Original Article

Prevalence and Antibiogram of Escherichia Coli Causing Nosocomial Urinary Tract Infection in Surgical Ward of Kumudini Women's Medical College Hospital

***Fardows J[1], Karim MF[2], Khan RA[3], Joly SN[4], Chakraborty SR[5], Laskar N[6], Tarana MN[7], Rupom S[8]**

Abstract :

Background: *Urinary tract infection is a very common community prolem in Bangladesh. The upsurge of antibiotic resistence has made the situation worse in our country.* ***Objective:*** *To observe the possible nosocomial uropathogen from indoor catherized UTI patients of surgical ward* ***Method:*** *Different pathogenic bacteria were isolated and identified from urine sample by culture and biochemical tests.* ***Result:*** *Out of 50 urine samples, 35 (70.00%) yielded significant bacterial growth. Among them E. coli was the most predominant bacteria 20 (57.14%) followed by Acinetobacter baumanni 5 (14.29%), Pseudomonas aeruginosa 5 (14.29%), Klebsiella pneumoniae 3 (8.57%) and Proteus vulgaris 2 (5.72%). Only antibiotic susceptibility test of E. coli was done. All (100%) E. coli were sensitive to imipenem and colistin sulphate and 100% resistant to ciorofloxacin and co-trimoxazole.* ***Conclusion****: It can be said that antibiotic resistance against commonly using antibiotics is an alarming sing for us.*

Keywords: Antibiogram, antibiotic susceptibility, Escherichia coli, Urinary tract infection.

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Introduction

Hospital-acquired infections (HAI) have been recognized for over a century as a critical problem affecting the quality of healthcare, and these constitute a major source of adverse healthcare outcomes.[1,2] In the developed countries, it has been reported to affect from 5% to 15% of hospitalized patients in regular in regular wards and as many as 50% or more of patients in intensive care units while in developing countries the magnitude of the problem remains largely underestimated.[3] Only few studies have focused on nosocomial infection in developing countries, especially in Bangladesh.[4]

Urinary tract infection (UTI) represent the frequent form of nosocomial infections in developing countries and invasive medical procedures play a major role.[5] UTI are a a global financial burden and the emergence of resistance in uncomplicated and complicated uropathogen is of great concern.[6]

There is a wide spectrum of pathogens causing UTI including E. coli, Klebsiella, Pseudomonus, Enterobacter, Enterococci and Proteus spp.[7] Escherichia coli is the most common uropathogen in both complicated and uncomplicated UTI.[8] It is also a common causes of hospital acquired UTI.[8]

The aim of this study was to describe the prevalence of nosocomial urinary tract infections caused by different bacteria especially E.coli and to see their antimicrobial susceptibility pattern.

Material and Method

This Cross-sectional study was done at Kumudini Women's Medical College Hospital fromJanuary to June, 2018. After obtaining the clearance from Ethical Review Board, 50 patients who were

1. Associate Professor, Department of Microbiology, Kumudini Women's Medical College, Mirzapur, Tangail.
2. Professor, Department of Microbiology, Kumudini Women's Medical College, Mirzapur, Tangail.
3. Associate Professor, Department of Microbiology, Kumudini Women's Medical College, Mirzapur, Tangail.
4. Associate Professor, Department of Microbiology, Kumudini Women's Medical College, Mirzapur, Tangail.
5. Laboratory Manager, Microbiology Lab (Child Health Research Foundation), Kumudini Women's Medical College Hospital, Mirzapur, Tangail.
6. Associate Professor, Department of Microbiology, International Medical College, Gazipur.
7. Assistant Professor, Department of Microbiology, Faridpur Medical College, Faridpur.
8. Assiatant Registrar, Department of Gastroenterology, Dhaka Medical College Hospital, Dhaka.

***Correspondence:** jannat2026@gmail.com

admitted in general surgery ward were included in the study. All study subjects were catheterized for various reasons and suspected to have urinary tract infection. Clean catch mid-stream urine samples were collected in sterile containers for doing Culture sensitivity. Different bacteria were isolated from the specimens and only antibiotic susecptibility of E.coli was seen.

Isolation of organisms

All the samples were inoculated on blood agar media and MacConkeys agar media and incubated at 37°C aerobically for 24 hours. The incubated plates were examined for bacterial growth and the organisms were identified by colony morphology, hemolytic criteria, staining character, pigment production and biochemical tests such as oxidase test, reaction in TSI, MIU anddetermination of antimicrobial susceptibility pattern.[9]

Antimicrobial susceptibility testing

The antimicrobial susceptibilitypattern was determined by Kirby Bauer disk-diffusionmethod on Mueller-Hinton agar using commerciallyavailable antibiotic discs (Oxiod, Hampshire, UK)according to CLSI guidelines[10]. The antibiotic diskused in antibiogram for all the Gram-negative bacteriawere co-trimoxazole (1.25/23.75 µg), gentamicin (10µg), ciprofloxacin (5 µg), doxycycline (30 µg), azithromycin (30 µg), amoxiclav (20+10 µg), ceftriaxone (30 µg), ceftazidime (30 µg), imipenem(10 µg),amikacin (30µg/disc), colistin sulphate (10µg/disc), cefixime (30µg/disc), chloramphenicol (30 µg/disc), cefepime (30µg/disc), doxycycline. (30µg/disc) and nitrofurantoin (300µg/disc). Escherichia coli ATCC 25922 was used forquality control. Pure colonies of isolated organisms were emulsified in normal saline and turbidity was matched with 0.5 McFarland turbidity standards. Selected antibiotic discs were placed on inoculated Mueller Hinton agar media. These plates were incubated at 37ºC for 24 hours. Resistant and sensitive bacteria were defined according to CLSI guidelines[10].

Data analysis:

After compiling data were analyzed using` Microsoft Office Excel 2007` program.

Table I: Rate of isolation of bacteria from urine specimen (n=50)

Isolated bacteria	Frequency	Percentage
Significant growth	35	70.00
No growth	15	30.00
Total	50	100.00

Table-II: Organisms isolated from urine (n=35)

Organisms isolated	Number	Percentage
E. coli	20	57.14
Acinetobacter baunanni	05	14.29
Pseudomonas aeruginosa	05	14.29
Klebsiella pneumoniae	03	8.57
Proteus vulgaris	02	5.72
Total	35	100.00

Table-III: Age distribution of infected patients

Age (years)	Number	Percentage
<20	01	2.86
21-40	11	31.43
41-60	19	54.28
>60	04	11.43
Total	35	100.00

Table- IV: Antimicrobial susceptibility of E.coli causing UTI by disc diffusion method

Antibiotics	Sensitive %	Resistant %
Amikacin	19 (95.00)	1 (5.00)
Azythromycin	10 (50.00)	10 (50.00)
Ceftazidime	12 (60.00)	8 (40.00)
Ceftriaxone	12 (60.00)	8 (40.00)
Chloramphenicol	0 (0.00)	20 (100.00)
Ciprofloxacin	0 (0.00)	20 (100.00)
Co-trimoxazole	0 (0.00)	20 (100.00)
Gentamicin	10 (50.00)	10 (50.00)
Imipenem	20 (100.00)	0 (0.00)
Cefepime	12 (60.00)	8 (40.00)
Cefixime	12 (60.00)	8 (40.00)
Nitrofurantoin	18 (90.00)	2 (10.00)
Doxycycline	18 (90.00)	2 (10.00)
Colistin sulphate	20 (100.00)	0 (0.00)

Result:

Out of 50 urine samples of suspected cases of UTI of indoor patient, 35 (70.00%) samples showed significant bacterial growth. (Table: I)

Among them, E.coli was the most predominant pathogenic bacteria 20 (57.14%) followed by Acinetobacter boumanni 5 (14.29%), Pseudomona aeruginosa 5 (14.29%), Klebsiella 3 (8.57%), Proteus 2 (5.72%). (Table: II)

In this study we found that most UTI cases (54.28%) were within 41-60 years followed by in the age group of 21-40 years (31-43%). (Table-III)

According to disc diffusion method, none of the E.coli was resistant to imipenem and colistin sulphate. All 41 (100%) E.coli were resistant to chloramphenicol, ciprofloxacin and co- trimoxazole. (Table IV)

Discussion

Nosocomial infection is affecting the hospitalized patients and creating a major problem in both developed and developing countries. In developed countries many interventions were made to control this but in developing countries like Bangladesh on emphasis has yet been given in this field. In this present study, it was observed that the most common organism isolated from post-catheterized UTI cases was E.coli (57.14%) followed by Acinetobacter baumanii and Pseudomonas aeruginosa (14.29%) and Klebsiella pneumoniae (8.57%). Earlier studies done in Bangldesh in 1973, 2010, 2016 and 2021reported similar predominance of E. coli (37.5%, 55.9% and 57.14%, 82.25% respectively) in hospital acquired infections.[4,5, 11,12,]

In a previous study done in Dhaka Medical College Hospital it was found that majority of the patients (41%) belonged to 45-59 years of age, it is similar to the findings in our study.13 In the present study most of the UTI patients (54.28%) were in the age group of 41-60 years. It may be due to decrease in immunity with increase of age.

In this study, it was observed that 100% E.coli were resistant to ciprofloxacin and co-trimoxazole which are the most commonly used antibiotics in UTI. Similar result was seen in another study in Bangladesh which was 80%.5 We found that all E.coli were sensitive to imipenem and colistin sulphate and it is similar to another study.[14] The multidrug resistance pattern in E.coli due to production of extended spectrum of beta-lactamase.[15] Increased level of resistance to the commonly used antibitics in hospital isolates was reported by others[16,17.]

Conclusion

Despite aggressive efforts to limit the rapid rise of antimicrobial resistance, the problem of developing resistance to multiple antibiotics continues to worsen as demonstrated by various studies including the present study. However, the current situation is the ineffective control measures and

antibiotic policies. Large numbers of Gram negative bacteria causing nosocomial UTI produce ESBL with most being multidrug resistant. Therefore, routine and subsequent antibiogram with disc diffusion method could be useful to determine the best treatment option for UTI.

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