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## RESEARCH ARTICLE

**DRUG UTILIZATION PATTERN AND ADVERSE DRUG REACTION MONITORING IN URINARY TRACT INFECTION PATIENTS IN A TERTIARY CARE HOSPITAL**Eima Fatima<sup>1</sup>, Arifa Anwar<sup>2</sup>, Mridu Dudeja<sup>3</sup>, Mohd. Akhtar<sup>1</sup>, Abul Kalam Najmi<sup>1\*</sup><sup>1</sup>Department of Pharmacology, Faculty of Pharmacy, Jamia Hamdard, New Delhi-110062, India<sup>2</sup>Department of Obstetrics and Gynaecology, Hamdard Institute of Medical Sciences and Research and HAHC Hospital, Jamia Hamdard, New Delhi-110062, India<sup>3</sup>Department of Microbiology, Hamdard Institute of Medical Sciences and Research and HAHC Hospital, Jamia Hamdard, New Delhi-110062, India*\*Corresponding Author's Email: [aknajmi@hotmail.com](mailto:aknajmi@hotmail.com)*

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**ABSTRACT**

**Background:** Urinary tract infection is a key public health issue causing morbidity, especially in women population. This problem is further aggravated in pregnant women. **Aims:** This study was designed to evaluate the drug prescribing behaviour and adverse drug reaction monitoring in urinary tract infection patients in a tertiary care hospital. **Materials and Methods:** The present study was prospective, observational and carried out for four months, and done to assess the drug utilization pattern, adverse drug reactions (ADRs) and to identify the bacterial pathogens associated with UTI and their susceptibility to antibiotics. **Results:** A total of 327 female patients were evaluated, out of which 248 (75.84%) cases were symptomatic. The study reflected maximum of 50.46% UTI in the age group 21-30 years. Pathogens isolated after a urine culture were of both Gram positive 131 (40.07%) and Gram negative 196 (59.93%) type. The maximum incidence (45.80 %) occurred in last trimester of pregnancy. The most frequently prescribed antibiotic to the pregnant patients in our study was Nitrofurantoin, whereas Amoxicillin with Clavulanic acid was most frequently used in non pregnant cases. Most common ADRs reported with almost all classes of antibiotics was nausea and vomiting followed by vaginal irritation, skin rash and photosensitivity. **Conclusion:** To ensure appropriate therapy, current knowledge of the pathogenic organism and their antibiotic susceptibility pattern is mandatory, especially in cases of UTI with pregnancy.

**Keywords:** Drug utilization pattern, Adverse Drug Reactions, Urinary Tract Infection, Renal Pharmacology**INTRODUCTION**

Drug utilization evaluation is a tool to evaluate appropriateness of drug therapy. The intention is to recognize whether current patterns of prescribing, dispensing and use of drug therapy are reliable with criteria and standards. These criteria and standards are to demonstrate the drug therapy is effective, safe, appropriate, and cost effective and support optimal patient outcome.<sup>1</sup> Urinary Tract Infection (UTI) is one of the most common clinical syndromes encountered in general and gynaecological practices.<sup>2</sup> Most often, UTI is caused by a bacterial infection and can cause serious complications, if left untreated. Today, UTI represents one of the most common diseases with an estimated worldwide incidence of 150 million per annum. Although UTIs occur in both men and women, clinical studies suggest that its overall prevalence is higher in women. UTI is also a common problem during pregnancy, particularly beginning at week 6 and peaking during weeks 22 to 24.<sup>3</sup> Several studies reported that untreated bacteriuria in pregnancy either asymptomatic or symptomatic is associated with 50%

increase in the risk of stillbirth and a significant increase in the risk of pre-eclampsia, hypertension, anemia, and postpartum endometritis.<sup>4-7</sup> Studies also report that diabetes mellitus is a well recognized risk factor for the occurrence of UTI. UTI is a common illness in children, with overall prevalence ranging from 2-8% throughout childhood as reported in the studies.<sup>8-10</sup>

UTI treatment depends on location (cystitis vs. pyelonephritis), patient's age, severity of presentation, and the antimicrobial resistance pattern in the community. Empiric therapy for UTI should be initiated after urine culture sensitivity test of urine specimen has been obtained. The antibiotic choice should be based on pathogen identification, sensitivity from urine culture and comorbid diseases related to the patient.

Therapy to uncomplicated UTI usually begins before the results of microbiological tests are known. The rationale for this approach is based on the highly predictable spectrum of etiological agents causing UTI and their antimicrobial resistance pattern in the given

population. Recurrent urinary tract infection (RUTI) is explained as three episodes of UTI in the last twelve months or two episodes in the last six months. Some studies estimate that 20-30 % of woman who has a UTI would have an RUTI. A different approach has been proposed for the prevention of RUTI and include non pharmacological therapies such as avoiding sexual intercourse and ingestion of cranberry juice.

To improve the patient compliance, it is mandatory to continue drug utilization study and adverse drug reactions (ADRs) monitoring. Thus, the aim of this study is to improve patient care, risk assessment and cost benefits in relation to the use of medicines. This also promotes the understanding, education and clinical training in pharmacovigilance and its effective communication to health professionals and the public.

## MATERIALS AND METHODS

This study was a four month prospective observational drug utilization study focusing on the prescribing patterns, sensitivity to antibiotics and the ADRs with the antibiotics prescribed for UTI patients of all age groups were included in the study. Mid stream urine were collected in sterile urine culture bottle to specify

antibiotic sensitivity. A total of 327 females were interviewed. All the observations were recorded in the drug utilization form and ADR monitoring form. A Patient profile (age, weight, height, patient address, socio economic status, educational status, marital status, pregnancy), susceptibility factors for UTI, past history of UTI, concomitant conditions, if undergone any urogenital surgery, eating habits, urine culture and sensitivity report of the pathogen were recorded. Pregnant patients were separately interviewed and recorded for the diseased condition and concomitant drug use. Drugs prescribed for UTI to patients, drug dose and frequency, adverse drug reaction, if any, due to the antibiotics prescribed were also noted. Individuals who did not give verbal informed consent or had complicated infection were not included in the study.

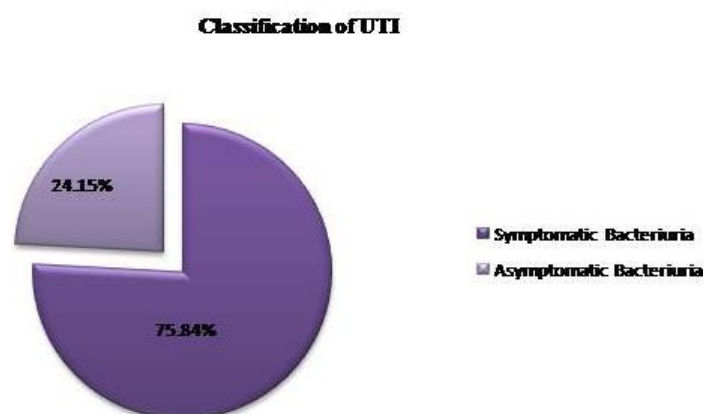
## OBSERVATIONS AND RESULTS

During the period of four months (January 2013 to April 2013) of the study, a total of 327 patients with UTI were evaluated in the HAH Centenary Hospital, Jamia Hamdard. Age distribution reflects maximum of 165 (50.46%) in the age group 21-30 years, followed by 61 (18.65%) in the age group of 31-40 years [Table 1].

**Table 1: Age wise distribution of patients**

S. No.	Age group(yrs)	No. of patients	Percentage (%)
1	1-10	8	2.44
2	11-20	24	7.34
3	21-30	165	50.46
4	31-40	61	18.65
5	41-50	33	10.09
6	51-60	18	5.50
7	61-70	11	3.36
8	Above 70	7	2.14
	Total	327	100

Out of 327 patients suffering from UTI, 248 (75.84%) cases were symptomatic while 79 (24.16%) cases were asymptomatic [Figure 1]. Isolated pathogens in urine were of both Gram positive 131 (40.07%) and Gram negative 196 (59.93%) type. Most common Gram positive pathogens causing UTI was found to be *Staphylococcus aureus* as urine culture of 91 (27.83%) patients were positive for this bacteria followed by 25 (7.63%) patients positive for *Enterococcus faecalis* and 10 (4.28%) patients positive for *Streptococcus pyogenes*. Incidence of Methicillin resistant *S. aureus* was least, only one case detected positive for this bacterium. Among gram negative bacteria, *Escherichia coli* 118 (36.09%) were the most common, followed by *Pseudomonas aeruginosa* 18 (5.50%) and *Klebsiella pneumoniae* 16 (3.28%). [Table 2]



**Figure 1: Classification of UTI**

**Table 2: Frequency of isolation of various pathogens detected in urine**

Pathogens		Number and percentage of pathogens in					
		P	(%)	NP	(%)	Total	(%)
<b>Gram +ve</b>	Staphylococcus aureus	29	8.87	62	18.96	91	27.83
	Enterococcus faecalis	10	3.06	15	4.59	25	7.65
	Streptococcus pyogenes	10	3.06	4	1.22	14	4.28
	Methicillin resistant S. aureus	0	0.00	1	0.31	1	0.31
<b>Gram -ve</b>	Escherichia coli	51	15.60	67	20.49	118	36.09
	Klebsiella oxytaca	2	0.61	10	3.06	12	3.67
	Klebsiella pneumonia	5	1.53	9	2.75	12	4.28
	Proteus mirabilis	2	0.61	1	0.31	3	0.92
	Pseudomonas aeruginosa	7	2.14	11	3.36	18	5.50
	Morganellamorganii	5	1.53	1	0.31	6	1.84
	Salmonella typhi	1	0.31	0	0.00	1	0.31
	Enterobacterfaecalis	0	0.00	3	0.92	3	0.92
	Acinetobacterbaumannii	4	1.22	6	1.83	10	3.05
	Providenciarettgeri	5	1.53	6	1.83	11	3.36
	<b>Total</b>		131	40.06	196	59.94	327

It has been observed that UTI was most common during 26-40 weeks of pregnancy as out of 131 pregnant cases, 60(45.80%) patients came to treatment in the HAHC hospital during the above gestational age [Table 4].

**Table 3: Demographic characteristics of UTI patients****(a) Marital status**

Marital Status	Number of cases	Percentage (%)
Married	260	79.51
Unmarried	67	20.49
Total	327	100

**(b) Social status**

Social Status	Number of cases	Percentage (%)
High( MI above 20k)	16	4.89
Middle ( MI between 10-20k)	54	16.51
Low( MI below 10k)	257	78.60
Total	327	100

**(c) Educational status**

E. Status	Number of cases	Percentage (%)
Illiterate	202	61.77
Educated	80	24.46
Highly educated	45	13.76
Total	327	100

**Table 4: Prevalence of UTI in pregnant women in relation to gestational age**

Gestational Age (weeks)	Number of cases	Percentage (%)
1-12	32	24.42
13-25	39	29.80
26-40	60	45.80
	131	100

In our study 131 cases were pregnant while 196 were non-pregnant. From USG (LA) of pregnant cases, 56(42.74%) patients were diagnosed as nephritis and pyelonephritis. Findings of our study suggest quite higher percentage of nephritis in India in comparison to

US; it may be due to poor hygienic conditions and humid weather of India. Susceptibility of urinary tract infection showed past history of biological factors like UTI in 18 cases (P5 and 13NP), diabetes mellitus 28(P9 and NP 19), urinary obstruction 16 (P6 and NP10),

incontinence in 16(P7 and NP9). Out of 9 pregnant cases, gestational diabetes was reported in 7 cases. Menopause was also recorded in 32 cases; it may be due to less mucus in vaginal area with low estrogen level increasing the chances of infection. Behavioral factors like use of condom 54(P22 and NP32) and contraceptive pills 64(P23 and NP41) were also recorded. Besides

these, other susceptibility factors like catheterization 124(P72 and NP52), urogenital surgery 57(P24 NP33) and spinal cord injury 2(NP) were recorded [Figure2]. In a study done by Turan et.al in 2008, it was found that women taking insulin and those with longer diabetes duration (more than 10 yrs) are at increased risk of UTI.

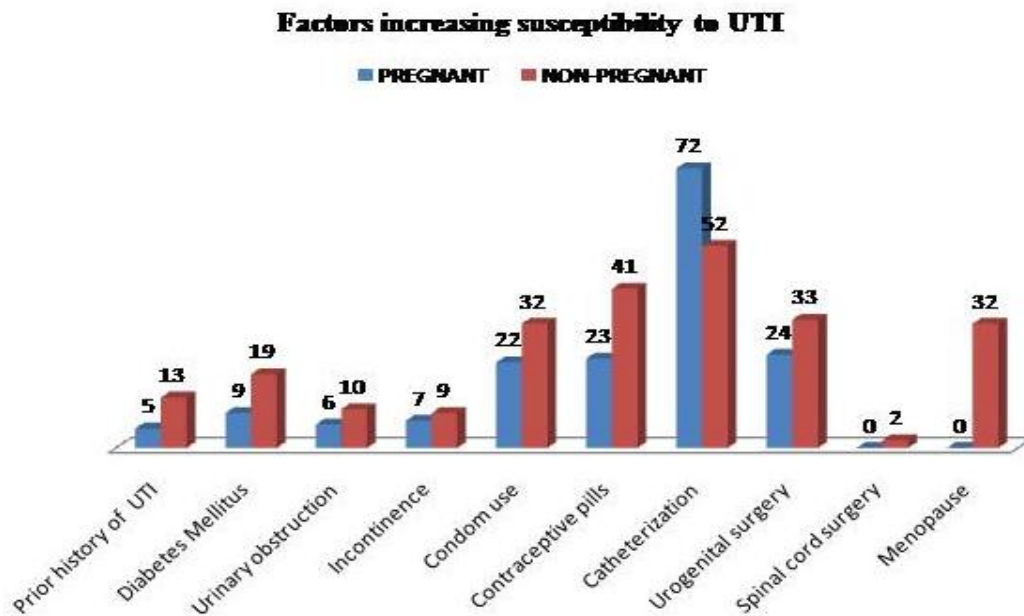


Fig. 2 Factors increasing susceptibility to UTI

Antimicrobial susceptibility pattern of both gram positive and gram negative microorganisms was tested with Amoxicillin Clavulanic acid(AMC), Nitrofurantoin (NIT), Ofloxacin(OF), Amikacin (AK), Ceftriaxone(CTX), Chloramphenicol (C), Azithromycin (AZT), Doxycycline(DOX), Gentamycin(GEN) and Cefixime(CEF).The pattern of prescription reflects that the maximum prescribed antibiotic was the combination of Amoxicillin- clavulanic acid 142(43.33%) followed by Nitrofurantion 127(38.83%).The pattern also depicts that amoxicillin-clavulanic acid was mostly included in the prescription of non pregnant UTI cases 136(41.50%) while nitrofurantion in pregnant UTI cases 120(36.69%).[Table 5, Table 6]

Antibiotics were usually given empirically before the laboratory results of urine culture are available.The antibiotics prescribed by the doctors included Amoxicillin + clavulanic acid[1.2gm i.v/10-12 hrly 375mg bid (5 days), Nitrofurantoin [50-100mg qid (4-7 days)], Amikacin [250mg bid i.v(4-7 days)], Azithromycin[500mg o.d (3 days)], Cefixime[200-400mg o.d (4-7 days)], Ceftriaxone[250mg o.d (5 days); 1-2g i.v], Ofloxacin[400mg o.d (5 days)], Ciprofloxacin[250-500mg o.d (4-7 days)], Norfloxacin[400mg bid (5 days)] and Doxycycline[100mg bid (7 days)].Majority of Gram positives were resistant to most of the antibiotics tested than the Gram negatives. As indicated in the Tables 33 and 34 most of the gram positives were found sensitive to NIT, C and GEN and gram negatives were found sensitive to AK, NIT, C, GEN and AMC.Gram positives

were found resistant to AK, CTX and DOX whereas Gram negatives were resistant to DOX, CEF, CTX and OF. [Table 5,6]

The pattern of prescription reflects that the maximum prescribed antibiotic was the combination of Amoxicillin-clavulanic acid 142(43.33%) followed by Nitrofurantion 127(38.83%).The pattern also depicts that amoxicillin-clavulanic acid was mostly included in the prescription of non pregnant UTI cases 136(41.50%) while nitrofurantion in pregnant UTI cases 120(36.69%) [Table 7].

Most of the antibiotics were prescribed in second and third trimester which possess less threat to both, mother and fetus as the drug prescribed in the first trimester (organ development phase) may lead to fetal abnormalities.

ADRs are common with UTI treatment. In general, the common side effects are mild to moderate and self limiting however, occasional serious adverse effects can occur. Out of 142 patients prescribed with Amoxicillin with Clavulanic acid, there were 13 reports of nausea and 2 reports of skin rash.127 patients, mostly the pregnant, were given Nitrofurantoin, out of which 3 patients complained of vaginal irritation and 2 pregnant females reported nausea.

**Table 5: Antimicrobial susceptibility pattern of gram positive bacteria isolated from urine culture of pregnant and non pregnant women**

Bacterial Isolate	Total No.	Pattern	Anti-microbial agents tested									
			AMC No.(%)	NIT No.(%)	OF No.(%)	AK No.(%)	CTX No.(%)	C No.(%)	AZT No.(%)	DOX No.(%)	GEN No.(%)	CEF No.(%)
Staphylococcus aureus	91	S	25 (27.47)	57 (62.63)	20 (21.97)	3 (3.29)	27 (29.69)	57 (62.63)	1 (1.09)	0 (0.00)	40 (43.95)	3 (3.29)
		R	66 (72.52)	34 (37.36)	71 (78.02)	88 (96.70)	64 (70.32)	34 (37.36)	90 (98.90)	91 (100.00)	51 (56.04)	88 (96.70)
Enterococcus faecalis	25	S	5 (20.00)	17 (68.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (4.00)	0 (0.00)	1 (4.00)	2 (8.00)	3 (12.00)
		R	20 (80.00)	8 (32.00)	25 (100.0)	25 (100.0)	25 (100.0)	24 (96.00)	25 (100.00)	24 (96.00)	23 (92.00)	22 (88.00)
Streptococcus pyogenes	14	S	3 (21.42)	11 (78.57)	0 (0.00)	0 (0.00)	3 (21.42)	2 (14.28)	1 (7.14)	0 (0.00)	3 (21.42)	7 (50.00)
		R	11 (78.57)	3 (21.42)	14 (100.0)	14 (100.0)	11 (78.57)	12 (85.71)	13 (92.85)	14 (100.00)	11 (78.57)	7 (50.00)
Methicillin resistant S. Aureus	1	S	0 (0.00)	0 (0.00)	1 (100.0)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)	1 (100.00)
		R	1 (100.0)	1 (100.00)	0 (0.00)	1 (100.0)	1 (100.0)	1 (100.0)	1 (100.00)	1 (100.00)	1 (100.00)	0 (0.00)
TOTAL	131	S	33 (25.19)	85 (64.88)	21 (16.03)	3 (2.29)	30 (22.90)	60 (45.80)	2 (1.52)	1 (0.76)	45 (34.35)	14 (10.68)
		R	98 (74.80)	46 (35.11)	110 (83.96)	128 (97.70)	101 (77.09)	71 (54.20)	129 (98.48)	130 (99.23)	85 (64.88)	117 (89.31)

Table 6: Antimicrobial susceptibility pattern of gram negative bacteria isolated from urine culture of pregnant and non pregnant women

Bacterial Isolate	Total number	Pattern	Anti-microbial agents tested									
			AMC No.(%)	NIT No.(%)	OF No.(%)	AK No.(%)	CTX No.(%)	C No.(%)	AZT No.(%)	DOX No.(%)	GEN No.(%)	CEF No.(%)
Escherichia coli	118	S	52 (44.06)	79 (66.94)	14 (11.86)	80 (67.69)	14 (11.86)	70 (59.32)	39 (33.05)	2 (1.69)	49 (41.52)	2 (1.69)
		R	66 (55.93)	39 (33.05)	104(88.13)	38 (32.20)	104(88.1)	48 (40.67)	79 (66.94)	116(98.30)	69 (58.47)	116(98.30)
Klebsiellaoxytaca	12	S	1 (8.33)	6 (50.00)	1 (8.33)	9 (75.00)	3 (25.00)	9 (75.00)	3 (25.00)	2 (16.66)	3 (25.00)	0 (0.00)
		R	11 (91.66)	5 (41.66)	11 (91.66)	3 (25.00)	9 (75.00)	3 (25.00)	9 (75.00)	10 (83.33)	9 (75.00)	12(100.00)
Klebsiella pneumonia	14	S	1 (7.14)	2 (14.28)	1 (7.14)	9 (64.28)	5 (35.71)	7 (50.00)	13 (92.85)	0 (0.00)	6 (42.85)	0 (0.00)
		R	13 (92.85)	12 (85.71)	13 (92.85)	5 (35.71)	9 (64.28)	7 (50.00)	1 (7.14)	14(100.00)	8 (57.14)	14(100.00)
Proteus mirabilis	3	S	1 (33.33)	0 (0.00)	0 (0.00)	2 (66.66)	1 (33.33)	1 (33.33)	2 (66.66)	0 (0.00)	2 (66.66)	0 (0.00)
		R	2 (66.66)	3 (100.00)	3 (100.00)	1 (33.33)	2 (66.66)	2 (66.66)	1 (33.33)	3 (100.00)	1 (33.33)	3 (100.00)
Pseudomonas aeruginosa	18	S	1 (5.55)	1 (5.55)	3 (16.66)	15 (83.33)	1 (5.55)	5 (27.77)	8 (44.44)	0 (0.00)	11 (61.11)	1 (5.55)
		R	17 (94.44)	17 (94.44)	15 (83.33)	3 (16.66)	17 (94.44)	13 (72.22)	10 (55.55)	18 (100.00)	7 (38.88)	17 (94.44)
Morganellamorganii	6	S	0 (0.00)	3 (50.00)	1 (16.66)	5 (83.33)	4 (66.66)	3 (50.00)	4 (66.66)	0 (0.00)	1 (16.66)	1 (16.66)
		R	6 (100.00)	3 (50.00)	5 (83.33)	1 (16.66)	2 (33.33)	3 (50.00)	2 (33.33)	6 (100.00)	5 (83.33)	5 (83.33)
Enterobacterfaecalis	3	S	0 (0.00)	3 (100.00)	1 (33.33)	3 (100.00)	1 (33.33)	1 (33.33)	0 (0.00)	0 (0.00)	1 (33.33)	0 (0.00)
		R	3 (100.00)	0 (0.00)	2 (66.66)	0 (0.00)	2 (66.66)	2 (66.66)	3 (100.00)	3 (100.00)	2 (66.66)	3 (100.00)
Acinetobacterbaumannii	10	S	0 (0.00)	4 (40.00)	2 (20.00)	7 (70.00)	5 (50.00)	4 (40.00)	2 (20.00)	0 (0.00)	7 (70.00)	0 (0.00)
		R	10 (100.00)	6 (60.00)	8 (80.00)	3 (30.00)	5 (50.00)	6 (60.00)	8 (80.00)	10 (100.00)	3 (30.00)	10 (100.00)
Providenciarettgeri	11	S	4 (36.36)	9 (81.81)	3 (27.27)	10 (90.90)	4 (36.36)	7 (63.63)	4 (36.36)	0 (0.00)	1 (9.09)	1 (9.09)
		R	7 (63.63)	2 (18.18)	8 (72.72)	1 (9.09)	7 (63.63)	4 (36.36)	7 (63.63)	11 (100.00)	10 (90.90)	10 (90.90)
Total	195	S	60 (30.61)	107 (54.59)	26 (13.26)	141 (71.94)	39 (19.90)	107 (54.59)	76 (38.78)	4 (2.04)	81 (41.32)	5 (2.55)
		R	136 (69.38)	88 (44.90)	163 (86.73)	54 (27.55)	158 (80.61)	89 (45.40)	120 (61.22)	192 (97.95)	110 (56.12)	191 (97.44)

Table 7: Drugs prescribed for UTI

Class of Antibiotic	Antibiotic	Dosage	Prescribed to treat UTI in			
			Pregnant (%)	Trimester	Non Pregnant (%)	Total (%)
PENICILLIN	Amoxicillin + clavulanic acid	1.2gm i.v/10-12 hrly 375mg bid (5days)	6 (1.83)	1,2	136(41.50)	142(43.33)
NITROFURAN	Nitrofurantoin	50-100mg qid (4-7 days)	120 (36.69)	1,2,3	7 (2.14)	127(38.83)
AMINOGLYCOSIDE	Amikacin	250mg bid i.v (4-7 days)	0 (0)	-	10 (3.05)	10(3.05)
MACROLIDE	Azithromycin	500mg o.d (3days)	3 (0.91)	2,3	13 (3.98)	16(4.89)
CEPHALOSPORIN	Cefixime	200-400mg o.d (4-7 days)	1(0.30)	2	7 (2.14)	8(2.44)
CEPHALOSPORIN	Ceftriaxone	250mg o.d (5 days); 1-2g i.v	0(0)	-	2 (0.61)	2(0.61)
FLOROQUINOLONE	Ofloxacin	400mg o.d (5 days)	0(0)	-	5 (1.52)	5(1.52)
FLOROQUINOLONE	Ciprofloxacin	250-500mg o.d (4-7 days)	1(0.30)	3	2 (0.61)	3(0.91)
FLOROQUINOLONE	Norfloxacin	400mg bid (5 days)	0(0)	-	8 (2.45)	8(2.45)
TETRACYCLINE	Doxycycline	100mg bid (7 days)	0(0)	-	6 (3.36)	6(3.36)
Total			131		196	327(100)

Table 8: Adverse drug reactions encountered by the use of antibiotics

S.No.	Antibiotic	ADR	No. of Cases
1	Amoxicillin + clavulanic acid	Nausea	13
		Skin Rashes	2
2	Nitrofurantoin	Vaginal irritation	3
		Nausea	9
3	Amikacin	Headache	1
		Nausea & Vomiting	2
4	Azithromycin	Abdominal pain	3
		Nausea	2
5	Cefixime	Nausea	2
6	Ceftriaxone	Watery stool	1
7	Ofloxacin	Metallic taste	3
		Nausea	2
	Ciprofloxacin	Metallic taste	7
		Nausea & vomiting	3
		Photosensitivity	1
9	Norfloxacin	Metallic taste	4
		Nausea & vomiting	2
10	Doxycycline	Diarrhoea	1
			61

Record of socioeconomic status [Table 3] of the patients depicts that the chances of UTI are quite high in patients of low socioeconomic status 257(78.59%) which proves that the living conditions and hygiene is poor in low socioeconomic status as compared to high socioeconomic status. Similarly the incidence of UTI was higher in illiterate 202(61.77%) that reflects that the education increases the sense of hygiene and therefore decreases the chances of infection.

## DISCUSSION

In developing countries it is important to conduct drug utilization studies to rationalize the drug use in clinical practice. Keeping in mind, we proposed this work to measure the prescribing pattern of different cases of UTI in HAH Hospital which is a 350 bedded teaching hospital of Jamia Hamdard University, New Delhi (India). The study focused on pregnant as well as non pregnant patients taking treatment in OPD as well as IPD. During the 4 months period of our study, a total of 327 patients suffering from different types of UTI attending HAH Centenary Hospital were evaluated.

As previously reported the UTI is common during 26-40 weeks of pregnancy. The maximum incidence of UTI during last trimester may be due to anatomical changes in the genital organs occurring due to the pressure exerted by the foetus on the walls of urinary bladder and ureters causes to urine remains stagnate that further leads to the bacterial growth.

Our analysis reflects the increased number of symptomatic cases having fever, pain in micturition and hematuria in comparison to asymptomatic cases.<sup>13</sup>

The isolated pathogens in urine culture were of both from positive and gram negative type as also reported earlier.<sup>14</sup> Susceptibility to UTI infection showed past history of biologic factors like UTI, diabetes mellitus, urinary obstruction, incontinence. Antimicrobial susceptibility pattern also depicted that amoxicillin with clavulanic acid was mostly included in the prescription of non pregnant UTI cases, while nitrofurantoin was the drug of choice in the pregnant UTI cases.

Most of the antibiotics were prescribed in second and third trimester, which possess less threat to both, mother and foetus as the drug prescribed in the first trimester (organogenesis phase) may lead to foetal abnormalities.

Six recurrent cases were recorded after the first episode of UTI within 2-6 weeks of treatment. The reoccurrence was due to diabetes, menopause, contraceptive use and catheterization, etc.<sup>15,16</sup>

Multi drug resistance (if, resistance in  $\geq 2$  drugs) was seen in most of the isolated bacterial uropathogens. This indicates that multi drug resistance was found to be very high to the commonly used antibiotics. Therefore, the reasons for this alarming phenomenon might be inappropriate and incorrect administration of antimicrobial agents in empirical therapies and lack of appropriate infection control strategies, which can cause a shift to increase prevalence of resistant organism in the community.

ADRs are common with UTI treatment. In general, the common side effects are mild to moderate and self limiting. However, occasional side effects occurred specially nausea and skin rashes with use of Amoxicillin with Clavulanic acid.

Previous data on socioeconomic status of the patients depicts that the chances of UTI in patients that have unhygienic condition. Consistently, the incidence of UTI was higher in illiterate cases that reflect that the condition increases the sense of hygiene and therefore decreases the chances of infection.

Excessive use of spicy food, alcohol, cigarette smoking, pan masala, tea, coffee, soft drinks, may be predisposing factors for UTI. Those who take fluids in excess quantity are less liable to have a UTI.

## CONCLUSION

UTI is the most common bacterial infection. It is generally associated with minimal morbidity except among specific subpopulations. However, there is a significant absence of data regarding its accurate incidence, factors that increase susceptibility to UTI, and the long-term medical sequelae of UTI. It is the prevalent complication of pregnancy that can worsen maternal and prenatal prognosis. Untreated asymptomatic forms can progress to pyelonephritis, which is associated with preterm delivery, low birth weight infants and stillbirth. We studied the drug utilization pattern of patients of UTI visiting HAHC Hospital, New Delhi.

The study strongly recommends the need of patient education and counselling for managing UTI which has been always undermined due to which the burden of UTI is increasing exponentially. Antibiotics are given empirically before the laboratory results of urine culture are available. To ensure appropriate therapy, current knowledge of the organism that causes UTIs and their antibiotic susceptibility pattern is mandatory. In addition to the increased incidence of UTI during gestation, health care professionals should be aware that the choice of available anti-infective drugs are restricted, given the risk of certain of them for the fetus, and the potential for bacterial resistance.

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