Original Article

Retrospective study of antimicrobial resistance among isolates from UTI in Tamil Nadu, India

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Abstract

Objective: The objective of the present study was to ascertain the prevalence of Uropathogens and to study the antimicrobial resistance among them with commonly used antibiotics retrospectively. **Methods:** The urine specimens were collected from patients with symptoms of UTI from Govt. Villlupuram medical college hospital were cultured by standard microbiological procedures for the isolation of uropathogens and the isolates were subjected to antimicrobial susceptibility assay to investigate the resistance pattern of isolates. **Results:** A total of 1817 non-duplicative urine specimens were collected, of which 478 (26.3%) were found to be positive for urine culture. The positive samples were from both 223 (46.65%) male and 255 (53.35%) female patients. In the present study 491 isolates were obtained from the culture positive urine (n=478) specimens, of which 445/491 (90.6%) were found to be Gram negative bacilli and 66/491 (13.4%) were found to be Gram positive cocci. **Conclusion:** Isolates form urine showed high degree of resistance against the panel of antibiotics used to determine the antibacterial susceptibility.
Keywords: UTI, urine culture, drug resistance, antibiotic susceptibility.

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INTRODUCTION

Urinary tract infection (UTI) is the frequenthealthcare associated problemin community practice with a high rate of morbidity. It has been estimated that 250 million people were infected with UTI worldwide[1]. UTI could be caused by Gram-negative pathogens includes *Escherichia coli, Klebsiella sp., Enterobacter sp., Proteus sp*. and gram-positive pathogens like *Enterococcus sp.*, and *Staphylococcus sp. E. coli* is the most common uropathogen causing UTI in both community acquired and hospital acquired UTI as well. Organisms responsible for the UTI may have the capability to develop multiple drug resistance. Antimicrobial drug resistance is one of the major healthcare problems due to indiscriminate use of antimicrobials in general population that resulting changes in the antibiotic resistance pattern among pathogens over time[2]. The present study highlights the resistance pattern of common UTI causing organisms against commonly used antibiotics in the current scenario.

MATERIALS AND METHODS

Study Subjects

A total of 1817 suspected urine specimens from patients with symptoms of UTI were tested for culture and sensitivity in Villupuram Medical College, Tamilnadu, India, and the reports were analyzedretrospectively over the period of eight months from January 2015 to August 2015.

Sampling and processing of Specimen

Midstream urine specimenswere collected from the patients with clinical symptoms of UTI and cultured according to standard microbiological procedures. A positive urine culture was considered by a growth of 10^5 colony forming units (CFU)/mL of urine. The isolates were identified using standard microbiological procedures by routine colonial morphology, cultural and biochemical methods and stored at 4°C for further analysis.

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RESULTS

Distribution of uropathogen

A total of 1817 non-duplicative urine specimens were collected in a period of eight months from January 2015 to August 2015,of which 478 (26.3%) were found to be positive for urine culture. The positive samples were from both 223 (46.65%) male and 255 (53.35%) female patients of various age groups ranging from ≤ 1 to 75 years. In the present study 491 isolates were obtained from the culture positive urine (n=478) specimens comprising eight different uropathogens were reported, of which 445/491 (90.6%) were found to be Gram negative bacilli and 66/491 (13.4%) were found to be Gram positive cocci. Amongst 491 isolates, *E. coli* (258 (52.5%)) was the predominant uropathogen isolated in our study, followed by 84 (17.1%) were *Pseudomonas spp.*, 81(16.5%) were *Klebsiella spp.*, 22(4.5%) were *Enterococcus spp.*, 21(4.3%) were *Proteus spp.*, 14(2.9%) were *Staphylococcus aureus*, 10 (2%) were coagulase negative *Staphylococcus spp*. (*CoNS*), 1(0.2%) was reported as *Acenetobacter sp*. (Table 1).

Table 1: Distribution of uropathogens isolated from UTI

Sr. No	Uropathogens	No. of Isolates n (%)
1	*E. coli*	258(52.5%)
2	*Pseudomonas sp.*	84(17.1%)
3	*Klebsiellasp*	81(16.5%)
4	*Enterococcus sp.*	22(4.5%)
5	*Proteus sp*	21(4.3%)
6	*Staphlococcus aureus*	14(2.9%)
7	*CoNS*	10(2%)
8	*Acenetobacter sp.*	1(0.2%)
	Total	**491**

Antibacterial susceptibility testing

Of the 445/491uropathogenic Gram negative bacillusisolates tested by Kirby-Bauer disc diffusion assay against a panel of antibiotics such asamikacin, ampicillin, amoxicillin, ciprofloxacin, cotrimaxazole.*E. coli*(n=258) showed 58/258 (22.5%), 65/258 (25.2%), 202/258 (78.3%), 191/258 (74%), 175/258 (67.8%) resistance, *Pseudomonas sp.* (n=84) showed 31/84 (37%), 50/84 (59.5%), 62/84 (73.8%), 54/84 (64.3%), 58/84 (69%) resistance, *Klebsiella sp.* (n=81) showed 20/81 (24.7%), 78/81 (96.3%), 11/81 (13.6%), 54/81 (66.7%), 61/81 (75.3%) resistance, *Proteus sp.* (n=21) showed 3/21 (14.3%), 19/21 (90.5%), 16/21 (76.2%), 14/21 (66.7%), 15/21 (71.4%) resistance against the panel of antibiotics respectively, *Acenetobacter sp.* Showed 100 % resistance against ampicillin and cotrimaxazole (Table 2).

Table 2: Antibiotic susceptibility pattern of Gram negative bacilli isolated from UTI

Uropathogens Gram negative Bacillus (n)	AK		AMP		AMOX		CIP		COT	
	S	R	S	R	S	R	S	R	S	R
E. coli (n=258)	200 (77.5%)	58 (22.5%)	193 (74.8%)	65 (25.2%)	56 (21.7%)	202 (78.3%)	67 (26%)	191 (74%)	83 (32.2%)	175 (67.8%)
Pseudomonas sp. (n=84)	53 (63%)	31 (37%)	34 (40.5%)	50 (59.5%)	22 (26.2%)	62 (73.8%)	30 (35.7%)	54 (64.3%)	26 (31%)	58 (69%)
Klebsiella sp. (n=81)	61 (75.3%)	20 (24.7%)	3 (3.7%)	78 (96.3%)	70 (86.4%)	11 (13.6%)	27 (33.3%)	54 (66.7%)	20 (24.7%)	61 (75.3%)
Proteus sp. (n=21)	18 (85.7%)	3 (14.3%)	2 (9.5%)	19 (90.5%)	5 (23.8%)	16 (76.2%)	7 (33.3%)	14 (66.7%)	6 (28.6%)	15 (71.4%)
Acenetobacter sp. (n=1)	1 (100%)	0	0	1 (100%)	1 (100%)	0	1 (100%)	0	0	1 (100%)

S= sensitive, R= resistant, AK=amikacin, AMP=ampicillin, AMOX=amoxicillin, CIP=ciprofloxacin, COT=cotrimaxazole

Of the 66/491uropathogenicGram positive isolates tested against a panel of antibiotics such as penicillin, amoxicillin, gentamycin, doxycycline, erythromycin against Gram positive cocci, *Enterococcus sp.* (n=22) showed 17/22 (77.3%), 13/22 (59%), 9/22 (41%), 6/22 (27.3%), 16/22 (72.7%) resistance, *Staphylococcus aureus* (n=14) showed 14/14 (100%), 14/14 (100%), 2/14 (14.3%), 1/14 (7.2%), 12/14 (85.7%) resistance against the panel of antibiotics respectively, *CoNS* (n=10) showed 10/10 (100%) resistance to penicillin, 4/10 (40%) resistance to amoxicillin, 3/10 (30%) resistance to doxycycline, 8/10 (80%) resistance to erythromycin and showed 100% sensitive to gentamycin (Table 3).

Table 3: Antibiotic susceptibility pattern of Gram positive cocci isolated from UTI

Uropathogens	P		AMOX		G		DO		E	
Gram positive coccus (n)	S	R	S	R	S	R	S	R	S	R
Enterococcus sp. (n=22)	5 (22.7%)	17 (77.3%)	9 (41%)	13 (59%)	13 (59%)	9 (41%)	16 (72.7%)	6 (27.3%)	6 (27.3%)	16 (72.7%)
Staphlococcus aureus (n=14)	0	14 (100%)	0	14 (100%)	12 (85.7%)	2 (14.3%)	13 (92.8%)	1 (7.2%)	2 (14.3%)	12 (85.7%)
CoNS (n=10)	0	10 (100%)	6 (60%)	4 (40%)	10 (100%)	0	7 (70%)	3 (30%)	2 (20%)	8 (80%)

S= sensitive, R= resistant, P=penicillin, AMOX=amoxicillin, G=gentamycin, DO=doxycycline, E=erythromycin, *CoNS*=coagulase negative *Staphylococcus* species

DISCUSSION

The present study the prevalence of UTI was found to be 26.3% which correlates with the other studies which accounts for 22%[4]. The present study indicates the higher prevalence of UTIs among women than men. It may be because of anatomic differences, hormonal imbalances, and behavioral patterns[5]. In this study, the Gram negative bacilli comprising 90.6% of the total bacterial isolates while Gram positive cocci comprising13.4%. *E. coli* (52.5%) was found to be the most predominant gram negative bacteria in the positive urine samples of UTI. This observation is correlated with reports from other studies[6,7,8]. Antimicrobial drug resistance has been reported as an increasing world-wide problem[9]. The study showed high degree of resistance against the antibiotics used. This result indicates the earlier exposure of the isolates to these antimicrobials that could be the reason for the development of resistance against commonly used antibiotics.

CONCLUSION

The present study revealed that *E. coli* was the predominant pathogens isolated. The presence of uropathogens with a very high degree of resistance to the commonly prescribed drugs that leads to the very few choices of drugs for the clinicians to treatment UTIs. The drug resistance among uropathogens is gradually developing and it requires routine surveillance and monitoring studies to provide physicians knowledge for the most effective empirical treatment for UTIs.

REFERENCES

1. Ronald AR, Nicolle LE, Stamm E, *et al*. Urinary tract infection in adults: research priorities and strategies. Int J Antimicrob Agents 2001; 17:343-348.
2. Bonadio M, Meini M, Spetaleri P, Gilgi C. Current microbiological and clinical aspects of urinary tract infections. Eur J Urol 2001; 40:439-445.
3. CLSI. 2015. Performance Standards for Antimicrobial Susceptibility Testing; Twenty-Fifth Informational Supplement, M100–S25. Clinical and Laboratory Standards Institute, Wayne, PA.
4. C. C. Ekweozor and T. N. Onyemenen, "Urinary Tract Infection in Ibadan, Nigeria: causative organism and anti-microbial sensitivity pattern," African Journal of Medical Sciences, vol. 25, pp. 165–169, 1996.
5. Cuevas O, Cercenado E, Gimeno M, Marín M, Coronel P, Bouza E. Comparative in vitro activity of cefditoren and other antimicrobials against Enterobacteriaceae causing community-acquired uncomplicated urinary tract infections in women: a Spanish nationwide multicenter study. DiagMicrobiol Infect Dis 2010; 67: 251-260.
6. M. Dash, S. Padhi, I. Mohanty, P. Panda, and B. Parida,"Antimicrobial resistance in pathogens causing urinary tract infections in a rural community of Odisha, India," Journal of Family and Community Medicine, vol. 20, no. 1, pp. 20–26, 2013.
7. T. S. Dimitrov, E. E. Udo, F. Awni, M. Emara, and R. Passadilla,"Etiology and antibiotic susceptibility patterns of communityacquired urinary tract Infections in a Kuwait Hospital," Medical Principles and Practice, vol. 13, no. 6, pp. 334–339, 2004.
8. O. Omigie, L. Okoror, P. Umolu, and G. Ikuuh, "Increasing resistance to quinolones: a four-year prospective study of urinary tract infection pathogens," International Journal of General Medicine, vol. 2, pp. 171–175, 2009.
9. Sefton AM. The impact of resistance on the management of urinary tract infections. Int J Antimicrob Agents 2000; 16:489–491.

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