Original Article

Bacteria Causing UTI

Frequency of Bacteria Causing Urinary Tract Infections During Pregnancy and Antimicrobial Sensitivity in Southern Punjab-Pakistan

S. M. Abbas Naqvi, M. Majid Rasheed, Shahbaz Anwar, Rubina Yaseen and Muhammad Nouman Iqbal

ABSTRACT

Objective: Urinary tract infections are common infection and incidence resistant strains causing UTI is also increasing. Bacteriuria results in serious complications in mother and fetus. The need of the hour is to aware the pregnant women of proper screening and improved treatment against resistant bacteria.

Study Design: Descriptive Cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Pathology in collaboration with the Gynecology department, Nishtar Medical College/Hospital, Multan from October 2018 to February 2019.

Materials and Methods: One hundred and sixty (n=160) pregnant women, presenting with signs and symptoms of UTI, were included in the study from Gynaecology outdoor of Nishtar Hospital, Multan. Midstream urine samples were collected in sterile containers and processed in microbiology section of that college. Complete urine examination and urine culture were done to diagnose UTI. Antimicrobial susceptibility testing of isolated bacteria were also done by standard Kirby-Bauer disk diffusion method using CLSI 2015 guidelines.

Results: Out of total 160 urine samples, 58 samples were culture positive. Of all isolates (100% i.e., 58), the highest number was of Staphylococcous aureus 41.38% (n=24) followed by E. coli 29.31% (n=17), S. saprophyticus 10.34% (n=6), Klebsiella enterica 5.18% (n=3), Pseudomonas spp 5.17% (n=3), Enterococcous fecalis 3.45% (n=2), Enterobacter spp 3.45% (n=2) and Staphylococcous epidermidis 1.69% (n=1). Moreover, 23.5% of Multi drug resistant E. coli were also isolated.

Conclusion: The study concluded that Staphylococcous aureus and Escherichia coli were the most frequent organisms isolated, with 23.5% of multidrug resistant E. coli. It is suggested, considering the complications of UTIs, that every pregnant women should have regular screening for bacteriuria followed by antibiotic susceptibility testing for improved therapy against resistant organisms.

Key Words: UTI. Pregnant women, Multidrug Resistant E. Coli, Staphylococcous Aureus.

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INTRODUCTION

Urinary tract infection is one of the most frequent bacterial infections in pregnant and non-pregnant women, and it may affect any part of the urinary tract[1,2]. The total estimated yearly UTIs are about 150 million worldwide[3]. Women are more prone to UTI due to proximity of urethra with the anus. Other risk factors are sexual contact, poor hygiene and indwelling catheters[4].

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According to American Pregnancy Association women in 1st and 2nd trimester of pregnancy are at higher risk for a urinary tract infections[5]. Pregnancy itself is a predisposing factor for UTI as it causes physiological and hormonal changes like relaxation of ureters and urinary stasis in bladder which favour development of UTI. The sign and symptoms of UTIs are urinary urgency, frequency, dysuria, suprapubic pain, nausea and vomiting[6]. UTIs are not STIs, still type of organisms causing UTIs in pregnant and non-pregnant women are same. Organisms causing UTIs include Proteus species, Enterobacter species, Pseudomonas species, Klebsiella pneumonia, Staphylococcus saprophyticus, Enterococcus faecalis and Staphylococcus aureus[7]. The prevalence of organisms causing UTI vary in different regions of world. The highly mutant E. coli strains that cause UTI have toxins like adhesins, pili, or fimbriae which help adherence to uroephithelium[8]. Multidrug resistant E. coli is the strain that is resistant to more than three of the following classes of antibiotics i.e, pencillins third generation cephalosporins, aztreonam, aminoglycoside,

and quinolones[9]. The resistance of first line drugs like ampicillin, nitrofurantoin, and co-trimoxazole is increasing in community acquired strains. According to more recent studies, resistance to fluoroquinolones such as levofloxacin and ciprofloxacin is also increasing[10]. Therefore, considering the increased incidence of multidrug resistant UTIs, local antibiotic resistance profiles must be known to support empirical therapy for management of these serious infections. With this background the present study was conducted to find out frequency of bacteria plus Multi-Drug-Resistant (MDR) strains of E. coli causing symptomatic UTI in pregnant women.

MATERIALS AND METHODS

This Descriptive Cross-sectional study was carried out in the department of Pathology in collaboration with the Gynecology department, Nishtar Medical College/ Hospital, Multan from October 2018 to February 2019. A total number of 160 pregnant women of all ages having symptomatic urinary tract infection (UTI) were included. Midstream urine samples were taken in sterile containers after properly instructing every woman about sample collection. Specimens were first chemically tested for specific gravity, pH, albumin, glucose, leukocyte esterase and nitrites by urine dipstick. Then, by centrifuging urine at 3000 rpm for 5 minutes, microscopy of each sample was done to test out WBCs. All the samples were cultured on CLED agar media and incubated aerobically at 37°C for 24 hours[11]. On the next day growth of organism were identified morphologically by Gram stain and confirmed by biochemical analysis. Antimicrobial sensitivity (AST) testing of bacteria isolated was performed using standard Kirby-Bauer method[12]. A performa was employed for data collection and storage. The history of patients including name, socioeconomic status, education, gestational period, number of pregnancies result of tests on dipstick, culture positive bacteria and AST were all recorded. The data was analyzed through SPSS for Windows version 16. The nominal variables were reported as frequency and percentages. The age variable was reported as Mean.

RESULTS

The age of pregnant women was between 26-40 year, average age was 27 years; maximum were from lower socioeconomic status (83.04%). Out of 160 pregnant females included in this study, the most women showed multiple signs and symptoms. Urinary frequency (96%), urinary urgency (91%), dysuria (53%), fever (41%), supra-pubic pain (29%) and flank pain (7.5%) were seen. (Table-1) Maximum number of women 86 (53.8%) were in 2nd trimester, 53 (33.1%) were in 3rd trimester and 21 (13.1%) were in 1st trimester of pregnancy. Of 160 samples, 58 samples were culture positive (36.25%). (Table-2)

Of all isolates (58), the highest number was of Staphylococcous aureus 24 (41.38%) followed by E. coli 17 (29.31%), S. saprophyticus 6 (10.34%), Klebsiella enterica 3 (5.17%), Pseudomonas spp. 3 (5.18%), Enterococcous fecalis 2 (3.45%), Enterobacter spp 2 (3.45%) and Staphylococcous epidermidis 1 (1.69%). (Table-3)

Of 160 samples, 46 (28.7%) samples showed a positive leukocyte esterase test and 114 (71.2%) samples showed negative leukocyte esterase test. Leukocyte esterase test was positive in those urine samples in which more than 13 WBCs/ HPF were seen. No organism was isolated from those urine samples in which insignificant WBCs (less than 6) were present. Of 160 samples, 22 (13.7%) samples showed a positive nitrate test and 138 (86.2%) showed negative nitrate test. Nitrate test was positive in E. coli, Enterobacter spp and Klebsiella enterica.

Table No.1: Signs and symptoms of UTI in pregnant women (n=160)

Signs and Symptoms	Number	Percentage
Dysuria	85	53%
Urine frequency	154	96%
Urine urgency	146	91%
Supra pubic pain	47	29%
Fever	66	41%
Flank tenderness	12	7.5%

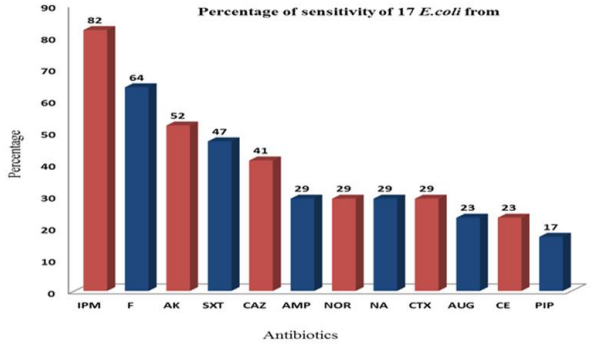
Table No.2: Correlation of gestational period with the organisms isolated

Sr. No.	Gestational period	No. of patients	Organisms isolated
1	1st Trimester	21 (13.1%)	14.8%
2	2nd Trimester	86 (53.8%)	31.3%
3	3rd Trimester	53 (33.1%)	52.8%
4	Total	160 (100%)	36.2%

Table No.3: Frequency of Microorganisms Detected in Urine Samples (n=58)

Microorganism	Frequency (%)
Staphylococcous aureus (n=24)	41.38%
E coli (n=17)	27.31%
Staphylococcus saprophyticus (n=6)	10,34%
Klebsiella enterica (n=3)	5.18%
Pseudomonas spp. (n=3)	5.18%
Enterococcous fecalis (n=2)	3.45%
Enterobacter spp (n=2)	3.45%
Staphylococcous epidermidis (n=1)	1.69%

Among 12 antibiotics tested, susceptibility pattern of E. coli was imipenem (82%), followed by nitrofurantion (64%), amikacin (52%), cotrimoxazole (47%), ceftazidime (41%), ampicillin, norfloxacin, nalidixic acid and cefotaxime (29%), augmentin and cefaclor (23%) and pipemidic acid (17%). Out of 17 isolates of E. coli, 4 were multidrug resistant. (Figure-1)



Key: IPM; Imipemem, F; Nitrofurantion, AK; Amikacin, SXT; Cotrimoxazole, CAZ; Ceftazidime, AMP; Ampicillin, NOR; Norfloxacin, NA; Naladixic acid, CTX; Cefotaxime, AUG; Augmentin, CE; Cefaclor, PIP; Pipemidic acid.

Figure No.1: Multi-Drug-Resistant (MDR) E coli.

DISCUSSION

According to various studies, it is also estimated that more than 50% of women will have UTI once during their lifetime. In childbearing women, the frequency of UTI can even be more than 8%[13]. It is a serious health issue for women and more than 75% of all women experience it once or more at some stage of their life [14]. In our study the frequency of UTI was 36.2%. The rate of incidence in our study was comparable with other studies reported.[15,16] Furthermore, the percentage of UTI causing organisms in our study was higher than that reported by Leigh Brook et al., (2001)[17] 1-10% and Onyemelukwe et al., (2003) 12.7%. The variation in above results may be because of the fact that we included only symptomatic pregnant woman as our targeted population or because geographical location is different.

In our study, the rate of UTI was more in the second trimester (53.8%) in comparison to the first and 3rd trimester. A study by Leigh (1989), did not match with our study that showed more cases of Urinary tract illness in the 3rd trimester.[18] According to our study, S. aureus (41.32%) is the commonest organism identified in urine of pregnant mothers. According to results in Nigeria the commonest organisms was mainly E. coli (42.10%).[19] This controversy might be due to the fact that all females included in our study were from outpatient department and not from indoor where there could be chance of spread of resistant E. coli strains that causes urinary tract infections.

CONCLUSION

Staphylococcous aureus 24 (41.4%) and Escherichia coli 17 (29.3%) were the commonest isolated organisms with 23.5% of multidrug resistant E. coli. Thus, every pregnant woman should undergo antenatal screening for bacteriuria followed by immediate treatment, to avoid any complications poses by UTI.

Author's Contribution:

Concept & Design of Study:	S. M. Abbas Naqvi
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Data Analysis:	Rubina Yaseen, Muhammad Nouman Iqbal
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Conflict of Interest: The study has no conflict of interest to declare by any author.

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