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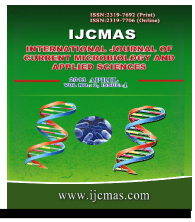

Original Research Article

Isolation and identification of bacteria causing urinary tract infections in pregnant women in vidarbha and their drug susceptibility patterns in them

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Keywords

Urinary tract infection; Pregnant women; uropathogens; antimicrobial susceptibility pattern.

A B S T R A C T

Urinary tract infections (UTIs) are a common problem in women at all stages of life; this is particularly true of pregnant women. UTIs are an especially important topic in pregnancy, as this may cause complications such as pyelonephritis, hypertensive disease of pregnancy, anemia, chronic renal failure, premature delivery and fetal mortality. Knowledge about the type of pathogens responsible for urinary tract infections and their resistance patterns may help the clinician to choose the correct empirical treatment. Therefore, the aim of this study was to identify the etiologic agents of UTI and to determine the patterns of antimicrobial drug susceptibility among pregnant women attending antenatal clinic. Retrospective analysis was carried out for 280 mid-stream urine specimens processed for culture and antimicrobial drug susceptibility testing between July and October 2012. 280 urine specimens were collected from women contacting Hospitals for children and & Delivery in various cities of Vidarbha that suffering from urinary tract infection .Isolated and diagnosed bacteria from pregnant women were : *Escherichia coli* (43.47%), *Staphylococcus aureus* (23.91%), *Proteus vulgaris* (19.56%), *Klebsiella* species (5.43%), Coagulase negative *Staphylococci* (7.6%).The isolated uropathogens showed resistant to ampicillin, co-trimoxazole, ciprofloxacin, ceftazidime and sensitive to nitrofurantoin and cephotaxime. In conclusion, *E coli* were found to be the common cause of UTI among the pregnant women. The presence of bacterial isolates with very high resistance to the commonly prescribed drugs leaves the clinicians with very few alternative options of drugs for the treatment of UTIs. So Culture and sensitivity of the isolates from urine samples should be done as a routine before advocating the therapy.

Introduction

Urinary Tract Infections (UTIs) is an infection caused by the presence and growth of microorganism anywhere in the urinary tract and is perhaps the single commonest bacterial infection of mankind (Morgan and McKenzie, 1993; Ebie *et al*., from the body which include: kidneys, ureters, bladder and urethra. UTIs are among the most common bacterial infections in humans, both in the community and hospital settings and have been reported in all age groups in both sexes (Hooton *et al*., 1995). Urinary tract

infections (UTIs) are the most commonly encountered infectious diseases by clinicians in developing countries with an estimated annual global incidence of at least 250 million. UTI affects all age groups, but women are more susceptible than men, due to short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora.

Pregnant women are more susceptible to UTI due to a number of factors including ureteral dilatation, increased bladder volume and decreased bladder tone, along with decreased ureteral tone which contributes to increased urinary stasis and ureterovesical reflux .Development of glycosuria seen in 70% of pregnant women encourages bacterial growth in the urine.

The two type of inflammation of the urinary tract infection

Uncomplicated U.T.I

Occurs in the normal urinary tract (not abnormal) on the anatomical and functional and unaccompanied disorders lead to a shortage in the immune defense mechanisms, on kidney and caused by single strain of bacteria solitary.

Complicated U.T.I

The three cases are important: Oddity urinary tract because it contains obstruction, calculi, vesico – ureteric reflux, neurological abnormalities, analgestic nephropathy, renal scarring, Indwelling catheterization and Impaired function .

The presence of turbulence inhibition defense mechanism, such as disruption of diabetes, Medication or treatment to discourage resistance, cancer medicines, steroids and organ transplant medications. The clinical symptoms that appear on the infected women, they are urinary tract infection, abdominal pain, Dysuria, Hematuria, Urinary hesitancy, Incontinence, Nocturia, Frequency, Suprapubic pain, Lower back pain Untreated upper UTI in pregnancy carries well documented risks of morbidity, and rarely, mortality to the pregnant women (NICE 2003).

Enterobacteriaceae is the leading cause of the urinary tract infection, which includes : *Escherichia coli*, *Klebsiella* spp, *Proteus* spp., *Enterobacter* sp. Failure to treat bacteriuria during pregnancy increases the risk of development of acute pyelonephritis by 25% and may result in complications, such as preterm labour, transient renal failure, acute respiratory distress syndrome, sepsis, shock and haematological abnormalities. Woman with untreated UTI during their third trimester of pregnancy are at-risk of delivering a child with mental retardation or developmental delay.

The incidence of these complications can be decreased by promptly treating UTI during pregnancy. To ensure appropriate therapy current knowledge of the organisms that cause UTI and their antibiotic susceptibility is mandatory.

Although a variety of etiology is involved with UTI, *E. coli* and other coliforms account for large majority of naturally acquired urinary tract infections. Microorganisms causing UTI vary in their susceptibility to antimicrobials from place

to place and time to time. specimens examined in most medical microbiology laboratories (Morgan and McKenzie, 1993).

The objective of this includes Isolation and identification of the bacteria that cause of the urinary tract infection in pregnant women. Determine the effect of antibiotics on the prevailing bacteria isolated from samples of urine.

Materials and Methods

Collection of Samples

(280) samples of urine were collected from pregnant women contacting Hospital for children and Delivery in Wardha, Yavatmal, Nagpur, Amravati, Akola, Bhandara, Gondia and Chandrapur Cities, mid stream urine sample was taken for each woman in sterilized test tubes (Karlowsky *et al*., 2006) and (Solberg *et al*., 2006).

Bacterial isolation and antimicrobial susceptibility testing

Urine samples received at the microbiology Laboratory were plated on Mac-Conkey and Blood agar plates and incubated at 37^{o}C for 24 hours. . A significant bacterial count was taken as count equal to or in excess of 10^{5}per milliliter. Identification of pure isolates was done by observing morphological, cultural and biochemical characters according to Cheesbrough (2002-2004). The isolates were identified by Bergey's Manual for Determinative Bacteriology (Bunchanan and Gribbons, 1974)

Antibiotic sensitivity testing was performed using the Kirby–Bauer disc diffusion method, determining sensitive and resistant bacteria to antibiotics by measuring the diameter of inhibition zone by mm and then compared with the standard diameters that installed in the standard scales.

Antimicrobial drug susceptibility testing for Ampicillin 10 μg, Amoxicillin/ clavulanic acid (augmentin)20/10 μg, Gentamicin 10 μg, Cefotaxime 30 μg, Ceftriaxone (30μg), Ceftazidime(30mg), Cotrimoxazole 25 μg, Ciprofloxacin (5 μg), Amikacin 30 μg, Nitrofurantoin (300 μg)and Norfloxacin (10 μg) was done on all bacteria isolated. Interpretation of results was done based on the diameter of the zone.

Results and Discussion

A total of 280 urine specimens were received from Hospital for children and delivery in Vidarbha during July to October 2012 and these were processed in the laboratory. Significant bacteriuria (cultures with > 10^{5} colony forming units (cfu) of bacteria/mL of urine) was found in 92/280 (32.85%) of the urine specimens. Gram-negative bacteria were more prevalent (68.46%) than Gram-positive bacteria (31.51%).

Of the 92 isolates, the most commonly isolated bacteria were *Escherichia coli* 40 (43.47%), *Klebsiella* spp. 5 (5.43%), *Proteus vulgaris* 18(19.56%), coagulase negative *Staphylococcus 7* (7.6%) and *Staphylococcus aureus* 22 (23.91%) (Table.1).

Table.1 Distribution of bacteria isolated from urine samples of pregnant women presenting with symptoms of UTI

Organism isolated	No of isolates	Percentage (%)
Escherichia coli	40	43.47%
Klebsiella species	5	5.43%
Proteus species	18	19.56%
Coagulase negative Staphylococcus	7	7.60%
S. aureus	22	23.91%
Total positive urine culture	92	99.97%

Bacterial uropathogen isolates from patients with UTIs revealed the presence of high levels of single and multiple antimicrobial resistances against commonly prescribed drugs (Table. 2).

E.coli, which is the predominant cause of UTI, showed high percentage of resistance to ampicillin (87.5%), cotrimoxazole (75%), ceftazidime (62.5%), ciprofloxacin (62.5%), ceftriaxone (50%) and norfloxacin (50%)and low resistance to Augmentin (25%), cefotaxime(37.5%), Gentamycin (25%), nitrofurantoin (12.5%), but all were sensitive to amikacin.

Klebsiella spp which is the second most prevalent pathogen of UTI displayed a similar resistance pattern as of E.coli and showed hundred percent resistant to ampicillin however, and all others gram negative isolates were similarly resistant to most of the antibiotics as that of *E. coli* and *Klebsiella* spp. Of the Gram-positive organisms 100% resistance to Ampicillin, ceftazidime 56%, Cefotaxime 54%, Amikacin 37.5% ciprofloxacin 29%, Gentamicin 27% was noted.

Table.2 Resistance of organisms to Antibiotics

S.No	Name of antibiotic	% of resistance
1.	Ampicillin	87.5
2.	Augmentin	25
3.	Gentamicin	25
4.	Cotrimoxazole	75
5.	Amikacin	0
6.	Norfloxacin	50
7.	Ciprofloxacin	62.5
8.	Ceftazidime	62.5
9.	Cefotaxime	37.5
10.	Ceftriaxone	50
11.	Nitrofurantoin	12.5

Bacterial infection of the urinary tract is one of the common causes for seeking medical attention in the community. Micro organisms causing UTI vary in their susceptibility to antimicrobials from place to place and from time to time. So identification of the etiological agent and the selection of an effective antibiotic agent to the organism in question is very important for effective management of patients suffering from bacterial UTIs.

UTIs are caused by a variety of microorganisms, including both gram positive and gram negativeones. In our study *Escherichia coli* (43.47%) was predominant isolate followed by *Proteus spp.* (19.56%) and *Klebsiella spp.* (5.43%) respectively. This finding is similar to many reports which indicated that gram negative bacteria mostly *E.coli* and *Proteus* spp. are the commonest pathogens isolated in patient with urinary tract infections.

Table.3. Biochemical tests of gram positive bacteria isolated from samples of urine and some attributes appearance and microscopic.

Type of Bacteria / Test	*Staphylococcus aureus*	Coagulase negative *Staphylococci*
Coagulase	+	-
Haemolysis	+	-
Catalase	+	+
Oxidase	-	-
Qualities appearance	Colonies of medium-to large-sized karimi-yellowish color, smooth,β haemolysis	Small colonies of white analysed blood
Attributes microscopic	Spherical from of the grapes, G+	Spherical form of the grapes, g+

Table.4. Biochemical tests of gram negative bacteria isolated from samples of urine and some attributes appearance and microscopic.

Tests / Type of bacteria	Oxidase	VP	Indole	Methyl red	Motility	Urease	Simmons citrate	H_2S Production	Kiliglar agar	Maltose	Lactose	Fructose	Mannitol
Escherichia coli	-	-	+	+	+	-	-	-	**A/A**	+	+	-	+
Proteus vulgaris	-	-	+	+	+	+	**V**	+	**K/A**	+	-	-	-
***Klebsiella* Spp.**	-	+	-	-	-	+	+	-	**A/A**	+	+	-	+

A: Acid, K: Alkaline, V: Variable, +: positive. - : Negative, K/A : Alkaline/Acid, A/A : Acid / Acid

Although the spectrum of agents causing UTI in pregnant women is relatively constant, their antibiotic susceptibility patterns are different in different geographical locations Cotrimoxazole in the present study was no longer found to be effective for UTI as 75% of uropathogens showed high degree of resistance to it. Previously this antibiotic was used as the drug of choice for empirical treatment of UTI.

The most useful antibiotics in this study were, Amikacin, Nitrofurantoin, Cephotaxime notably. Ampicillin, Ciprofloxacin, Norfloxacin antibiotics which were used to treat UTI, had shown resistance. Similar findings were observed by many workers around the world. The broad spectrum activity of Fluoroquinolones has made them as one of the best therapeutic options for UTI. In the present study the isolates showed low

degree of susceptibility (37%) to Fluoroquinolones which indicates that they can no more be opted for treating UTI. It is also noted in our study that there is increased resistance to third generation cephalosporin, Ceftazidime. Almost all organisms are sensitive to Amikacin , so we can suggest Amikacin to be prescribed as the empirical treatment for UTI . This is similar to the findings reported previously in India.

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