

Prevalence of Urinary Tract Infection and the Antibiotic Sensitivity Pattern of the Most Common Uropathogen from a Tertiary Care Hospital of Jamshedpur

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ABSTRACT

Introduction: Urinary tract infections are one of the most common infections encountered and pose a major threat to public health. Strict antibiotic policies based upon the knowledge of regional susceptibility pattern, may be of great help for the clinicians and also prevent emergence of resistant strains of pathogens.

Aim: The aim of this study was to observe the prevalence and analyse the antibiotic sensitivity pattern of the most commonly isolated uropathogen in urinary tract infection.

Materials and Methods: In this study a total of 338 urinary samples of suspected urinary tract infections were collected from the microbiology laboratory of M.G.M. Medical College and Hospital, a tertiary care hospital. The age and sex of patients, the organisms isolated and antimicrobial susceptibility profile of the most frequently isolated uropathogens was observed.

Results: Out of 338 samples suspected of UTI 118 samples showed positive growth in MacConkey agar. Antibiotic susceptibility test was done by disc diffusion method. The most frequently isolated uropathogen was E.coli ie 51% and the antibiotic susceptibility pattern of E.coli was observed.

Resistance to the commonly used drugs was high.

Conclusion: Drug resistance has become a global problem these days so proper surveillance and coordination with the clinicians is required for the judicious selection of effective empirical treatment of UTI.

Keywords: Antibiotic Sensitivity Pattern, Prevalence, Urinary Tract Infection, Uropathogen.

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INTRODUCTION

Urinary tract infections are one of the most common and prevalent infection in the community. UTI are commonly encountered diseases by clinicians in developing countries with an estimated annual global incidence of at least 250 million.^{1,2} Emergence of resistant strains have posed a big challenge in dealing with urinary tract infections. The pattern of resistance observed varies from hospital to community, large hospital to small hospital state to state and even vary from country to country.³

Clinically UTI is divided into two categories uncomplicated and complicated. Complicated UTI is due to the factors that compromise the urinary tract which include urinary obstruction neurological disease causing urinary retention, renal failure, renal transplantation pregnancy and the presence of foreign bodies such as calculi indwelling catheter or other drainage devices.⁴

Emergence of drug resistance among the uopathogens isolated have posed a big challenge in dealing with urinary tract infections. The misuse of antibiotics and poor patient compliance have further aggravated the problem The emergence of resistance to such drugs is a natural biological phenomenon.⁵

The empirical treatment and management of UTI have made the matter worse The estimation of local etiology and susceptibility profile could support the most effective empirical treatment² Hence the basis for antimicrobial agent selection should be based upon the expected resistance pattern of that geographic area.⁶ Considering the above facts this study was conducted to know the prevalence of the disease, causative organisms and also the antibiotic sensitivity pattern of the most frequent pathogen isolated.

MATERIALS AND METHODS

This study was an observational study carried out at Microbiology Department of M.G.M Medical College and Hospital Jamshedpur during the period between June 2017 to January 2018. The study included all the patients who were admitted or visited the outdoor of the hospital with signs and symptoms of urinary tract infection. A total of 338 midstream urine samples were taken for study in a wide mouthed sterile universal sample container. Contaminated/ non sterile samples were discarded and not processed.

Isolation and Identification of Organisms

Isolation of uropathogens were performed by using a calibrated nichrome wire loop of 0.01 mm diameter and were plated on Macconkey agar and incubated aerobically at 37degree Celsius for 24 hrs. Cultures were then examined and colonies were counted. A growth of >=10⁵ colony forming units/ml was considered as significant bacteria suggestive of UTI. Bacterial isolates were identified using standard microbiological techniques.⁷

Antibiotic Susceptibility Testing

Antimicrobial susceptibility testing of the E.coli isolates was performed by Kirby Bauer disc diffusion method and the interpretation was done according to Clinical and Laboratory Standards Institute (CLSI) guidelines 2017.⁸

All E.coli isolates were tested for their antibiotic sensitivity pattern against the following panel of antibiotics: Cefotaxime(30 microgram), Ampicillin (10 microgram), Levofloxacin(5 microgram), Trimethoprim/ Sulfamethoxazole (1.25/23.75 microgram), Nitrofurantoin (300 microgram), Piperacillin-Tazobactam (100/10 microgram), Amikacin (30 microgram), Gentamycin (10 microgram). All antibiotics discs were obtained from (Hi-Media Labs Mumbai India). Plating of the suspension was done on Mueller Hinton agar plates by lawn method and then incubated at 37 c for 24 hrs.

Disks were placed 20 mm apart on Mueller Hinton agar medium inoculated with 0.5 McFarland suspension of the tested bacterial isolate. Plates were incubated at 37 c for 24 hrs.

Table 1: Age and sex predilection of the urinary pathogens.

Age	Male(n=34)	Female(n=64)
<18	2 (5.88%)	7 (10.9%)
18-45	4 (14.70%)	46 (71.87%)
>45	28 (79.41%)	11 (17.18%)

Table 2: Antibiotic sensitivity pattern of E.coli isolates

ANTIBIOTICS	Percentage Sensitivity
Ampicillin	12(10.16%)
Trimethoprim/sulfomethaxazole	09(7.62%)
Amikacin	33(27.9%)
Gentamycin	29(24.57%)
Cefotaxime	22(18.64%)
Levofloxacin	30(25.42%)
Piperacillin/Tazobactam	52(44.06%)
Nitrofurantoin	45(38.13%)

RESULTS

A total of 338 urine samples were collected from symptomatic patients of urinary tract infections out of which 118 samples yielded positive culture growth. The overall prevalence was 34.9%. Among these isolates the no. of isolates identified as E.coli were 61(51.6%) followed by Klebsiella spp. 22 (18.6%), Pseudomonas 15 (12.7%), Proteus 9 (7.6%), Staphylococcus aureus 01 (0.8%), coagulase negative Staphylococcus 01 (0.8%) Candida spp. 9 (7.6%). The overall prevalence of UTI was found to be 34.91%.

The prevalence of the disease was more in females (54.23%) than in comparison with to males (28.81%). In females more cases were seen in the age group 18-45 years. Whereas in males more than 45 age group was most affected. Since the most common urinary pathogen isolated was E.coli so the antibiotic susceptibility pattern of the organism was observed.

DISCUSSION

Urinary tract infection is one of the most common cause for seeking medical attention in the community.⁹ The prevalence of UTI was found to be 34.9%. These findings corroborate with other studies from India.^{10,11} E.coli is the most common organism causing UTI which accounts for up to 90% of cases. P.mirabilis, Klebsiella spp., P. aeruginosa and Enterobacter spp. are less frequent offenders. Gram-positive organisms are less common which includes Group B Streptococcus, S. aureus, S. saprophyticus and S.haemolyticus.¹²

In this study the incidence of E.coli was found to be 51.6% and was the most common Gram-negative uropathogen to be isolated. These findings were similar to the studies done by (Devanand et al.¹³, Smita et al.¹⁴, Mulugeta et al.¹⁵) where incidence was found to be 42.58%, 61.84%, 63.30% respectively and it was also the most common uropathogen in these studies.

Higher prevalence of UTI was seen in females (54.23%) than in males (28.81%). These findings were similar to the studies done by Devanand et al.¹³ who observed that E.coli bacteraemia is twice more common in females than males. The reason behind the high prevalence of UTI in females is due to close proximity of the urethral meatus to the anus, shorter urethra, sexual intercourse, incontinence, and bad toilet.¹³ High incidence of UTI in males above 45 years may be due to some underlying clinical condition that is prostatitis, epididymitis, diabetes, immunosuppressive treatment etc.

The increasing pattern of resistance is becoming a universal threat. In this study antibiotic susceptibility was done on the most frequently isolate i e. E.coli. High degree of resistance was seen against Ampicillin, cotrimoxazole, cefotaxime. Higher sensitivity was shown by Piperacillin/Tazobactam (44.06%), Nitrofurantoin (38.13%) followed by Amikacin (27.9%), Gentamycin (24.57%), Levofloxacin (25.42%). Araghya Das et al.¹⁸ in his study observed highest resistance to Ampicillin, Fluroquinolones, Ceftriaxone whereas Gentamycin & Nitrofurantoin were the antibiotics to which the organisms were most sensitive hence Nitrofurantoin can be preferred instead of Cotrimoxazole for empiric treatment. It is advisable to collect urine samples for culture and susceptibility testing before the administration of antibiotics. Inappropriate, rapid and rampant, without proper prescription use of antibiotics has led to the emergence of resistance and hence should be discouraged.

CONCLUSION

The present study shows high degree of resistance to commonly used antibiotic. Strict antibiotic policies and avoidance of indiscriminate use of antibiotics may prevent the emergence of resistant strains. Empirical antibiotic treatment / therapy should depend upon the knowledge of local prevalence of micro-organisms and their antibiotic susceptibility patterns and not just universal guidelines. Early detection of resistance strains can help to avoid the treatment failure. Regular surveillance and monitoring

of the population should be undertaken and proper coordination with the physician upon the updated antibiotics sensitivity pattern is the need of the hour so as to prevent the emergence of resistant strain. Measures should be taken to standardise empirical therapy. Hospitals should prepare their antibiograms in order to combat the problem of antibiotic resistance.

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