Prevalence Of Uropathogens And Their Antimicrobial Susceptibility Pattern In A Teaching Hospital, Bhavnagar

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Abstract: Background: The objective of the study is to assess the latest antibiotic sensitivity pattern of most commonly isolated organisms in urinary tract infection (UTI). Widespread and irrational use of antibiotics has led to development of highly resistant microorganisms. As the antibiotic sensitivity patterns of the microorganisms are frequently changing, this study was performed to assess the recent antibiotic sensitivity pattern in urinary tract infection among the human population. Methods: Study was conducted from January 2019 to July 2019 at Sir T. Hospital attached with teaching hospital GMC, Bhavnagar. Study population includes all adults (> 18 years olds) both in patients and out patients .2572urine samples were studied. The processing of the samples were done by standard microbiological methods. The antibiotic susceptibility was measured by disk diffusion test. CLSI guidelines were used for the antibiotic susceptibility evaluation. Results: . Out of these 452 (17.57%) samples was found to be positive showing significant bacteria. Out of 452 (culture positive cases) ,276(21.11%)were females and 176(13.91%) were males. Out of 452 positive culture cases more than half cases (54.64 %) reported E.coli, followed by Kleseilla spp.(17.03%),Enterococcus spp.(14.52%), Pseudomonas Spp.(3.92%), proteus spp.(1.76%)Staphylococcus aureus (1.52%),Coagulase negative staphylococcus Spp.(1.32 %) and Candida spp.(5.52%).The study showed marked resistance to quinolones, aminogycosides and greater sensitivity to nitrofurantoin and carbapenum group of antibiotics. Conclusions: The study confirmed, *E.coli* is still the most common bacteria to cause UTI, irrespective of geographical area. Nitrofurantoin, and carbapenum group of antibiotics showed very high susceptibility to urinary tract infection pathogens, which include most commonly isolated gram-negative bacteria and gram-positive cocci, which were resistant to other various antibiotic groups. Thus, because of orally use, nitrofurantoin seemed to be promising drugs. [Patel S Natl J Integr Res Med, 2019; 10(5):64-67]

Key Words: E. coli, Enterococcus spp.,Nitrofurantoin, UTI,Uropathogens

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Introduction: UTIs are among the most common bacterial infections that lead to patients to seek medical care. It has been estimated that more than 6 millions outpatients visits and 3 millions hospital stay every years are due to UTIs.[1.]

UTI has become the most common HAI and major health problems in terms of morbidity, work load in clinical laboratory and financial burden in community.[2] UTIs are most important complication of Diabetes, renal diseases, structural and neurological abnormalities that interfere the urine flows. [1] Studies suggest that UTIs are most common in females as compare to males. Among 50% females experience one incidence of UTIs in their lifespan and 20% to 40% females have recurrent infection of Urinary tract.[3]

Urinary tract infection is an inflammatory response of epithelial cells of tract due to the invasion of pathogenic organisms. Escherichia coli is by far the most frequent cause of the etiology of UTI. Other organisms frequently isolated such as Klebsiella pneumonia, Staphylococcus aureus, Enterococcus sp. and P. aeruginosa are on the rise[4].

Antimicrobial susceptibility patterns various uropathogens isolated from Urine mar vary in short period and depends on various environment changes. Periodic evaluation of antibacterial activity is needed to update the information.[3]

Present study was undertaken with the aims to know the various uropathogens isolated from UTIs and their antimicrobial susceptibility Due high incidence of UTIs, irrational uses of antibiotics, availability of antibiotics over the counters and poor infection prevention practices leads to multidrug resistance so this knowledge can be used for betterment of public health and as well as or controlling the drug resistance.

Materials and Methods: Study was conducted at Sir T. Hospital attached with teaching hospital GMC, Bhavnagar with permission of laboratory in charge. Study population includes all adults (> 18 years olds) both in patients and out patients.

Patients are excluded from study showing mix infection and infection other than bacteria.

Total 2572 patients from January 2019 to July 2019 were included in the study, of which 1307 were females and 1265 were males with age above 18 years. Majority of the samples were midstream clean catch urine and others included catheterized urine samples.

Samples were received in a sterile screw-capped wide-mouth container from various departments after informing patients about proper urine collection method. Samples are inoculated in CLED media using standard microbiological procedures. Inoculation of urine sample was done by calibrated loop using streak plate method followed by incubation for 18-24 hours at 37°C under aerobic conditions. Based on growth and colony count the cultures are negative or significant for further procedure as per standard recommendation. Identification of organisms are done by manually by using various biochemical reaction and antibiotics susceptibility testing(AST) was performed by modified Kirby-Bauer disc diffusion method as per CLSI guidelines. A 0.5 McFar-land physiological saline suspension prepared by picking up a single colony from pure culture was used. AST was done by placing standard antimicrobial impregnated disk on lawn cultured Mueller-Hinton agar followed by incubation for 18-24 hours at 37°C. Results were determined as sensitive or resistant based on the diameter of zone of inhibition. The quality control strains used were E. coli (ATCC) 25922, Pseudomonas aeruginosa ATCC 27853, Enterococcus fecalis ATCC 29212 and Staphylococcus aureus ATCC 25923 for antimicrobial discs. Statistical analysis done by using Epi Info software.

Results : During the study from January 2019 to July 2019 Total 2572samples analysed. Among them1307 females and 1265 males. Out of these 452 (17.57%) samples was found to be positive showing significant bacteria. Out of 452 (culture positive cases) ,276(21.11%)were females and 176(13.91%) were males(Table-1).

Out of 452 positive culture cases more than half cases (54.64 %) reported E.coli, followed by Kleseilla spp. (17.03%), Enterococcus spp.(14.52%), Pseudomonas Spp.(3.92%), Proteus spp. (1.76%) Staphylococcus aureus (1.52%),Coagulase negative staphylococcus Spp.(1.32 %) and Candida spp.(5.52%).(Table-2)

Table 1: Gender distribution of cases according to their test results

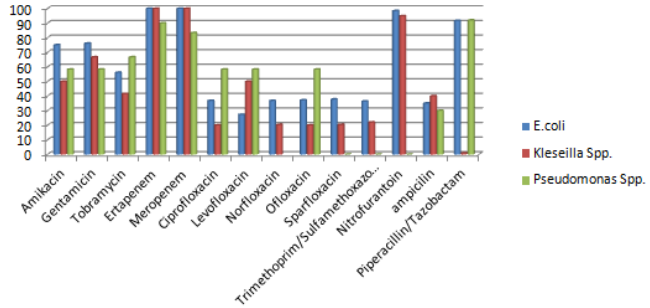
Gender	Total samples	Culture positive(No/%)
Males	1265	176(13.91%)
Females	1307	276(21.11%)
Total	2572	452 (17.57%)

Table:2 Distribution of organisms isolated from Urine

Name of organisms	No of isolates
E.coli	247 (54.64 %)
Kleseilla spp.	77(17.03%)
Pseudomonas Spp.	18 (3.92 %)
Staphylococccus aureus	7 (1.52%)
Coagulase negative Staphylococcus	6 (1.32%)
Enterococcus spp.	64 (14.52%)
Proteus Spp.	8 (1.76%)
Candida Spp.	25 (5.52 %)
Total	452 (100 %)

Among the gram negative isolates in culture positive cases shows highly drug resistances in most commonly used fluroquinolones groups range from 60- 75 % and aminogycosides groups and cotrimaxole also show less susceptibility 36 % to 75 % among all most commonly isolated gram negative organisms. All three most commonly isolated organisms shows highly susceptibility among carbapenum group of antibiotics (100%) and also in Nitrofuroitoin shows 98 % susceptibility to all gram negative isolates.(Figure 1)

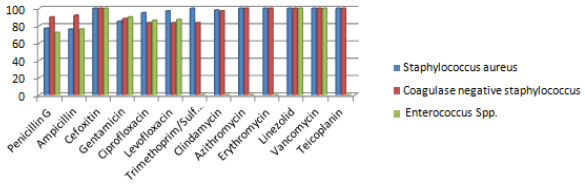
Figure 1: Antimicrobial susceptibility patterns among E.coli and Klebseilla spp And Pseudomonas spp.



Among gram positive organisms staphylococcus spp. Shows less susceptibility to peniciliin G (77-90%) and ampicilin (76 -92%). Enterococuus group of organisms are also less susceptibility to

penicillin G (72%),ampicilin (76%).all gram positive cocci are susceptible to cefoxitin ,vancomycin and linezolid up to 100 %.(Figure 2)

Figure 2: Antimicrobial susceptibility patterns among gram positive coci



Discussion: Present study was carried out in Sir T Hospital attached to Govt, medical college ,a teaching institute located at Bhavnagar in Gujarat, western part of India . Study was carried out from January 2019 to July 2019. Total 2572 urine samples received in department of microbiology. Among them1307 females and 1265 males. Out of these 452 (17.57%)samples was found to be positive showing significant bacteria. Out of 452 (culture positive cases) ,276(21.11%)were females and 176(13.91%) were males.

The study finding showed that UTI is more common in females (21.11%) as compared to males (13.91%), which is similar with the earlier studies.[2, 3] Short female urethra, proximity of the female urethral meatus to the vagina and rectal mucosa with their abundant microbial flora and sexual intercourse have been reported as influencing factors for the higher occurrence of UTI in women.[2]

Present study showed majority of isolates were gram negative organisms. *E. coli* (54.64%) is the most common bacteria isolated among them followed by *Klebsiella pneumoniae* (17.03%) and. *Enterococcus spp.* (14.52%).finding of present study is similar to other study like JainS,et al(2014)[2],Gupta S et al (2014).[5]other study from various region also shows similar finding.[6,7,8].

Present study shows that among all gram negative bacilli shows less susceptibility among most commonly used fluroquinolones antibiotics .among most commonly prevence organisms E.coli and Kleseilla spp. Show less susceptibility among ciprofloxacin(20 to 36.8%), levofloxacin(27.3 to 50%) and ofloxacin (20 t0 37.2%). Similar findings to fluroquinolones antimicrobial susceptibility to e.coli and Kleseilla Spp. Shows by Smita S. & Gupta R et al(2012) Mandal J., Acharya et al (2012) and Eshwarappa M et al (2011). [6,9.10]

Present study shows that carbapenum group of antibiotics like meropenum and Ertapenum shows most useful antibiotics as they shows around 100 % susceptibility to them in gram negative isolates. Similar finding are found in Jain s et al (2014), Lawhale MA et al (2017).[2,3]

Present study shows among gram positive cocii isolates enterococcus spp. Are more (14.52%) as compare to sthaphylococcus spp. Among enterococcus spp. The antimicrobial susceptibility to ciprofloxacin (86%), levofloxacin (87%) and ampicilin (76%) are less. Similar study is found in Lawhale MA et al (2017).[3]

Conclusion: During this study we confirmed that E.coli is still the most common bacteria to cause UTI, irrespective of geographical area. In the era of antimicrobials, study shows that uropathogens isolated from cases of UTIS shows highly resistance to orally used fluroquinolones antibiotics due to irrational use of theses antibiotics. Still Nitrofurointoin drugs shows high susceptibility to all uropathogens from UTI cases. These are orally available and found active against most of the multi-drug resistant isolates, hence use of these drugs should be preferred. . One should have vigilance on their usages so that future must have such choices available. Thus, there is need for the making and following of policy for antibiotic usages that will guide the prescription and use of antibiotics through the regular surveillance of resistant organisms in the environments.

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