



Research Article

STUDY ON THE BACTERIOLOGICAL PROFILE OF URINARY TRACT INFECTION AND ANTIBIOTICS SENSITIVITY PATTERN IN A TERTIARY CARE HOSPITAL, JAMNAGAR, GUJARAT

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Abstract- Urinary tract infection (UTI) is defined as a disease caused by microbial invasion of the urinary tract that extends from the renal cortex of kidney to the urethral meatus. Urinary tract infections (UTIs) are among most common bacterial infections that need medical care; accounting for second most common infection after respiratory tract infections in community. Whereas in hospitals, they are the most common hospital acquired infections (HAIs) accounting for 35% of total HAIs. Approximately half population of women will have a UTI during their lifetime. *Escherichia coli* are the most common cause of UTIs. Clean-Catch midstream urine was collected of the patients with history of fever, abdominal pain, dysuria, urgency and frequency. During study 343 urine samples received in microbiology laboratory for culture were processed according to standard protocol. Isolates were identified by conventional phenotypic methods and antibiotic sensitivity determined by standard Kirby Bauer disc diffusion method and follow Clinical and Laboratory Standards Institute (CLSI) guidelines. In this study 86 (25.07%) patients out of 343 were shown to be urine culture positive out of them 54 (62.79%) females and 32 (37.21%) males. The most isolated bacterium was *E. coli* with frequency rate of 54 (62.79%). The other bacteria were *Klebsiella* spp. 20(23.26%), *Pseudomonas* spp. 07 (8.14%), and other gram negative bacteria 05 (5.81%). The study suggests that Gram-negative bacilli were responsible for UTI infections. The most common isolated organism from urinary tract infections were *E. coli* followed by *Klebsiella pneumoniae*. The most effective antimicrobial agents were Imipenem and Piperacillin-tazobactam and the least effective one was cephalexin.

Keywords- Female, Urinary tract infection, Antimicrobial susceptibility, *E. coli*

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Introduction

Urinary Tract Infections (UTIs) have been proven to be one of the most common bacterial infection in humans [1, 2], affecting all the age groups and gender in both the community and hospital setups [3, 4]. Most of all females will experience at least an episode of UTI during their lifetime [5]. Urinary tract infections (UTI) are common among adult men and women; although the incidence is higher among women due to their anatomical structure of female urogenital system, females have short urethra and close proximity of urethral meatus to anus [6, 7]. Higher prevalence is seen among women during pregnancy and in those females who are very sexually active [8]. Asymptomatic bacteriuria denotes significant bacteriuria without symptoms of urinary tract infections (such as frequency, urgency, dysuria or fever) or other abnormal findings. UTI is an infection that affects any part of the urinary tract from the urethral meatus to the renal cortex of kidney. It is not classified as a sexually transmitted disease [9] although sexual activity is known to be a risk factor in females [10]. Frequent and/or painful urination, a feeling to urinate despite having an empty bladder, fever and flank pain are the symptoms of UTI. At times, pyuria and/or haematuria may be seen [11]. Antimicrobial drug resistance in the treatment of UTI and other bacterial infections constitute a major public health concern especially in the developing countries. Misuse of antibiotics as well as fake and substandard medications, including antibiotics are common in these countries [12, 13]. This study is aimed to determine types and level of antimicrobial drug susceptibility of bacterial uropathogens isolated from female patients with symptomatic UTI and attending a tertiary care hospital, Jamnagar. This will help to decrease misuse of antibiotics and development of resistance.

Material and Method:

This study was carried out at tertiary care hospital, Jamnagar (Gujarat) between from 1st January to 31st March-2019. Total 343 patients with clinical manifestation of UTI were included in the study. Clean catch mid-stream urine was collected from each patient in sterile screw capped container which were distributed to patients. Each specimen was appropriately labelled, transported to the microbiology laboratory of Shri M. P. Shah Medical College, Jamnagar as early as possible. After receiving samples to laboratory, MacConkey agar, Blood agar were prepared per their manufacturing specification and sterilized in the autoclave by heating at 121°C for 15 minutes. The sterilized media were poured aseptically into petri dish and allowed to solidify. Each urine sample inoculated on it by using sterile calibrated loop and then agar plate incubated at 37°C for 24 hours in incubator with proper labelling. On next day, identification of bacterial isolates was done on basis of their culture, gram staining and biochemical characteristics. The antibiotics susceptibility of pure culture was performed on Muller Hinton agar using the standard Kirby bauer disk diffusion method. Standard inoculum suspension prepared of each isolate into peptone water in test tube by adjusting to match 0.5 McFarland turbidity standard which was approx. 1.5×10^8 CFU/ml bacterial suspension. This bacterial suspension was lawn culture on Muller Hinton plates by using sterile wooden cotton swab then allow to dry for 5 minutes. The antibiotics disks Ampicillin-Sulbactam(AS), Cephalexin(PR), Norfloxacin(NX), Ceftriazone(CI), Ciprofloxacin(RC), Tetracycline(TE), Gatifloxacin(GF), Nitrofurantoin(FD), Chloramphenicol(CH), Piperacillin-tazobactam(PT) & Imipenem(IPM) were placed aseptically on agar plate, then Muller Hinton plates incubated at 37°C for 24 hours in incubator with proper labelling.

Next day the zone of inhibition measured of all antibiotics and recorded in millimeter. Susceptibility/Resistance was interpreted according to clinical and laboratory standard institute (CLSI) guidelines [14].

Result and Analysis

This study was carried out at tertiary care hospital, Jamnagar (Gujarat) between from 1st January to 31st March-2019. Total 343 patient's urine samples with clinical manifestation of UTI were received. Out of these, only 86(25.07%) samples found positive microorganism growth. Out of them 54(62.79%) samples were from female patients and 32(37.21%) samples were from male patients. Table-1. This study shows that maximum cases of UTIs were found in old age groups which were 39 (45.35%) Table-2. Out of 86 isolated organisms, 54 (62.79%) were *E. coli*, 20 (23.26%) were *Klebsiella pneumoniae*, and 07 (8.14%) were *Pseudomonas aeruginosa* [Table-3].

Table-1

Total	Positive	Male	Female
343	86 (25.07%)	32 (37.21%)	54 (62.79%)

Table-2 Age group wise distribution of UTIs positive cases

Age groups (Years)	Total (n=86)	Male(n=32)	Female(n=54)
<10	09 (10.46%)	02	07
11-30	20 (23.26%)	09	11
31-50	18 (20.93%)	06	12
51-80	39 (45.35%)	15	24

Table-3 Frequency of bacterial agent isolated from urine samples

Organism	No. of isolation (%) (n=86)
<i>Escherichia coli</i>	54 (62.79%)
<i>Klebsiella pneumoniae</i>	20 (23.26%)
<i>Pseudomonas aeruginosa</i>	07 (8.14%)
Others (Acinetobacter & Proteus)	05 (5.81%)

Table-4 Antibiotics sensitivity pattern of isolated organisms

Antibiotics	Sensitivity (%) (n=86)
Imipenem (IPM)	82 (95.35%)
Piperacillin-tazobactam (PT)	79 (91.86%)
Chloramphenicol (CH)	61 (70.93%)
Nitrofurantoin (FD)	51 (59.30%)
Gatifloxacin (GF)	32 (37.20%)
Tetracycline (TE)	28 (32.56%)
Ciprofloxacin (RC)	14 (16.28%)
Ceftriazone (CI)	11 (12.79%)
Norfloxacin (NX)	10 (11.63%)
Cephalexin (PR)	09 (10.47%)
Ampicillin-Sulbactam (AS)	08 (09.30%)

Discussion

This study revealed that out of 343 UTIs patients 25.07% found positive bacterial growth which much similar to Angoti *et al.* [15] and Solanki *et al.* [16] study. Similar finding regarding the sex distribution of positive urine samples have reported in a study by Angoti *et al.* [15], Solanki *et al.* [16] and Bency *et al.* [18] (Table-05). In our study, *E. coli* (62.79%) was predominant organism isolated which were similar to study of Angoti *et al.* [15] and Solanki *et al.* [16]. The present study also revealed that maximum positivity found in old age group which can compared with Bency *et al.* [18] study (Table-05).

Table-5 Comparison of other studies

Different Studies	Positivity (%)	Female	<i>E. coli</i>	50-80 Years
Angoti <i>et al.</i> [15]	24.96%	62.47%	55.38%	-
Solanki <i>et al.</i> [16]	21.68%	63.87%	65.97%	-
Singh VP <i>et al.</i> [17]	33.30%	45.40%	33.30%	-
Bency <i>et al.</i> [18]	-	63.30%	74.26%	59.78%
Present study	25.07%	62.79%	62.79%	45.34%

Conclusion

The study revealed that urinary tract infection is much more common in female gender due to their differing anatomy. *E. coli* is the predominant isolated pathogen in UTIs patients and study shows that bacterial isolates were resistant to the commonly prescribed antimicrobial drugs. The antimicrobial resistance pattern suggests that Nitrofurantoin(FD), Chloramphenicol(CH), Piperacillin-tazobactam(PT) & Imipenem(IPM) are more appropriate to treat the UTIs than routinely prescribed antimicrobial drugs like Ampicillin-Sulbactam(AS),

Cephalexin(PR) Norfloxacin(NX), Ceftriazone(CI), Ciprofloxacin(RC), Tetracycline(TE), Gatifloxacin(GF).

Application of research: Study of appropriate measure may help to reduce UTIs, we recommend routine UTIs screening of high risk group like female gender, pregnancy, hospitalised patients, indwelling catheter and married individual to prevention of UTI at lower cost.

Research Category: Urinary tract infection

Abbreviations: UTI- Urinary tract infection, HAI- Hospital acquired infection

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Study area / Sample Collection: Department of Microbiology, M.P.Shah Govt. Medical College, Jamnagar, 361008, Gujarat, India

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