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Isolation of Associated Microorganisms among the Urinary Tract Infections (UTI) patients

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Abstract

Chronic kidney disease is a worldwide public health problem with an increasing incidence and prevalence, poor outcomes, and high cost. This clinical based observational study was conducted to find out the responsible microorganisms and applying the appropriate antibiotic for specific organism to treat the urinary tract infections. Consecutive urine samples were collected from both OPD and IPD patients having clinical symptoms of microbial infection from National Kidney Foundation Hospital, Dhaka, Bangladesh. The number of patients was 500 irrespective of age and sex. Urine samples were sent for examination and found only 21.4% specimens yielded positive culture. There was a marked gender variations is all age groups.UTI is more prevalent in female than in male. The most common isolated germs were in the Gram negative E. coli (45%), Pseudomonas spp. (18%), Klebsiella spp. (6.5%), Proteus spp. (2.8%), Candida spp. (2%). The load of Streptococcus spp. (13%) and Staphylococcus spp. (9%) were predominated as Gram positive bacteria. Many organisms were found to resistant against commonly used antibiotics. Among all the antibiotics Cephalexin (87%) was highly sensitive to Gram positive bacteria conversely Cotrimoxazole (8.5%)

showed low sensitivity. Another antibiotics such as Amikacin (76%) & Cephradine (3.6%) showed sensitivity against Gram negative bacteria.

Keywords: *UTI, CKD, Renal complications, MDR, Public health problem*

Introduction

Urinary tract infections (UTI) affect any part of the urinary tract. Most bacterial UTIs can involve the kidney, ureter, urinary bladder, prostate gland & urethra. Urinary tract infections (UTIs) are responsible for nearly 10 million doctor visits each year worldwide[1]. One in five women has at least a single UTI in her Lifetime[2]. Nearly 20 percent of women who have a UTI and 30 percent of those have another. Among the once infected women, 80 percent of them suffer by recurrence[1,4]. Urinary tract infections occur more commonly in women than men. 50% of the women have at least one infection at some point in their lives[4]. Recurrent of the infections are common in women where as the rate of asymptomatic bacterial infection in urine among men over 75 years of age are between 7-10%[4]. Risk factors are female anatomy, sexual intercourse, unhygienic conditions, environment and family history. Randomly using, incomplete and short course of antibiotics to treat this condition is increasing the complicacy. It increases the Multi Drug Resistant (MDR)[5]. In the United States, urinary tract infections accounts as for nearly seven million office visits, one million emergency department visits, and ten million are needed hospitalizations every year. The cost of these infections is significant both in terms of lost time at work and costs of medical care. In the United States the direct cost of treatment is estimated at 1.6 billion USD yearly[6,9]. Urinary tract infections may affect 10% of people during childhood. Among the children urinary tract infections are the most common in uncircumcised males less than three months of age, followed by females less than one year. Estimates of frequency among children however vary widely. In a group of children with a fever, ranging in age between birth and two years, 2% to 20% are diagnosed and found with a UTI[7]. In young sexually active women, sexual activity is the cause of 75-90% of bladder infection, with the risk of infection related to the frequency of sex. The term 'honeymoon cystitis' has been applied to this phenomenon of frequent UTIs during early marriage[8]. During pregnancy, high progesterone levels elevate the risk o f decreased muscle tone of the ureters and bladder[9], which leads to a greater likelihood of reflux, where urine flows back up the ureters and towards the kidneys . A kidney infection during pregnancy may result in premature birth or pre-eclampsia. Escherichia coli remains the predominant uropathogen (80%) isolate in acute community acquired uncomplicated infections, followed by Staphylococcus saprophyticus (10% to 15%). Klebsiella[10], Enterobacter, Proteus species, and Enterococci infrequently cause uncomplicated cystitis and pyelonephritis.

Methods and Materials:

Urine samples were taken in a leak proof sterile container if the patient(s) catheterized urine collected from through catheter and took the midstream urine from the container as specimens. Specimens were tested within half an hour after collecting the samples[11]. For

chemical examination of urine by Dipstick method midstream urine were collected in the clean and sterilized container, took a Dipstick and immersed it inside the urine sample and then quickly pulled out the Dipstick from the urine and held the strip horizontally to get the result accurately[12]. For microscopic examination 10-15 ml urine was taken in a centrifuging tube and centrifuged it at 3000 rpm for 5 minutes. Poured off the supernatant fluid left 0.5 ml of urine and deposited. Then mixed the sediment gently and placed one drop on a clean glass slide. A cover slip was placed on it and examined under the microscope with low & high power. Report was given as cells/HPF after counting[13]. Different culture media such as MacConkey agar for isolation of only gram negative or enterobacteriaceae, Blood agar media for isolation of pathogenic Gram positive & Gram negative bacteria, Mueller-Hinton agar media for antibiotic sensitivity test were used[14] in microbiological method. The urine specimen 0.05ml was inoculated immediately into MacConkeys agar and Blood agar media by the sterile platinum wear loop as soon as possible. Than the media contain Petridis were inoculate at 37°C for 24-48 hours[13-15].

Results:

Table 1: Distribution of the respondents regarding age and gender in number and percentage (N=500).

Sl. No.	Age (year)	Total	Male	%	Female	%
1	0 to 10	56	28	50	28	50
2	11 to 20	30	10	33.3	20	66.7
3	21 to 30	97	28	28.9	68	70.1
4	31 to 40	86	28	32.6	58	67.4
5	41 to 50	92	39	42.4	53	57.6
6	51 to 60	68	27	39.7	41	60.3
7	61 to 70	49	27	55.1	22	44.9
8	70 +	22	5	22.7	17	77.3
	Total	**500**	**193**	**38.6**	**307**	**61.4**

Table 1 shows the total number 500 patients with UTI both sex and irrespective of age were participated. Majority of them were female (61.4%) and almost double than male (38.6%). Among them age between 21 to 30 years and more than 70 years female were more prone to suffer urinary tract infection respectively 70.1% and 77.3%. On the contrary male of those age group were less infected by UTI.

Table 2: Number of specimen according to growth of urinary pathogen, non pathogen and no growth of pathogen (N= 500)

Criterion of specimen	Number
Specimens showing growth of urinary pathogens	103
Specimens showing growth of non pathogens	26
Specimens showing no growth	371
Percentage of positive culture for urinary pathogen	20.6%

The study found the growth of urinary pathogen in 20.6% specimen, non pathogenic growth found in 5.2% specimen. But in most of the specimens found no growth of pathogen.

Figure 1: The growth of E. Coli in MacConkey agar media.

Fig: Growth of E. Coli in MacConkey agar media.

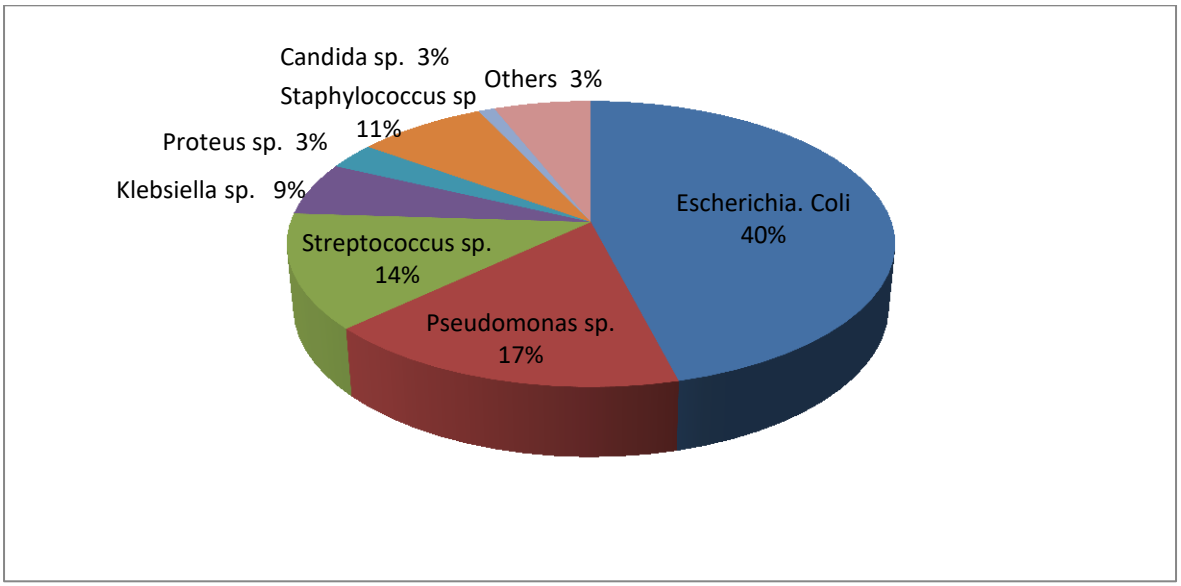
Figure 1 showed the growth of E. Coli in MacConkey agar media after 24 hours inoculation at 37^0 C in the freeze.

Table 3: Distribution of the Gram Negative and Gram positive Isolated Microorganisms of UTI patients (N=107).

Isolated Microorganisms	Number	Percentage
Gram Negative organisms	83	77.5%
Gram Positive organisms	24	22.5%
Total	**107**	**100**

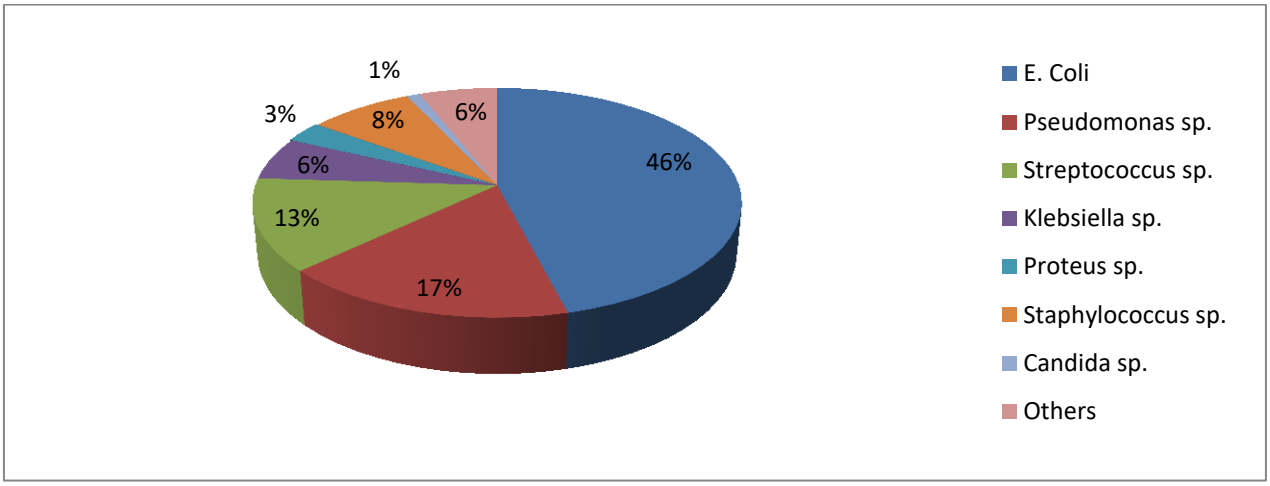
The study revealed that among the isolated microorganisms most of them (77.5%) were Gram Negative and 22.5% were Gram Positive.

Figure 2: Etiological agents and isolated microorganisms of UTI isolated male patients.



The above pie diagram shows the percentage of different type of isolated organisms of male UTI patients. E. Coli was the highest (40%), Pseudomonas sp. (17%), Streptococcus sp. (14%), Klebsiella sp. (9%), Proteus sp. (3%), Staphylococcus sp. (11%), Candida sp. (3%), Other's (3%).

Figure 3: Etiological and isolated agents of UTI from female patients.



The pie diagram (Fig.3) shows the percentage of isolated agents of urinary tract infection of male patient. Among them E. Coli (46%) was major cause of infection then Pseudomonas sp. (17%), Streptococcus sp. (13%), Klebsiella sp. (6%), Proteus sp. (3%), Staphylococcus sp. (8%), Candida sp. (1%), and Other's (6%).

Discussion:

. The mean age of the study respondents was 36.4 years with standard deviation of ± 10.1 years which is similar with study conducted in National Kidney Hospital in India where the figure were 35.6 ± 1214 years.[3,13] It was revealed in study conducted in Malaysia and found that the mean age was 36 ± 8.4 years , and in Srilanka it was 36.9 years , but differ with study in Thailand where it was 29.5 ± 11.0 years.[1,7,9] In this study, 38.6% of the respondents were male which differs largely with study in India where 33.7% and 61.4% were female whereas it was in India 72.3%.

In the current study we found among the 500 UTI cases 110 (22%) from IPD and 390 (78%) from OPD patients as study subjects. Another study was done in Pakistan there found 31% from IPD 69% from OPD. The study revealed that Escherichia Coli has occupied the highest percentage (46%) of the cause of infections (UTI) and a small number of Candida species (2%) are caused of UTI among the pathogenic growth microorganisms. But in Hongkong E. coli found 29%, in Thailand 33% and in India got 44.7% responsible for urinary tract infections (UTI)[14]. The study also revealed that the most common isolate was E. Coli 45%, followed by Pseudomonas sp. 18%, Streptococcus sp. 13%, Klebsiella sp. 6.5%, Proteus sp. 2.8%, Staphylococcus sp. 9%, Candida sp. 2%, Others (Enterobacter, Serratia,Citrobacter) 4.6%. The present results indicate that E. Coli is the principal etiological agent of UTI in Bangladesh,

Recommendations:

This study attempts to ease some of the problems that may arise when prescribing antibiotics to UTI patients and reduce the ominous of Multi Drug Resistant (MDR). This study may also contribute to the development of national policies for using antibiotics as well as diagnosis of UTI in Bangladesh.

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