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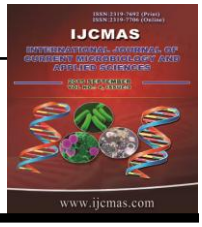

Original Research Article

Urinary Tract Infection: Study of Microbiological Profile and its Antibiotic Susceptibility Pattern

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A B S T R A C T

Urinary tract infections (UTIs) are counted among the most common infections in humans. In spite of the availability and use of the antimicrobial drugs, UTIs caused by bacteria have been showing increasing trends. The extensive and inappropriate use of antimicrobial agents has invariably resulted in the development of antibiotic resistance which, in recent years, has become a major problem worldwide. Patients diagnosed clinically as UTI during the study were included in the study. Urine sample of these patients were tested by microscopy &Culture. All positive cultures were tested for antibiotic susceptibility. Out of total 732 patients, isolates were detected in 314(42.89%) samples. Out of these, 64.01%were female. Most common microbial agent isolated was *Escherichia coli (E.coli)* . *E. coli* was highly sensitive to Amikacin and Ceftriaxone. Whereas, E.coli was highly resistant to Ciprofloxacin and Nalidixic acid. Antibiotic sensitivity pattern of Gram positive organism shows that they were highly sensitive to Kanamycin and Tobramycin and resistant to Amikacin. The pattern of resistance to commonly used antibiotics for treating UTI alerts us against indiscriminate usage of antibiotics

Keywords

Urinary tract infection, Microbial agent, Antibiotic resistance

Introduction

Urinary tract infections (UTIs) are counted among the most common infections in humans, exceeded in frequency among ambulatory patients only by respiratory and gastrointestinal infections (Levi *et al.*,2005) (Shalini *et al.*,2011). Urinary tract infection is said to exist when pathogenic microorganisms are detected in the urine, urethra, bladder, kidney, or prostate with or without the presence of specific symptoms.

It is estimated that 20% or more of the female population suffers some form of UTI in their lifetime. Infection in the male population remains uncommon through the fifth decade of life, when enlargement of the prostate begins to interfere with emptying of the bladder. The most common pathogenic organisms of UTI are *Escherichia coli, Staphylococcus saprophyticus* and less common organisms are *Proteus sp.,*

Klebsiella pneumoniae, *Pseudomonas aeruginosa*, *Enterococci sp.* and *Candida albicans* (Salek, S.B.1992).

Treatment of UTI cases is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens. In spite of the availability and use of the antimicrobial drugs, UTIs caused by bacteria have been showing increasing trends.

The extensive and inappropriate use of antimicrobial agents has invariably resulted in the development of antibiotic resistance which, in recent years has become a major problem worldwide. (Goldstein,F.W.2000) In patients with suspected UTI, antibiotic treatment is usually started empirically, before urine culture results are available. To ensure appropriate treatment, knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory (Ashkenazi et al., 1991).

This study was planned to explore the common pathogens responsible for UTI and to determine the antibiotic susceptibility pattern of them.

Materials and Methods

Sampling

In total, sample of 732 patients with clinical symptoms of UTI were investigated at infeXn laboratories pvt.Ltd. Clean-Catch midstream urine of the patients was collected in a sterile tube (4-5 ml) and immediately transported to the laboratory. Guidelines for proper specimen collection were given to all patients on a printed card.

Bacterial colony count of bacteria in UTI

A measured amount of urine, using calibrated loop method was inoculated to nutrient agar medium for colony count. Equal or more than 10^4 CFU/ml of a single potential pathogen or for each of two potential pathogens interpreted as positive UTI and a result of 10^2-10^4 CFU/ml was repeated. A less than 10^2 CFU/ml was interpreted as negative UTI. (Schneider et al., 1996). Urine specimens were cultured for isolation of the microbial agents of UTI on blood agar and MacConky agar media. (Forbes *et al.*, 2007). All the bacteria isolated from urine in this study were identified and Antimicrobial susceptibility testing was done by using phenoix ver.6.01.system

Result and Discussion

In this study, urine sample of total 732 patients clinically diagnosed with urinary tract infection was collected and tested for microorganism. Out of total 732 patients, Isolates were detected in 314 (42.89%) samples. Out of these 314 total growths, 64.01% were female and 35.99% were male. Most common organism isolated were gram negative (GN) organisms (81.84%) most common being (51.27%) *Escherichia Coli* followed by *Klebsiella sp.* Gram positive (GP) isolate constitute 9.23% and *Candida sp.* constitutes 8.91% of total. (Table 1)

Table 2 & 3 shows percentage of Antibiotic Sensitivity Pattern of gram positive and gram negative organism. It was seen that E. coli (most common GN) was highly sensitive to Amikacin and Piperacillin - tazobactam. Antibiotic sensitivity pattern of Enterococcus sp.(most common GP) shows that they were 100% sensitive to Kanamycin and Tobramycin followed by Ampicillin (85%).

Urinary tract infections are common conditions worldwide and the pattern of antimicrobial resistance varies in different

regions. We describe the relationships between sex, isolated bacterial agents and antibiotic resistance of UTIs. In the United States, UTIs account for seven million office visits and 100,000 hospitalizations yearly, making them the most common bacterial infections in outpatient settings (Foxman *et al.*, 2002).

The uropathogens identified in our study are similar to those of many other studies conducted in different countries either in the region or internationally, (Astal *et al.*,2002) however different results have been reported. The similarities and differences in the type and distribution of uropathogens may result from different environmental conditions and host factors, and practices such as healthcare and education programmers, socioeconomic standards and hygiene practices in each country.

In our study the prevalence rate of isolation of urinary pathogen was 42.89%,in a similar study by Das *et al.*,2006 isolation rate is 71.6%.Another study done in Karnataka has reported 71.72% prevalence rate of isolation of urinary pathogen.(Razak *et al.*,2012)

Table.1 Gender wise distribution of various urinary pathogens

Isolate	Female	Male	Total
E.coli	107	54	161
Klebsiella sp.	30	14	44
Enterococcus sp.	15	13	28
Candida sp.	21	07	28
Pseudomonas sp.	09	13	22
Enterobacter sp.	13	05	18
Proteus sp.	06	06	12
Staphylococcus aureus	00	01	01
Total Growth	201	113	314
Total no growth	260	158	418
Total	461	271	732

Table.2 Percentage of In Vitro Antibiotic Sensitivity Pattern of Isolated Gram negative urinary pathogen

ISOLATE→ DRUGS ↓	*E.coli (%)*	*Klebsiella sp. (%)*	*Pseudomonas sp. (%)*	*Proteus sp. (%)*	*Enterobacter sp. (%)*
Amikacin	91	70	60	60	60
Ampicillin	40	25	8	35	10
Gentamycin	45	20	20	40	50
Ciprofloxacin	30	25	20	50	50
Cotrimoxazole	35	20	0	25	50
Nitrofurantoin	40	30	10	40	30
Nalidixic acid	30	10	10	60	60
Norfloxacin	33	30	10	00	50
Ceftriaxone	60	50	30	30	70
Piperacilin-tazobactam	90	85	20	50	100

Table.3 Percentage of In Vitro Antibiotic Sensitivity Pattern of Isolated Gram positive urinary pathogen

ISOLATE ⟶ / DRUG ↓	*Enterococcus sp. (%)*	*Staphylococcus aureus (%)*
Amikacin	10	00
Ampicillin	85	00
Penicillin	25	100
Amoxicillin	75	100
Kanamycin	100	100
Nitrofurantoin	35	100
Linezolid	100	100
Vancomycin	100	100
Tobramycin	100	100

The sex distribution of patients in our study is consistent with those of other reported studies, showing a statistically predominance of females with UTI (64.01%of the positive cultures). This result is similar to those reported from many other centers (Abu *et al.*,2000). The elevated incidence of infection among females is related to differences between the male and female genitourinary systems in anatomy and micro flora (Strom *et al.*,1987).

The prevalence of Gram-positive cocci is not high in our study; this is similar to other studies in different countries.(Astal *et al.*,2002) (Kothari *et al.*,2008) Apart from the Gram-positive isolated in urine, the other isolates are inhabitants of the large bowel. The Enterobacteriaceae family is the most common microorganism isolated of Urinary tract infection.

The most commonly isolated organism in UTI isolated in our study is *E. coli*. The proportion of bacterial species isolated is similar to those described in several previous studies (Andrade *et al.*,2006; Gupta et al.,1999; Zhanel *et al.*,2005). The most frequently isolated organisms (*E.coli*& *Klebsiella* spp) show resistance to commonly used antibiotics like Ampicillin, Norfloxacin and Nalidixic acid. This high resistance of antibiotics is attributable partly to self medication, which is very common in the community and partly due to treatment of patients by the physicians without proper diagnosis in the laboratory.(Khalil *et al.*,2008)

In our study the most commonly isolated GN bacilli i.e *E.Coli* is highly sensitive to Amikacin and Ceftriaxone which is consistent with study conducted by Mansour Amin *et al.*,2009 and in contrast with for Ciprofloxin which is less active against E.Coli in our study. Similar comparable findings is found in case of *Klebsiella sp.*

Isolated Gram-positive cocci are fully sensitive to Kanamicin and Tobramicin. This study is comparable with the results reported by Astal *et al.*,2002 and McIsaac *et al.*,2004 On the basis of this study we can conclude that the resistance of commonly used antibiotic is very crucial. The antibiotic treatment should be limited to symptomatic urinary tract infections (except in certain situations) and be initiated after sensitivity testing only.

In conclusion, Urinary Tract Infection was more common among females than males.

E. coli was the most commonly isolated microorganisms in UTI. Urinary pathogens showed resistance to commonly used antibiotics like Ampicillin, Norfloxacin and Nalidixic acid. This pattern of resistance to commonly used antibiotics for treating UTI alerts us against indiscriminate usage of antibiotics. As drug resistance among pathogens is an evolving process, routine surveillance and monitoring studies should be conducted to provide physicians with knowledge about the most effective empirical treatment of UTIs. All efforts to minimizing the spread of resistant bacteria through appropriate infection control would be quite important and may represent a first step in resolving the issue of resistant microorganisms.

References

Abu, Shaqra, Q. 2000. Occurrence and antibiotic sensitivity of Enterobacteriaceae isolated from a group of Jordanian patients with community acquired urinary tract infections. *Cytobios.*101: 15-21

Andrade, S.S., Sader, H.S., Jones, R.N., Pereira, A.S., Pignatari,A.C.,and Gales, A.C. 2006. Increased resistance to first-line agents among bacterial pathogens isolated from urinary tract infections in Latin America: time for local guidelines? Mem Inst Oswaldo Cruz., 101:741-748

Ashkenazi, S., EvenTov, S., Samra Z., *et al.* 1991.Uropathogens of various childhood populations and their antibiotic susceptibility. Pediatr Infect Dis J. 10: 742–6

Astal, ZY., and Sharif FA. 2002.Relationship between demographic characteristics and community-acquired urinary tract infection.*EMHJ.* 8(1): 164-71

Das, R. N., Chandrashekhar, T. S., Joshi, H. S., Gurung, M., Shrestha, N., and Shivananda, P. G. 2006. Frequency and susceptibility profile of pathogens causing urinary tract infections at a tertiary care hospital in western Nepal. Singapore Med J. 47(4): 281

Forbes, BA., Sahm, DF., Weissfeld, AS.,Bailey and Scott's. 2007. Diagnostic microbiology, 12tedition, Mosby Elsevier. 842-55.

Foxman, B. 2002.Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. *Am J Med*. 113(suppl):5S-13S

Goldstein, F.W. 2000. Antibiotic susceptibility of bacterial strains isolated from patients with community-acquired urinary tract infections in France. Multicentre Study Group. Eur J Clin Microbiol Infect Dis.19:112-7

Gupta, K.D., Scholes, W.E., Stamm. 1999. Increasing prevalence of antimicrobial resistance among uropathogens causing acute uncomplicated cystitis in women. Journal of theAmerican Medical Association. 281: 736-738

Khalil, Ahmed., and Imran. 2008. Prevalence and Antibiogram of Uncomplicated Lower Urinary Tract Infections in Human Population of Gilgit, Northern Areas of Pakistan. Pakistan J. Zool.40(4): 295-301

Kothari, A.,and Sagar, V. 2008. Antibiotic resistance in pathogens causing community-acquired urinary tract infections in India: a multi center study. *J Infect Developing Counties.*. 2(5): 354-8

Levi M.E., Redington,J., and Barth, L. 2005. The Patient With Urinary Tract Infection. Manual of Nephrology 6th Edition. Lippincott Williams &

Wilkins. 7: 91

Mansour, A., Manijeh, M., Zohreh, P.2009. Study of bacteria isolated from urinary tract infections and determination of their susceptibility to antibiotics. Jundishapur Journal of Microbiology. 2(3): 118-123

McIsaac, W.J., Mazzulli, T., Moineddin, R,,Raboud, J., Ross, S. 2004. Uropathogen antibiotic resistance in adult women presenting to family physicians with acute uncomplicated cystitis. *Can J Infect Dis Med Microbiol*. 15: 266-70

Razak,S.K., and Gurushantappa V. 2012. Bacteriology of urinary tract infection and antibiotic susceptibility pattern in a tertiary care hospital in South India. Int J Med Sci Public Health.1:109-112

Salek, S.B.1992. Infective syndrome in medical microbiology,4th edition, pp. 740

Schneider, PF.,and Riley, TV. 1996.*Staphylococcus saprophyticus* urinary tract infections: Epidemiological data from Western Australia. *Eur J Epidemiology*.12: 51-4

Shalini., Joshi, MC., Rashid, MK., and Joshi, HS.2011. Study of Antibiotic Sensitivity Pattern In Urinary Tract Infection At A Tertiary Hospital. NJIRM; Vol. 2(3): 43-46

Zhanel, G.G., *et al*. 2005. Antibiotic resistance in outpatient urinary isolates: final results from the North American Urinary Tract Infection Collaborative Alliance (NAUTICA). Int JAntimicrob Agents. 26:380-388.