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TO DETERMINE THE PREVALENCE AND ANTIBIOTIC SENSITIVITY PATTERN OF UROPATHOGENS IN TERTIARY CARE HOSPITAL

Ms Chanchal Chauhan	Tutor, Dept. of Microbiology, Rama Medical College, Hospital and Research Center, Hapur.
Dr. Amit Kumar	Associate Prof., Dept. of Microbiology, Rama Medical College, Hospital and Research Center, Hapur.
Dr. Ashutosh Rawat	Prof and Head, Dept. of Microbiology, Santosh Medical College, Ghaziabad.
Mr. Sandesh Shrestha*	Tutor, Department of Biochemistry, Rama Medical College, Hospital and Research Center, Hapur, UP.*Corresponding Author

ABSTRACT Microbial colonisation of the urine and infection of the urinary tract structures are identified by UTI. In both developed and developing countries, resistance to widely prescribed antibiotics for UTI is a growing global issue. In order to establish the prevalence and bacterial profile of the organism causing urinary tract infections among patients from nearby villages and admitted to various wards of the Rama Medical College, Hapur Hospital and Research Center, this study was carried out. From different wards, a total of 1275 samples were obtained. Normal microbiological procedures, including direct wet urine mounting, Culture on CLED (Cystine Lactose Electrolyte Deficient Medium), Morphology, Gram stain, Motility, Biochemical test and Antimicrobial susceptibility test, processed all collected samples. The positivity rate of urine culture found in our sample was 25.7 percent . There were 32% Gram positive cocci, 63.5% Gram negative bacilli and 4.5 percent isolated candida species. The most common isolate was E.coli (40.8 percent), and Staphylococcus aureus (16.7 percent) was most common in Gram-positive cocci. E.coli was most susceptible to Cefuroxime and most resistant to Nitrofurantoin. All Staphylococcus aureus is completely Vancomycin-sensitive and most were Amoxyclav-resistant and 34.6 percent were present with MRSA.

KEYWORDS : Urinary Tract Infection, prevalence, pathogens, antibiotic resistance and sensitivity profile

INTRODUCTION

Infection of the urinary tract (UTI) is an infection induced anywhere by the presence and development of microorganisms.

They're in the urinary tract. Urinary Tract Infection (UTI) remains the commonest bacterial infection in humanAs this disease meets with both community and hospitalised patients of all age groups, population with a high rate of morbidity and fi nancial expense. Women are more vulnerable to UTI as compared to men, and this is primarily attributable to short urethra, absence of prostatic secretion, pregnancy, and simple urinary tract contamination with faecal fl ora (Haider et al. 2010). UTI is typically categorised by the site of infection: - bladder(cystitis), kidney(pyelonephritis), and urethra (urethritis). UTIs that occur in a normal genitourinary tract without previous instrumentation are deemed "uncomplicated," while in genitourinary tracts with structural or functional anomalies, "complicated" infection is diagnosed. including instrumentation such as indwelling urethral catheters (Haider et al. 2010; Taher et al. 2009).

The standard pathogens causing UTI are E. Pathogens such as coli, Klebsiella spp, Staphylococcus spp and others, including Pseudomonas, Streptococcus and MRSA, are other pathogens. More than 95% of UTI cases are triggered by bacterial pathogens, which include E. Coli, the leading causative organism, is responsible for the inflammation of the urinary tract. Klebsiella spp. causes more than 80 per cent of urinary tract infections. (2008 Ramesh et al.). Enterobacter spp., Pseudomonas aeruginosa, Proteus spp., Citrobacter spp., Morganella morganii, and so on, are other Gram-negative bacteria causing infection. The total number of Gram-positive bacteria that cause urinary tract infection, including Enterococcus spp., Staphylococci, and Streptococci, is 5 to 15 percent of the total bacteria (Akram et al. 2007).

Most UTIs are not life-threatening and do not infect human health with any serious illness. Nevertheless, there is a chance of severe illness such as tissue damage and an elevated risk of bacteremia when bacterial infections that affect the kidneys are involved (Manikandan et al. 2011). Most bacteria, fungi and viruses, among others, may be involved in the presence triggers UTI. Such bacteria migrate into the urethra and then into the bladder and kidneys (Benjamin 2009).

In recent years, the aetiology of urinary tract infection and the antibiotic resistance trend of uropathogens have improved. In both developed and developing countries, resistance to widely prescribed antibiotics for UTI is a growing global issue. So, in various wards of Rama Medical College. Hospital and Research Center, Hapur, this study was done to determine the prevalence and bacterial profile of species causing urinary tract infections.

MATERIAL AND METHODS

Descriptive cross-sectional study was carried in department of Microbiology in Rama Medical College, Hospital & Research Centre Hapur. Sample size (1275) was not statistically calculated rather taken simply to meet the need of the aim of the study as it is an non-inferential study. Sample was collected by typical case purposive sampling method from 1/03/ 2017 to 28/02/ 2018 from the In patient departments of the hospital. Inclusion criteria- All IPD clinically suspected UTI defi ned by physician. Patients aged 10 years and older were included in this study and mid-stream urine, catheter urine and suprapubic aspirate were obtained. The specimens were observed for their colour and appearance under macroscopic inspection of urine and reported accordingly (Cheesbrough 2000). Exclusion Criteria- All Out going patients and those taking antibiotics.

A 10ml urine sample was taken in a sterile test tube during a microscopic urine analysis and the sample was centrifuged for 5 minutes at 3000 rpm. Then the supernatant was discarded and sediment was used to detect RBC, pus and epithelial cells for the wet mount preparation. Every urine sample was cultivated by semi-quantitative method in the CLED (Cystine Lactose Electrolyte Deficient Medium), MacConkey agar and blood agar medium using the standard sterile inoculating loop of the standard dimension (0.001ml).The plates were then incubated at 37degree celcius for overnight. Samples showing ≥105colony forming unit (CFU) per milliliter (ml) of urine were taken as signifi cant. If there was some indication that can reduce the concentration of bacteria in the urine, low count signifi cant bacteriuria (104-105CFU/ml) was taken into account. Based on the morphological appearance of the colonies, Gram's staining reactions and various biochemical reactions, direct wet mounting of urine and motility, major cant isolates were identified. Antibiotic susceptibility testing: As recommended by CLSI (2014) on MHA, antibiotic sensitivity testing of bacterial isolates was performed by modification of the KirbyBauer disc diffusion process.

The data obtained was presented in pie chart, bar graph and table using Excel and Ms Word.

OBSERVATION AND RESULT

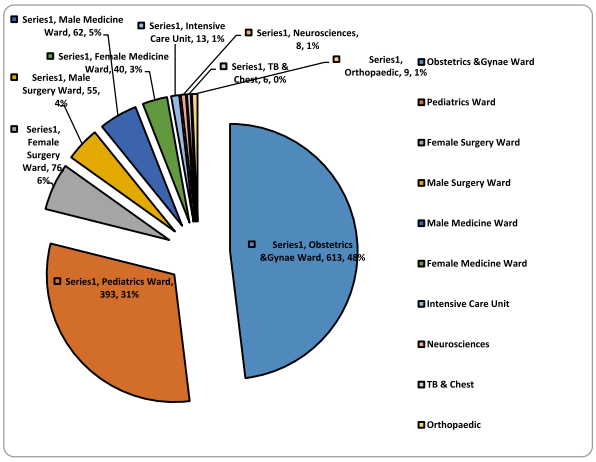

Fig 1. Samples collected from different Wards

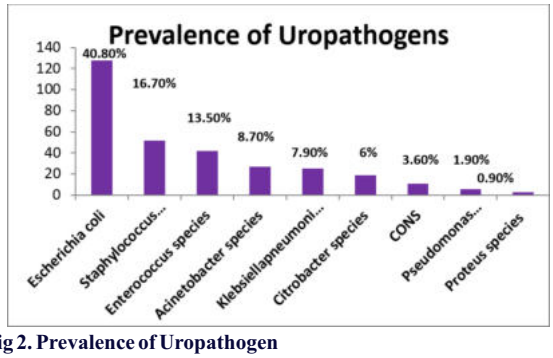

Fig 2. Prevalence of Uropathogen

Table 1. Antibiogram Profile of E.Coli and Klebsiella pneumoniae

Group	Antibiotics	Escherichia coli (n=128)			Klebsiellapneumonia e (n=25)		
		S	I	R	S	I	R
Aminoglycosides	Amikacin	98 (76.5%)	4 (3.1%)	26 (20.3%)	8 (32.6%)	-	17 (68%)
	Gentamicin	86 (67.1%)	15 (11.7 %)	27 (21%)	19 (76%)	1 (4%)	5 (20%)
	Tobramycin	87 (67.9%)	4 (3.1%)	37 (28.9%)	21 (84%)	-	4 (16%)
Penicillin	Amoxyclav	49 (38.2%)	-	79 (61.7%)	NT	NT	NT
Cephalosporin	Ceftazidime	36 (28.1%)	-	92 (71.8%)	16 (64%)	-	9 (36%)
	Cefepime	21 (16.4%)	12 (9.3%)	95 (74.2%)	21 (84%)	-	4 (16%)
	Cefuroxime	16 (12.5%)	-	112 (87.5%)	NT	NT	NT
Carbepenems	Meropenem	40 (31.2%)	13 (10.1 %)	75 (58.5%)	16 (64%)	4 (16 %)	5 (20%)
	Imipenem	23 (17.9%)	12 (9.3%)	93 (72.6%)	2 (8%)	-	23 (92%)
Quinolones	Ciprofloxacin	21 (16.4%)	10 (7.8%)	97 (75.7%)	17 (68%)	1 (4%)	7 (28%)
Foliate pathways antagonist	Co-trimoxazole	25 (19.5%)	-	103 (80.4%)	NT	NT	NT
Nitrofurans	Nitrofurantoin	126 (98.4%)	-	2 (1.5%)	23 (92%)	1 (4%)	1 (4%)
Fosfomycin	Fosfomycin	108 (84.3%)	-	20 (15.6%)	19 (76%)	-	6 (24%)

Table 2. Antibiogram Profile of Citrobacter and Proteus

Group	Antibiotics	Citrobacter species (n=19)			Proteus species (n=3)		
		S	I	R	S	I	R
Aminoglycosides	Amikacin	16 (84.2%)	3 (15.7%)	-	2 (66.6%)	-	1 (33.3%)
	Gentamicin	17 (98.4%)	2 (10.5%)	-	3 (100%)	-	-
	Tobramycin	19 (100%)	-	-	2 (66.6%)	-	1 (33.3%)
Penicillin	Amoxyclav	6 (21.5%)		13 (68.4%)	-	-	3 (100%)
Cephalosporins	Ceftazidime	-	-	19 (100%)	-		3 (100%)
	Cefepime		2 (10.5%)	17 (89.4)	1 (33.3%)		2 (66.6%)
	Cefuroxime	3 (15.7%)	-	16 (84.2%)	2 (66.6%)	-	1 (33.3%)
Carbepenems	Meropenem	16 (84.2%)	3 (15.7%)		-	-	3 (100%)
	Imipenem	-	2 (10.5%)	17 (89.4%)	3 (100%)	-	-
Quinolones	Ciprofloxacin	13 (68.4%)	2 (10.5%)	4 (21%)	-	1 (33.3%)	2 (66.6%)
Folate pathways antagonist	Co-trimoxazole	16 (84.2%)	-	3 (15.7%)	-	-	3 (100%)
Nitrofurans	Nitrofurantoin	19 (100%)	-		2 (66.6%)	-	1 (33.3%)
Fosfomycin	Fosfomycin	2 (10.5%)	-	17 (89.4%)	1 (33.3%)		2 (66.6%)

Table 3. Antibiogram of Staph aureus and CONS

Group	Antibiotics	Staphylococcus aureus (n=52)			CONS(n=11)		
		S	I	R	S	I	R
Aminoglycosides	Gentamicin	42 (80.7%)	9 (17.3%)	1 (1.9%)	10 (90.9%)	1 (1.9%)	-
Penicillin	Amoxyclav	10 (19.2%)	-	42 (80.7%)	1 (9%)	-	10 (90.9%)
Cephalosporin	Cefoxitin	34 (65.3%)		18 (34.6%)	NT	NT	NT
Tetracycline	Doxycycline	37 (71.1%)	-	15 (28.8%)	8 (72.7%)	-	3 (27.2%)
	Tetracycline	45 (86.5%)	-	7 (13.4%)	11 (100%)	-	-
Quinolones	Ciprofloxacin	15 (28.8%)	6 (11.5%)	31 (59.6%)	8 (72.7%)	2 (18.1%)	1 (9%)
Folate pathways antagonist	Co-trimoxazole	14 (26.9%)	-	38 (73%)	7 (63.6%)	-	4 (36.3%)
Macrolides	Erythromycin	13 (25%)	-	39 (75%)	-	-	11 (100%)
Lincosamides	Clindamycin	52 (100%)	-	-	NT	NT	NT
Glycopeptides	Vancomycin	52 (100%)	-	-	11 (100%)	-	-
Oxazolidinones	Linezolid	52 (100%)	-	-	11 (100%)	-	-
Nitrofurans	Nitrofurantoin	52 (100%)	-	-	11 (100%)	-	-

DISCUSSION

The present study offers data on the distribution of UTI-causing bacterial isolates along with their pattern of antibiotic susceptibility. The positive urine culture rate found in our study was 25.7 percent, comparable to the rates recorded in numerous other studies. In the research conducted by UTI, the prevalence of UTI was found to be 345% (M. Dash, S. Padhi et.al, Odisha, 2013)

And in the analysis performed by M.Akram, M.Shahid et al., it was found to be 17.1 percent. JNMC Aligarh Hospital, India, 2007. (Akram and others, 2007) In our sample, Gram positive cocci make up 32% of the total isolates, compared with 9.68% in the study performed by Gram positive cocci (Prakash & Saxena, 2013)

Similarly, Gram negative bacilli accounted for 63.4% of the total isolates in our sample, which was less than 90.3% of the total isolates in the study (Prakash & Saxena, 2013). In our sample, 4.5 percent of Candidal UTI infection cases were found, which was comparable to 9 percent of total isolates in the study conducted by (Lundstrom & Sobel, 2001).

E.coli was 40.8 percent of the most common bacterial pathogen isolated in our research. In the study performed by (Nys et al., 2006), which also had E.coli as the most common isolate, this was similar. E.coli was present in 42.58 percent of total isolates in that sample. However, in a study by (Taiwo & Aderounmu, 2009), the most common pathogen was the Klebsiella species (26 percent). Klebsiella was contained in 8.7 percent of the total isolation in our sample.

E.coli was contained in 20 percent of total isolates in the above research conducted in Nigeria in 2006, which was lower than our total E.coli isolates (40.8 percent). Most of the E.coli isolates were most susceptible to Nitrofurantoin (98.4 percent), although in the study (HåkanHanberger et.al 1999). E.coli was most susceptible (56 percent) to Meropenem and just 26 percent to Nitrofurantoin. E.coli was highly resistant (71.8 percent) to Ceftazidime, which was equivalent to the research conducted (Taiwo & Aderounmu, 2009) in which E.coli was highly resistant to Ceftazidime (65.5 percent).

Staphylococcus aureus was most common in our research among Gram positive cocci (15.8 percent), which was lower (47.1 percent) than the study conducted by (Shrestha et al., 2019), but Staphylococcus aureus was completely susceptible to Vancomycin (100 percent) and in the study conducted by Shrestha et al., 2019, it was similar (100 percent). However, it was most resistant to Co-trimoxazole (73%), which was also stated in their analysis (71.9%) by the same community.

CONCLUSION

The positivity rate of urine culture found in our sample was 25.7 percent . There were 32% Gram positive cocci, 63.5% Gram negative bacilli and 4.5 percent isolated candida species. The most common isolate was E.coli (40.8 percent), and Staphylococcus aureus (16.7 percent) was most common in Gram-positive cocci. E.coli was most susceptible to Cefuroxime and most resistant to Nitrofurantoin. All Staphylococcus aureus is completely Vancomycin-sensitive and most were Amoxyclav-resistant and 34.6 percent were present with MRSA.

Limitations and Recommendation

In patients, it is advisable to perform a study on patients together to gain insight into the variations in prevalences and their pattern of antibiotic sensitivity.

The prospect of a clinical analysis of uropathogens in patients with type II diabetes or pregnant women who might otherwise provide details of the antibiotic profile was avoided in order to understand the overall prevalence. This indicates the possible danger posed by pathogens.

-Ensure that antimicrobial susceptibility tests are performed before antimicrobials are prescribed for care.

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