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THE STUDY OF URINARY TRACT INFECTIONS AND ANTIBIOGRAM OF UROPATHOGENS IN TERTIARY CARE HOSPITAL AT SHIMOGA INSTITUTE OF MEDICAL SCIENCES, SHIMOGA.

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ABSTRACT

Urinary Tract Infection is one of the most common bacterial infections seen in clinical practice particularly in developing countries. The causative agents for Urinary tract

infections are the most common bacterial infections seen in clinical practice particularly in developing countries. The causative agents for Urinary tract infection vary from place to place and they also vary in their susceptibility and resistance patterns. **Objectives:** Study is to determine the etiological bacterial pathogens of UTI and to determine the antibiotic sensitivity pattern of isolates. **Material and Methods:** A total of 855 urine samples from OPD and IPD patients of Microbiology SIMS, Shimoga. These samples were subjected to culture and susceptibility test with use of standard bacteriological techniques as described by CLSI guidelines. **Results:** 30.90% of the total urinary samples showed significant bacterial growth. 12 different bacterial species isolated. Among these, *E.coli* (30.29%) was significantly the most predominant followed by *Enterococcus* species (18.24%), *Staphylococcus saprophyticus* (13.35%), *Klebsiella pneumoniae* (9.12%) and others. *E.coli* is highly sensitive to amikacin (81.72%) followed by imipenem (89.24%) and Piperacillin (89.24%). **Conclusion:** This study will be continued to include more number of samples to determine sensitivity and resistance pattern of bacterial isolates in UTI

KEYWORDS: Urinary tract infection; Anti- microbial susceptibility; Uropathogens

INTRODUCTION

Urinary tract infections are the most common infections in clinical practice.¹ One of the most prevalent problems faced by health care services is the increasing prevalence of antimicrobial resistance. Urinary tract infection (UTI) are among the most common bacterial infections affecting humans throughout their lifetime. They are the frequent cause of morbidity in outpatients as well as most frequently involved in the cause of nosocomial infection in many hospitals.² Most of the UTI are caused by Gram negative bacteria like *Escherichia coli*, *Proteus* species, *Klebsiella* species sp. *Pseudomonas aeruginosa*, *Acinetobacter*, *Serratia* and *Morganella morganii*. UTI also caused by Gram positive bacteria like *Enterococcus*, *Staphylococcus* especially coagulase negative staphylococci and *Streptococcus agalactiae*.³ UTI is much more common in women than in men due to anatomical and physiological reason; by virtue of its position urinogenital tract is more vulnerable to bacterial infections caused by both internal and external flora.² The prevalence of antimicrobial resistance among urinary pathogens has been increased worldwide due to aberrant use of antibiotics in practice.⁴ Urinary tract infections are often treated with different broad spectrum antibiotics, one with narrow spectrum of activity may be appropriate because of emerging concerns about infection with resistant organisms and antimicrobial susceptibility testing of the urinary pathogens constitutes the basis for antibiotic therapy. However in view of the increasing bacterial resistance, regular monitoring of resistance pattern is necessary to improve guidelines for empirical antibiotic therapy.² Hence this study was done to find out the common bacteria causing and to determine the antibiotic susceptibility pattern of the urinary pathogens causing UTI over one year period from a tertiary care hospital attached to Shimoga institute of medical sciences, Shimoga.

Methods;

This study was done from January 2014 to December 2014 at the department of microbiology, Shimoga Institute of Medical Sciences, Shimoga. A total of 855 clean catch midstream urine sample were collected in a wide mouthed sterile container from both outpatients and inpatients and processed in the Microbiology Laboratory. The urine sample were inoculated on both blood and MacConkey agar using calibrated loops for semi-quantitative method and incubated aerobically at 37°C for 24 hours. A specimen was considered positive for UTI if a single organism was cultured at a concentration of $\geq 10^5$ cfu/ml. Colonial appearance and morphological characters of isolated bacteria was noted and isolated colonies were subjected to preliminary tests like Gram staining, motility by hanging drop, catalase test and oxidase test. These preliminary tests were followed by biochemical reactions for identification of the isolated organism.

And the isolated organisms subjected for antibiotic susceptibility testing.⁵

Antimicrobial susceptibility testing

Antimicrobial susceptibility testing was done by Kirby Bauer disk diffusion method by using Mueller Hinton agar plates. Commercially available HiMedia discs were used. The bacterial suspension were made by inoculating 4-5 well isolated identical colonies in peptone water. After 2 hours of incubation the turbidity was standardized by using 0.5 McFarland standards. By using a sterile swab a lawn culture was made on the Mueller Hinton agar plates. The antibiotic discs were placed and inoculated plates were incubated at 37°C. The results were read after overnight incubation and compared with standard chart. The following drug were used for Antibiotic sensitivity test, [According to CLSI guidelines]⁶ Amikacin (30µg), Gentamycin (10µg), Ciprofloxacin (5µg), Ceftriaxone (30µg), Norfloxacin (10µg), Ampicillin (10µg), Imipenem (10µg), Cefoxitin (30µg), Cefepime (30µg), ceftazidime (30µg), Piperacillin (100µg), Erythromycin (15µg), Clindamycin (2µg), Oxacillin (1µg), Linezolid (15µg) and Vancomycin (30µg). The following drug were used for Antibiotic sensitivity test, [According to CLSI guidelines]⁶ Amikacin (30µg), Gentamycin (10µg), Ciprofloxacin (5µg), Ceftriaxone (30µg), Norfloxacin (10µg), Ampicillin (10µg), Imipenem (10µg), Cefoxitin (30µg), Cefepime (30µg), ceftazidime (30µg), Piperacillin (100µg), Erythromycin (15µg), Clindamycin (2µg), Oxacillin (1µg), Linezolid (15µg) and Vancomycin (30µg).

Statistical analysis Results and Discussion

A total of 855 samples were collected during the study period of which 523 (61.16%) were from female and rest 332 (38.83%) were from males. Pathogenic bacteria were isolated in 307 with a prevalence rate of (35.90%). The prevalence in female was 62.54% and the prevalence in male was 37.5%, which is shown in Table 1.

Table.1: Sex wise distribution of prevalence of urinary tract infection

Sex	Total no. of samples	No. of Positive	Prevalence
Male	332	99	37.5%
Female	253	208	62.54%

Statistical Analysis;

Table No. 2A shows age wise distribution of samples and their positivity.

Age (years)	Positive Samples	Negative Samples	Total Samples
< 20	108(29.8%)	254(70.16%)	362(100%)
21-40	122(40.53%)	179(54.46%)	301(100%)
41-60	49(36.02%)	87(63.97%)	136(100%)

>61	28(50%)	28(50%)	56(100%)
Total	307(35%)	548(64%)	855(100%)

Urinary tract infections was most commonly seen in the age group of 21-40 years (54.46%). The age wise distribution of samples and their positivity is shown in table 2. Among females UTI was commonly seen in the age group of 21-40 years and in males it was common between 41-60 years. Number of positives in relation to sex.

E.coli are highly sensitive to Imipenem, Amikacin, and Piperacillin and showed high resistance to Penicillin, Ampicillin/salbutam, Gentamycin.

Table No. 2B : shows number of positives samples in relation to sex.

Age (years)	Male	Female	Total
< 20	35(32.4%)	73(67.59%)	108(100%)
21-40	28(22.95%)	94(77.04%)	122(100%)
41-60	24(48.97%)	25(51.02%)	49(100%)
>61	12(42.85%)	16(57.14%)	98(100%)
Total	99(32.24%)	208(67.76%)	307(100%)

E.coli was the most commonly isolated urinary pathogen (30.29%), followed by Enterococcus species (18.24%), Staphylococcus saprophyticus (13.35%) and Klebsiella species (9.12%). The isolation rates of other organisms are shown in table 3.

Urinary pathogen isolated	Number (Percentage)
Escherichia coli	83 (30.29%)
Enterococcus species	56 (18.24%)
Staphylococcus saprophyticus	41 (13.35%)
Klebsiella pneumonia	28 (9.12%)
Staphylococcus aureus	23 (7.49%)
Pseudomonas aeruginosa	22 (7.16%)
Candida albicans	16 (5.21%)
Gram-negative nonfermentors	11(3.58%)
Proteus species	6 (1.95%)
Streptococcus pyogenes	4 (1.30%)
Acinetobacter species	3 (0.97%)

Table.3 : Frequency of isolation of various urinary pathogens. Citrobacter species 2 (0.65%)

Table. 4: Percentage of In Vitro Antibiotic Sensitivity pattern of

most Frequently Isolated Microorganism

Drugs	E. coli (%)	Enterococcus (%)	Staphylococcus (%)	Klebsiella (%)
Ampicillin/ Salbutam	13.97	17.54	21.71	14.33
Amikacin	81.72	66.35	68.75	68.75
Gentamycin	29.03	30.41	63.41	44.44
Ciprofloxacin	21.12	19.29	14.63	14.63
Ceftriaxone	20.98	-	-	28.51
Clindamycin	63.41	63.41	63.41	63.41
Norfloxacin	19.35	9.52	34.61	25.92
Cefepime	17.27	-	-	5
Imipenem	89.24	-	96.42	-
Cefoxitin	-	-	17.07	-

Linezolid	-	96.49	100	-
Vancomycin	-	87.71	87.80	-
Penicillin	-	18.18	7.01	-
Piperacillin	89.24	-	-	-

Statistical analysis Results and Discussion

A total of 855 samples were collected during the study period of which 523 (61.16%) were from female and rest 332 (38.83%) were from males. Pathogenic bacteria were isolated in 307 with a prevalence rate of (35.90%) The prevalence in female was 62.54% and the prevalence in male was 37.5%, which is shown in Table.1. Effective management of patients suffering from bacterial UTIs commonly relies on the identification of type of organisms that caused the disease and selection of an effective antibiotic agent to the organism. Diagnosis of UTIs is a good example of the need for close cooperation between the clinician and the microbiologist. In our study prevalence rate of infection of urinary pathogen was 35.90%, similar study by Hari.P.Kattel et al (2008) in which 26% of urine specimens showed significant bacterial growth. The prevalence of UTI are more in females when comparing to males. This correlates with other study by A.R.M. Momoh et al. in which 60.2% were females and 39.8% were males. Women are more prone to UTIs than men because of short urethra and is closer to anus. Among patients with UTI, females were most commonly in the age group between 21-40 years and males were between 41-60 years. This was in consistent with a study of Dr. Alka Nerukar et al.(2012) 4 in which 52.16% were in the age group 21-40 years, who concluded that most uncomplicated urinary tract infections occurs in women who are sexually active, with far fewer cases occurring in older women, those who are pregnant, and in men. In older men, the incidence of UTI may increase due to prostatic obstruction or frequent instrumentation. This was in consistent with the study of S. Balherjee. et al(2009). 9 E.coli was the predominant bacteria found in our study similar result was found by D. Durgesh et al (2012) and that prevalence of E.coli was 31.5% predominant study. 10 Enterococcus faecalis was isolated pathogen was Enterococcus faecalis, this correlates with other study of J. Shanthi et al (2012) in which 28.1% of Enterococcus faecalis was isolated as urinary pathogen. 2 In our study E.coli was most resistant to Ampicillin, Penicillin and Gentamycin. It was most sensitive to and Amikacin(81.72%), Similar finding were seen in a study by Shamataj Kattalagere Razak , G. Vishwanath (2012), 1 who concluded that the organisms showed resistance to older urinary antimicrobial agents such as Ampicillin which indicates that increased consumption of particular antibiotics is the pathway to its resistance. Enterococcus faecalis was most resistant to Norfloxacin, Penicillin, Ampicillin and Ciprofloxacin. It was most sensitive to Linezolid and Vancomycin. Staphylococcus saprophyticus was resistant to Penicillin, Ampicillin, Ciprofloxacin and Cefoxitin. It was sensitive to Linezolid and Vancomycin. Klebsiella pneumonia was most resistant to Ampicillin, Cefoxitin and very much sensitive to Imipenem. All the four isolated organisms susceptibility pattern showed in table 4.

CONCLUSION

E.coli was the most frequent causative agent in UTI. Higher prevalence of UTI was seen in females. In females UTI was seen in patients between 21-40 years age group and in males it was seen in older age group between 41-60 years. Gram

negative or- ganisms were most commonly isolated organisms in UTI among which E.coli the most frequent agent. Urinary pathogens showed resistant to commonly used antibiotics like Ampicillin and Nor- floxacin. On the basis of this study we can conclude that the re- sistance of commonly used antibiotics is very crucial. The anti- biotic treatment should be limited to symptomatic UTIs and be initiated after sensitivity testing only. As drug resistance among pathogens in an evolving process, routine surveillance and mon- itoring studies should be conducted to help physician to start most effective empirical treatment.

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