A Prospective Study of Patterns of Urinary Tract Infections & Antibiotic Sensitivity In Rural Setting of Mirpurkhas.

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ABSTRACT:

BACKGROUND:

Urinary tract infection (UTI) is a common infection which can be caused by a variety of bacteria. The distribution of bacteria and effectiveness of antibiotics to those bacteria causing UTI can be different in different regions.

OBJECTIVE:

To determine the frequency of the various organisms causing urinary tract infection, as well as finding their sensitivity to various antibiotics in patients attending Urological OPD of Muhammad Medical College.

MATERIAL AND METHODS:

Between 1" Oct 2008 to 31" Jan 2009, urine samples were collected from 457 patients attending urology outpatient with clinical diagnosis of UTI prospectively. 152 met the exclusion criteria. Remaining 305 samples were cultured. 111 were sterile and 194 had positive culture. Of these 194 patients with confirmed UTI, 131 were male and 63 females. The sensitivity was tested for 15 commonly used drugs.

RESULTS:

The commonest causative organism was Escherichia coli (E. Col), which was present in 78 (40H%) samples. This is half the number of E. Coli induced infection found in studies conducted in other parts of the world. 45 (23) grew Klebsiella and 33 (17%) grew Staphylococcus. More than 70% of samples were sensitive to Amikacin (149, 77%), Fosfomycin (144, 74%) and Imipenem (144, 74%6).

CONCLUSION:

The distribution of bacteria causing urinary tract infection and their sensitivity to various antibiotics are different from those reported in most standard textbooks and guidelines.

KEYWORDS:

Infection, urinary tract, sensitivity, antibiotics.

INTRODUCTION:

Infections of the upper and lower urinary tract account for more than 6 million office visits per year in the US., costing tore than $2.5 billon annually[1,2,3]. Since 50% to 60% of women report at least one urinary tract infection (UTI) in their lifetime, UTIs have become a common condition diagnosed and treated by gynecologists, urologists, and other health care providers for women[4].

UTIs are mostly found in women, occurring in an 8:1 ratio in women to men[5].

UTs are defined as infectious processes that occur anywhere in the urinary system, involving the urethra, bladder, ureters, or kidneys. Some clinicians use the tens complicated and uncomplicated to further delineate these infections. Complicated UTs refer to those infections that result in treatment failure or complications (i.e., pyelonephritis or renal scarring). In addition, complicated UTIS Include certain populations such as pregnant women, males, persons with any of the co morbid conditions like diabetes or renal disease, a recent history of a UTI, or urinary tract anomalies [6,7.8,9,10].

As the pattern of bacteria causing UTI differs, it is suggested that one will have knowledge of the local susceptibility profile of the community's common pathogens and use this to tailor empiric treatment decisions[11]. Recant rapports by several groups have documented emergence of resistant uropathogens in UTIs[12] .

Hence we decided to prospectively study the various organisms causing UTI and their sensitivity to commonly used antibiotics at a large 500 bedded teaching hospital in Mirpurkhas.

PATIENTS AND METHODS:

During 1 Oct 2008 to 31* Jan 2010 a total of 457 samples of midstream urine sent to the pathological laboratory of Muhammad Medical College, Mirpurkhas from the Urology outpatients were examined prospectively.

Exclusion criteria included the patients who had received any antibiotic within 72 hours of sample collection. Any patient with instrumentation in urinary tract like urethral catheterization or cystoscopy was excluded from the study. Those with presence of stones or tumors were also excluded. Those who did not have numerous pus cells on microscopic examination were also excluded. 152 patients met one or more exclusion criteria and were excluded from the study. Urinary samples of remaining 305 patients

were cultured. Of these, 111 were sterile whereas 194

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grew bacteria and their sensitivity to various antibiotics was assessed.

All the patents were provided with white mouthed, tightly closed, sterilized bottles. The bottles were sterilized in hot air ovens by dry heat at 160 degrees C for 1 hour. The patients were advised to collect clean-catch, mid-stream specimen of urine. The patients were asked to produce the specimen to lab within 30 minutes of collection. With the help of 1 mm sterilized, microme-wire loop, the samples were obtained from uncentrifuged urine specimen and were streaked on blood gar, MacCkonkey agar, and CLEB medium at the same time, according to standard procedure. After streaking, the plates were kept in the incubator at 35-37 degrees C for 18-24 hours. When growth was obtained on any of the media, the identification of pathogen was confirmed by observation of colony characteristics, gram staining, and biochemical staining using different tests.

For determination of sensitivity, standard antibiotic test tablets (Evan) Kirby-Bauer antibiotic testing (K-B testing) or disc diffusion antibiotic testing was used. Antibiotic impregnated wafers were used to test whether particular bacteria were susceptible to specific drugs. A known quality of bacteria was grown on agar plates in the presence of thin wafers containing relevant antibiotics. If the bacteria were susceptible to a particular antibiotic, the area of clearing surrounded the wafers where bacteria were incapable of growing (Zone of Inhibition).

RESULTS:

A total of 457 patients were referred from Urology Outpatient of Muhammad Medical College Hospital (MMCH) with provisional diagnosis of UTI. 152 met the exclusion criteria and were therefore not included. All remaining patients had symptoms of dysuria and frequency of micturition. Other urinary symptoms were sometimes present. Pathogens were cultured from 194 specimen, whereas 111 were sterile.

AGE RANGE:

The age range of the patients according to gender distribution is given below:

AVERAGE AGE OVERALL:

Average age in positive culture	40 Years
Average age in negative culture	35 Years

- In Females:

Average age in positive culture	38 Years
Average age in negative culture	31 Years

- In Males:

Average age in positive culture	44 Years
Average age in negative culture	38 Years

UTI Pathogens:

Table-1

Bacteria	No. of Patients Affected	Percentage
E. Coli	78	40.2%
Klebsiella	45	23.2%
Staphylococcus	33	17%
Enterobacter	12	6.2%
Pseudomonas	9	4.6%
E. Faecalis	7	3.6%
Proteus	4	2%
Salmonella	2	1%
Citrobacter	2	1%
Serratia	2	1%

Bacterial Sensitivity to Antibiotics:

The most effective antibiotics showing sensitivity to overall over 70% of cases were Amikacine, Fasfomycine, and Imipemen. Table 2 show the overall sensitivity to various antibiotics.

Table-2

Antibiotics	No. of cases sensitive	% Sensitive
Amikacine	149	77%
Fosfomycine	144	74%
Imipemen	144	74%
Cotrimoxazole	103	53%
Amoxycillin	95	49%
Vancomycin	74	38%
Augmentin	74	38%
Ceftazidime	68	35%
Ampicillin	68	35%
Cefotaxime	64	33%
Ofloxacin	60	31%
Pipemedic Acid	60	31%
Ciprofloxacin	48	25%
Cephradine	48	25%
Cefuroxime	46	24%

DISCUSSION:

UTLs are mostly found in women, occurring in an 8:1 ratio in women to men9. However in our study, more men than women had UTI. The cause may be that the Urology department of MMCH is very renowned for endoscopic treatment of Prostate and people come from all over Sindh to attend it. Hence older men with enlarged prostate and UTIs were sent more often for urine culture and sensitivity.

Common pathogens that have been implicated in UTIs are primarily gam-negative organisms with Escherichía coli having a prevalence of 80%. Other gram-negative pathogens include Klebsiella pneumoniae, Enterobacter species, Proteus mirabilis, Pseudomonas aeruginosa, and Citrobacter[13.14.15.16,17.18,19,20,21,22].

In our study, we also found that Escherichia coil was the commonest organism found. But its prevalence was half of that reported above, i.e. 40%. The second commonest was Klebsiella but the third commonest organism found was Staphylococcus. Although guidelines such as Scottish Intercollegiate Guidelines Network (SIGN) are present for treatment of UTIs, it is widely appreciated that geographical and local factors play an important role in type of organism causing infection and resistance pattern[23].

Hence it has been suggested that when the decision is made to treat, local resistance patterns and patient population should be considered[24].

We found that the resistance pattern was alarming. Most writers suggest the use of Trimethoprim, either alone or with Sulfamethoxazole and Quinolines as first line of treatment. We found that Trimethoprim with Sulfamethoxazole and Quinolines including Ofloxacin and Ciprofloxacin were sensitive in only 54%, 31% and 25% patients respectively.

It has been reported that multidrug resistance patterns are emerging. In one study 20% of the cases of community-acquired UTIs were resistant to first-line antibiotic therapy[18] , In that same study, the researchers identified a decline in the incidence of E. coli as the common pathogen from approximately 71% to 56%. In the United States the resistance patterns of uropathogens to specific agents are as follows: trimethoprim and sulfamethoxazole (TMP-SMX), 10% to 20%; ampicillin, 40%; nitrofurantoin, 15% to 20%; fluoroquinolones, < 10%. In addition, recent evidence suggests that cephalosporins are also showing resistance patterns[6,7,8,9,10].

One study showed that the prevalence of E coli resistant to Trimethoprim and Trimethoprim Sulfamethoxazole (TMP/SMX) rose from 9% in 1992 to more than 18% in 1996. Increasing resistance to ampicillin and cephalothin was also seen[12]. Other studies have shown similar trends[25.26].

One guideline has suggested following three antibiotics as first line of treatment for management of UTI in non-pregnant women:

1. Trimethoprim-Sulfamethoxazole: 1 tablet (160 mg trimethoprim-800 mg sulfamethoxazole) twice daily for 3 days.
2. Trimethoprim 100 mg twice daily for 3 days.
3. Ciprofloxacin 250 mg twice daily for 3 days[27].

It is remarkable that the sensitivity of first and third regimen in our study was 53% and 25% respectively (Trimethoprim was not tested separately) This may be due to injudicious use of antibiotics as reported previously[28].

It is also noted that only 3 antibiotics had a sensitivity of over 70%. Two of them are available only for parenteral usage. Only Fosfomycin, which is not recommended in any guideline, was active against bacteria in 74% of UTI. Next orally available antibiotic with highest sensitivity was Co-trimoxazole, which was active against bacteria in 53% of UTI.

Conclusion:

The present study shows that the distribution of bacteria in patients with Urinary Tract Infection in rural regions of Pakistan can be quite different from those reported in international literature. Similarly most infections are resistant to commonly prescribed antibiotics. This may be due to injudicious use of antibiotics. It is therefore necessary to perform large studies in various parts of the country to find prevalence of various organisms in UTI and to find their resistance pattern to various antibiotics. A guideline should then be developed addressing the local condition. Urine should probably be cultured and sensitivity done in more cases of UTIs than not. It appears that in Mirpurkhas, Fosfomycin should probably be the first drug of choice in at least uncomplicated UTIs until the results of culture and sensitivity are back It is also necessary to stop injudicious use of antibiotics to prevent the resistance of organisms to antibiotics from increasing any further.

Conflict of interest:

We hereby declare that there is no conflict of interest in our position and the findings in this study.

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References:

1. Gricbling, T.L (2005). Urologic diseases in America project: Trends in resource use for urinary tract inlections in women. The Journal of Urology.173, 1281-1287.
2. Karram, M., & Siddighi, S. (2008). Lower urinary tract infection. In A.E. Bent, G.W. Cundill, & S.E. Swift (Eds.), Ostergards's urogynocolngy and pelvic floor dysfunction (pp. 148-169). Philadelphia: Lippincottt, Williams and Wilkins.
3. National Center for Health Statistics. (1977), Ambulatory medical care rendered in physicians offices. United States 1975. Advanced Data, 12, 1-8.
4. Foxman, B. (2002). Epiderniology of urinary tract infections: Incidence, morbidity, and economic costs. American Journal of Medicine, 113(Suppl 1A), 5S-13S.
5. Cox, C.E., Lacy, S.S., & Hinman, F. (1968). The urethra and its relationship to urinary tract infection, I. The urcthral flora of the female with recurrent urinary tract infection. The Journal of Urology, 99, 632-638.
6. McLaughlin SP, Carson CC. Urinary tract infections

in women. Med Clin North Am. 2004:88.417-429.
7. Ebell MH. Trealing adult women with suspected T. Am Fam Physician. 2006;73:293-296.
8. Llenerrozos HJ, Urinary tract infections: management rationale lor uncomplicated cystitis. Clin Fam Prac. 2004;6:157-173.
9. Griebling TL. Urologic disease in America project: trends in resource use for urinary tract infections in men, J Urol. 2005:173:1288-1294.
10. Howes DS, Kantor SS. Urinary tract infection, mala. Avalable at: www.emedicine.com/energ/topic625.htm. Accessed May 17. 2007
11. Hooton. T.M., Besser, R., Foxman, B., Fritsche, T.R., & Nicolle, L.E. (2004). Acute uncomplicated cystitis in an era of increasing antibiotic resistance. A proposed approach to empirlcal therapy. Clinical Infectious Diseases, 39(1), 75-80.
12. Gupta K, Scholes D, Stamm WE. Increasing prevalence of antimicrobial resistance among uropathogens causing acute uncomplicated cystitis in women. JAMA. 1999; 281:736-738.
13. McLaughlin SP, Carsorn CC. Urinary tract infections in women. Med Clin North Am. 2004;88:417-429.
14. Ebell MH. Treating adult women with suspected UT. Am Fam Physician. 2006;73:293-296.
15. llenerrozos HJ. Urinary tract infections: management rationale lor uncomplicated cystitis. Clin Farn Prac. 2004:6:157-173.
16. Griebling TL. Urologic disease in America project: trends in resource use for urinary tract infections in men. J Urol. 2005:173:1288-1294.
17. Howes DS. Kantor SS. Urinary tract infection, male. Available at: www.emedicine. com/emerg/topic625.htm. Accessed May 17, 2007
18. Nesher L Novack V Risenberg, et al. Regional community acquired urinary tract infections in Isreall: diagnosis, pathogens and antibiotic guidelines adherence: A prospective study. Int J Infect Dis. 2005:11:245-250
19. Rahn DD, Boreham MK, Allen, KE. et al. Predicting bacteriuria in urogynecology patients. Am J Obstetric Gynecol. 2005;192:1376-1378.
20. Wright OR, Salranek S. Urine dipstick for diagnosing urinary tract infection. Am Farm Physician. 2006:73:129-130.
21. Morgan KL Management of UTIs during pregnancy. MCN Am J Matern Child Nurs. 2004:29:254-258.
22. Mittal P, Wing DA. Urinary tract infections in pregnancy. Clin Perinatol. 2005;32:749-764.
23. Goldıman I, Bennett JC. Cecil Textbook of Medicine. 2lst Edition. Philadelphia: WB Saunders: 200: 616.
24. Mittal P, Wing DA. Urinary tract infections in pregnancy. Clin Perinatol. 2005;32:749-764.
25. Hoolon TM, Stamm WE. Diagnosis and treatment of uncomplicated urinary tract inlection. Infect Dis Clin North Am. 1997, 11.551-581.
26. Talan DA, Stamm WE, Hooton TM. Comparison of ciprofloxacin (7 days) and trimethoprim, sulfamethoxazole (14 days) for acute uncomplicated pyelonephritis in woman: a randomized trial. JAMA. 2000; 283.1583-1590.
27. Barclay L. New Guidelines for Management of Urinary Tract Inflection in Nonpregnant Women Obstet Gynecol. 2008;111:785-794.
28. Warren JW, Abrutyn E, Hebel JR et al. Guidelines lor antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Clin Infect Dis. 1999:29:745-758.