IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 16, Issue 6 Ver. VI (June. 2017), PP 69-72
www.iosrjournals.org

Comparison of Bacteriological Profile & Antibiotic Susceptibility Pattern of Community Acquired & Nosocomial Urinary Tract Infection

[1]Dr.Nisha Majeed, [2]Dr.Ashalatha V Nair
[1,2]*(Department Of Microbiology, SUT Academy Of Medical Sciences, Vattappara,Trivandrum,Kerala,India)*

Abstract:
Background: *Urinary tract infection (UTI) is one of the most common infectious disease diagnosed both in community and in hospital. As antibiotic resistance is on the rise among uropathogens, it is important to have local community and hospital based knowledge of the organisms causing UTI and their sensitivity pattern to choose correct treatment regimen.*
Aims & objectives: *The study was done with the objective to compare the prevalence &antibiogram among the bacterial isolates of both the community acquired UTI and nosocomial UTI.*
Materials & Methods: *It was a cross sectional study carried out in the Department of Microbiology, SUT Medical College during Dec 2015 to Nov 2016.A total of 1500 urine samples 750 from community acquired and 750 from hospitalized patients were cultured aerobically. All those isolates were identified by standard microbiological techniques and their antibiotic susceptibility was done by Kirby Bauer disc diffusion method.*
Results: *In both cases females were more affected with a male: female ratio 1:1.6 & major age group was 20-40 years. Culture positivity was 850(56.66%) in which Escherichia coli was the predominant isolate 245 (54.44%) in community acquired & 212(53%) in nosocomial UTI. There was remarkably high level of resistance with Ampicillin & Co-trimoxazole in both study groups. Aminoglycosides were found effective in both groups.Third generation Cephalosporins were found more sensitive in community acquired UTI.Nitrofurantoin was found equally effective in both community& hospital acquired UTI.In our study all the isolates in both study groups were sensitive to Carbapenems.*
Conclusion: *Uropathogen resistance rates of several antibiotics are higher for urinary specimens obtained from inpatients than outpatients. These differences should be considered when empirically treating patients who present with urinary tract symptoms and awaiting culture reports.*
Keywords*: Antibioticsusceptibility, Colonycount, Escherichiacoli, Nosocomial,Uropathogen*

I. Introduction

Urinary Tract Infection (UTI) is one of the most important causes of morbidity in the general population and is the second most common cause of morbidity among hospitalized patients. It has been estimated that symptomatic UTIs result in as many as 7 million visits to outpatient clinics, 1 million visits to emergency departments, and 100,000 hospitalizations annually.[1] UTIs have become the most common hospital-acquired infection, accounting for as many as 35% of nosocomial infections, and they are the second most common cause of bacteremia in hospitalized patients [2, 3].Treatment of UTI is often started empirically and therapy is based on information determined from the antimicrobial resistance pattern of the urinary pathogens.The prevalence of antimicrobial resistance among urinary pathogens has been increasing worldwide due to aberrant use of antibiotics in practice. Distribution of urinary pathogens & their susceptibility to antibioticsvaries regionally so it becomes necessary to have knowledge of distribution of these pathogens and their susceptibility to antibiotics in a particular setting. Knowledge of etiological agents causing UTIs and their antimicrobial resistance patterns in specific geographical locations may aid clinicians in choosing the appropriate empirical antimicrobial agent. Hence thisstudy was taken up to study the distribution of uropathogens in Outpatient and Inpatient settings and to compare the susceptibility pattern of isolates to antibiotics.

II. Materials & Methods

This was a cross sectional study done in Department of Microbiology, SUT Medical College, Vattappara from December 2015 to November 2016.tudy group comprised of 1500 adultpatients, 750 each from inpatients and out patients with suspected uncomplicated lower urinary tract infection. Detailed history was recorded regarding symptoms, duration, previous antibiotic administration, treatment for the current illness etc. Patients with pyelonephritis, urinary tract abnormalities, calculi, catheterisation and pregnant women were excluded. Inpatients who were hospitalized for less than 48hrs were excluded. Mid-stream urine sample was

collected. Uncentrifuged sample was subjected for wet film examination,Gram staining and semi-quantitative culture done on Blood agar and MacConkey agar. After 24 hours of incubation pure growth of organism with Colony count of $>10^5$CFU/ml or Colony count of $>10^3$CFU/ml, if there is history of antibiotic intake were considered as significant and isolates were identified by biochemical tests as per standard methods. The Gram negative isolates were tested for susceptibility on Mueller Hinton agar against ampicillin, gentamicin, amikacin ,cephazolin, cefuroxime, ceftriaxone, norfloxacin, ciprofloxacin, nitrofurantoin, co-trimoxazole,c efoperazone-sulbactum by Kirby-Bauer disc diffusion method.Pseudomonasaeruginosa were tested against the drugs-gentamicin, amikacin , ciprofloxacin , ceftazidime, piperacilin-tazobactum & imipenam.Staphy lococcusaureus (ATCC 25923),Escherichia coli(ATCC 25922) & Pseudomonasaeruginosa (ATCC 27853) was used throughout the study for culture& antibiotic susceptibility testing.

III. Results

In both study groups females were more affected with a male:female ratio 1:1.6 (Table 1)&major age group was 20-40 years(Table 2).Culture positivity was 850(56.66%)in which Escherichia coli was the predominant isolate 245(54.44%)in community acquired&212(53%)in nosocomial UTI.(Table 3)

Table1: Table showing gender wise distribution among the culture positive isolates of both study groups

SEX	IP N=400 n(%)	OP N=450 n(%)
MALES	152(38)	166(36.89)
FEMALES	248(62)	284(63.11)

Table2: Table showing age wise distribution among isolates of both study groups

Age group	IP N=400 n(%)	OP N=450 n (%)
1-20 yrs	44	25
20-40 yrs	205	265
40-60 yrs	106	120
60-80 yrs	40	30
>80 yrs	5	10

Table 3: Table showing distribution of organisms among the study groups

Organism isolated		IP(N=400) n(%)	OP(N=450) n(%)
1	Escherichia coli	212(53)	245(54.44)
2	Klebsiella species	58(14.5)	45(10)
3	Citrobacter species	37(9.25)	39(8.67)
4	Enterobacter species	17(4.25)	23(5.11)
5	Proteus species	9(2.25)	19(4.22)
6	Pseudomonas aeruginosa	6(1.5)	15(3.33)
7	Acinetobacter species	14(3.5)	5(1.11)
8	Staphylococcus aureus	8(2)	9(2)
9	Coagulase negative Staphylococci	11(2.75)	20(4.44)
10	Enterococcus species	28(7)	30(6.67)

Table 4: Table showing antibiotic susceptibility pattern of gram negative organisms:hospital associated isolates

Antibiotics	Ecoli N=212	Klebsiella sps N=58	Citrobacter N=37	Enterobacter N=17	Pseudomonas N=6	Proteus N=9	Acinetobacter Species N=14
Ampicillin	11(5)	0(0)	0(0)	0(0)	Not tested	4(44.4)	7(50)
Gentamicin	85(40)	20(34)	26(70)	10(59)	5(83.33)	3(33.33)	4(28.5)
Amikacin	181(85)	50(86)	30(81)	12(71)	5(83.33)	5(55.6)	8(57.1)
Cotrimoxazole	22(10)	32(55)	22(59)	10(59)	Not tested	4(44.4)	4(28.5)
Norfloxacin	17(8)	35(60)	26(70)	12(71)	Not tested	5(55)	3(21.43)
Ciprofloxacin	172(81)	40(69)	30(77)	15(88)	5(83.33)	7(77.8)	5(35.71)
Ceftriaxone	128(60)	40(69)	30(81)	15(88)	Not tested	6(66.67)	6(42.86)
Ceftazidime	Not tested	Not tested	Not tested	Not tested	6(100)	Not tested	Not tested
Amoxyclav	100(47)	40(69)	31(84)	15(88)	Not tested	6(66.67)	6(42.86)
Cefoperazone-Sulbactum	159(75)	45(78)	32(86)	15 (88)	Not tested	7(77.8)	6(42.86)
Piperacillin-Tazobactum	170(80)	48(83)	34(92)	15(88)	6(100)	7(77.8)	7(50)
Nitrofurantoin	85(41)	42(72)	32(87)	14(82)	Not tested	Not tested	2(1.42)
Imipenam	212(100)	58(100)	37(100)	17(100)	6(100)	9(100)	14(100)

Table 5: Table showing antibiotic susceptibility pattern of gram negative organisms:community associated isolates

Antibiotics	Ecoli N=245	Klebsiella sps N=45	Citrobacter N=39	Enterobacter N=23	Pseudomonas N=15	Proteus N=19	Acinetobacter Species N=5
Ampicillin	74(30.2)	0(0)	2(5.12)	0(0)	Not tested	9(47.37)	3(60)
Gentamicin	147(60)	30(67)	28(72)	14(61)	10(66.67)	7(37)	3(60)
Amikacin	236(96.3)	39(87)	32(82)	16(70)	10(66.67)	10(53)	3(60)
Cotrimoxazole	49(20)	36(80)	30(77)	18(70)	Not tested	6(32)	2(40)
Norfloxacin	65(27)	38(84)	28(71)	18(78)	Not tested	7(37)	2(40)
Ciprofloxacin	195(80)	39(87)	34(88)	20(87)	12(80)	10(53)	3(60)
Ceftriaxone	172(70)	40(89)	32(82)	18(78)	Not tested	11(58)	3(60)
Ceftazidime	Not tested	Not tested	Not tested	Not tested	14(93.33)	Not tested	Not tested
Amoxyclav	180(73)	40(89)	32(82)	18(78)	14(93.33)	12(63.16)	3(60)
Cefoperazone-Sulbactum	210(86)	38(84)	34(87)	18(78)	Not tested	16(84)	3(60)
Piperacillin-Tazobactum	218(89)	40(89)	33(85)	20(87)	15(100)	17(89.5)	4(80)
Nitrofurantoin	74(30.2)	40(89)	34(87)	19(83)	Not tested	Not tested	0(0)
Imipenam	245(100)	45(100)	39(100)	23(100)	15(100)	19(100)	5(100)

IV. Discussion

U.T.I. is the most common infectious disease in both hospital acquired and community settings. It is universally accepted that U.T.I. can only be ascertained on the basis of microscopy and microbial culture of urine. For initial therapy, we need to have a thorough knowledge on the antibiotic pattern of common causative microrganisms of U.T.I. I.D.S.A. also recommends that physicians obtain information on local resistance spectrum of organisms causing U.T.I.s[4].In our study in both study groups females were more affected with a male:female ratio 1:1.6&major age group was 20-40 years .Similar findings are reported by Dharmishta et al.[5] and Linhares et al.[6] Men are usually less prone to UTI as compared to females, owing to the longer course of the urethra and bacteriostatic properties of prostatic secretions. As per our study E.coli was the predominant uropathogen in both community and hospital settings, responsible for UTI in 54.44% and 53% patients respectively. It correlates with the studies of Maryam et al [7], Senad et al [8], Priya et al [9] and Singh et al [10]. Intestinal flora is the common source of organisms producing UTI. Antibiotic resistance is common in intestinal bacteria due to antimicrobial therapy for infections other than U.T.I. Thus irrational use of antibiotics has an influence on the spread of antimicrobial resistance among bacteria.

In the present study, it is found that ampicillin is a poor choice for treatment of UTI in both community and hospital settings, as 11(5%) of the isolates from inpatients and only 74(30.2%)from outpatients were susceptible. Co-trimoxazole was also found to have high resistance rates in hospital isolates and in community isolates as well. Norfloxacin was found to be effective against a significant proportion of isolates from outpatients, while a high rate of resistance was found against isolates from inpatients. High levels of resistance to ampicillin, cotrimoxazole, norfloxacin can be explained by the long time period for which these drugs have been available and in use for UTI.

Higher resistance to ceftriaxone, a 3rd generation cephalosporin is a matter of concern, since third generation cephalosporins have been used as first line of therapy for many infections in hospital settings and it would have been ideal if resistance to ceftriaxone could have been warded off for a longer time. In our study we found Ceftriaxone to be effective against a good population of community isolates, but high rate of resistance was found against hospital isolates. Gentamicin &Amikacin were found to have excellent activity against isolates from community acquired UTI.In nosocomial UTI Amikacin was found superior. Even though the aminoglycosides have been around for a long while, resistance to them has not developed as rapidly as to others. The chief reason for this appears to be that these drugs have not been over-used. Since these are administeredparentrally it would be difficult to use for empiric therapy in outpatient settings. Nitrofurantoin showed good susceptibility in both groups. This might be due to its unique structure and mechanism of action, localizing only in urinary tract. The susceptibility pattern of nitrofurantoin is satisfactory in our study as its activity on the urinary isolates is very effective.Dahle et al. recently examined different susceptibility patterns of urinary isolates in a single health care system, comparing a community based uropathogenantibiogram to a hospital based uropathogenantibiogram in Utah. Similar to our findings, they determined that there was a significant difference in resistance patterns between outpatient and inpatient uropathogens.[11] In contrast to this finding, Rajesh et al. reports the resistance among hospital and community isolates to be similar[12] This might indicate the spread of multi drug resistant strains in the community.In our study all the isolates were sensitive to carbapenems which serves as a promising fact.

V. Conclusion

Escherichiacoli is the most common organism causing urinary tract infection in both hospital and community settings. Uropathogen resistance rates of several antibiotics are higher for urinary specimens obtained from inpatients than outpatients. These differences should be considered while treating patients who present with urinary tract symptoms and awaiting culture reports.

References

[1]. Wilson M.L., Gaido L. Laboratory Diagnosis of Urinary Tract Infections in Adult Patients. CID 2004; 38: 1150-8
[2]. Stamm WE. Scientific and clinical challenges in the management of urinary tract infections. Am J Med 2002; 113:1S–4S.
[3]. Weinstein MP, Towns ML, Quartey SM, et al. The clinical significance of positive blood cultures in the 1990s: a prospective comprehensive evaluation of the microbiology, epidemiology, and outcome of bacteremia and fungemia in adults. Clin Infect Dis 1997;24:584–602.
[4]. Warren, J. W., E. Abrutyn, J. R. Hebel, J. R. Johnson, A. J. Schaeffer, and W. E. Stamm. 1999. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Clin.Infect.Dis. 29:745–75.
[5]. Dharmishta T., Paragi J.G., Kiran N.P. A study on antibiotic related resistance in UTI patients: a comparison between community acquired and hospital acquired E.coli. National Journal of Community Medicine 2012; 3(2): 255-8.
[6]. Linhares et al.: Frequency and antimicrobial resistance patterns of bacteria implicated in community urinary tract infections: a ten-year surveillance study (2000–2009). BMC Infectious Diseases 2013;13: 9
[7]. Anvari MS., Naderan M., Boroumand MA. et al. Microbiologic Spectrum and Antibiotic Susceptibility Pattern among Patients with Urinary and Respiratory Tract Infection.IJM 2014; Article ID 682304, 6 pages, 2014. doi:10.1155/2014/682304.
[8]. Ljuca S., Zvizdic S., Hamzic S., et al. Antimicrobial susceptibility of Bacteria isolated from Inpatients and Outpatient Urine samples. Med Arh 2010; 64(3): 161-4
[9]. Priya P., Radha K., Jennifer G. Urinary tract infections: a retrospective survey of causative organisms and antibiotics prescribed in a tertiary care setting. Indian Journal of Pharmacology 2002; 34: 278-80.
[10]. Singh NP, Goel V, Rohtagi A. et al. Urinary tract infections- a fresh look. J AssocPhys India 1996; 44: 809- 14.
[11]. Dahle KW, Korgenski EK, Hersh AL, et al. Clinical value of an ambulatory-based antibiogram for uropathogens in children. JPediatric Infect Dis Soc. 2012; 1:333
[12]. Rajesh K.R., Mathavi S., Priyadarshini R.I. Prevalence of Antimicrobial Resistance in Uropathogens and determining Empirical Therapy for Urinary Tract Infections. IJBMS 2010; 1: 5