related donors. Although the results in this study were not conclusive, there is sufficient evidence from literature to support the fact that the source of the transplanted kidney is a risk factor for post-transplantation UTI.

Some researchers have concluded that transplanting a kidney from living-related donors is a risk factor for developing UTI (Charfeddine et al., 2005; Tabatabaei et al., 2006), while others concluded that a cadaveric kidney is a risk factor (Midtvedt et al., 1998; Dantas et al., 2006; Säemann and Hörl, 2008; Rivera-Sanchez et al., 2010). Rigorous investigation into the medical history and extensive laboratory testing of living-related donors would help in reducing the incidence of UTIs in recipients of kidneys from these donors. It is worth mentioning that it has been proposed that the delayed graft function after renal transplantation may contribute to the observed incidence of UTI in recipients of cadaveric kidneys (Lorenz and Cosio, 2010).

With respect to age, the current results imply that advanced age of RTRs is associated with a higher incidence of UTIs. It has been shown that advanced age is a risk factor for developing UTIs in RTRs (Dharnidharka et al., 2006; Säemann and Hörl, 2008; Snyder et al., 2009). The current investigation found that 66.7% of the RTRs who are ≥ 50 years of age developed UTI which is in agreement with Trouillhet et al. (2005) finding that RTRs who are 65 years or older have 70% chance of developing UTI. There was not a large difference between the average age of RTRs who developed UTIs and that of those who did not develop UTIs. These current results are similar to results of a study that was performed on a much larger sample size (500 patients) which found that the average ages of RTRs who develop UTIs and of those who did not were 45±12.7 and 43±12.5, respectively (Chuang et al., 2005).

Several pathogens can cause UTIs in RTRs which are similar to those implicated in UTIs in non-immuno-compromised patients. In the current investigation, *E. coli* was found to be the most common causative agent of UTIs, followed by *P. aeruginosa*. Other pathogens were *E. coccus*, *E. bacter*, *Acinobacter*, and *Citrobacter*. These results are in-line with previous reports. Several reports have found that *E. coli* is the most frequent causative pathogen of post-renal transplantation UTI (Rice et al., 2006) and its implication in UTI can be as high as 58% (Fiorante et al., 2010) or 71% (Valera et al., 2006; Khawcharoenporn et al., 2012) followed by *P. aeruginosa* (Hsueh et al., 2011). It has been suggested that the uropathogenic serotypes and adherence factors of *E. coli* contribute to allograft injury in RTRs (Rice et al., 2006). Furthermore, a multi-drug resistant strain, *E. coli ST131*, has been reported as a possible threat to renal transplant recipients (Johnson et al., 2010).

The majority of UTIs reported in this study were detected within one month of renal transplant. Usually, UTI during the first three months after transplantation is frequently associated with pyelonephritis, bacteremia, and a high rate of relapse with conventional antibiotics (Rubin et al., 1981). A recent review of the literature has concluded that in the first 3 months post-transplantation, pyelonephritis is the most common presentation and it is associated with a relatively high incidence of bacteremia while in the following periods, most episodes are subclinical and asymptomatic (Dupont et al., 2010). The results in the current study are in agreement with previously reported data.

Examination of the available literature reveals that 35 to 74% of UTIs were detected one month after transplantation (Renoult et al., 1994; Gołębiewska et al., 2011; Valdez-Ortiz et al., 2011). On the other hand, the incidence of UTI one-year post transplantation is less than 14% while the incidence of UTI secondary to bacteremia is less than 7% (Green et al., 2011). Although there is general agreement that UTI occurring six months or later after transplantation is relatively benign and can be treated with short term antibiotics, there are reports that such late UTIs might be associated with increased risk of mortality and graft loss (Abbot et al., 2004). The latter finding was a result of a retrospective cohort study on 28,942 Medicare primary renal transplant recipients in the United States Renal Data System (USRDS) database.

The recurrent UTI rate found in the current study is similar to previous reports which put the recurrent rates at 44.4 to 55% (Laboudi et al., 2008; Pinheiro et al., 2010). Chuang et al. (2005) have found that post-transplantation UTIs significantly increase mortality but not graft survival. Therefore, prevention of UTI in high-risk renal transplant recipients or those with recurrent UTI may possibly decrease post-transplant mortality.

## CONCLUSION

The results of this study have confirmed that the problem of UTIs in RTR's is significant, and gender and advanced age are possible risk factors. The recurrence rate was also considered to be alarming. The most important implication of this work is the need for the implementation of a new prophylaxis regimen at the renal transplant unit at King Adulaziz Medical City at the National Guard Health

Affairs that takes into consideration the epidemiology of the current results.

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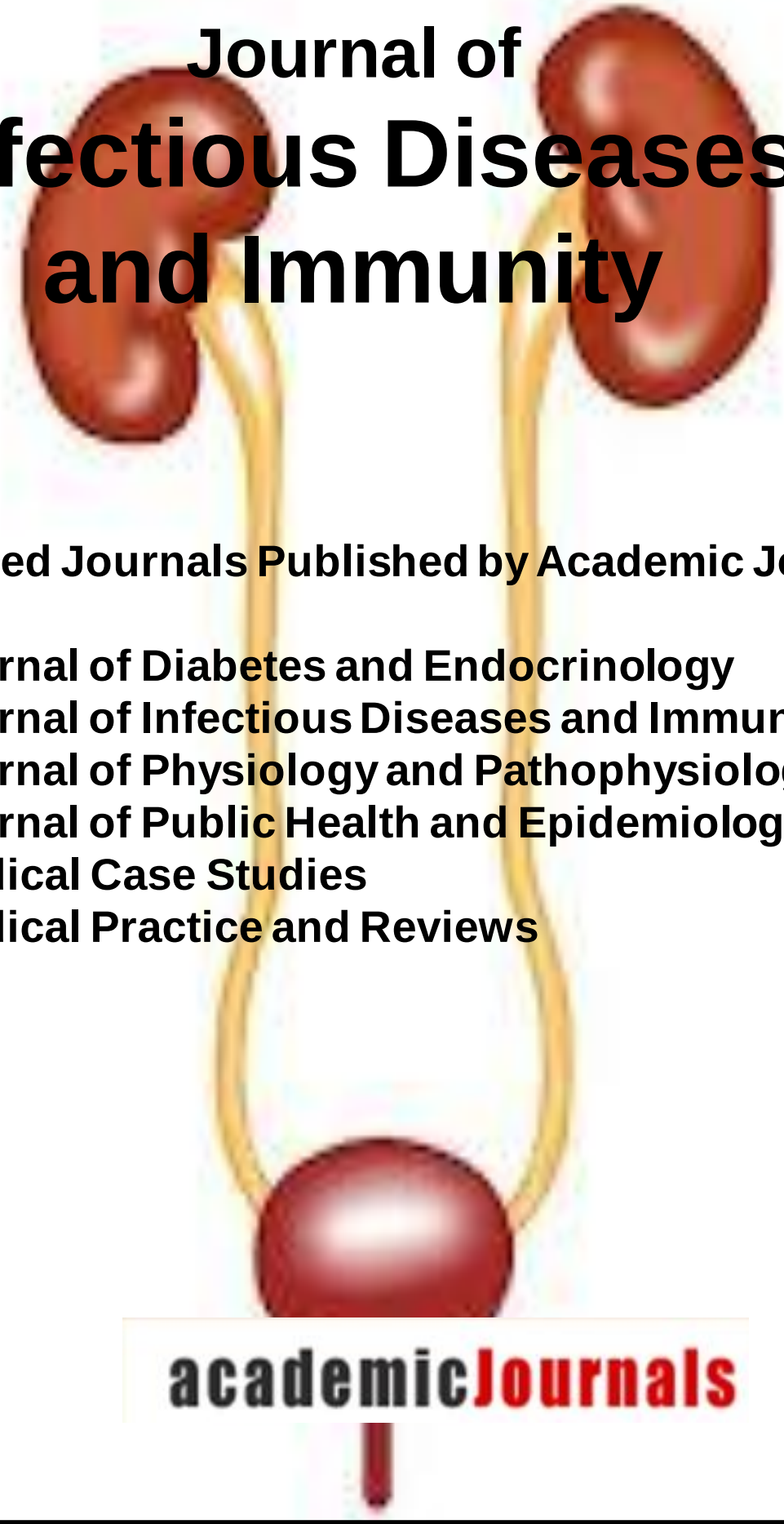

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