



## URINARY TRACT INFECTION IN PREGNANT FEMALES ATTENDING ANTENATAL CLINICS AMONG MIDDLE SOCIOECONOMIC SETTINGS.

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**Article received on:**

25/11/2019

**Accepted for publication:**

01/01/2020

**ABSTRACT... Objectives:** To determine the frequency of Urinary tract infection (UTI) and the antibiotic sensitivity patterns of isolated uropathogens in pregnant females among middle socioeconomic settings. **Study Design:** Retrospective Cross Sectional study. **Setting:** Jinnah Medical College Hospital Karachi. **Period:** From Jan 2017 to Dec 2017. **Material & Methods:** All the pregnant women who were registered in antenatal clinics from January 2017 to December 2017 WERE included. **Results:** Five hundred and sixty-four pregnant women of age 17-44 years were registered in the hospital in antenatal clinics during the year 2017. Out of 564 females, 48 (8.50%) presented with urinary tract infection some time during their pregnancy period. Majority of patients (54.2%) were infected with *Escherichia coli* (E coli), followed by *Klebsiella pneumonia* (16.77%), *Pseudomonas* spp. (12.5%), *Enterococcus* spp. (8.3%) and *Staphylococcus aureus* (8.3%). These etiologic agents vary in their sensitivity pattern to antibiotics. Piperacillin-tazobactam had the highest overall sensitivity of (89.6%). This was followed by Meropenem (87.5%), Nitrofurantoin (87.5%) and Fosfomycin (81.3%). Cefixime, Cefotaxime and Amoxicillin/ clavulanic acid had overall sensitivities above 50%. **Conclusion:** E coli was the common organisms followed by others gram negative and positive organisms. *Enterococcus* spp. was also a significant bacterial isolates in this settings. Meropenem, Piperacillin-tazobactam, Nitrofurantoin, Fosfomycin were the highly effective antibiotics against isolated uropathogens. Amoxicillin/clavulanic acid and Cephalosporin also had a good results.

**Key words:** Antibiotics Sensitivity Pattern, Pregnancy, Urinary Tract Infection, Uropathogens.

**Article Citation:** Yaseen M, Rashid S, Naqvi S. Urinary tract infection in pregnant females attending antenatal clinics among middle socioeconomic settings. Professional Med J 2020; 27(8):1636-1641.  
DOI: 10.29309/TPMJ/2020.27.08.4357

### INTRODUCTION

Urinary tract infection (UTI) is the most commonest infectious diseases in under developed countries annually the estimated incidence is 250 million.<sup>1</sup>

In pregnant females UTI is commonly observed in 6 to 24 weeks.<sup>2</sup> It is the common reason for hospitalization and 20% of females have been affected with UTI in their gestational period. 28% of pregnant women with UTI have signs and symptoms of UTI while 71.9% have no symptoms.<sup>3</sup> Short length of urethra, lack of secretions from prostate gland, close anatomical structure of urethra and anal region, poor hygienic conditions, increase frequency of sexual intercourse, high parity, age, low socioeconomic status, functional and anatomic disorders of urinary

tract, diabetes mellitus, poor control of glucose during pregnancy, neurogenic bladder are the risk factors for increase prevalence of UTI.<sup>4</sup>

Pregnant females are likely to get UTI due to some other factors as well which include decreased tonicity of bladder and ureter, dilatation of ureters, increased bladder volume .All these factors contributes to stasis of urine and increase vesicoureteral reflux.<sup>5</sup>

Preterm labor, low birth weight babies, intrauterine deaths, chronic kidney diseases, anemia, kidney infections, hypertension during pregnancy are the complications of UTI in pregnancy. To avoid these complications UTI have to be treated timely in pregnant females.<sup>6</sup>

Microorganisms of UTI are almost same in pregnant and non-pregnant females. *Escherichia coli* causing 90% of the infection.<sup>7</sup> Remaining infections are caused by *Pseudomonas* spp. and *Klebsiella pneumoniae*.

Since last few years there is an increase in the resistance of antimicrobial drugs of UTI. For a good and proper management of UTI in pregnant females it is necessary for the Nephrologist, Physicians and Obstetricians to know about the common etiologic organisms of UTI and their patterns of antibiotic sensitivity.

So empirical treatment can be started before the availability of final sensitivity results.

Currently Local data on the etiological organisms of UTI and their susceptibility to antibiotics is scarce. Therefore this study aims to explore the pattern of UTI causing organisms and their susceptibility to antibiotics in pregnant females attending antenatal clinics of Jinnah Medical College Hospital (JMCH).

## MATERIAL & METHODS

This study was carried out at Jinnah Medical College Hospital (JMCH) Karachi after ethical review committee approval. This was a descriptive cross sectional study of pregnant females who were registered at the antenatal clinic of JMCH and underwent urinary culture and sensitivity analysis. All pregnant females who had attended the antenatal clinic from January 2017 to December 2017 were included. Those who had Congenital or acquired urinary tract abnormality and renal stone diseases were excluded. Data was taken from Medical record department and information about age, parity, gravida, miscarriages, microorganisms from the urine samples and their antibiotic susceptibility pattern was noted in a study Performa.

Data was entered and analyzed using the SPSS (version 25). Descriptive analysis was used for the socio-demographic characteristic and other variables.

## RESULTS

Total 564 participants were included in the study.

The mean age of women with UTI were 28.71 + 5.458. Majority were in the age group of 20-29 years. UTI was observed more commonly in multiparous women. Out of 564 participants, 48(8.5%) had a positive urine culture results. Table-I.

Isolated uropathogens isolated are presented in Table-II. *Escherichia coli* (*E.coli*) was the most common bacterial isolates accounting for 26 (54.2%) of the total isolates. This was followed by *Klebsiella pneumoniae* which accounted for 8 (16.7%) of the isolate. The frequency of the other bacterial isolates included *Pseudomonas* spp. 6 (12.5%); *Enterococcus* spp. 4 (8.3%); *Staphylococcus aureus* 4(8.3%).

Overall antibiotic sensitivity pattern of bacterial isolates is shown in Table-III.

Piperacillin-tazobactam had the highest overall sensitivity of 89.6%. This was closely followed by Meropenem 87.5%. Nitrofurantoin and Fosfomycin had a sensitivity of 87.5% and 81.3% respectively. Cefixime, Cefotaxime and Amoxicillin/clavulanic acid had overall sensitivities above 50%.

The antibiotic sensitivity pattern of uropathogens from UTI positive women is shown in Table-IV. *E coli* showed 100% sensitivity to Meropenem and Piperacillin-tazobactam, 92.3% to Fosfomycin, 84.6% to Cefixime & Nitrofurantoin, 77% to Amoxicillin/clavulanic acid, 73.1% to Amikacin and Cefotaxime, 53.8% to Ciprofloxacin and less than 50% sensitivity to other antibiotics. *Klebsiella pneumoniae* showed 100% sensitivity to Nitrofurantoin, Meropenem and Piperacillin-tazobactam, 75% to Fosfomycin, 62.5% to Amikacin, 50% to Amoxicillin/Clavulanic acid, Cefotaxime and Ciprofloxacin.

100% of *Pseudomonas* spp. were sensitive to Cefotaxime, 83.3 % to Piperacillin-tazobactam, Cefixime, Colomycin and Ciprofloxacin, 66.7% to Nitrofurantoin, Meropenem and Amikacin, 66% to Amikacin, 50% to Fosfomycin, Cefotaxime and amoxicillin/Clavulanic acid.

100% of the *Staphylococcus aureus* were found

to be sensitive to Amikacin, Nitrofurantoin and Fosfomycin and 75% to Vancomycin and Ciprofloxacin.

However 100% of *Enterococcus* spp. were sensitive to Fosfomycin, Amikacin, Nitrofurantoin, and Amoxicillin/Clavulanic acid, 75% to Ampicillin, Vancomycin, and Piperacillin-tazobactam, Meropenem, Cefotaxime and Ciprofloxacin.

Variables	Pregnant woman with Positive culture (n =48) n (%)	Pregnant woman with Negative culture (n =516) n (%)
<b>Age</b>		
<20	5(10.4)	46(8.9)
20-29	22(45.8)	305(59.1)
30-39	21(43.8)	165(32)
<b>Parity</b>		
Primigravida	15(31.3)	143(27.7)
Primipara	7(14.6)	149(28.9)
Multi para	20(41.7)	178(34.5)
Grand multipara	6(12.5)	46 (8.8)

**Table-I. Socio-demographic characteristics of pregnant women:**

Organisms	Numbers (n)	Percentage (%)
<i>E. coli</i>	26	54.2
<i>Klebsiella pneumoniae</i>	8	16.7
<i>Pseudomonas</i> spp.	6	12.5
<i>Enterococcus</i> spp.	4	8.3
<i>Staphylococcus aureus</i> .	4	8.3

**Table-II. Organisms isolated from pregnant women with urinary tract infection:**

Antibiotics	Frequency (n)	Sensitive (%)
Piperacillin-tazobactam	43	89.6
Meropenem	42	87.5
Nitrofurantoin	42	87.5
Fosfomycin	39	81.3
Cefixime	33	68.8
Cefotaxime	32	66.7
Amoxicillin clavulanic acid	28	58.3
Ciprofloxacin	27	56.3
Ampicillin	15	31.3
Ofloxacin	3	6.3

**Table-III. Overall antibiotics sensitivity pattern (irrespective of bacterial isolates) to the isolated organisms (n=48)**

## DISCUSSION

Along with anemia and hypertension in pregnancy, UTI is also commonly found and affects 5-10% of pregnancies. In this study we found 8.5% of positive urine culture reports in pregnant females. This is in agreement with the Sevki et al who reported a prevalence rate of 8.5%.<sup>8</sup> Prevalence rate reported by Agersew et al (10.4%) and Getachew et al (12%) are also consistent with our study results.<sup>9,10</sup>

Furthermore the prevalence rate of our study is not match with studies done in Ibadan South-Western Nigeria who reported a prevalence rate of 45.7% and in Amassoma Southern Nigeria who reported a prevalence rate of 25.3% respectively which is higher than our results.<sup>11,12</sup> This high prevalence is may be due to low socio-economic status, deficient environmental cleanliness, lack of awareness and practices of personal hygiene and increased frequency of sexual intercourse.

In our study gram-negative bacteria was more commonly observed than gram-positive bacteria and *E coli* is the commonest one which is similar to many other studies.<sup>1,9,10</sup>

Second common pathogen in this study is *Klebsiella pneumonia* (16.7%) which is opposite to many other studies that reported *Staphylococcus aureus* is the second common uropathogens.<sup>3,13</sup>

This variations in pattern of uropathogens might be due to the variations of environment, personal hygiene practice and social habits Karki and Derese reported 16.6% and 11.5% of *Klebsiella* species respectively.<sup>13,14</sup>

Third common uropathogens is *Pseudomonas* spp. (12.5%) which is consistent with Derese.<sup>14</sup>

*Staphylococcus aureus* is reported as second common pathogen in many previous studies but in our study we found its prevalence is only 8.3% that is consistent with the Shazia et al.<sup>1</sup>

Majority of uropathogens causing UTI are gram negative bacteria and usually from the gastrointestinal tract.

Organisms	E.coli	Klebsiella Pneumoniae	Pseudomonas spp.	Enterococcus spp.	Staphylococcus aureus
Drugs	N (%)	N (%)	N (%)	N (%)	N (%)
Meropenem	26(100)	8(100)	4(66.7)	3(75)	1(25)
Piperacillin-Tazobactam	26(100)	8(100)	5(83.3)	3(75)	1(25)
Fosfomycin	24(92.3)	6(75)	3(50)	2(50)	4(100)
Nitrofurantoin	22(84.6)	8(100)	4(66.7)	4(100)	4(100)
Cefixime	22(84.6)	3(37.5)	5(83.3)	2(50)	1(25)
Amoxicillin/ Clavulanic acid	20(76.9)	4(50)	3(50)	0(0)	1(25)
Amikacin	19(73.1)	5(62.5)	4(66.7)	1(25)	4(100)
Cefotaxime	19(73.1)	4(50)	6(100)	2(50)	1(25)
Ciprofloxacin	14(53.8)	4(50)	5(83.3)	1(25)	3(75)
Ampicillin	10(38.5)	0(0)	0(0)	4(100)	1(25)
Vancomycin	9(34.6)	0(0)	0(0)	4(100)	3(75)
Tetracycline	1(3.8)	0	0	0	0
Colomycin	1(3.8)	0	5(83.3)	0	0
Ofloxacin	0	0	0	1(25)	0

**Table-IV. Antibiotic sensitivity pattern of uropathogens from UTI positive women.**

In our study antibiotic with the overall high sensitivity pattern is Piperacillin-tazobactam which is consistent with the previous studies.<sup>15,16</sup>

Second one is Meropenem which is consistent with Rizvi et al and Patnik et al who reported a high sensitivities of uropathogens with Meropenem.<sup>17,18</sup>

Nitrofurantoin has a very good sensitivity pattern in our study .It is a cheap drug and could play a good role in the treatment of UTI. Studies done in Ethiopia and Tanzania also showed a similar results to our study.<sup>2,19</sup>

Fosfomycin have a very good results in our study and consistent with the study done previously.<sup>20</sup> It is also a cheap drug and can also play a good role in management of UTI.

Cephalosporin also have a good results in our study which include Cefotaxime and Cefixime this is consistent with Subeidi et al.<sup>15</sup>

Our study also reported low sensitivity with Quinolones which is divergent with many studies done previously.<sup>21,22</sup> High resistance to Quinolones and other antibiotics is due to over usage and practice of self-medication which leads

to emergence of highly resistant organisms.

Amoxicillin/clavulanic acid also have a good results in our study. Similar findings was also evidenced in earlier studies.<sup>15,19</sup>

#### LIMITATIONS OF THE STUDY

This study was a hospital based and may not truly reflect the entire city. As this study was the analysis of cultures done prior to the study there is a lack of uniformity of antibiotic sensitivities results against uropathogens. The antibiotic susceptibility results against isolated microorganisms in the laboratory was an in-vitro activity and may not truly reveal the in-vivo activity.

#### CONCLUSION

E coli was the common organisms followed by others gram negative and positive organisms. Enterococcus spp. was also a significant bacterial isolates in this settings. Meropenem, Piperacillin-tazobactam, Nitrofurantoin, Fosfomycin were the highly effective antibiotics. These antibiotics could be administered empirically due to their high sensitivity results. Cost effective antibiotics still are the options in uncomplicated cases. Amoxicillin/ clavulanic acid and Cephalosporin also had a good results.

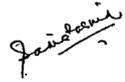
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