ORIGINAL ARTICLE

ANTIBIOTIC SUSCEPTIBILITY PATTERN OF URINARY TRACT PATHOGENS ISOLATED AT A TERTIARY CARE HOSPITAL IN PESHAWAR

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ABSTRACT

Objective: The current descriptive cross-sectional study was conducted to determine the sensitivity pattern of uropathogen against commonly used antibiotics in a tertiary care hospital of district Peshawar.

Material & Methods: A total of 100 urine specimens were consecutively collected from suspect of urinary tract infection, both male and female, in a sterile container. All the specimens were inoculated on Cystine lysine electrolyte deficient agar and uropathogen were identified by using colonial morphology and different biochemical tests. Antibiotic susceptibility pattern was determined by disc diffusion method according to the protocol of Clinical and laboratory standard institute.

Results: Out of 100 urine specimens 5 different uropathogen were isolated encompassing E. coli, S. aureus, Enterobacter spp., P. aeruginosa, and E. faecalis. The frequency of UTI was more common in female than male patient and in age groups of 16-30 and 46-60 years. Imipenem and Nitrofurantoin were found to be the most sensitive antibiotic for gram-negative and gram-positive uropathogen respectively.

Conclusion: The present study reveals that E. coli is the most frequent uropathogen in Hayatabad Medical Complex, Peshawar. The antibiotic susceptibility pattern indicates that the isolated uropathogen show significant resistant to commonly used antibiotics.

Key Words: Antibiotic, Bacteria, Infection, Pathogens, Urinary.

INTRODUCTION

Urinary Tract Infection (UTI) is the microbial infection of urinary tract, which extends from urethra to kidney.[1] Gram negative bacteria such as Escherichia coli, Klebsiella species, Proteus species, Serratia species, Enterobacter species and Pseudomonas species are commonly associated with recurrent UTI especially in association with obstruction, nosocomial catheter associated infection, urologic manipulation and stones.[2] Females are usually at higher risk of UTI because of several predisposing factors including asymptomatic bacteriuria during pregnancy[3], female urethra is very close to vagina and it can get injured during sexual intercourse, and the moist perineum of female promote bacterial growth predisposes result in subsequent contamination of bladder.[4] The UTI gets complicated due to prostatic hypertrophy in elderly men and increased post void residual volume in post-menopausal women.[5] Worldwide, prevalence of UTI is estimated to be around 150 million persons per

year and about 6 million patients are estimated to visit outpatient departments and about 0.3 million are treated every year.[6] E. coli is the major cause of UTI contributing to 80–85% of community-acquired UTI.[7] The current study was conducted to determine the most frequent uropathogen and their antibiotic susceptibility in the Hayatabad Medical Complex, Peshawar, Pakistan.

MATERIAL AND METHODS

This descriptive cross-sectional study was conducted in Hayatabad Medical Complex, Peshawar from May 1, to August 31, 2020. A total of 100 urine specimens were consecutively collected in a sterilize container from UTI suspected patients including both males and females referred by their physicians and the age of the patient were ranging from 1 to 90 years.

All the urine specimens were inoculated on the Cystine lactose electrolyte deficient (CLED) agar with Mast bacteruritest strip and the inoculated media plates were incubated at 35°C for 16-18 hours. Afterward, the observable significant colonies (10^4 to 10^5CFU/ml)[8] were processed for identification using basic techniques such as Colonial morphology, Gram staining and different biochemical test including Catalase test, Coagulase test, Oxidase test, Urease test, and Triple sugar iron test.[9] The tentative identities of the isolates were obtained from Bergey's Manual of Determinative Bacteriology.[10]

All the isolated uropathogen were further tested against the commonly used antibiotics for resistance and/or susceptibility pattern by using disc diffusion method according to the guidelines of Clinical and laboratory standard institute (CLSI).[11] . Briefly, 3-5 isolated colonies of uropathogen were emulsified in the normal saline and the turbidity of the resultant bacterial suspension were set to 0.5 McFarland standard and lawn was prepared on the surface of the Muller Hinton (MH) agar with sterilize cotton swab. Later on, 6 antibiotic discs were applied at each standard plate and was incubated at 35°C for 16-18 hours and zone of inhibition were measured and interpreted according to CLSI.

The tested antibiotics included Ciprofloxacin, Amikacin, Gentamicin, Penicillin, Ceftazidime, Imipenem, Nitrofurantoin, Vancomycin, Teicoplanin, Tazobactam, Cefotaxime, Polymyxin B, Colistin, Fosfomycin, Doxycycline, Chloramphenicol. All the antibiotics were purchased from Oxoid and the antibiotics panel were decided according to uropathogen. S. aureus (ATCC 25923), E. coli (ATCC 25922) and P. aeruginosa (ATCC 27853) were used as control strains.

RESULTS

Out of 100 urine specimens 5 different uropathogen were isolated encompassing E. coli (63.0%), S. aureus (12.0%), Enterobacter species (12.0%), P. aeruginosa (5.0%), and E. faecalis (8.0%), while frequency of UTI is higher in female than male patient. **(Table 1)** The frequency of uropathogen was higher in age group 16-30 and 46-60 years. **(Table 2)** The antibiotics sensitivity and/or resistant pattern of uropathogen, vary for gram positive cocci and gram-negative rods. **(Table 3, Table 4)**

Table 1: Frequency distribution of isolated uropathogens

Uropathogen	Male	Female	Total
E. coli	20	43	63
S. aureus	5	7	12
Enterobacter Species	7	5	12
P. aeruginosa	5	0	5
E. faecalis	1	7	8
Total	38	62	100

Table 2: Frequency distribution of uropathogen in different age group

Age group (years)	E. coli	S. aureus	Enterobacter	P. aeruginosa	E. faecalis	Total
1-15	11	4	2	0	0	**17**
16-30	18	3	3	1	4	**29**
31-45	03	0	3	0	1	**7**
46-60	20	4	2	2	1	**29**
60-75	07	1	1	2	2	**13**
76-90	04	0	1	0	0	**5**
Total	**63**	**12**	**12**	**5**	**8**	**100**

Table 3: Antibiogram of gram positive uropathogen

Antibiotics	S. aureus			E. faecalis		
Pattern	S	I	R	S	I	R
Doxycycline	8	0	4	8	0	0
Penicillin G	0	8	4	8	0	0
Teicoplanin	7	5	0	8	0	0
Nitrofurantoin	10	1	1	8	0	0
Vancomycin	12	0	0	5	0	3
Erythromycin	11	0	1	0	2	6
Ciprofloxacin	8	0	4	1	0	7

S: sensitive; I: intermediate; R: resistance

Table 4: Antibiogram of gram negative uropathogen

Antibiotics	E. coli			Enterobacter species			P. aeruginosa		
Pattern	S	I	R	S	I	R	S	I	R
Cefotaxime	12	5	46	3	0	9	1	0	4
Piperacillin/tazobactam	48	7	8	11	1	0	4	0	1
Ceftazidime	12	0	51	6	0	6	0	0	5
Gentamycin	21	0	42	7	0	5	3	0	2
Cefoperazone/sulbactam	51	8	4	11	1	0	3	1	1
Polymyxin B	22	31	9	9	1	2	4	1	0
Imipenem	54	5	4	12	0	0	4	0	1
Nitrofurantoin	52	8	3	11	1	0	3	2	0
Ciprofloxacin	15	8	40	4	0	8	3	0	2
Amikacin	48	7	8	12	0	0	2	0	3
Colistin Sulphate							5	0	0

S: sensitive; I: intermediate; R: resistance

DISCUSSION

The overall frequency of UTI was higher in female than male as indicated by previous studies[12], while the most common uropathogen was E. coli (63.0%) which is extended by other studies published from the different areas of Pakistan including Lahore, Rawalpindi[13, 14], and Peshawar[15]. Our findings reveal that the gram negative uropathogen showed highest rate of sensitivity toward imipenem which is consistent with the results of other studies conducted in different locale of Pakistan.[14-16] In addition to this, more than 90% of the gram negative uropathogen were sensitive to Amikacin, Cefoperazone/sulbactam, Piperacillin/sulbactam, and nitrofurantoin and similar finding has been reported by several studies[17, 18] while sensitivity of gram negative uropathogen toward Ceftazidime, Cefotaxime, and Gentamicin was less than 50%[19]. All the isolates of P. aeruginosa were sensitive to Colistin sulphate which is comparable to earlier published literature from Pakistan.[19] In case of gram positive uropathogen, more than 90% isolates of S. aureus were sensitive to Nitrofurantoin and Erythromycin while Vancomycin kill 100% isolate of S. aureus, these findings are further extended by other studies.[20, 21] The overall sensitivity pattern of E. faecalis showed similar trends which has been documented previously.[22]

CONCLUSION

The given study reveals that the frequency of UTI is higher in female than male and E. coli is the most common uropathogen in both genders. The gram negative uropathogen showed highest sensitivity towards Imipenem while in gram positive uropathogen S. aureus and E. faecalis showed highest sensitivity to Vancomycin and Penicillin respectively.

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