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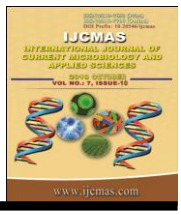

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Study of Bacteriological Profile in Urinary Tract Infection in Pregnant Women

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A B S T R A C T

Urinary tract infection (UTI) is the most common human bacterial infection in the community as well as in hospital settings (Vijaya Swetha *et al.,* 2014). Urinary tract infection during pregnancy may cause complications such as pyelonephritis, hypertensive disease of pregnancy, anaemia, chronic renal failure, premature delivery and foetal mortality (Moyo *et al.,* 2010). Early diagnosis and treatment of UTI has shown marked improvement in pregnancy outcome as well as reduction of the incidence of acute pyelonephritis, highlighting the need to screen all women in pregnancy irrespective of symptoms. This was a prospective study, conducted in 60 pregnant women attending Department of Obstetrics and Gynaecology OP/IP. Among 60 samples, 6(10%) samples yielded significant bacterial growth and 54 samples showed insignificant growth. *E. coli* was isolated as predominant pathogen. These *E. coli* isolates were resistant most commonly to cefuroxime (98%) followed by ampicillin (96%) and ciprofloxacin (54%) and were most sensitive to nitrofurantoin (83.3%) followed by Amikacin (66.6%), cotrimoxazole (68%).

Introduction

Urinary Tract Infection (UTI) is defined as the microbial invasion of any of the tissue of the urinary tract extending from the renal cortex to the urethral meatus. Urine formed in the kidney is a sterile fluid that serves as a good culture medium for proliferation of bacteria (Okonko *et al.,* 2009). Women are at greater risk for UTI than men, partly because of the relatively short straight urethra, retrograde ascent of bacteria from the perineum, changes in normal vaginal flora. Simple hygiene habits, including voiding before and after sexual intercourse and wiping from anterior to posterior, tend to decrease the risk of UTI. Anatomically, UTI is been classified into Lower Urinary Tract Infection involving the bladder and urethra and Upper Urinary Tract Infection involving the kidney, pelvis and ureter. UTI is reported among 20% of the pregnant women and it is the most common cause of admission in obstetrical wards (Lawani ebidor *et al.,* 2015).

After anaemia, UTI is the second common complication in pregnant women, which if not controlled well, can adversely affect the health of infants or the pregnant mothers. In pregnancy, UTI is classified into two

categories of symptomatic and asymptomatic. The involvement of the lower urinary tract, leading to asymptomatic bacteriuria, is the most common cause of UTI during pregnancy. The involvement of the upper urinary tract can lead to symptomatic bacteriuria and is characterized by acute pyelonephritis.

Based on performed researches, the prevalence of symptomatic Urinary Tract Infection in pregnant women has been 17.9% and in asymptomatic form 13%. If asymptomatic infection is not treated, it leads to some clinical manifestations in mother and newborn (Marziyeh Amiri *et al.*, 2015).

Increased age, number of childbirths, number of intercourses per week, diabetes, recessive sickle cell anaemia, previous history of UTI, immunodeficiency and urinary tract abnormalities can increase the risk of UTI in pregnant women. Bacterial organisms, which cause this disease, include *Escherichia coli, Klebsiella pneumonia, Proteus, Acinetobacter, Staphylococcus, Streptococcus Group B and Pseudomonas aeruginosa* (Wanyoike Gichuhi *et al.*, 2015).

The incidence of UTI increases in pregnancy with increasing gestation months, though the probability of UTI is initiated by the sixth week of pregnancy. This probability peaks at 22 - 24 weeks of gestational age. The reasons for increased probability of infection in pregnant women are probably increased bladder volume and its expansion and expanded ureter. Anatomical and physiological changes occurring during pregnancy alter the course of bacteriuria and make pregnant women more susceptible to UTI complications such as pyelonephritis.

Early diagnosis and treatment of UTI has shown marked improvement in pregnancy outcome as well as reduction of the incidence of acute pyelonephritis, highlighting the need to screen all women in pregnancy irrespective of symptoms. In view of the potential importance of bacteriuria in pregnancy, the present study was undertaken to set gold standard method of urine culture and sensitivity as effective screening test for UTI in pregnancy.

Materials and Methods

This was a prospective study, conducted in 600 pregnant women attending Department of Obstetrics and Gynaecology OP/IP, for a period of six months, after obtaining clearance from Institutional research committee.

Informed consent was taken from the patients. Patients not giving consent to participate and on antibiotics since 2 weeks were not included in this study. Only one sample from one patient was included in this study.

Clean catch midstream urine samples were collected in sterile containers. Wet mount examination after centrifuging the sample was done to look for pus cells, RBCs, casts, microorganisms, crystals if any and inoculated within 30 minutes on to nutrient agar, blood agar and Mac Conkey agar with sterile precautions; incubated in aerobic environment at $37^{o}C$ for 24 hours. Growth of one type of organism of $>10^{5}$ colony forming units, in more than one medium was considered as significant bacteriuria. The isolates were then identified based on colony morphology and biochemical reactions (Cowan and Steel, 1974). Mueller- Hinton agar was used to perform antimicrobial susceptibility testing for all the isolates (NCCLS, 1999). The zone of inhibition was measured and interpreted according to CLSI guidelines 2016. Antimicrobial drug susceptibility testing was done on all pathogenic bacteria isolated.

Patients with symptoms of UTI, >50 pus cells per high power field with or without RBCs in

wet mount examination of urine sample and single organism isolated with significant growth is categorised as symptomatic bacteriuria. Patients without symptoms of UTI, <10 pus cells per high power field with or without RBCs in wet mount examination of urine sample and single organism isolated with significant growth is categorised as asymptomatic bacteriuria.

Ethical consideration

There was no risk to the participants as there were no invasive procedures done. Participants whose test results showed any growth of microbes benefitted by being treated as per the culture and sensitivity results. No adverse reactions to the drugs were expected as these were the drugs routinely used in the department.

Results and Discussion

A total of 600 urine samples were received from pregnant women.

Among 600 samples, 60(10%) samples yielded bacterial growth.6 samples showed symptomatic bacteriuria and 54samples showed asymptomatic bacteriuria (Table 1). *E. coli* was isolated as predominant pathogen (Table 2).

These *Escherichia coli (E. coli)* isolates showed resistance most commonly to cefuroxime (98%) followed by ampicillin (96%) and ciprofloxacin (54%). It was most sensitive to imipenem (96%), piperacillin (92%), nitrofurantoin (85%) followed by amikacin and cotrimoxazole (69%) (Table 3).

The demographic variables such as age-wise distribution, educational status, gestational age, gravida status of the pregnant women are related to symptomatic and asymptomatic bacteriuria.

Statistical analysis

Statistical analysis was performed by the chi-square test. A p-value < 0.001 was taken as significant.

Age distribution

From Table 4 the study reports urine samples of 60 pregnant women with UTI fall within the age groups 21-35 years of which 55% were in 26-30 years age group. There is an increased presentation of asymptomatic bacteriuria in 26-30 yrs age group and it is statistically significant with p-value <0.0001 This is in agreement with studies in Kenya (Wanyoike Gichuhi *et al.,* 2015), Nigeria (Lawani ebidor u *et al.,* 2015), Pondicherry (Valentina and Srirangaraj, 2016) and Iran (Marziyeh Amiri *et al.,* 2015).

Socioeconomic status

From Table 5 socioeconomic status of 60 pregnant women with UTI was found to be middle class and high class of which middle class were found to be predominant of 73.33%. This is in agreement with studies in Kenya (Wanyoike Gichuhi *et al.,* 2015).

Table.1 Patients with Bacteriuria

Total no. of samples	Significant growth in culture	Symptomatic bacteriuria	Asymptomatic bacteriuria
600	60	6	54

Table.2 Pathogenic flora isolated

Organism isolated	No. of samples	% of samples
Escherichia coli.	26	43
Klebsiella sp..	13	22
Proteus sp..	7	12
Enterobacter sp..	7	12
Staphylococcus aureus	4	6
Candida albicans	3	5
Total	60	100

Table.3 Antibiotic sensitivity pattern, percentage in parantheses

Antibiotics	*E. coli* (26)		*Klebsiella* sp..(13)		*Proteus* sp..(7)		*Entero bacter* sp..(7)		*Staph. aureus* (4)	
	S	R	S	R	S	R	S	R	S	R
Amikacin	18(69)	8(31)	10(77)	3(23)	3(43)	4(57)	1(14)	6(86)		
Amoxyclav	17(65)	9(35)	4(31)	9(69)	2(28)	5(72)	2(28)	5(72)	(25)	(75)
Ampicillin	1(4)	25(96)	1(8)	12(92)	1(14)	6(86)	3(43)	4(57)	(0)	(100)
Gentamicin	15(57)	11(43)	10(77)	3(23)	5(71)	2(29)	6(86)	1(14)		
Ciprofloxacin	12(46)	14(54)	11(85)	2(15)	6(86)	1(14)	7(100)	0(0)	(50)	(50)
Norfloxacin	17(65)	9(35)	11(85)	2(15)	6(86)	1(14)	6(86)	1(14)	(50)	(50)
Nitrofurantoin	22(85)	4(15)	9(69)	4(31)	7(100)	0(0)	6(86)	1(14)	(25)	(75)
Cotrimoxazole	18(69)		7(54)		5(71)	2(29)	6(86)	1(14)	(25)	(75)
Imipenem	25(96)	1(4)	12(92)	1(8)	7(100)	0(0)	7(100)	0(0)		
Piperacillin	24(92)	2(8)	11(85)	2(15)	7(100)	0(0)	7(100)	0(0)		
Cefuroxime	1(4)	25(96)	11(85)	2(15)	6(86)	1(14)				
Ceftriaxone	4(15)	22(85)	12(92)	1(8)	6(86)	1(14)	7(100)	0(0)	(75)	(25)
Chloram phenicol	18(69)	8(31)	10(77)	3(33)	4(30)	3(70)			(0)	(100)
Erythromycin									(0)	(100)
Cefoxitin									(50)	(50)

Table4 Age-wise distribution of pregnant women with bacteriuria

Age in years	Frequency	Percentage	Symptomatic bacteriuria	Asymtomatic bacteriuria
A) 21- 25 years	18	30%	2	16
B) 26-30 years	33	55%	3	30
C) 31-35 years	9	15%	1	8

Table.5 Socioeconomic status of pregnant women with bacteriuria

Socioeconomic status	Frequency	Percentage	Symptomatic bacteriuria	Asymtomatic bacteriuria
A. High class	44	73.33%	-	-
B. Middle class			2	42
C. Low class	16	26.67%	4	14

Table.6 Educational status of pregnant women with bacteriuria

Educational status	Frequency	Percentage	Symptomatic bacteriuria	Asymtomatic bacteriuria
A. Illiterate	12	20%	4	8
B. Schooling	38	63.33%	2	36
C. Graduate	10	16.67%	-	10

Table.7 Gestational age of pregnant women with bacteriuria

Trimester	Frequency	Percentage	Symptomatic bacteriuria	Asymtomatic bacteriuria
A. First	16	26.67%	2	14
B. Second	6	10%	1	5
C. Third	38	63.33%	3	35

Table.8 Gravida status of pregnant women with bacteriuria

Gravida	Frequency	Percentage	Symptomatic bacteriuria	Asymtomatic bacteriuria
A. Primi	26	43.33%	2	24
B. Multi	34	56.67%	4	30

Education status

From Table 6 based on educational status, pregnant women with UTI were grouped as illiterate, schooling and graduate and found that 63.33% have done their schooling. This was in agreement with studies in Kenya (Wanyoike Gichuhi *et al.*, 2015).

Gestational age

From Table 7 gestational age of 60 pregnant women was grouped on trimesters of which third trimester was found to the greater percentage as to 63.33%. This was in agreement with studies in Nigeria (Lawani ebidor u *et al.*, 2015). About 35 women in the third trimester with UTI had asymptomatic bacteriuria which is statistically significant with p-value<0.0001.

Gravida status

From Table 8 gravida status of 60 pregnant women is known and 56.67% were found to be multi gravida. This was in agreement with studies in Kenya (Wanyoike Gichuhi *et al.*, 2015) and Iran (Marziyeh Amiri *et al.*, 2015).
There are many published studies on UTI in pregnancy globally. Its importance is to deem a geographical bacterial flora pattern from time to time. The knowledge about the antimicrobial resistance patterns in the pathogens is crucial for the treating physicians.

Hence it helps physicians to start on empirical treatment in pregnancy at the earliest. UTI in pregnancy is one of the preventable causes of feto-maternal complications. Appropriate screening and treatment of UTI in pregnancy has to be made mandatory worldwide.

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