

## Original article

# Sensitivity Pattern of Urinary Tract Pathogens to Anti-microbial Drugs at a Tertiary Level Hospital in Bangladesh.

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### Abstract

Urinary tract infections (UTIs) are some of the most common infections experienced by human. It is also the most common cause of nosocomial infections in adults. The aim of this study was to determine the bacteriological pattern and their sensitivity to commonly used antimicrobial drugs in urinary tract infection in Bangladesh. This was a prospective study conducted in Microbiology department of Dhaka National Medical College, a tertiary level teaching hospital in Dhaka, Bangladesh. A total of 216 culture positive urine samples were examined. Female patient were found to be more 65.7% than male 34.3%. Maximum patients were from 20-35 yrs. age group. The most common isolate was *E.coli* 84.3%. These *E.coli* is more sensitive to Imipenem 93.98%, Amikacin 90.52%, Nitrofurantoin 78.88% Ceftazidim 78.26%, Ciprofloxacin 70.67%, Cefuroxime 65.49%, Ofloxacin 60.83%, Ceftriaxone 59.03% and Cephradine 56.96%. Resistance is more in case of amoxicillin 82.41%, Doxycycline 72.42%, Cefixime 58.70% and Nalidixic Acid 57.02%.

### Introduction

Urinary tract infection (UTI) is one of the most common infections observed in clinical practice among community and hospitalized patients. <sup>(1)</sup> It is also the most common cause of nosocomial infections in adults. Urinary tract infections are a serious health problem affecting millions of people each year. Women are especially prone to UTIs. Twenty five to 35% of all females suffer from UTI at some stage in their lives. <sup>(2)</sup> UTIs in men are not as common as in women but can be very serious when they do occur. The microbes that continued causing infections despite usage of newer antibiotics represented a new form of infectious diseases caused by drug resistance. It is expected that in course of time, microbes will become more resistant because of their new mutants. <sup>(3)</sup> Urinary tract infections are the second most common infections after infections of the respiratory tract, <sup>(4)</sup> and constitute a great proportion of prescription of antibiotics.

### Methodology

This was a prospective study, performed on 216 patients with urinary tract infections referred to microbiology laboratory of Dhaka National Medical College during the years 2009 and 2010. Urine samples were collected according to the

Antibiotic treatment that are of duration shorter than required, and also treatment administered without considering the microbiologic and antibiotic sensitivity data result in more resistance in bacterial strains. Antibiotic resistance patterns vary in different areas. <sup>(5)</sup> In order to apply an appropriate therapeutic strategy in each region, we must have data on the most common pathogens and also their sensitivity to different antibiotics. The purpose of this study is to determine the prevalence of the type of bacterial agents that cause urinary infection and to assess the antimicrobial sensitivity pattern in the Dhaka National Medical College Hospital a tertiary level teaching hospital of Bangladesh. Surveys of this nature will give a clear idea about the bacteriologic profile in a given institution as well their antibiotic sensitivity profile. This will act as a guide to commencing empirical antibiotic treatment in patients with urinary infections until such time culture sensitivity reports are available.

midstream method and in sterile containers. We cultured them on blood agar and McConkeys environments. After 24-hours incubation at 37 degrees Celsius, the colonies were counted and samples with colony count more than 100,000/mL

were considered positive. A confirmation test was performed for identifying the organism. The sample was then cultured in Muler Hilton bras environment (antimicrobial sensitivity test). The disc diffusion test (using Kirby-baur method) on Muler Hilton agar was used to assess the sensitivity pattern. After incubation and diameter measurements, we determined the growth rate of the sensitive and resistant micro-organisms. The data were analyzed by SPSS software.

**Results**

**Table No: 1**

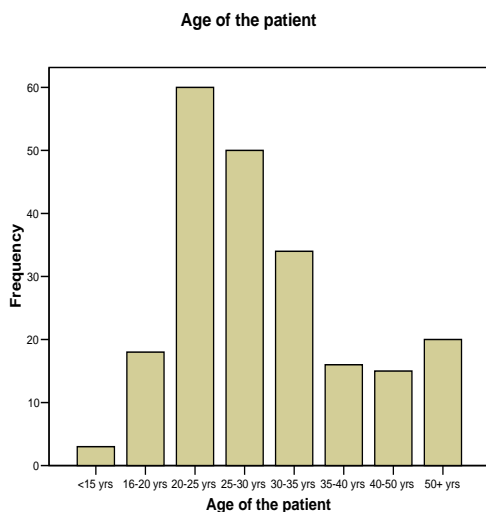
**Sex of the patient**

Out of 216 patients with culture +ve UTI, the females patients were almost double (65.7%) than male (34.3%).

		Frequency	Percent
Valid	Male	74	34.3
	Female	142	65.7
	Total	216	100.0

**Fig No: 1**

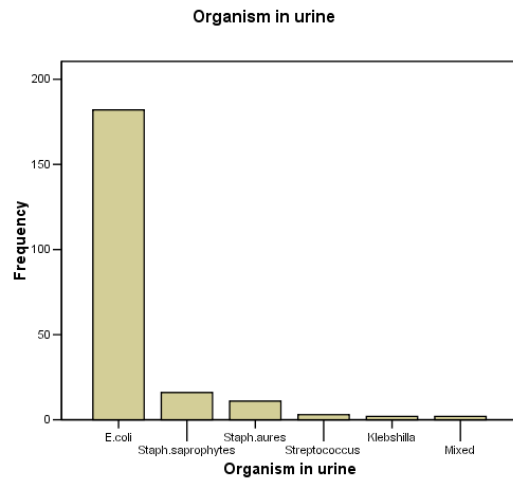
**Age distribution of the patients** UTI is more common in 20-25 yrs, 25-30 yrs and 30-35 yrs age group and also found in 16 to 20 and 35 to 50+ age group but very less in <15 yrs age group.



**Figure No: 2**

**Organism in urine**

The common micro-organisms isolated were *E. coli* (84.3%), *Staph. saprophytes* (7.4%) and *Staph. aureus* 5.1%. *E. Coli* is the most common micro-organism causing urinary tract infection in both men and women of all age-groups.



**Table No: 2**

**Sensitivity pattern of *E.coli* causing Urinary Tract Infection to anti- microbial drugs.**

Sl.No	Name of anti-microbial drugs.	Sensitive %	Resistant %
1.	Imipenem	93.98	6.02
2.	Amikacin	90.52	9.48
3.	Nitrofurantoin	78.88	21.12
4.	Ceftazidime	78.26	21.74
5.	Ciprofloxacin	70.67	29.33
6.	Cefuroxime	65.49	34.51
7.	Ceftriaxone	59.03	40.97
8.	Cephradine	56.96	43.04
9.	Azactum	52.25	47.75
10.	Co-trimoxazole	52.59	47.41
11.	Nalidixic acid	42.98	57.02
12.	Cefexime	41.30	58.70
13.	Doxycyclin	27.58	72.42
14.	Amoxycillin	17.59	82.41

From the above table it seen that the major uropathogen *E.coli* are sensitive to Imipenem

93.98%, Amikacin 90.52%, Nitrofurantoin 78.88% Ceftazidime 78.26%, Ciprofloxacin 70.67%, Cefuroxime 65.49%, Ceftriaxone 59.03% and Cephradine 56.96%. Resistance is more in case of amoxicillin 82.41%, Doxycycline 72.42%, Cefixime 58.70% and Nalidixic Acid 57.02%. Resistance to Azactum 47.75 and Co-trimoxazole, 47.41.

### Discussion

Out of 216 patients urine were studied of whom 65.7% were females and 34.3% were males. According to the age of the patients maximum patients belongs to 20 to 35 yrs age group. There are patients 35 to 50 + age group. But there are very few patients < 15 yrs age. The common micro-organisms isolated were *E. coli* (84.3%), *Staph. saprophytes* (7.4%) and *Staph. aureus* 5.1%. *E. Coli* is the most common micro-organism causing urinary tract infection in both men and women of all age-groups. This finding is similar, to studies done in Pakistan 78%,<sup>(6)</sup> in India 61%<sup>(7)</sup> in Nigeria 76.6%,<sup>(8)</sup> in Britain 65.1%.<sup>(9)</sup> and in South Africa 90%.<sup>(10)</sup>

In our study the *E.Coli* isolated showed higher sensitivity to Imipenem 93.98%, Amikacin 90.52%, Nitrofurantoin 78.88% Ceftazidime 78.26%, Ciprofloxacin 70.67%, Cefuroxime 65.49%, Ceftriaxone 59.03% and Cephradine 56.96%. Resistance seen maximum to Amoxicillin 82.41%, Doxycycline 72.42%, Cefixime 58.70% and Nalidixic Acid 57.02% Resistance is more to Azactum, Co-trimoxazole, and are 47.75 and 47.41 respectively. (Table-2)

There are some differences in sensitivities to antimicrobial drugs between centers of study around the world. Study done by S. P. Barretta et.al in Britain found that approximately 99% of all isolates were sensitive to Norfloxacin and Ciprofloxacin, 95% to Co-amoxiclav, 87% to Nitrofurantoin, 75% to Trimethoprim and the Cephalosporins and 50% to Amoxicillin.<sup>(9)</sup> Nwadioha S.I et al found in Nigeria averagely below 50% sensitive to the antibiotics; Ampicillin, Tetracyclines and Cotrimoxazole. Antibiotics such as Chloramphenicol, Erythromycin, Cloxacillin, Nalidixic acid and Nitrofurantoin showed average activity of about 50% on these organisms. On the other hand, antibiotics such as Augmentin, Gentamycin, Ceftazidime, Ceftriaxone and Ciprofloxacin recorded higher activity of about 70% and above on these organisms.<sup>(11)</sup> Senewiratne B. in Ceylon studied the drug sensitivity of organisms in

patients with acute urinary-tract infections (U.T.I.) acquired outside hospital. Only 37.7% of *Escherichia coli* in first infections and 26.5% in second or recurrent infections were Sulphonamide sensitive. A high percentage were also resistant to Tetracycline and Ampicillin.<sup>(12)</sup> In study of 2006-2007 in Pakistan by Mortazavi F. found among the oral agents, Nitrofurantoin and Ciprofloxacin, and among the parenteral agents, Amikacin and Gentamicin had the highest activity against *E.coli*. The activity of Ceftriaxone, Ceftizoxime, Nalidixic acid and Cephalexine against *E.coli* has decreased significantly over six years ( $P<0.05$ ).<sup>(13)</sup> In study done by Gupta K. et. al. showed that the Gram-negative isolates displayed a very high level of resistance to Amoxicillin (range 43 - 100%) and Co-trimoxazole (range 29 - 90%), whereas resistance to Gentamicin (range 0 - 50%) and Ciprofloxacin (range 0 - 33%) was lower. *E. coli* isolates were susceptible to Nitrofurantoin (94%).<sup>(14)</sup> Antibiotic susceptibility pattern of these isolates revealed that for outpatients, first generation Cephalosporins, Nitrofurantoin, Norfloxacin/Ciprofloxacin were effective for treatment of urinary tract infection but for inpatients, parenteral therapy with newer Aminoglycosides and third generation Cephalosporins need to be advocated as the organisms for nosocomial UTI exhibit a high degree of drug resistance. Trimethoprim and Sulphamethoxazole combination was not found to be effective for the treatment of urinary tract infections as all the uropathogens from inpatients and outpatients showed high degree of resistance to Co-trimoxazole.<sup>(15)</sup>

### Conclusion

UTI is more in female than male, 20 to 50+ yrs age group. But there are very few patients < 15 yrs age. UTI is more commonly caused by *E. coli*. There are differences in sensitivities of uropathogens to anti-microbial drugs in different centers. The micro-organisms are still sensitive to many drugs, but these are getting reduced each year to some commonly used drugs because of empirical use.

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