

Research Article

To Study the Prescription Pattern of Antimicrobials in Urinary Tract Infection in Pregnant Women in a Tertiary Care Hospital

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Abstract: Urinary tract infection (UTI) is caused by pathogenic invasion of the urinary tract which leads to inflammatory response of the urothelium. Urinary tract infection (UTI) is a serious health problem and is the second most common type of infection in the body. Anatomically UTI may be classified as lower (cystitis and asymptomatic bacteriuria) or upper (pyelonephritis). The recommended antibiotics for use in pregnancy for management of Asymptomatic Bacteriuria (ASB) include oral Cephalosporins, Nitrofurantoin and Amoxicillin; and for the treatment of lower UTI during pregnancy include Penicillins and oral Cephalosporins. Data from the antibiotic usage study in UTI during pregnancy will help in establishing a proper antibiotic utilization guideline and promotes rational prescribing of medicines. Our object is to study the antimicrobial prescription pattern for Urinary tract infection during pregnancy. This study was conducted in Department of Pharmacology, Dr. S.N. Medical College in association with Deptt. of Obstetrics & Gynaecology and Deptt. of Microbiology at Umaid Hospital, Jodhpur, Rajasthan over a period of 9 months from Sept.2014 to June 2015. This was a prospective cross sectional observational study done on 200 pregnant women with symptoms of UTI. In our study most common organism found in pregnant women was E.coli in 56%, and Cephalosporins were the most frequently prescribed drug followed by Nitrofurantoin. Urine culture should be performed as a screening and diagnostic tool for UTI during pregnancy. This study has highlighted the need to raise awareness of UTIs and to expand services for prevention and treatment of UTI in pregnant women.

Keywords: Urinary tract infection, Pregnancy, Antimicrobials, Cephalosporins, E.coli, Asymptomatic Bacteriuria.

INTRODUCTION

Urinary tract infection (UTI) is caused by pathogenic invasion of the urinary tract which leads to inflammatory response of the urothelium. Anatomically UTI can be classified into lower urinary tract infection involving the bladder and urethra and upper urinary tract infection involving the kidney, pelvis, and ureter. The majority of the UTI occur due to ascending infection [1]. Three common clinical manifestations of UTIs in pregnancy are: asymptomatic bacteriuria, acute cystitis and acute pyelonephritis [2]. "Asymptomatic bacteriuria" is a term coined by Kass, which indicates multiplication of organisms within the urinary bladder without the realization of the patient [3]. Untreated bacteriuria in pregnancy either asymptomatic or symptomatic is associated with a 50% increase in the risk of low birth weight babies; there is significant increase in the risk of premature delivery, pre-eclampsia, hypertension, anemia and postpartum endometritis [4].

The detection of bacteriuria allows an approach to be made for the prevention of chronic urinary disease in the community and to avoid complication in pregnancy at an early stage. The organisms causing UTIs during pregnancy are the same as those found in non pregnant patients. E. coli accounts for 85% of community acquired UTIs, 50% of nosocomial UTIs and more than 80% of uncomplicated pyelonephritis [5]. Quantitative urine culture is the gold standard for the diagnosis of bacteriuria. The recommended antibiotics for use in pregnancy for management of ASB include oral cephalosporins (200mg BD for 3 days), Nitrofurantoin (100mg BD for 3 days) and amoxicillin (500mg TDS for 3 days); and for the treatment of lower UTI during pregnancy include penicillin's and oral cephalosporins. The antimicrobial chosen should have a good maternal and foetal safety profile, excellent efficacy and low resistance rates. Antibiotics are usually given empirically before the laboratory results of urine culture are available. Prescribing drugs is an important skill which needs to be continuously assessed and refined

accordingly. Hence the present study is taken to know the prescription pattern of antibiotics in urinary tract infection in a tertiary care hospital in our setup. This type of study will help to provide data which might be helpful in improving rational prescribing.

MATERIALS and METHODS

Study Area:

This study was conducted in Department of Pharmacology, Dr. S.N. Medical College in association with Dept. of Obs & Gynae. and Dept. of Microbiology at Umaid Hospital, Jodhpur, Rajasthan. This hospital is one of the biggest tertiary level referral and teaching hospitals in the Western Rajasthan.

Study Design:

The study was designed as prospective cross sectional observational type.

Study Populations:-

The study population was those pregnant women attending Ante Natal Clinic (ANC) at Umaid Hospital during the study period and had clinical evidence of urinary tract infection, determined by treating physicians, were included in this study.

Study Period:- Study was conducted from September 2014-June 2015.

Sample Size and Sampling Techniques:-

Two hundred suspected symptomatic cases of UTI were included for our study. Out of 200 cases, only 100 cases were positive for urine culture and sensitivity.

Inclusion Criteria:-

1. Pregnant women presenting in the antenatal clinic diagnosed with UTI.
2. Pregnant women not taking prior treatment in the preceding weeks with antibiotics or any other medications that may affect the culture results.

Exclusion Criteria:

1. Pregnant women with lower abdominal pain due to any specific cause other than UTI.
2. Those women already on antibiotic treatment for any other reason.
3. Pregnant women in labour

Data Collection:

Data was collected with structured questionnaire which composed of two sections. A prior prepared set of specific questions was administered to patients in regard to their demographic information, obstetric information and any other information of relevance to the study. This was done in ANC clinics and antenatal wards.

Sampling Methods:

The study utilized purposive sampling technique. Purposive sampling was used to select

women who presented with clinical symptoms of UTI in the antenatal clinics and then simple random sampling was used to choose women to include in study with strict application of the inclusion criteria.

Sample Collection and Processing:

Fresh midstream urine was collected aseptically in sterile wide mouth capped disposable universal container on the same day of enrolment urine samples were labelled and immediately the sample was processed for microbiology urine culture was done to study the distribution of pathogens. Isolates were tested for antimicrobial susceptibility testing by the standard Kirby Bauer's disc diffusion method and interpreted by the recommendations of clinical and laboratory standards.

Statistical Analysis:

Pregnant women were started on empirical antimicrobial treatment which was modified later according to the susceptibility pattern of the urine culture report. Data was analysed using Microsoft Excel ver. 2007 and Statistical Package for the Social Sciences Software (SPSS 17.0). Graphical representation of the data was done in terms of figures using Microsoft Excel 2007. Data was presented in descriptive statistics using percentage and proportions.

Ethical Considerations:

An ethical approval was obtained from Institutional Ethics Committee of Dr.S.N. Medical College, Jodhpur. Informed consent was obtained from the study participants prior to sample collection.

RESULTS

A total of 200 pregnant women clinically diagnosed as Urinary Tract Infection (UTI) were studied to isolate bacteria from urine. Routine urine analysis including microscopy examination was done. Culture and antimicrobial sensitivity were done on all the received samples.

A total of 200 patients with suspected case of UTIs, majority belonged to age group 26-35 years (47%) followed by 18-25 years (35%) and >45years (18%) respectively. In our study 42% patients who were in III trimester associated with UTIs, while who were in II trimester 37% and 21% in I trimester respectively. In this study majority of pregnant women of UTIs were belonged to 3rd gravida (40%) followed by 2nd gravida (28%), 1st gravida (20%) and >3rd gravida (12%) respectively. In our study 84% women had past history of UTI. In our study most of pregnant women were in low socioeconomic class (46%) as compared to middle (37%) and high (17%) socioeconomic class. In present study 67% of the patients were illiterate while 33% were literate. Incidence of UTI was more common in illiterate due to their low level of education and poor hygiene.

Out of 200 samples, significant growth was observed in 100, remaining samples either had no growth or insignificant growth. Almost in all the positive culture, single type of organism had grown. The overall prevalence of UTI was 50%. Out of these 100, Gram-negative bacteria isolate were more prevalent (78%) than gram-positive bacteria isolates (20%). Yeast cell like candida was found in 2% of cases.

In our study most common organism found in pregnant women E.coli in 56%, 15% were related to Staphylococcus aureus, 11% were due to Enterococci, 8% were due to Klebsiella, 5% cases were due to Staph. Saprophyticus, 2% were due to Proteus mirabilis, 2% were belonged to Candida albicans and single one case was due to Citrobacter. (**Table 1**)

Table 1:- Distribution of various pathogen

Organism	No. of patients	Percentage(%)
E. coli	56	56
Klebsiella	8	8
Enterococci	11	11
Proteus mirabilis	2	2
Staph. Aureus	15	15
Staph. saprophyticus	5	5
Candida albicans	2	2
Citrobacter sp.	1	1
Total	100	100

In our study, most common causative pathogen was E.coli 100% sensitive to Linezolid and Imipenem. Proteus, Staph. Aureus, Candida and Citrobacter were also showed 100% sensitivity to Linezolid and Imipenem. Klebsiella was 87.5% sensitive to linezolid,

ofloxacin and imipenem. Enterococci were almost 91% sensitive to Nitrofurantoin. Staph. Saprophyticus was more sensitive to cephalosporin group, Nitrofurantoin and linezolid than other group of antibiotics. (**Table 2**)

Table 2:- Drug sensitivity and resistant pattern

Antibiotics	E.coli(n=56)		Klebsiella(n=8)		Enterococci(n=11)		Proteus mirabilis(n=2)		Staph. Aureus(n=15)		Staph. Saprophyticus(n=5)		Candida albicans(n=2)		Citrobacter sp.(n=1)	
	S	R	S	R	S	R	S	R	S	R	S	R	S	R	S	R
Amoxycillin and Potassium Clavulanate	15	41	4	4	7	4	1	1	7	8	1	4	1	1	0	1
Ampicillin	20	36	6	2	6	5	0	2	9	6	2	3	2	0	0	1
Linezolid	56	0	7	1	9	2	2	0	15	0	4	1	2	0	1	0
Amikacin	46	10	5	3	8	3	1	1	12	3	3	2	2	0	1	0
Nitrofurantoin	42	14	6	2	10	1	1	0	8	7	4	1	1	1	1	0
Ofloxacin	52	4	7	1	9	2	1	1	13	2	3	2	2	0	1	0
Cefoperazone	26	30	5	3	7	4	1	1	9	6	4	1	2	0	1	0
Ceftazidime	34	22	6	2	6	5	2	0	11	4	4	1	1	1	1	0
Cefotaxime	38	18	4	4	8	3	2	0	12	3	3	2	2	0	0	1
Ceftriaxone	43	13	5	3	7	4	2	0	10	5	4	1	1	1	0	1
Cefixime	18	38	3	5	6	5	0	2	7	8	3	3	0	2	0	1
Imipenem	56	0	7	1	9	2	2	0	15	0	3	2	2	0	1	0

[S- Sensitive; R-Resistance]

In our study cephalosporins (43%) were the most commonly used class of antimicrobials followed

by Nitrofurantoin (18.5%). All these antimicrobials were prescribed empirically. (**Table 3**)

Table 3:- Overall use of antibiotics

Antibiotics	Total no. prescribed(%) n=200
Amoxicillin and pot. Clavulanate	22 (11%)
Ampicillin	12 (6%)
Linezolid	4 (2%)
Amikacin	16 (8%)
Nitrofurantoin	37 (18.5%)
Ofloxacin	19 (9.5%)
Cefoperazone	5 (2.5%)
Ceftazidime	5 (2.5%)
Cefotaxime	6 (3%)
Ceftriaxone	12 (6%)
Cefixime	58 (29%)
Imipenem	4 (2%)

DISCUSSION

Pregnancy is a unique state with anatomic and physiologic urinary tract changes. Bacteriuria, either symptomatic or asymptomatic, is common in pregnancy. While ASB in non pregnant women is generally benign, pregnant women with bacteriuria have an increased susceptibility to pyelonephritis [6]. If left untreated; 20% - 30% of asymptomatic bacteriuria will lead to acute pyelonephritis. This may result in low birth weight of infants, premature delivery cases and occasionally, stillbirth, so it is a serious threat for the mother and foetus. UTIs during pregnancy may increase the risk of cerebral palsy or mental retardation. Therefore, careful monitoring of the UTI infections among pregnant women becomes necessary [7].

Screening for and treatment of ASB in pregnancy has become a standard of obstetric care and most antenatal guidelines include routine screening for ASB. The present study was conducted to evaluate the prevalence of UTI in pregnant females and to review the drugs that can be used for the treatment of the same.

Proper investigation and prompt treatment are needed to prevent serious life threatening condition and morbidity due to UTI that can occur in pregnant women [8]. Of the 200 urine samples examined in this study, 100 were found to contain significant bacteriuria. Urine microscopy revealed >10 pus cells/high power (40×) field. Overall incidence of UTI in pregnant women was found to be 50% which is nearly to par with figure in Nigeria by Okonko *et al.*; [9] who reported an incidence rate of 47.5% in pregnant women.

Maternal age was not found to be a significant risk factor in this study. The highest incidence is 26-35 years (47%) followed by 18-25 years (35%) and >35years (18%). In literature, only a significant increasing risk of 12% is reported per decade of age [10]. The reason could be due to the fact that many women within this age group are likely to have had many children before the present pregnancy.

A total of 200 urine culture sensitivity reports were analyzed in the present study between September

2014 and June 2015. The predominant growth of single bacteria was seen in 100 (50%) samples. In our study we found significant growth of *Escherichia coli*, *Staphylococcus aureus*, *Enterococci*, *Klebsiella* and *Staph. Saprophyticus*. These represented 56%, 15%, 11%, 8% and 5% of isolates respectively.

The results of our study, showing Gram-negative bacilli in 78%, Gram-positive cocci in 20% and yeast cells in 2%, were similar to the findings of Van Norstrand *et al.*; [11] (2000).

In the present study all pregnant women were screened by urine culture and were started on empirical therapy initially which was modified later according to susceptibility pattern. Linezolid and Imipenem were prescribed as definitive therapy after the culture report of antibiotic susceptibility pattern showed resistance to the initial antimicrobial prescribed. The study of prescribing pattern is a component of medical audit, which seeks monitoring, evaluation in the prescribing practices of prescribers to achieve rational medical care. Various classes of antimicrobials were prescribed for UTI during pregnancy in the present study.

Cephalosporins were most frequently prescribed followed by Nitrofurantoin and Amoxyclav groups. Nitrofurantoin has minimal side effects and can be safely used for the treatment of uncomplicated cystitis and ASB even during pregnancy [12]. Cephalosporins are recommended for initiating therapy for pyelonephritis. Widespread empiric use of antibiotics, while convenient, potentially contributes to development of antimicrobial resistance. Although irrational and unnecessary use of drugs in India has been documented before, to the best of our knowledge there are no other studies from India where antibiotic use in pregnant women has been addressed. It is likely that our findings reflect the reality in many other developing countries. Encouraging guideline based treatment is an important aspect of changing prescribing behaviour, a goal of antibiotic stewardship.

The main limitation of the study was short duration and small number of highly selected pregnant

women with symptoms of UTI. Future studies are recommended with a large sample the present study has highlighted the need to raise awareness of UTIs and to expand services for prevention and treatment of UTI in pregnant women.

CONCLUSION

It is concluded from the present study that there was a high prevalence of ASB among pregnant women. It is therefore imperative that early screening of bacteriuria in pregnancy must be considered as a part of routine antenatal care. Urine culture should be performed as screening and diagnostic tool of UTI in pregnancy. E.coli was the most common isolated organism. All pregnant women with UTI should be treated. Cephalosporins were the most commonly prescribed antimicrobials followed by Nitrofurantoin. Periodic and continuous follow up is mandatory to reduce the consequences of ASB and symptomatic UTI.

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