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Letter to Editor

Microbiology Section

Aetiological Profile and Antibiotic Susceptibility Pattern in Patients with Urinary Tract Infection in Tripura

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Though urinary tract infection (UTI) stands as the second most common infection in the community [1]. Treatment of community acquired UTI is usually empirical in resource limited health care settings or while awaiting for the antimicrobial susceptibility test report. To formulate an empirical treatment guideline, appropriate knowledge of local and national antimicrobial resistance and aetiological trends is of utmost importance [2]. Also, considering the fact, that resistance rates to chemotherapeutics commonly used in UTI is increasing and susceptibility of micro-organisms shows significant geographical variations, recent studies to enhance knowledge on changing trends of aetiological agents in UTI and their antibiotic susceptibility pattern at local levels, serve an important guide for empirical treatment [3].

The present study was conducted for a period of two years, from June 2011 to May 2013, at Dr.B.R. Ambedkar Memorial Teaching Hospital, a tertiary health care centre in the state of Tripura. As, no previous reference was available from this state, prevalence of 50% and Confidence interval as 95%, has been assumed for the minimum sample size estimation.

Freshly voided mid stream urine specimens were collected from patients with clinical suspicion of UTI. The samples were cultured for isolation and identification of the pathogenic bacteria. Bacterial counts of more than 105 Cfu/ml were considered significant and bacterial counts of 104-105 Cfu/ml with significant history of UTI, morbidity and immunocompromised state were followed up and reported as UTI. Antibiotic susceptibility pattern was determined by Kirby Bauer disc diffusion method as per CLSI guidelines [4]. Extended Spectrum Beta Lactamases (ESBL) were detected for *E.coli* and *Klebsiella spp.* by double disc synergy test [4]. Out of 2396 urine samples processed, 1084 (45.2%) yielded significant bacterial isolates. The predominant isolate was *Escherichia coli* (43.9%) followed by *Enterococcus faecalis* (21.4%), *Klebsiella pneumoniae* (11.8%), *Staphylococcus aureus* (10.3%) and others. Females were more affected than males (3.1: 1), with majority of infections in the age group of 31-45 years (36%) followed by 16-30 years (29.3%).

The Gram negative isolates were highly sensitive to Imipenem (100%), followed by Piperacillin tazobactum (95.9%), Nitrofurantoin (87.3%) and Amikacin (83.2%). Cotrimoxazole (5.8%) was the least sensitive antibiotic for Gram negative isolates followed by Amoxycillin-clavulanic acid (49.1%) and Ciprofloxacin (50.9%). The predominant isolate *E.coli*, exhibited the similar pattern of susceptibility. Gram positive isolates were more sensitive to Vancomycin (95.9%), Amikacin (89.8%), Amoxycillin-clavulanic acid (84.7%), Nitrofurantoin (83.7%) and Gentamicin (80.6%). Ampicillin (25.5%) and Erythromycin (49%) were least sensitive antibiotics. *Enterococci spp*. as the predominant isolate, was highly sensitive to Vancomycin (93.1%) followed by Amikacin and Amoxycillin-clavulanic acid. Extended Spectrum Beta Lactamases (ESBL) was detected in *E.coli* (10.3%) and *Klebsiella pneumoniae* (3.3%). The result of Antibiotic susceptibility pattern has been depicted in [Table/Fig-1,2].

Bacterial isolate	Total No.	No. of isolates sensitive to Antimicrobial agents - n (%)											
		IMP	PIT	AK	NT	OF	CIP	LEV	AMC	CXM	CTX	CFT	COT
E. coli	476	476 (100)	456 (95.9)	396 (82.7)	420 (87.3)	328 (68.9)	252 (52.9)	380 (79.8)	252 (52.9)	348 (73.1)	332 (69.7)	364 (76.5)	28 (5.9)
Klebsiella spp.	128	128 (100)	120 (93.8)	112 (87.5)	112 (87.5)	92 (71.9)	60 (46.8)	96 (75)	56 (43.8)	84 (65.6)	80 (62.5)	92 (71.9)	0 (0)
Citrobacter spp.	24	24 (100)	24 (100)	24 (100)	24 (100)	20 (83.3)	20 (83.3)	24 (100)	16 (66.7)	24 100)	20 (83.3)	20 (83.3)	8 (33.3)
Enterobacter spp.	24	24 100)	24 (100)	20 (83.3)	24 (100)	20 (83.3)	16 (66.7)	24 (100)	16 (66.7)	20 (83.3)	16 (66.7)	20 (83.3)	4 (16.7)
Acinetobacter spp.	20	20 (100)	20 (100)	12 (60)	12 (60)	8 40)	4 (20)	12 (60)	0 (0)	4 (20)	0 (0)	4 (0)	0 (0)
Pseudomonas spp.	12	12 (100)	12 (100)	4 (33.3)	4 (33.3)	0 (0)	0 (0)	4 (33.3)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
Proteus spp.	8	8 (100)	8 (100)	8 (100)	8 (100)	4 50)	0 (0)	8 (100)	0 (0)	4 (50)	4 (50)	8 (100)	0 (0)
TOTAL (Sensitive)	692	692 (100)	664 (95.9)	576 (83.2)	604 (87.3)	472 (68.2)	352 (50.9)	548 (79.2)	340 (49.1)	484 (69.9)	452 (65.3)	508 (73.4)	40 (5.8)

[Table/Fig-1]: Antibiotic sensitivity pattern of Gram negative bacteria isolated from urine culture
IMP – Imipenem ; PIT – Piperacillin Tazobactum ; AK – Amikacin ; NT – Nitrofurantoin ; OF – Ofloxacin ; CIP – Ciprofloxacin ; LEV – Levofloxacin ; AMC – Amoxycillin Clavulanic acid ; CXM – Cefuroxime ; CTX – Ceftriaxone ; CFT – Cefotaxime ; COT – Cotrimoxazole

Bacterial isolate	Total No.	No. of isolates sensitive to Antimicrobial agents - n (%)										
		VA	GEN	AK	NT	OF	CIP	AMP	AMC	CXM	CEP	ER
Enterococci spp.	232	216 (93.1)	168 (72.4)	208 (89.7)	184 (79.3)	176 (75.9)	136 (58.6)	76 (32.8)	188 (81)	172 (74.1)	124 (53.4)	100 (43.1)
Staphylococcus aureus	112	112 (100)	100 (89.3)	96 (85.7)	96m (85.7)	84 (75)	64 (57.1)	12 (10.7)	96 (85.7)	88 (78.6)	76 (67.9)	64 (57.1)
Staphylococcus saprophyticus	48	48	48 (100)	48 (100)	48 (100)	44 (91.7)	36 (75)	12 (25)	48 (100)	40 (83.3)	32 (66.7)	28 (58.3)
TOTAL (Sensitive)	392	376 (95.9)	316 (80.6)	352 (89.8)	328 (83.7)	304 (77.6)	236 (60.2)	100 (25.5)	332 (84.7)	300 (76.5)	232 (59.2)	19 (49)

[Table/Fig-2]: Antibiotic sensitivity pattern of Gram positive bacteria isolated from urine culture
VA – Vancomycin ; GEN – Gentamicin ; AK – Amikacin ; NT – Nitrofurantoin ; OF – Ofloxacin ; CIP – Ciprofloxacin ; AMP – Ampicillin ; AMC – Amoxycillin Clavulanic acid ; CXM – Cefuroxime ; CEP – Cephalexin ; ER – Erythromycin

The positivity rate reported in this study was higher than values reported in India 10.86% [5] and 9.17% [6]. This indicates that urine culture was essential for definitive diagnosis of UTI. The age group exhibiting the highest occurrence of UTI was 16-45y. This was the most sexually active group and women of child bearing age fall in this group. The propensity of young women to develop UTI has been explained on the basis of their anatomy (short urethra) and behavioral factors [7].

The predominant isolate was *Escherichia coli* (43.9%) followed by *Enterococcus faecalis* (21.4%), irrespective of the gender. This was unusual because, in most of the previous studies *E.coli* and *Klebsiella spp.* were found to be major pathogens, with a low isolation rate of *Enterococcus spp.* In 1997 and 1998, *Enterococcus faecalis* was isolated in only 0.8% and 0.5% cases of UTI [8]. In 2001, a study reported isolation rate of 8.9% from Mumbai and in 2002, another study from Chandigarh reported isolation rate of *Enterococcus spp.* as 6.4% [9,10]. A recent study from Bihar, reported isolation rate of *Enterococcus spp.* as high as 15.64% [11], which can be compared with the present study. This indicates the emergence of *Enterococcus spp.* as a significant pathogen.

IDSA guidelines recommend a bench mark of 10-20% resistance at which first line empiric therapy should be modified [12]. Considering the susceptibility pattern of the predominant isolates, Nitrofurantoin and Amikacin can be recommended as first line empirical therapy by oral and parenteral route respectively. As Nitrofurantoin is a urinary antibiotic and not frequently used in this part of India, a low level of resistance was observed. Imipenem, Piperacillin-tazobactum and Vancomycin showed least levels of resistance to all organisms, but these antibiotics should be reserved as final therapeutic options, thereby reducing the antibiotic pressure and abuse. Our observation may be correlated with a study from Mangalore, recommending Nitrofurantoin and Amikacin as drugs of choice for treatment of UTI [1]. Considerable resistance of organisms to Ciprofloxacin, Ofloxacin and Levofloxacin were observed in the present study, for which fluoroquinolones can no longer be advocated for empirical therapy. Most of the ESBL producing strains were multi-drug resistant and showed susceptibility to Imipenem and Piperacillin-tazobactum only.

CONCLUSION

In this geographical area of North East India, the present data represents *E.coli* as the most predominant organism, followed by *Enterococcus faecalis*, as an emerging pathogen causing UTI. As usual, females were more infected than males, with predominance of infection in reproductive age group. Laboratory diagnosis is essential for definitive diagnosis of UTI. On analysis of local antibiotic susceptibility pattern, Nitrofurantoin and Amikacin represents the choice of first line empiric therapy for treatment of UTI. Due to variation in such scenario in geographical areas and changing pattern of antibiotic susceptibility, more studies need to be conducted at intervals, based on which hospital policies are to be modified.

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