

## Isolation and Antimicrobial Susceptibility Pattern of *Escherichia coli* Causing Urinary Tract Infection in Enam Medical College Hospital

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### Abstract

**Background:** Since antibiotic resistance of uropathogens has gradually been rising, knowledge of antimicrobial resistance pattern of *Escherichia coli* (*Esch. coli*), the predominant pathogen of urinary tract infection (UTI), is important in selecting empirical antimicrobial therapy. **Objectives:** To find out the common organisms causing UTI with their antimicrobial susceptibility pattern in Enam Medical College Hospital. **Materials and Methods:** This study was carried out in the department of Microbiology, Enam Medical College Hospital, Savar, Dhaka between January 2010 to June 2011 to see the antimicrobial resistance pattern of *Esch. coli* in urine sample. A total of 512 urine samples were studied from clinically suspected UTI cases irrespective of age and sex. *Esch. coli* were isolated and antibiogram of the isolates were done. **Results:** The results of antibiogram revealed the resistance pattern of the isolated *Esch. coli* to ampicillin (93.94%), cefradine (70.71%), trimethoprim-sulfamethoxazole (48.49%), azithromycin (41.42%), ciprofloxacin (39.40%), ceftazidime (35.56%), nitrofurantoin (29.30%), ceftriaxone (10.11%), gentamicin (7.08%) and imipenem (3.04%). **Conclusion:** It can be inferred that our findings will render useful information to clinicians in determining the appropriately directed antimicrobial regimen when given empirically.

**Keywords:** Urinary tract infection, *Esch. coli*, Antibiotic resistance

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### Introduction

Urinary tract infection (UTI) is the major illness which accounts for 7 million patient visits per year with total costs exceeding one billion dollars.<sup>1,2</sup> It is the most common bacterial infection particularly in women with an increasing resistance to antimicrobial drugs.<sup>3,4</sup> In children, it is also the second most common bacterial infection next to the respiratory tract infection.<sup>5</sup>

The risk factors of UTI include both host and bacterial factors. Host factors are age, impaired

voiding, poor personal hygiene, debility, sexual activity and use of spermicidal agents.<sup>6,7</sup> Women with diabetes have approximately twice higher risk of cystitis than nondiabetic women.<sup>8</sup> Uropathogenic strains of *Esch. coli* have an adherence factor called P fimbriae, or pili. These P fimbriae mediate the attachment of *Esch. coli* to uroepithelial cells. Thus, patients with intestinal carriage of *Esch. coli* that contains P fimbriae are at greater risk of developing UTI than the general population.<sup>9</sup>

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Among the microbes causing UTI, *Esch. coli* alone are responsible for 75% to 90% community acquired infections. Gram negative rods especially Proteus, Klebsiella, and occasionally Enterobacter account for a smaller portion of uncomplicated infections. *Staphylococcus saprophyticus* is recognized as causing approximately 5-15% of symptomatic lower UTI in young sexually active females.<sup>10</sup>

The pathogens causing UTI are almost always predictable with *Esch. coli* being the leading aetiologic agent among both the outpatients and inpatients.<sup>6</sup> As antimicrobial susceptibility test report is usually found after 48 hours, the clinicians have to start an antimicrobial drug before getting the report. In these cases, the choice of antibiotic is influenced by recent available data about the susceptibility pattern of the causative agent.<sup>11</sup> The susceptibility pattern of different organisms to various antibiotics varies from time to time, institution to institution and there is a need to generate data for every institution that will guide the clinicians to select appropriate antimicrobial drugs.<sup>12</sup> Since antibiotic resistance among uropathogens have gradually been rising, it has been important to have institutional data about the pattern of antimicrobial susceptibility to choose the correct treatment regimen.<sup>10</sup>

The present study was carried out to isolate *Esch. coli* in urine samples from indoor and outdoor patients presenting with UTI in Enam Medical College Hospital. The susceptibility pattern of the isolates to antimicrobial drugs was determined to generate information to guide treatment of UTI patients.

**Materials and Methods**

This cross sectional study was carried out at Enam Medical College Hospital (EMCH), Savar, Dhaka during the period of January 2010 to June 2011. A total of 512 clean-catch midstream urine specimens were collected from clinically suspected UTI cases from inpatients and outpatients of EMCH irrespective of age and sex during the study period.

A loopful 0.01 mL of urine was inoculated by calibrated wire loop on cystine lactose electrolyte-deficient (CLED) agar and MacConkey’s agar media and incubated aerobically at 37°C for overnight. All the plates were inspected for growth and the isolates were identified by observing colony morphology, Gram-stain characteristics and relevant biochemical

tests.<sup>12</sup> Colony count >10<sup>5</sup> colony forming unit (CFU)/mL were considered as significant bacteriuria and further analyzed for antibiogram. All the isolates were tested for susceptibility to ampicillin, cefradine, trimethoprim-sulfamethoxazole, azithromycin, ciprofloxacin, ceftazidime, nitrofurantoin, ceftriaxone, gentamicin and imipenem by Kirby Bauer disc diffusion technique on Mueller-Hinton agar media.<sup>13,14</sup>

**Results**

In this study, *Esch. coli* were isolated in 99 cases during the period of January 2010 to June 2011. Age and sex distribution of the patients having growth of *Esch. coli* is shown in Table I. Highest number, 30 was in 19-45 age group in female.

Table I: Age and sex distribution of the *Esch. coli* isolated cases

Age group	Male	Female	Total
0-5	7	8	15
6-8	5	10	15
19-45	9	30	39
≥46	13	17	30
Total	34(34.34%)	65(65.66%)	99

Antibiogram of the *Esch. coli* is shown in Table II. We found that *Esch. coli* showed highest sensitivity (96.96%) to imipenem and lowest to ampicillin (6.06%). There was an important finding that *Esch. coli* was found to show sensitivity in 51.51% cases for trimethoprim-sulfamethoxazole.

Table II: Antibiotic susceptibility pattern of 99 isolated *Esch. coli*

Antibiotics	Sensitive (%)	Resistant (%)
Ampicillin	6.06	93.94
Cephadrine	29.29	70.71
Trimethoprim-sulfamethoxazole	51.51	48.49
Azithromycin	58.58	41.42
Ciprofloxacin	60.60	39.40
Ceftazidime	64.64	35.36
Nitrofurantoin	70.70	29.30
Ceftriaxone	89.89	10.11
Gentamicin	92.92	7.08
Imipenem	96.96	3.04

## Discussion

In this study, UTI was found more in females than males. In case of females it is 66% and in case of males it is 34%. Maximum numbers of patients were found in age group 19-45 years in females. The findings of predominance of infection in females are in agreement with the report of Parvin *et al.* They found 71.1% cases in females and 28.9% in males.<sup>10</sup> In another study conducted in Kenya 64% cases of *Esch. coli* were in females compared to 36% in males.<sup>15</sup> The high prevalence of infection in females is usually related to anatomical and pathogenic factors, eg, the short length of the urethra and hence lesser distance for bacteria to ascend up the tract, hormonal changes and urethral trauma during sexual activity.

In this study, highest level of (93.954%) resistance was found against ampicillin. The best activity against *Esch. coli* (>90% susceptible) was attained with ceftriaxone, imipenem and gentamicin. Ciprofloxacin, nitrofurantoin, cefradine and azithromycin were found effective in 60-70 % cases. It can be noted here that in 51.51% cases, *Esch. Coli* were found sensitive to trimethoprim-sulfamethoxazole. Our data are almost consistent with the studies reported by other researchers.<sup>16,17</sup> But another study done at Mymensingh, Bangladesh found the isolates sensitive to ampicillin 21.2%, ceftriaxone 45.4%, ceftazidime 39.3%, imipenem 100%, gentamicin 57.6 %, ciprofloxacin 39.3%, trimethoprim-sulfamethoxazole 18.2% and nitrofurantoin 60.6%.<sup>10</sup> This is not consistent with our study.

Majority of the *Esch. coli* isolated in our study were found resistant to most of the commonly used antibiotics. It is worth-mentioning that there is an urgent need to generate more data at institutional level about bacterial resistance to drugs while monitoring the rapid emergence and propagation of multidrug resistant bacteria.

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