Original Article:

Prevalence and Antibiogram of *Escherichia Coli* Isolated from Urine Sample of Male UTI Patient.

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Abstract

Background: *E. coli is found to be the commonest cause of Urinary Tract Infection (UTI). However, E. coli antibiotic resistance has escalated over the past many years. To observe the possible uropathogen from suspected UTI male outdoor patient, different pathogenic bacteria isolated and identified from urine sample by culture and biochemical tests. Out of 200 urine samples, 160 (80.00%) yielded significant bacterial growth. Among them E. coli was the most predominant bacteria 82 (51.25%) followed by Klebsiella 30 (18.75%), Pseudomonas 14 (8.75%), Proteus 10 (6.25%) and different Gram positive bacteria 10 (6.25%). 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. In conclusion, it can be said that antibiotic resistance against commonly using antibiotics is an alarming sign for us to treat the outdoor patients.*

Key words: *UTI, Escherichia coli, urine, antibiotic susceptibility*

Introduction: Urinary tract infection is one of the most common bacterial infections and Gram negative bacteria are among the most prevalent bacteria detected from UTI patients.[1] UTI are a global financial burden and the emergence of resistance in uncomplicated and complicated uropathogen is of great concern.[2]

There is a wide spectrum of pathogens causing UTI including *E.coli*, Klebsiella, Pseudomonas, Enterobacter, Enterococci and Proteus spp.[3] Escherichia coli is the most common uropathogen in both uncomplicated and complicated UTI.[4]

Antimicrobial resistance is an evolving and growing problem in UTI. Of more concern is increasing incidence of infections caused by strains of *E.coli* that are resistant to commonly used antimicrobial agents specially to trimethoprim-sulphamethoxazole (TMP/SMX) and beta lactam antibiotics.[5] This multidrug resistance pattern in E.coli might be due to the production of extended spectrum beta lactamase enzyme.[6] Therefore it is necessary for continuous surveillance of antimicrobial resistance of Gram negative organisms specially *E.coli*.[7]

The present study is carried out to isolate Escherichia coli from urine sample of male patient by culture and to see their antimicrobial susceptibility pattern.

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Materials and methods

It was cross sectional study. Urine samples were collected from the outdoor male patients from Kumudini Women's Medical College Hospital. Clean catch mid stream urine samples were collected in sterile containers. A total of 200 urine samples were collected from suspected male patients of UTI during January to June, 2018 in the department of Microbiology, under CHRF (child health research foundation) of Kumudini Women's Medical College Hospital.

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 and Simmon's citrate media and different sugar fermentation test.8 Only *E.coli* was taken for determination of antimicrobial susceptibility pattern.

Antimicrobial susceptibility testing

The antimicrobial susceptibility pattern was determined by Kirby Bauer disk-diffusion method on Mueller-Hinton agar using commercially available antibiotic discs (Oxiod, Hampshire, UK) according to CLSI guidelines.[9] The antibiotic disk used in antibiogram for all the Gram-negative bacteria were co-trimoxazole (1.25/23.75 µg), gentamicin (10 µg), 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 (30µg/disc), cefepime (30µg/disc), doxycycline (30µg/disc) and nitrofurantoin (300µg/disc). *Escherichia coli* ATCC 25922 was used for quality 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.[9]

Data analysis:

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

Result

Out of 200 urine samples of suspected cases of UTI of outdoor male patient, 160 (80.00%) samples showed significant bacterial growth. (Table: I)
Among them, *E.coli* was the most predominant pathogenic bacteria 82 (51.25%) followed by *Klebiell* 30 (18.75%), *Pseudomonas* 14 (8.75%) *Proteus* 10 (6.25%) different Gram Positive bacteria 10 (6.25%) and *Acinetobacter* 9 (5.63%). (Table: II)
According to disc diffusion method, none of the *E.coli* was resistant to imipenem, colistin sulphate and amikacin. All 82 (100%) *E.coli* were resistant to chloramphenicol and ciprofloxacin followed by doxycycline 62 (75.71%) and co-trimoxazole 60 (73.71%). (Table: III)

Table-1: Rate of isolation of bacteria from urine specimen (n=200)

Isolated bacteria	Frequency	Percentage
Significant bacterial growth	160	80.00
No growth	40	20.00
Total	**200**	**100.00**

Table-2: Organisms isolated from urine (n=160)

Organisms isolated	Number	Percentage
Escherichia coli	82	51.25
Klebiella Pneumoniae	30	18.75
Pseudomonas aeruginosa	14	8.75
Enterobacter	05	3.13
Proteus vulgaris	10	6.25
Acinetobacter	09	5.63
Gram positive bacteria	10	6.25
Total	**160**	**100.00**

Table-3: Antimicrobial susceptibility of *E. coli* causing UTI by disc diffusion method

Antibiotics	Sensitive %	Intermediate %	Resistant %
Amikacin	75 (91.46)	2 (2.44)	5 (6.02)
Azythromycin	70 (85.37)	5 (6.09)	7 (5.83)
Ceftazidime	70 (85.37)	7 (8.53)	5 (6.02)
Ceftriaxone	70 (85.37)	0 (0.00)	12 (14.63)
Chloramphenicol	0 (0.00)	0 (0.00)	82 (100.00)
Cipfloxaxcin	0 (0.00)	0 (0.00)	82 (100.00)
Co-trimoxazole	20 (24.39)	2 (2.44)	60 (73.17)
Gentamicin	70 (85.37)	0 (0.00)	12 (14.63)

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Imipenem	82 (100.00)	0 (0.00)	0 (0.00)
Cefepime	75 (91.46)	0 (0.00)	7 (5.83)
Cefixime	70 (85.37)	0 (0.00)	12 (14.63)
Nitrofurantoin	80 (97.56)	0 (0.00)	2 (2.44)
Doxycycline	20 (24.39)	0 (0.00)	62 (75.61)
Colistin sulphate	82 (100.00)	0 (0.00)	0 (0.00)

Discussion

In present study, E. coli was the most predominant bacteria (51.25%) found in urine followed by Klebsiella pneumonia (18.75%), Pseudomonas (8.75%) and Proteus (6.25%) which correlates with the studies conducted in Bangladesh, India and Nepal.[6,10,11] Previous study conducted in Dhaka also showed *E.coli* as the most common uropathogen in Bangladesh.[6,12]

In our study, we found that All 100% *E.coli* were sensitive to imipenem, colistin and amikacin. Same result was observed in other studies[6,13]. But all are injectable antibiotics and difficult to treat in outdoor patient.

In present study, 100% *E.coli* were resistant to chloramphenicol and ciprofloxacin and most of the bacteria were resistant to doxycycline (75.61%) and co-trimoxazole (73.17%) which correlates with the another studies[14,15]. These antibiotics are given as empirical therapy in outdoor suspected UTI patient and these are the cost effective also. Increased level of resistance to the commonly used antibiotics might be due to production of extended spectrum of beta lactamases by Gram negative bacteria.[16]

This resistance also might be due to self medication, stop medication before end of antibiotic course and also from lack of knowledge the future danger of antibiotic resistance.

Conclusion

In this study most of the common drugs which are used in outdoor patient treatment in UTI. In this view of this emerging drug resistance the practice of inappropriate use of antibiotics is very future alarming for us.

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Conflict of interest

There is no conflict of interest of any author for the publication of this paper.

Reference

1. Mohammadi M, Gharemi E, Mokhayeni H, Pournia Y and Boroun H. Antimicrobial resistance patterns of E.Coli detected from hospitalized urine culture samples. Asian J of Bio Sci 2010; 3 (4): 195-201.

2. Bosch FJ, Vuuren C, Joubert G. Antimicrobial resistance patterns in outpatient urinary tract infections – the constant need to revise prescribing habits. S Afr Med J 2011;101:328-331.

3. Hooton TM, Stamm WE. Diagnosis and treatment of uncomplicated urinary tract infection. Infect Dis Clin North Am 1997;11(3):551-581.

4. Costelloe C, Metcalfe C, Lovering A, Mant D, Hay AD. Effect of antibiotic prescribing in primary care on antimicrobial resistance in individual patients: systematic review and meta-analysis. BMJ 2010; 34:500-512.

5. Thakur P, Ghimire P, Rijal K, Singh GK. Antimicrobial resistance pattern of Escherichia coli isolated from urine samples in patients visiting Tertiary health care centre in Eastern Nepal. Sunsari Tech Col J 2012;1(1): 2091-2102.

6. Islam TAB, Shamuzzaman SM, Nehar N, Fardows J. Prevalence and antibiogram of Microbial agents causing nosocomial urinary tract infection in surgical ward of Dhaka Medical College Hospital. J Enam Med Col 2016; 6 (2): 75-79.

7. Pitout JDD, Thomson KS, Hanson ND, Ehrhardt AF, Moland ES, Sanders CC. Beta lactamases responsible for resistant to expanders-spectrum cephalosporin in Klebsiella pneumoniae, Esch. Coli and Proteus mirabilis isolates recovered in South Africa. Antimicrob Agents Chemother 1998; 42: 1350-1354.

8. Fardows J, Shamsuzzaman SM. A Search for identifying aerobic bacteria by culture and multiplex PCR in market eggs causing gastro-enteritis and enteric fever in Bangladesh. Ann Clin Med Microbio 2015; 1(1): 1001.

Received date: 10 Aug 2021
Accepted Reviewed version Date: 20 Sep 2021

9. CLSI (Clinical and Laboratory Standard Institute). Performance standards for antimicrobial disc susceptibility testing; 20th informational supplement. CLSI document M100-S20. Wayne, PA: CLSI; 2010.

10. Hasan ASK, Kumar NT, Kishan RN, Neetha K. Laboratory diagnosis of urinary tract infections using diagnostics tests in adult patients. Int J Res Med Sci 2014; 2(2): 415-421.

11. Parajuli NP, Maharjan P, Parajuli H, Joshi G, Paudel D, Sayami S, Khanal PR. High rates of multidrug resistance among uropathogenic Escherichia coli in children and analyses of ESBL producers from Nepal. Antimicrob Resis Infect Cont 2017; 6:9.

12. Sikka R, Mann JK, Vashit MG, Chaudhary U, Deep A. prevalence and antibiotic sensitivity pattern of bacteria isolated from nosocomial infections in a surgical ward. Indian J Clin Prac 2012; 22: 512-522.

13. Haque R, Salam MA. Detection of ESBL producing nosocomial Gram negative bacteria from a tertiary care hospital in Bangladesh. Pak J Med Sci 2010; 26: 887-891.

14. Jafri SA, Qasim M, Masoud MS, Rahman M, Izhar M, Kazmi S. Antibiotic resistance of E. coli isolates from urine samples of Urinary Tract Infection (UTI) patients in Pakistan. Bioinformation 2014;10(7): 419-422.

15. Center for Disease Control and Prevention (CDC). Laboratory detection of extended-spectrum b-lactamases (ESBLs). Atlanta: CDC, 2012. [Cited 2015 Mar 12]. Available at: http://www.cdc.gov/HAI/settings/lab/labesb1.html. Accessed August 2018.

16. Soltani R, Ehsanpoor M, Khorvash F, Shokri D. Antimicrobial susceptibility pattern of extended-spectrum beta-lactamases producing bacteria causing nosocomial urinary tract infection in an Iranian referral teaching hospital. J Res Pharm Pract 2014; 3: 6-11.

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