

A PROSPECTIVE STUDY ON URINARY TRACT INFECTIONS: EVALUATION OF BACTERIOLOGICAL PROFILE AND ANTIBIOTIC SENSITIVITY PATTERNS IN FEMALE PATIENTS PRESENTING WITH LOWER ABDOMINAL PAIN

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Abstract

Background: UTI has been found to occur in all ages and sex groups, but females of all ages are more vulnerable to this infection. UTIs may be asymptomatic, acute, chronic, and complicated or uncomplicated.

Materials and Methods:

This study was conducted in Department of Obstetrics and Gynaecology in in a Tertiary Care Teaching Hospital Medical College in Rajsamand.

Result: The result of this study revealed that all the isolated uropathogens were found to be highly susceptible to the Amikacin, Imipenem and Meropenem, while showing very high resistance to Ampicillin and Cephalothin.

Conclusion: It can be conclude that continued use of these drugs since long can be the answer for this resistance.

INTRODUCTION

Urinary tract infection (UTI) is a deadly disease. It affects around 405 million population all over the world in hospital as well as community settings causing mortality in around 0.23 million. In 2019 only, it led to disability-adjusted life years (DALYs) figure of 5.2 million.^[1] UTI is classically treated with broad-spectrum antibiotics.^[2] Since the recent past, an increasing trend of incidence of multidrug resistant UTI (MDR UTI) has been noticed. Especially in developing nations, the conversion from simple UTI to MDR UTI makes UTI a life threatening disease.^[3,4] A detailed knowledge of the epidemiology of community-acquired UTIs (CA-UTIs) becomes extremely important as the frequency, spectrum, and antibiotic resistance in UTI causing uropathogens is different in different geographical locations and time.^[5] The most common uropathogens causing both complicated and uncomplicated UTI are *Escherichia coli*, *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Proteus mirabilis*, and group B *Streptococcus* (GBS).^[6] Along with these, both the CA- and hospital-acquired (HA-) UTIs are caused by MDR *E. coli* and *K. pneumoniae*.^[7,8] Just because of these two pathogens, a third-generation cephalosporin has been included in the treatment of acute pyelonephritis.^[9] On the other hand, excess and inappropriate uses of antibiotics are too common in the management of CA-UTI, especially in

developing nations, and this situation is further deteriorated by the over-the-counter purchase of antibiotics.^[10,11] Thereby, the routine antibiotics become ineffective and useless in due course of time.

UTI has been found to occur in all ages and sex groups, but females of all ages are more vulnerable to this infection.^[12] UTIs may be asymptomatic, acute, chronic, and complicated or uncomplicated. The sign and symptoms of the UTI are based on the port of the urinary tract involved, the uropathogen, the severity of infection, and the patient's immunity. Both symptomatic and asymptomatic UTIs are grievous condition for public health care as it affects the work and quality of life of the diseased.

MATERIALS AND METHODS

Study Area: This study was conducted in Department of Obstetrics and Gynaecology in in a Tertiary Care Teaching Hospital Medical College in Rajsamand.

Study Population: The Population of this study was 200.

Data Collection: A total 200 cases were included in the present study. Consent forms were taken for all individual. All Before collecting the urine sample, instruction were given to each patient regarding the collection. After that Sample sent to the Microbiology Department for the culture and

susceptibility testing. Antibiotic susceptibility pattern were noted down.

Data Analysis: Data were analyzed by using Microsoft Excel.

RESULTS

We received 200 total urine samples, out of which 80 were positive. Among 80 cases maximum cases were from 11-40 and <10 age group followed by 51-

60,41-50 & 11-20 age group. In the present study *Escherichia coli* (26.2%) is more prevalent followed by *Klebsiella* spp. (21.2%). Other organism were also isolated like *Aeromonas* (6.25%), *ACB* complex (3.75%), *Citrobacter* spp. (6.25%), *Enterobacter* spp (7.5%), *Proteus* spp. (11.2%), *Pseudomonas* spp. (15%) & *Providencia* spp (2.5%). The result of this study revealed that Amikacin, Imipenem & Meropenem showed high resistance as compared to other antibiotics.

Table 1: Distribution of cases according to total samples.

Total sample	No.	Percentage
Positive	80	40
Negative	120	60
Total	200	100

Table 2: Age distribution.

Age	No.	Percentage
<10	18	9%
11-20	6	3%
21-30	18	9%
31-40	18	9%
41-50	9	4.5%
51-60	11	5.5%
Total	80	100

Table 3: Isolated organism from positive growth

Organism	No.	Percentage
<i>Acinetobacter baumannii</i> complex	3	3.75%
<i>Aeromonas</i> spp	5	6.25%
<i>Citrobacter</i> spp	5	6.25%
<i>Enterobacter</i> spp	6	7.5%
<i>E. coli</i>	21	26.2%
<i>Klebsiella</i> spp	17	21.2%
<i>Proteus</i> spp.	9	11.2%
<i>Providencia</i> spp	2	2.5%
<i>Pseudomonas</i> spp	12	15%
Total	80	100%

Table 4: Antibiotic susceptibility pattern

Antibiotics	Susceptible	Resistant
Amikacin	63	17
Gentamicin	11	69
Imipenem	75	5
Meropenem	72	8
Cephalothin	37	43
Cefuroxime	23	57
Ceftazidime	14	66
Ceftriaxone	24	56
Cefepime	42	38
Aztreonam	23	57
Ampicillin	76	4
Amoxicillin– Clavulanate	67	13
Piperacillin– Tazobactam	15	65
Trimethoprim– Sulfamethoxazole	34	46
Nitrofurantoin	23	57
Ciprofloxacin	67	13
Levofloxacin	13	67

DISCUSSION

The aim of the present study was to identify the bacterial pathogen causing UTI in a tertiary care hospital. The bacterial pathogens were found in 40% of the cultured urine samples. This result of the present study was supported by a previous study, the

frequency of 20.7% and 39.6% were reported in two different studies.^[13,14] Some studies were contrary to this study.^[15,16] The low frequency can be due to taboos of people for avoiding medical checkups for urinary problems, taking self-medications, as well as non-reporting of UTIs by various private clinics to which patients are consulting. Only female cases

were taken. The same result has been found in other studies as well.^[17,18] The reason for increased incidence of females is given to female anatomy having short urethra and its closeness to anus, thus favoring pathogens to travel easily from anus to the urinary tract. All the isolated uropathogens were Gram negative bacteria and the prevalence of the *E. coli* was the maximum followed by *K. pneumoniae* subspecies *pneumoniae*. The same prevalence was reported by Abunja et al.^[19] Predominance of the Enterobacteriaceae (78.7%) have been reported in one study while *E. coli* being the most (64.0%) followed by *Klebsiella* (17.9%).^[20] *K. pneumoniae*, *P. aeruginosa*, *A. baumannii* and *Proteus* species have been reported to be the common organisms in one study.^[21] Incidence of UTI was the maximum in sexually active adults, followed by elderly and kids. This data was contrary to data of other study in which elderly were having higher incidence.^[22] UTI have reported to be more in elderly males (24.48%) in one report, while in other elderly females were reported (16.55%).^[23,24] Various factors such as urinary tract anomalies, urinary and fecal incontinence, decline in the immune system, malnutrition, functional disability, diabetes, prostate enlargement in males and post-menopausal hormonal changes in females have been labeled for increased incidence of UTI in elderly.^[23,25,26] Various other factors such as environmental conditions, health practices, patient conditions, personal hygiene, number of patients examined, and laboratory procedures have also been found. In the present study, all the isolated uropathogens were found to be highly susceptible to the Amikacin, Imipenem and Meropenem, while showing very high resistance to Ampicillin and Cephalothin. Resistance was also found against very commonly used antibiotics Amoxicillin–Clavulanate and Nitrofurantoin followed by Trimethoprim–Sulfamethoxazole, Ceftriaxone, Ciprofloxacin and Levofloxacin. These findings were supported by various studies of the review of literature.^[27,28] Amikacin has been reported to be the most effective one while Ampicillin as the least effective. And Ciprofloxacin, Cefoxitin, Levofloxacin, Nitrofurantoin, Nalidixic acid, Chloramphenicol, Amoxicillin and Gentamicin have been found to effective at different levels. In a study involving pregnant females, Nitrofurantoin, Ofloxacin, Cefotaxime, Ciprofloxacin, Norfloxacin and Amikacin have been found to be highly sensitive against *E. coli*, *Proteus* species and *Klebsiella* species while Ampicillin and Cotrimoxazole have been found to be highly resistant. Furthermore, isolates of *P. aeruginosa* were found to be resistant against all antimicrobials except Amikacin and Nitrofurantoin.^[29]

CONCLUSION

The higher resistance of uropathogens against third- and fourth-generation Cephalosporins; Penicillins and Fluoroquinolones poses a very serious threat to their treatment. The continued use of these drugs since long can be the answer for this resistance. Additionally in developing countries, the excess and inappropriate use of these drugs and over the counter sale can be the reason for this alarming resistance. The prevalence of the UTI among tested patients can be concluded with *E. coli* being the most frequent mainly in females. Amikacin, Gentamicin, Imipenem and Meropenem are suggested to be the drug of choice against UTI as being the highly sensitive. It is expected that in future various other studies will substantiate the emergence of multi-drug resistance among clinical bacterial species and differentiate the isolates and antimicrobials in OPD and IPD settings.

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