

Antimicrobial Susceptibility Patterns of Uropathogenic *Escherichia coli* and their Prevalence among Old Age Male and Female People in and around Dhanbad, Jharkhand

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ABSTRACT

Introduction: The susceptibility and vulnerability of UTI is more common in ageing population. *E. coli* is normally found in human beings as intestinal gut flora. There are so many variant of *E. coli* but mainly six groups of *E. coli* are more hazardous for human population to cause some GIT and urinary tract manifestation. Good evidence and adequate immunity in healthy adults prevents them from poor outcome like kidney failure but in old age as it is its self at a risk factor become more suitable for developing life threatening progressive damage of whole urinary track, leads to renal failure that is haemolytic uremic syndrome. The purpose of this study was to evaluate the prevalence and their antibiogram profile of uropathogenic *Escherichia coli* (UPEC) in old age male and female population around Dhanbad district.

Material and methods: A total of 1050 urine samples were collected randomly, for culture and sensitivity tests from the suspected old male and female patients. Their samples were collected in sterile screw capped containers as a mid –stream urine and sent to the Department of microbiology Paliputra medical collage laboratory within one hour of collection. Culture was done by a standard surface streak procedure with MacConkey agar plate. Standard method for urine culture and identification of bacteria for different age group old male and females patients was used. Antibiotic sensitivity tests were done on diagnostic sensitivity plates (DST) by stokes method.

Results: Bacterial etiological agent was isolated from 1050 urine samples with highest prevalence of *Escherichia coli* -45.70 %. The *E. coli* were highly resistant to Penicillin 43.56% and intermediate level of resistance to Piperacillin/-77%, Levofloxacin and Amikacin followed by Cefotaxime (21.78%). Trimethoprim (11.88%) Sulfamethoxazole (5.94%) respectively.

Keywords: DST, Bacterial, Sensitivity, Culture

INTRODUCTION

Urinary tract infections are serious old age affecting problems worldwide. Moreover, since reporting of antibiotics susceptibility result in suspected cases of UTI takes at least 48 hours following sampling, the condition is treated empirically, based on available data reflecting antibiotics resistance. UTI is classified into two major categories, namely complicated or uncomplicated infection. The terms complicated refers to the fact that an individual's urinary tract has been in some way obstructed or is abnormal, unobstructed tract if UTI is not detected in early stages, it can result in chronic illness and long term renal damage. Old age is an important factor where old people with urinary device

like catheters are prone to the infection Diabetes enhance the incidence due to elevated blood sugar levels and other factor like parity, hormonal in balance and geographical location also has a significant role in the incidence suffering from UTI. Therefore, knowing ideal antibiotics therapy is based on determination of the etiological agent and it prevalent antibiotic sensitivity. This is because the drugs which will work on the strain, antibiotic susceptibility pattern in an area may help the clinicians in choosing appropriate antimicrobial treatment. The purpose of this study was to evaluate the prevalence and their antibiogram profile of uropathogenic *Escherichia coli* (UPEC) in old age male and female population around Dhanbad district.

MATERIAL AND METHODS

The study was carried out from April -2016 to May 2017 in the department of microbiology of Patliputra medical college and hospital Dhanbad, Jharkhand. All 1050 samples were collected in the Patliputra medical college and hospital including rural and urban health centres of Dhanbad. urinary tract infection suspected old age male and female patients sample collected in sterile screw capped containers as a mid – stream urine were sent to the Department of microbiology Paliputra medical collage laboratory within one hour of collection.

Laboratory identification of uropathogenic *E. coli*

Total 1055 Urine samples were collected from suspected patients in urinary tract infection male and female of different age groups, and directly inoculated on cultured MacConkey agar plates. After overnight incubation at 37°C, lactose –fermenting colonies were identified by characteristic morphology and inoculation on Triple sugar iron (TSI) Agar slants. The isolates were kept as stocks for 20°C in 50% glycerol stocks for long term storage. Biochemical tests done by Catalase test, Indole production in peptone water, Urease

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Gender	No of infected Patient (%)	Age (years)		
		60 - 70	71- 80	>81
Old male	175 (38.46)	95 (54.28)	53 (30.28)	27 (15.42)
Old female	280 (61.53)	122 (43.57)	75 (26.78)	83 (29.64)

Table-1: Age and sex wise distribution among total urine cultures

Antibiotics	No of sensitive isolates (%)
Ampicillin	57 (12.52)
Nitrofurantoin	117 (25.71)
Levofloxacin	82 (18.02)
Amikacin	73 (16.04)
Trimethoprim/sulfamethoxazole	16 (3.51)
Cefotaxime	45 (9.89)
Piperacillin/Tazobactam	65 (14.28)

Table-2: Antimicrobial Resistance pattern of organism isolated from urine

test acid/gas/H₂S production in TSI (Triple Sugar Iron agar) slant. With the help of Microscopy technic isolated characteristic morphology of e.coli and other pathogens Bacteria. Total 455 urine samples were e.coli positive. There was 175 old age male patients and 280 old age female patients was positive findings.

Antibiotic Susceptibility test

As a standard operational procedures, antimicrobial susceptibility tests were done on Mueller –Hinton agar using disk diffusion method. The antimicrobial agents tested were Ampicillin (10µg), Ceftazidime (30µg), Levofloxacin (5µg), Nitrofurantoin (300 µg), Cefotaxim (30µg), Piperacillin-Tazobactam (100/10µg) and Trimethoprim / sulfamethoxazole (1.25/23.75µg). Resistant data were interpreted according to National committee for clinical laboratory standard procedure strains of E. coli. The overall E.coli resistant rates to Ampicillin (10µg), Ceftazidime (30µg), Levofloxacin (5µg), Nitrofurantoin (300 µg), Cefotaxime were detected (p=001)

Age and sex predilection of UPEC

In this study all patients of both genders who were more than 60 years of age and Suspected of having UTI were included. There were 455 urine samples positive growth of e coli bacteria, e. coli affecting with 175 old age males and 280 old age females, This study found that percentage of e.coli infection was high in old age females, It was found that the percentage of e. coli isolates was high in people of age groups of 60 - 70 years and more than 81 years of age This study patients were divided into 3 groups according to their age (table-1).

Antibiogram

The antimicrobial susceptibility pattern was determined by disk –diffusion method on Muller-Hinton agar using commercially available antibiotic disc according to CLSI guidelines², The antibiotic disk used in antibiogram for all the gram negative bacteria were Nitrofurantoin (25.71%) and Piperacillin/ Tazobactam (14.28%). Levofloxacin (18.2%) and Amikacin (16.4%), cefotaxime (9.89%). UPEC isolates

were mostly resistant to Trimethoprim/sulfamethoxazole and Cefotaxime (table-2).

STATISTICAL ANALYSIS

Data were analysed using Categorical variables were summarized by percentages. χ^2 tests performed for trend of ordinal variable.

RESULTS

Out of 1050 urine samples received were isolated from *Escherichia coli* with 175 (38.46) old age males and 280 (61.63) old age females, This study found that percentage of *E.coli* infection was high in old age females of which *Escherichia coli* were the most predominant pathogenic bacteria followed by *Pseudomonas aeruginosa* 103 (17.02), *Klebsiella pneumonia* 135 (22.31%), *Klebsiella oxytoca* 89 (12.06%), *Proteus vulgaris* 82 (13.55%), *Proteus mirabilis* 73 (3.89%), *Candida* spp. 54 (6.85%), *Staphylococcus saprophyticus* 69 (11.40%). In this study we found that most UTI cases were within 60- 81 years followed by in age group of 60-71 years. UTI producing uropathogens were found mostly in the age group of 60-71 years.

DISCUSSION

This study shows the distribution of microbial species and antibiotic susceptibility patterns of *E. coli* isolated from Old age male and female patients with UTIs, Patliputra medical college and hospital a 500-bed hospital located in Dhanbad, Jharkhand, and receives patients from different areas of dhanbad District. In this retrospective, the majority of pathogens were isolated from old age women (69.8%). It has been extensively reported that old women have a higher prevalence of UTI than old man, principally owing to anatomic and physical factors.²Antibiotic resistance is a major clinical problem in treating infections caused by *e.coli*. The resistance to the antimicrobials has increased over the years. Resistance rates vary from area to area.^{1,2} In this study *E. coli* accounted for approximately *Pseudomonas aeruginosa* 34 (10.59%), *Klebsiella pneumonia* 26 (8.09%), *Klebsiella oxytoca* 19 (5.91%), *Proteus vulgaris* 16 (4.98%), *Proteus mirabilis* 5 (1.55%), *Candida* 22 (6.85%), *Staphylococcus saprophyticus* 10 (3.11%). This is consistent with the findings of previous studies in which *E. coli* was the predominant pathogen isolated from patients with UTIs.^{1,2} The rate of isolation of *Klebsiella pneumonia* might be described as high when compared to other studies,^{6,7} however, this can be explained by the fact that Risk factors for developing symptomatic UTI in the aging population are different to those in younger male and female patients.⁴ Old Age-associated changes in immune function, exposure to nosocomial pathogens and an increasing number of

comorbidities put the old age at an increased risk factor for developing UTI infection.^{5,6} In the present study, the higher rate of e.coli was found in old age females (280) compared to old age males (175). this is due to lack of oestrogen in old age females which changes vagina PH that become more acidic and urinary passage mucosa becomes thinner and excoriated so more prone e.coli infection, increased prostatic enlargement and hypotonic and weak tonic bladder is the cause of retention of urine or more residual urine in old age males.

CONCLUSION

Thus it is concluded that the incidence and prevalence of the urinary tract infection is mostly common in old age group hich are caused by multiple drug resistant E.coli.

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