Evaluating the Microbiological Profile of Urinary Tract Infections in Males at a Tertiary Care Centre, Uttar Pradesh

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ABSTRACT

Introduction: Men rarely get urinary tract infections (UTIs). The male urethra is longer and located further from the anal entrance as a result.
Additionally, the perianal region is dry, and the prostatic secretion guards against the development of any infections.Therefore, a UTI in a man is regarded as a complex infection.Complicated UTIs are challenging to treat and more likely to fail during treatme nt.
Aim and objective: To study the Microbiological Profile of Urinary Tract Infections in Males at a Tertiary care centre, Uttar Pradesh.
Material and Methods: The current cross-sectional study was conducted in the Department of Microbiology at RMCH&RC, Mandhana over a one-year period i.e, November 2023 to November 2024 where the microbiology lab handled and analysed urine samples from male inpatients and outpatients was performed. A total of 250 freshly voided mid- stream urine sample were collected in a sterile wide mouth container from the individuals preliminary routine urine tests positive for pus cells and albumin. All the urine samples were processed within one hour after the collection for aerobic bacterial culture. If delayed, samples were refrigerated and processed within 4 -6 hours. The identification , biochemicals and the AST pattern was done accoding to the CLSI guidelines 2024.
Results: In the present study a total of 250 urine samples were received out of which 50 (20%) urine samples were showing significant growth for UTI with the maximum age of 31-40 (30%) been affected the most followed by 21-30 (19.2%) years of age and least in the age group above 61 years of age (4%). It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates. It was found that Escherichia coli (50%) was the most common isolate followed by Klebsiella pneumoniae (30%) and least for Acinetobacter baumannii with (8%). In the present study the rate of Cefotaxime was 95% Ampicillin, Cefepime, Amikacin was observed to be 90%, resistant for E.coli . Low resistant was observed for Meropenem, Doripenem and Cotrimoxazole.

In case of K. pneumoniae there was no resistant observed for Meropenem, Doripenem and Imipenem. In case of P. aeruginosa and Acinetobacter Piperacillin/tazobactam, Imipenem, Meropenem, Doripenam, Amikacin, Ciprofloxacin and levofloxacin showed low level of resistant. In case of S.aureus Vancomycin, Gentamycin and Amikacin were observed to be a sensitive.

Conclusion : The male patients rarely experience a UTI, therefore microorganisms that are causing the infection have a similar microbiological profile and drug sensitivity pattern to the one seen in female UTI patients. However, because male UTI is regarded as a difficult infection that requires careful study of these people for a variety of illnesses, such as diabetes Mellitus, hypertension and BPH require special attention among male seniors. This helps in starting quick therapy to avoid antibiotic resistance and recurrent UTIs.
Keywords : UTI, Antibiotic sensitivity testing, Associated factors, Bacteria, CLSI

INTRODUCTION

UTIs (urinary tract infections) are rather typical among females. They are more susceptible to UTIs due to a number of anatomical and physiological variables. During puberty and the years when a woman is capable of having children, UTI is substantially more common in females [1].

Only in men over the age of 60 does the incidence of UTI in men approach that of women. UTIs in young males are extremely uncommon, and bacteriuria is only present in 0.1% of cases. During the first three months of life, there is an early peak incidence; in neonates, boys are more likely to have UTIs than girls are (with a male-to-female ratio of 1.5:1). Fewer than five to eight UTI cases per 10,000 adult males younger than 50 years of age occur annually. Men over the age of 50 have the incidence of UTI rises dramatically (range, 20-50% prevalence), because of enlargement of the prostate, debilitation and subsequent instrumentation of the urinary tract [2].

Urinary tract infections may be asymptomatic, acute, chronic, and complicated or uncomplicated, and the clinical manifestations of UTIs depend on the portion of the urinary tract involved, the etiologic organisms, the severity of the infection, and the patient's ability to mount an immune response to it. Both asymptomatic and symptomatic UTIs pose a serious threat to public health care, hence reducing the quality of life and resulting into work absenteeism [3]. The symptoms of UTIs such as fever, burning sensations while urinating, LAP, itching, formation of blisters and ulcers in the genital area, genital and suprapubic pain, and pyuria generally depend on the age of the person infected and the location of the urinary tract infected [4].

Several factors such as gender, age, race, circumcision [5] HIV [6], diabetes, urinary catheter, genitourinary tract abnormalities [7] pregnancy, infants, elderly [8] and hospitalization status [9] bear significant risk for recurrent UTIs. (e commonest pathogenic organism isolated in UTI is *E. coli* followed by *K. pneumoniae*, *Staphylococcus*, *Proteus*, *Pseudomonas*, *Enterococcus*, and *Enterobacter* [10]. About 150 million people suffer from UTIs each year globally which results in greater than 6 billion dollars in direct health care [11].

Thus, is necessary to circumvent non-judicious use of antibiotics that lead to the emergence of antimicrobial resistance and most appropriate antibiotics should be opted for first-choice empiric treatment of UTI.

Therefore, the present study was undertaken to study the Microbiological Profile of Urinary Tract Infections in Males at a Tertiary care centre, Uttar Pradesh.

MATERIAL AND METHODS

This was a Cross sectional study carried out in the Department of Microbiology at RMCH&RC for a period of 1 year i.e, between May 2023 to May 2024. A total of

250 freshly voided mid- stream urine sample were collected in a sterile wide mouth container from the individuals preliminary routine urine tests positive for pus cells and albumin. All the urine samples were processed within one hour after the collection for aerobic bacterial culture. If delayed, samples were refrigerated and processed within 4 - 6 hours.

The patients presenting or highly suspecious of having UTIs, were included in the study. Any patient who was terminally ill, who fails to give urine samples, with a history of antibiotic were excluded from the study [12]. The patients demographic details including age, gender, tribe, residence, level of education, and history of medical conditions were included in the study.

Collection, Isolation and Identification of Uropathogens

Mid-stream urine samples were collected in a sterile container and were processed within 2 h of collection time.

Urine sample was inoculated on a standard culture media Cystine–Lactose– Electrolyte-Deficient (CLED) agar, using a calibrated (1 μL) loop.

Culture plates were incubated at 35–37°C ambient air incubator for 18 h. After the allocated time period, the culture plates were visualized for the presence of bacterial colonies. Following the recommendations of Kass [13] in distinguishing genuine infection from contamination, culture of a single bacterial species from urine sample at a concentration of >105 CFU/ml.

The identification , biochemicals and the AST pattern was done accoding to the CLSI guidelines 2024 [14].

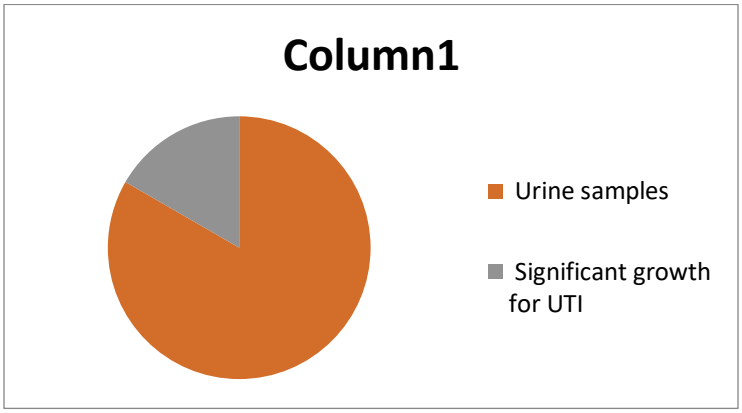
RESULTS

In the current study a total of 250 urine samples were received in the Microbiology Laboratory at RMCH&RC, out of which 50 (20%) urine samples were showing significant growth for UTI. The Males UTI was detected in all the age group. The maximum age of 31-40 (30%) years was affected the most followed by 21-30 (19%) years of age and least in the age group above 61 years of age (4%) [Table no.2].

Type of Clinical Isolates	Number of Isolates	Percentage
Urine samples	250	80%

Significant growth for UTI	50	20%

Table No. 1 : Samplewise distribution of the clinical isolates



Graph No. 1: Graphical Representation of Samplewise distribution of the clinical isolates

S.No.	Age (in years)	No. of Cases	Percentage
1.	0- 10	4	8%
2.	11-20	6	12%
3.	21-30	10	19.23%
4.	31-40	15	30%
5.	41-50	7	14 %
6.	51-60	6	12 %
7.	≥61	2	4%

Table No.2 : Age wise distribution of the UTI cases

It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates.

Type of Organism Isolated	No. of Isolates	Percentage
Escherichia coli	20	50%

Klebsiella pneumoniae	15	30%
Pseudomonas aeruginosa	5	10%
Acinetobacter baumannii	4	8%
Staphylococcus aureus	6	12%
Total	**50**	**100%**

Table No. 3: The Frequency of bacteria isolated from the UTI cases

It was found that *Escherichia coli* (50%) was the most common isolate followed by *Klebsiella pneumoniae* (30%) and least for *Acinetobacter baumannii* with (8%).

Antibiotic discs used	***E. coli* = 20**		***K. pneumoniae* = 15**	
	Sensitive n (%)	**Resistant n (%)**	**Sensitive n (%)**	**Resistant n (%)**
Ampicillin	2 (10%)	18 (90%)	-	15 (100%)
Amoxicillin/ clavulanic acid	4 (15%)	16 (85%)	4 (26.67%)	11 (73.33%)
Ampicillin/s ulbactam	5 (25%)	15 (75%)	5 (33.34%)	10 (66.66%)
Piperacillin/tazobactam	10 (50%)	10 (50%)	9 (60%)	6 (40%)
Cefazolin	8 (65%)	12 (35%)	2 (14%)	13 (86%)

Cefepime	2 (10%)	18 (90%)	2 (14%)	13 (86%)
Cefotaxime	1 (5%)	19 (95%)	2 (14%)	13 (86%)
Ceftriaxone	3 (15%)	17 (85%)	4 (26.67%)	11 (73.33%)
Aztreonam	3 (15%)	17 (85%)	4 (26.67%)	11 (73.33%)
Amikacin	2 (10%)	18 (90%)	4 (26.67%)	11 (73.33%)
Gentamycin	16 (80%)	4 (20%)	11 (73.34%)	4 (26.6%)
Ciprofloxacin	16 (80%)	4 (20%)	6 (40%)	9 (60%)
Levofloxacin	6 (30%)	14 (70%)	5 (33.34%)	10 (66.66%)
Imipenem	8 (40%)	12 (60%)	15 (100%)	0
Meropenem	18 (90%)	2 (10%)	15 (100%)	0
Doripenem	18 (90%)	2 (10%)	15 (100%)	0
Cotrimoxazole	18 (90%)	2 (10%)	10 (66.67%)	5 (33.33%)
Nitrofurantoin	7 (35%)	13 (65%)	10 (66.67%)	5 (33.33%)

Table No. 4: Antibiotic sensitivity pattern of *E. coli* and *Klebsiella* spp.

Antibiotic discs used	***P. aeruginosa* =5**	***Acinetobacter* spp. (n=4)**

	Sensitive n (%)	**Resistant n (%)**	**Sensitive n (%)**	**Resistant n (%)**
Piperacillin	2 (40%)	3 (60%)	4 (100%)	0
Piperacillin/tazobactam	4 (80%)	1 (20%)	4 (100%)	0
Ticarcillin/clavulanic acid	3 (60%)	2 (40%)	4 (100%)	0
Ceftazidime	3 (60%)	2 (40%)	2 (50%)	2 (50%)
Cefepime	3 (60%)	2 (40%)	2 (50%)	2 (50%)
Imipenem	4 (80%)	1 (20%)	4 (100%)	0
Meropenem	4 (80%)	1 (20%)	4 (100%)	0
Doripenam	4 (80%)	1 (20%)	4 (100%)	0
Amikacin	4 (80%)	1 (20%)	4 (100%)	0
Tobramycin	4 (80%)	1 (20%)	4 (100%)	0
Gentamycin	3 (60%)	2 (40%)	4 (100%)	0
Ciprofloxacin	4 (80%)	1 (20%)	3 (75%)	1 (25%)
Levofloxacin	4 (80%)	1 (20%)	3 (75%)	1 (25%)

Table No. 5: Antibiotic sensitivity pattern of *Pseudomonas* and *Acinetobacter* spp.

Antibiotic discs used	

	***S.aureus* =6**	
	Sensitive n (%)	**Resistant n (%)**
Penicillin	2(33.33%)	4(66.66%)
Ampicillin	Not tested	Not tested
Oxacillin	2 (33.33%)	4 (66.66%)
HLG (high-level aminoglycoside)	Not tested	Not tested
Vancomycin	6 (100%)	0
Gentamycin	6(100%)	0
Amikacin	6(100%)	0
Tetracycline	3 (50%)	3 (50%)
Ciprofloxacin	3 (50%)	3 (50%)
Levofloxacin	2 (33.33%)	4 (66.66%)
Nitrofurantoin	4(66.66%)	2 (33.33%)
Cotrimoxazole	3 (50%)	3 (50%)
	4 (80%)	1 (20%)

Table No. 6: Antibiotic sensitivity pattern of *S.aureus*

DISCUSSION

Though there is a wealth of information and literature on UTIs in women, investigations focusing solely on the microbiological profile and resistance pattern in male patients are sparse in number. The goal of the current study was to learn more about the clinical factors linked to the organisms that cause UTI in men. Coexisting clinical diseases must be looked into and treated with the

proper antibiotic therapy because male UTI is thought to be difficult.

In the present study the prevalence of UTI was observed to be 20%. This finding was similar to the study performed by the other authors Ahmad S et al and Suhail A. et al., where the prevalence was found to be 20.54% and 32% respectively [15,16] .

As the literature suggests that UTI in males is common in the extremes of life, this study shows a high rate of culture positivity in urine samples was seen in the two extreme age groups of patients i.e., the maximum age of 31-40 years was affected the most followed by 21-30 years of age and least in the age group above 61 years of age (4%). This correlates with the study done by Linhares I et al., who reported an isolation rate of 11.3% in elderly males [17]. In another study done by Vigila CR et al., in South India showed that elderly men are affected by UTI to an extent of 40.53% (age group 61-90 years) [18].

It was noted that the maximum number of isolates were from the gram negative isolates as compared to the gram positive isolates. It was found that *Escherichia coli* (50%) was the most common isolate followed by *Klebsiella pneumoniae* (30%) and least for *Acinetobacter baumannii* with (8%). This study was similar to the study performed by the other author where the rate of *Escherichia coli* was the most common isolate followed by *Klebsiella pneumoniae* . In the present study the rate of Cefotaxime was 95% Ampicillin, Cefepime, Amikacin was observed to be 90%, resistant for *E.coli* . Low resistant was observed for Meropenem, Doripenem and Cotrimoxazole.

In case of *K. pneumoniae* there was no resistant observed for Meropenem, Doripenem and Imipenem. In case of *P. aeruginosa* and *Acinetobacter* Piperacillin/tazobactam, Imipenem, Meropenem, Doripenam, Amikacin, Ciprofloxacin and levofloxacin showed low level of resistant. In case of *S.aureus* Vancomycin, Gentamycin and Amikacin were observed to be sensitive.

Similar study was observed by V Haritha et al in 2023, where the results were recorded parallel [19]. All UTIs in immunocompromised patients, males and those associated with fevers, stones, sepsis, urinary obstruction, catheters, or involving the kidneys are considered complicated infections.

Urine culture should always be obtained when a male patient presents with a suspected UTI because UTIs in men are considered complicated by definition and warrant at least seven days of antibiotic therapy. Hence,

diagnosing UTIs and treating them promptly is important.

CONCLUSION

It is important to do a thorough evaluation of the UTI in male patients and make an effort to look into any underlying or concomitant medical issues. These patients' bacteriological profiles and treatment resistance patterns were the same as those of female UTI patients.

Declarations:

Conflicts of interest: There is no any conflict of interest associated with this study

Consent to participate: There is consent to participate.

Consent for publication: There is consent for the publication of this paper.

Authors' contributions: Author equally contributed the work.

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