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## BACTERIAL PROFILE AND ANTIBIOGRAM PATTERN OF UROPATHOGENS CAUSING UTI IN PREGNANT WOMEN

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### ABSTRACT

Urinary Tract Infection is a common, medical complication of pregnancy. UTI is of great clinical concern in this group, as it has adverse maternal and obstetric outcomes. The changing pattern of antimicrobial resistance of uropathogen is a growing problems. Knowledge about the current trends of bacterial profile and their antibiogram pattern causing Urinary tract infection in pregnant women may help clinically to choose the correct empirical treatment. The present study was carried out to determine the trends in antimicrobial susceptibility of uropathogen in pregnant women having Urinary tract infection. A total of 50 urine samples collection for Urinary tract infection in pregnant women, during July 2016 to January 2017 and these were processed in the laboratory. Out of 50 samples analyzed 35 samples were found to contain significant bacteria. Result from the study revealed that the prevalence of Urinary tract infection was more in first trimester (14%) followed by third trimester (12%) and least prevalence was observed in the second trimester was higher in age group of (20 - 24) years. Among 35 isolates obtained from 50 samples, majority of isolates were Gram positive bacteria (71.4%) whereas Gram negative organisms was found to be (28.57%). In UTI, four different uropathogen were identified as E.coli (54.14%) the most predominant uropathogen, followed by S.aureus (28.57%), Proteus vulgaris (8.57%) respectively. The least prevalent bacteria isolated was Klebsiella pneumonia (5.71%). The most surprising result was obtained in case of all the isolates showing resistance to all ten different type of antibiotic indicating multi- drug resistance of uropathogen.

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### INTRODUCTION

Urinary tract infection (UTI) may be defined as the presence of multiplying microorganisms in the tract through which the urine flows. Recently it was suggested that infection result from the microbial invasion of any of the tissue of the urinary tract extending from the renal cortex to the urethral meatus (Kunin, 1994). Microbial infection of the vagina (vaginosis and vaginitis) among pregnant women are serious problems because they can lead to serious medical complication such as preterm labor, amniotic fluid infection, premature rupture of fetal membranes, and low birth weight of the neonate (Giraldo PC, *et al.*, 2012), leading to high prenatal mortality proper identification and treatment will reduce the risk of preterm birth and its consequence (McDonald H, *et al.*, 2005)

The vagina could be infected by a variety of pathogen including bacteria, fungi, viruses, and parasites. Bacterial vaginosis in the most frequent vaginal infection by the replacement of *Lactobacillus species* of normal vaginal flora by the excessive growth of a mixture of microorganisms. Vaginal complaints in candidiasis, trichomoniasis infection are common among pregnant women of reproductive age, with high incidence during pregnancy (Einarson A., *et al.*, 2002)

UTI in pregnancy increases during the gestational period, beginning from the sixth week of the first trimester and peaking in the 22<sup>nd</sup> to 24<sup>th</sup> week of the second trimester (Patterson *et al.*, 1987)

The type of uropathogen responsible for urinary tract infection and their resistance pattern may helps the clinician to choose the correct empirical treatment. The study was to identify the etiologic agent of UTI and to determine the pattern of antimicrobial drug susceptibility among pregnant women attending antenatal clinic urine specimens processed for culture and antimicrobial drug susceptibility testing. Bacterial infection of UTI is one of the common cause seeking medical attention in the community. Microorganisms causing UTI vary in their susceptibility to antimicrobial from place to place and from time to time.

### MATERIALS AND METHODS

This was a cross sectional study carried out in Microbiology Laboratory, during the period July 2016 to January 2017 including age group between 20 - 35. The first, second and third trimester gestation were included in the study for Urinary tract Infection, in pregnant women.

**Sample Collection**

Total 50 urine samples were collected from pregnant women having Urinary tract infection during course of study Samples were collected from different Maternity Hospital, Lady Harding, Sanjeevani Hospital and other Hospitals. Early

ranging between 9.6 to 13.1. From the standard literature the women with Haemoglobin percentage ranging from 9.2 to 10.5 was considered as the anaemic and hence the proper treatment is necessary with this regard. Outside of health sector broader approaches for anemia prevention targeting women of lower income are required (Areechokchai *et al.*, 2009).

**Table No 1** Age groupwise Haemoglobin percentage during all trimester of pregnancy period.

Age group	First Trimester	Haemoglobin in %	Second Trimester	Haemoglobin in %	Third Trimester	Haemoglobin in %
20 – 24	7	9.6	5	9.5	6	9.2
25 – 28	5	10.3	3	10.5	4	11.0
29 – 32	2	12.4	1	11.2	2	13.1

morning clean catch mid stream urine sample was taken in screw cap bottle. Samples of age group between 20 - 35 yrs including all three trimester were carried out. Similarly blood samples were also collected to study the Blood grouping and for Heamoglobin estimation.

**Sample Analysis**

The samples were submitted to the Microbiology Laboratory, they were processed immediately for possible isolation and identification of pathogenic microorganisms in accordance with standard laboratory method (Farmer J.J, *et al.*, 1995). Urine samples were streaked on Blood agar, MacConkey Agar, Cystein Lactose Electrolyte Deficient Agar. The plates were examined after overnight incubation aerobically at 37°C for 24 hours.

**Identification**

**Colonial morphology of isolates**

Identification of the bacteria colonies was done. On the basis of cultural and biochemical characterisation of Bergay’s manual of determinative bacteriology (Bergy’s, 1986)

**Antimicrobial susceptibility testing**

Antimicrobial susceptibility testing of isolates was performed on Mueller- Hinton agar plates by disc diffusion method (Kirby *et al.*, 1966). The sensitivity and resistance of bacteria to antibiotic is measured by the diameter of inhibition zone in " mm" and then compared with standard diameter on standard scales (Barr A L, *et al.*, 1991)

**RESULTS AND DISCUSSIONS**

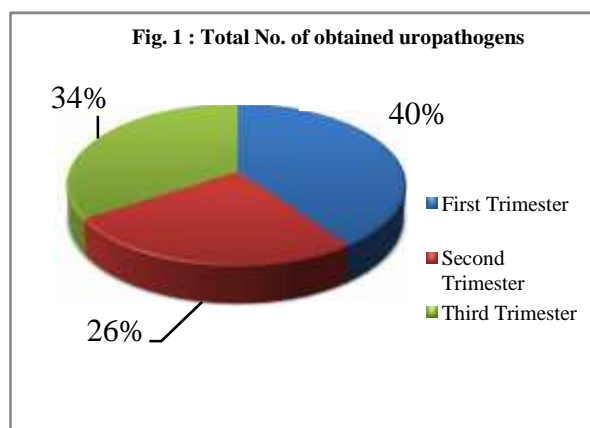
**Observation Table**

Urinary tract infection (UTI) is an infection caused by the presence and replication of microorganisms in the urinary tract, and is most common hospital acquired infection. The present study was carried out to determine the trends in antimicrobial susceptibility of uropathogen in pregnant women having Urinary tract infection. A total of 50 urine samples collection for Urinary tract infection in pregnant women was carried out. Specimens were received from delivery Hospital such as Maternity Hospital, Lady Harding, Sanjeevani Hospital during July 2016 to January 2017 and these were processed in the laboratory. Out of 50 samples analyzed 35 samples were found to contain significant bacteria. During the investigation period it was noticed that the percentage of Urinary tract infection was much higher in case of pregnant women, which is 35% in the present studied.

For the present investigation the age group under consideration for the study was in between 20 - 35 years. From the result it was revealed that Haemoglobin percentage for all trimester is

**Table no 2** Trimester wise Total number of obtained uropathogens

Trimester	Total No. of obtained uropathogens
First Trimester	14
Second Trimester	09
Third Trimester	12
Total	35



The prevalence of Urinary tract infection was more in first trimester (14%) followed by third trimester (12%) and least prevalence was observed in the second trimester was higher in age group of 20 - 24 year. (Table.No 2.; Fig.No.1). According to Teshome *et al.*, 2014, the majority of the pregnant women for Urinary tract infection were higher in their third trimester (45.1%) and second trimester (41%) for the analyzed urine samples 46 (18.8%) were positive for significant bacteria. The rate of isolation was higher in the age group 25 to 35 year. Leigh and Sharma 2009, observed that the incidence of bacteria was highest in the age group 34 and above 46.7%, the frequency of urinary tract infection was higher in the third trimester compared to the first and second trimester. Zeinab A. *et al.*, (2013), noted that in 176 infected women, 71.6% were in the third trimester of gestation, whereas 28.4% were in the second trimester.

**Table No. 3** Frequency of Gram +ve and Gram –ve uropathogen isolated

	Gram +ve uropathogen	Gram -ve uropathogen
Total no. of isolates	25	10
Percentage of isolates	71.4 %	28.57 %

**Table no 4** Distribution of isolated uropathogens

Organism isolated	No. of Isolates	Percentage %
E. coli	20	57.14%
K. pneumonia	2	5.71
P. vulgaris	3	8.57
S. aureus	10	28.57
Total urine cultures	35	99.99%

Among 35 isolates obtained from 50 samples, majority of isolates were Gram positive bacteria (71.4%) whereas Gram negative organisms was found to be 28.57% shown in Table No. 6. The isolates were confirmed on the basis culture, biochemical characteristics on bergey's manual of determination bacteriology. Agersew Alemu *et al.*, (2012), reported that 81.39% of isolates were Gram negative bacteria belonging to *Enterobacteriaceae* followed by Gram positive organisms which accounts for 18.61%. This finding is similar to the other reports, which suggest GNB are the predominant isolates.

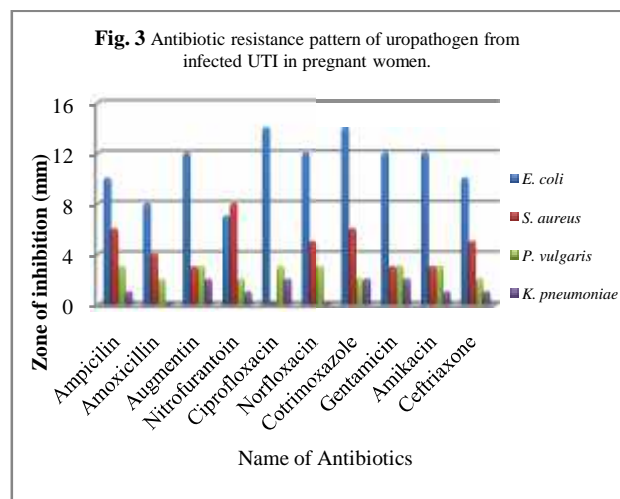
Endale Tadesse, *et al.*, 2014, reported that the total number of samples from 244, majority of bacteria isolates 51 were Gram positive bacteria (26%) whereas Gram negative bacteria was found to be (25%). In Urinary tract infection, four different uropathogen were identified as *E.coli*(54.14%) the most predominant uropathogen, followed by *S.aureus* (28.57%), *Proteus vulgaris* (8.57%) respectively. The least prevalent bacteria isolated was *Klebsiella pneumonia* (5.71%) Table.No 4. Onifade *et al.*, 2005, studied the prevalence of Urinary tract infection in pregnant women was 85% and predominant pathogen were pathogenic *E.coli* (30%), *S.aureus* (28%), *Klebsiella pneumonia* (18.2%) respectively. Rahimkhani *et al.*, 2008, stated that the predominant bacterial isolates observed in the studied were identified as *E.coli* (26.1%) and *S.aureus* (13%) the high prevalence rate of *staphylococci* (45.6%) respectively.

Poonam U. *et al.*, 2013, Bacteria causing Urinary tract infection in pregnant women were identified as *E.coli* (43.47%), *Klebsiella pneumonia* (5.43%), *Proteus vulgaris* (19.56%), coagulase negative *Staphylococcus* (7.6%) and *Staphylococcus aureus*(23.91%) similarly, Gram negative bacteria are particularly *E.coli* has being reported to be the commonest uropathogen isolated in Urinary tract infection. Bolaji,R.O *et al.*, (2013)studies the Urinary tract infection were organisms such as *Staphylococcus spp*, *Klebsiellaspp*, *Proteus spp*are overtaking the position of *Escherichia spp* in Urinary tract infection.

In our studies *Staphylococcus spp* was noticed only in 11.62% which is in agreement with earlier studies. Turay A.A, *et al.*,(2014) reported that in Urinary tract infection isolates including are *Escherichia coli* with an incidence rate of (30%) followed by *Staphylococcus aureus* (28%), *Klebsiella pneumonia* (18.2%), *Staphylococcus sarprophyticus* (16.5%), *Proteus morabilis* (10.6%) and the least prevalent bacteria isolated was *Peudomonasaeruginosa* (4.7%)as shown.

**Table 5** Antibiotic resistance pattern of uropathogen from infected UTI in pregnant women having urinary tract infection.

Antibiotic name	Zone of inhibition (mm)							
	U1	Sen/Res	U2	Sen/Res	U3	Sen/Res	U4	Sen/Res
Ampicilin	10.0	R	6.0	R	3.0	R	1.0	R
Amoxicicillin	8.0	R	4.0	R	2.0	R	0	R
Augmentin	12.0	R	3.0	R	3.0	R	2.0	R
Nitrofurantoin	7.0	R	8.0	R	2.0	R	1.0	R
Ciprofloxacin	14.0	R	0	R	3.0	R	2.0	R
Norfloxacin	12.0	R	5.0	R	3.0	R	0	R
Cotrimoxazole	14.0	R	6.0	R	2.0	R	2.0	R
Gentamicin	12.0	R	3.0	R	3.0	R	2.0	R
Amikacin	12.0	R	3.0	R	3.0	R	1.0	R
Ceftriaxone	10.0	R	5.0	R	2.0	R	1.0	R



Antimicrobial resistance among uropathogen to the commonly used antibiotic have been increasing, this Scenario leaves were limited therapeutic option for treatment. Now during the course of investigation the antibiotic susceptibility of different uropathogen isolated from pregnant women with Urinary tract infection is checked. The panel of antibiotic tested against Gram positive and Gram negative isolates were Ampicilin, Amoxicicillin, Augmentin, Nitrofurantoin, Ciprofloxacin, Norfloxacin, Cotrimoxazole, Gentamicin, Amikacin, Ceftriaxone and result were interpreted according to (CLSI) guidelines. The most surprising result was obtained in case of all the isolates showing resistance to all ten different type of antibiotic indicating multi drug resistance of uropathogen. The isolates U2, U3, U4 shows a very less zone of inhibition i.e 0 to 8 mm surrounding the antibiotic showing complete resistance toward the antibiotic used. Whereas, isolates U1 confirmed as *E.coli* its zone diameter is ranging between 7 to 14 mm i.e intermediated activity. Out of ten different antibiotic Ciprofloxacin and Cotrimoxazole are the best antibiotic in controlling the Urinary tract infection both the antibiotic was most activity against Gram positive and Gram negative infection. (Stapleton 1998) .

This antibiotic are commonly available and cheap drugs. This trend of resistance might be due to improper and indiscriminate use of antibiotic as these drugs are easily available over the counter. Agersew Alemu, *et al.*, (2012) studied this susceptibility pattern of Gram negative isolates showed that most of the isolates were sensitive to Augmentin (94.28%), Ceftriaxone (88.57%), and Norfloxacin (91.42%). We observed increasing resistance pattern for Gram negative isolates to Cotrimoxazole (74.28%), Amikacin (74.28%) and Gentamicin (77.14%) the reported high sensitivity of 80% to Cotrimoxazole 90% to Amikacin and Gentamicin. EndaleTadesse *et al.*, (2014) showed that Antimicrobial susceptibility of isolated bacteria are Norfloxacin (64.7%), Gentamicin (47.1%), Ceforaxime (43.15%), Penicillin (30.8 %), Tri-methoprim sulphamethoxazole (25.5%), Vancomycin (23.5%) and Ampicillin (17.3%) are multi drug resistance two or more drugs was observed in all isolated bacteria. Shopova *et al.*, (2011) reported that antimicrobial agents were tested against *Mycoplasma spp*. There is need for continuous evaluation of the quality of common antibiotic, drug prescription and judicious use of effective antibiotics is Urinary tract infection management.

## CONCLUSION

Urinary tract infection is a common problem amongst pregnant women. The observed high prevalence of UTIs amongst the pregnant women under studies was a threat to their health and wellbeing, and an indication of poor public health enlightenment and management by health care givers. The present study show high rate of prevalence of Urinary tract infection amongst pregnant women. All the test organisms shows Multi- drug resistance, but still Ciprofloxacin and Cotrimoxazole was found to be affecting in controlling in the uropathogen isolated from Urinary tract infection. This study has highlighted the need to raise awareness of Urinary tract infection and to expand services for prevention and treatment for pregnant women.

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