Incidence of asymptomatic urinary tract infection in pregnant women in Obio Cottage Hospital, Port Harcourt, River State, Nigeria

Abstract

Urinary tract infections (UTIs) are a common problem in women at all stages of life; this is particularly true of pregnant women. UTIs are especially important topics in pregnancy, as this may cause complications such as pyelonephritis and hypersensitive disease of pregnancy, anemia, chronic renal failure, premature delivery, and fatal 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. Midstream urine specimen was collected in a sterile universal bottle from 100 pregnant women who were attending antenatal clinic in Obio Cottage Hospital, Port Harcourt Rivers State, between March and April 2023. The samples were examined by the semiquantitative culture method for the presence of asymptomatic urinary tract infection. The women were non-hospitalized and were residing in Port Harcourt. Of the 100 samples examined, 19 samples had significant bacteriuria. *Escherichia coli*were(was) the most frequently isolated organisms accounting for 33.3% of the population of the organisms isolated. Other isolates accounted for 81% in the total population and 19% in the population with significant bacteria. *E. Coli* and *Klebsiella* sp. were the commonest organisms isolated from the population of pregnant women examined.

Keywords: Asymptomatic; pregnant women, Urinary tract infections

1.0 Introduction

Urinary Tract Infections (UTIs) is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract and is perhaps the single commonest bacterial infection of mankind [1].UTIs are some of the most common bacterial infections, affecting 150 million people each year worldwide[2]. Theurinary tract includes the organs that collect and store urine and release it from the body.They are: kidneys, ureters, bladder and urethra.

Urinary tract is the second commonest site, after the respiratory tract for bacterial infection with regards to man.UTI is responsible for much illness and contributes significantly to the cost of providing health care in economically developed countries. It also leads to death either by acute infection or from chronic renal failure. The incidence ofUTI is greatly influenced by age and sex and by predisposing factors that impair the defense mechanisms that maintain the sterility of the normal urinary tract. Infections in children are often hard to recognize because of their variable symptomatology and the difficulty of obtaining suitable specimens of urine in the very young age, but they are of particular importance as causes of permanent damage to the developing kidney. The incidence of infection is highest in woman, 20 – 50% of whom will suffer a clinical episode during their lifetime. Infection is much less common in males, in whom it is specially related to abnormalities of the urinary tract or instrumental interference with it [3].

UTIs are common, leading to between seven and 10 million doctor visits per year. Although some infections go unnoticed, UTIs can cause problems that range from dysuria (pain and/or burning when urinating) to organ damage and even death. The kidneys are the active organs that

produce about 1.5 quarts of urine per day. They help keepelectrolytesand fluids (for example, potassium, sodium and water) in balance, assist in the removal of waste products (urea), and produce a hormone that aids in the formation of red blood cells. If kidneys are injured or destroyed by infection, these vital functions can be damaged or lost [4].

In 2007, in the United States alone, there were an estimated 10.5 million office visits for UTI symptoms (constituting 0.9% of all ambulatory visits) and 2–3 million emergency department visits[5]. Currently, the societal costs of these infections, including health care costs and time missed from work, are approximately US$3.5 billion per year in the United States alone. UTIs are a significant cause of morbidity in infant boys, older men and females of all ages. Serious sequelae include frequent recurrences, pyelonephritis with sepsis, renal damage in young children, pre-term birth and complications caused by frequent antimicrobial use, such as high-level antibiotic resistance and *Clostridium difficile* colitis.

In hospitals, infections are often complicated to the free flow of urine such as urinary tract investigation, surgical operation and particularly catheterization.Bacteriological examination of the urine is the major aid to the diagnosis of infection. Clinical symptoms may sometimes be a good initial guide to the presence and site of infection, but many infections are symptomless and genital infection may mimic infection of the urinary tract.Frequent infectious organisms include *Escherichia coli, Staphylococcus saprophyticus, Klebsiella pneumonia,* other coliforms and *Pseudomonas aeruginosa*. The chemotherapy for infection may be guided by invitro sensitivity test on pathogens isolated in culture and the outcome for therapy assessed by examination of urine at the conclusion of treatment.

UTI constitute a major health problem I pregnant women due to their relatively short urethra which promotes the ascending of the pathogens to the bladder, urethra and kidney. It is a significant cause of perinatal and maternal morbidity and mortality.Untreated UTI will lead to pre-term premature rapture of membrane, maternal chorioamnionitis, intrauterine growth retardation and low birthweight baby.

The aim of this study is to evaluate the incidence of asymptomatic urinary tract infection in pregnant women in ObioCottage Hospital, Port Harcourt, River State.

2.0 MATERIALS AND METHODS

2.1 Sources of Samples

Urine samples were randomly collected from 100 non-hospitalized pregnant women attending ObioCottage Hospital, Port Harcourt, River State.

2.2 Structured Questionnaire

A structured questionnaire was administered to the pregnant women to obtain information on their age, occupation, education, type of family and the size of the family. This was done with the assistance of the nurses on duty during their antenatal days.

2.3 Collection of Specimen

Sterile universal containers were given to pregnant womenand directed on how to collect urine. Clean catch urine midstream urine (MSU) was collected by voiding out the first drop of the urine and then the mid-drop was collected up to the indicated mark on the container.

2.4 Examination of Samples

Specimens collected were carried to the laboratory immediately for examination. Urine was examined physically with the naked eyes. The appearance of urine was carefully observed and stated as straw and clear, straw and cloudy, amber and clear or amber and cloudy.

2.5 Identification of Isolates

The isolates were identified using the following parameters, colonial morphology, gram reaction, motility, enzymes production etc.Gram Staining, motility test, catalase test, methyl red test, Voges Proskauer test, oxidase test, citrate utilization test and sugar fermentation test.

2.6 Antibiotic Sensitivity Test

Antibiotic sensitivity test was carried out in other to find out the best treatment for the bacterial isolated (Dodeca discs was the multi disk used). The Gram-negative multi-disc contained the following:

Nitrofurantoin (300µg), Cefuroxime (30µg),Ceftriaxone Sulbactam (45µg) Ampicolox (10µg),Cefixime (5µg),Levofloxacin (5µg), AmoxicillinClavulanate (30µg),Cefotaxime (25µg), Imipenem/ Cilastatin (10µg), Ofloxacin (5µg), Gentamicin (10µg), Nalidixic Acid (30µg).

Gram positive disc contained the following:Ceftazidime (30µg),Cefuroxime(30µg),Gentamicin (10µg),Ceftriaxone (25µg),Erythromycin (5µg),Cloxaltin (5µg),Ofloxacin (5µg), AUG-Augmentin (30µg).

This method was done using disc diffusion method. Dodeca discs were saturated with antimicrobial agents on a lawn of bacteria seeded on the surface of Muller Hunton agar medium and the multidisc placed centrally. The plate was incubated at 24^0C for 24 hours. Zone of inhibition of 2.5mmand aboveindicated sensitivity while less than 2mm indicated resistance as per Clinical and Laboratory Standards Institute(CLSI) protocol [6]. Measurements were taken (using a graduated meter rule)around the discs.

2.7 Ethical

Ethical clearance was collected from the hospital management of Obio Cottage Hospital, Port Harcourt, Rivers State.

3.0 Results

3.1 Incidence of Bacteriuria

Table 1 show incidence of bacteriuria among the pregnant women. Significant bacteriuria ($< 10^5$ organisms/ml) was observed in 19 out of the 100 samples (19%). Incidence of no significant Bacteriuria ($> 10^5$ organisms ml) was 81%.

Table 2 show incidence of bacteriuria in relation to age of pregnant women.A higher percentage of pregnant women (36.8%) with UTI was found within the age bracket of 25-30 years. Meanwhile, the age groups with the least percentage (5.3%) are the participants less than 15 years. Only 15.8% of the participants within the age bracket of 30-39 years displayed bacteriuria. The older pregnant women (41-45 years) did not present with bacteriuria at all.

Table 3 shows incidence of bacteriuria in relation to education distribution, 57.8% are pregnant women with primary education, 26.5%are women with secondary education, 15.8% are women with tertiary education.

Table 4 shows incidence of bacteriuria in relation to occupation distribution, 57.9% were housewives as their occupation, 26.3% were Business women, civil servant were 15.8% in prevalence of bacteriuria.

Table 5 shows incidence of bacteriuria in relation to family type distribution, 68.4%were from polygamous families, 21.1% were pregnant women from monogamous family type, 10.5% were single parents.

Table 6 shows incidence of bacteriuria in relation to family size distribution, 52.6% were pregnant women with family size of 1-3,31.6% were pregnant women with family size 4-7, 15.8% were pregnant women with family size of 12- 15.

Table 7 shows incidence of pregnant women with parity 4-7, Parity status of 8-11 was 68.4% and 12-15 parity.

Table 8 shows incidence of bacteriuria in relation to marital status distribution, 63.1% were married, 27.3% are single parents, divorced 10.5%.

Table 1: The incidence of urinary tract infection in pregnant women

Sample	**Frequency**	Percentage **%**
Significant Bacteriuria.	19	19%
No significant Bacteriuria	81	81%

Table 2: Incidence of Bacteriuria in relation to age of pregnant women

Age group	**Frequency**	**Participants with bacteriuria**
<15	1	1 (5.26%)
15-24	28	6 (31.6%)
25-30	28	6 (42.1%)
31-39	26	3 (15.8%)
40-45	3	0
NR	2	1 (5.26)
TOTAL	100	19 (100%)

NR: No Response

Table 3: Incidence of Bacteriuria in relation to Education status of pregnant women

Education	Frequency	Participants with bacteriuria
Primary	4	9 (37.4%)
Secondary	24	5 (26.5%)
Tertiary	60	3 (15.8%)
NR	12	2 (10.5%)
TOTAL	100	19 (100%)

NR: No Response

Table 4. Incidence of Bacteriuria in relation to occupation of pregnant women

Occupation	Frequency	Participants with bacteriuria
Business	28	5 (26.3%)
Civil servant	13	3 (15.8%)
NR	4	0 (0.00%)
House wives	55	11(57.9%)
TOTAL	100	19 (100%)

NR: No Response

Table 5: Incidence of Bacteriuria in relation to Family type of pregnant women

Family type	Frequency	Participants with bacteriuria
Polygamous	9	13 (68.4%)
Monogamous	70	41 (21.1%)
Single parent	8	2 (10.5%)
NR	13	0 (00.0%)
TOTAL	100	19 (100%)

NR: No Response

Table 6: Incidence of Bacteriuria in relation to family size of pregnant women

Family size	Frequency	Participants with bacteriuria
1-3	2	3 (15.8%)
4-7	29	6 (31.6%)
8-11	63	10 (52.6%)
12-15	0	0
NR	6	0
TOTAL	100	19 (100%)

NR: No Response

Table 7: Incidence of Bacteriuria in relation to parity status of pregnant women

Parity	Frequency	Participants with bacteriuria
1-3	86	13 (68.4%)
4-7	9	4 (21.5%)
8-11	0	2 (10.5)
12-15	0	0
NR	5	0 (0.00)
TOTAL	100	19 (100%)

NR: No Response

Table 8: Incidence of Bacteriuria in relation to marital status of pregnant women

Marital status	Frequency	Participants with bacteriuria
S	2	5 2 (27.3%)
M	94	12 (63.1%)
D	4	2 (10.5%)
NR	2	0 (0.00%)
TOTAL	100	19 (100%)

S= Single; M = Married; D = Divorced, NR= No Response

3.2 Distribution of bacteria isolated from urine samples of pregnant women

Isolatesfrom the urine samples were identified on the basis of their biochemical reactions as*Proteus mirabilis, Escherichia coli*, *Serratia* sp., *Pseudomonas* sp., *Salmonella* sp.,*Staphylococcus aureus*and *Streptococcus* sp.The percentage frequency of microorganisms isolated from the urine samplesare as follows; *Escherichia coli* had the highest incident of 33.3% each in the population of the pregnant women examined, *Klebsiella* sp. was the next highest with an incident of 25%, *Proteus*sp. with an incident of 16.7%, *Salmonella* sp. with an incident of 6.7% , *Staphylococcus aureus* with an incident of 8.3%, *Pseudomonas* sp. with an incident 3.3%, *Streptococcus* sp. with an incident of 5% and *Serratia* sp. was the least with an incident of 1.7% (Table 9).

Table9: Distribution of bacteria isolated from urine samples of pregnant women

Organism	Number of isolates	Percentagefrequency
Escherichia coli	20	33.3%
Staphylococcus aureus	5	8.3%
Klebsiella sp.	15	25%
Pseudomonas sp.	2	3.3%
Salmonella sp.	4	6.7%
Proteus sp.	10	16.7%
Serratia sp.	1	1.7%
Streptococcus sp.	3	5%

Total	60	100%

3.3 Antibiotics Susceptibility of Isolates

Table 10 shows the antibiotic resistance profile of the Gram-negative isolates. All Gram-negative isolates were susceptible to Cefuroxime (CXM) and Augmentin (Aug). Overall, there were high multiple antibiotic resistance among all the isolates.

Table 11 shows the antibiotic resistance profile of the Gram-positive isolates. All Gram-negative isolates were susceptible to Ceftazidime (CAZ)andCloxaltin (CXC) and Augmentin (Aug). Overall, there were high multiple antibiotic resistance among all the isolates.

Table 10: Antibiogram for Gram negative isolates obtained from pregnant women

Sample No	NF	CXM	CRO	ACX	ZEM	LBC	AUG	CTX	IMP	OFX	GN	NA
10	I	R	R	R	R	I	R	R	R	S	R	S
42	R	R	R	R	R	R	R	R	R	S	R	I
44	R	R	R	R	R	I	R	R	R	R	R	R
46	R	R	R	R	R	R	R	R	R	R	R	R
48	S	R	R	I	S	R	R	I	I	S	R	R
60	R	R	R	R	R	R	R	R	R	S	I	I
62	I	R	R	R	R	R	R	R	R	R	R	I
63	R	R	R	I	R	R	R	R	R	R	R	R
52	R	R	R	R	R	R	R	R	R	R	R	R
65a	I	R	R	R	I	R	R	R	R	I	R	R
66	R	R	R	R	R	R	R	R	R	R	R	R
70	R	R	R	R	R	R	R	R	R	S	R	R
65b	S	R	S	R	R	R	R	I	R	S	R	R
68	R	R	R	I	I	R	R	R	R	S	I	K
65	S	R	R	S	R	R	R	R	R	S	R	R

R – resistance, S – sensitive, I – intermediate

NF=Nitrofurantoin,CXM = Cefuroxime, CRO=Ceftriaxone Sulbactam,ACX=ampiclox, ZEM=Cefixime, LBC=Levofloxacin, AUG=Augmentin,CTX=Amoxicillin Clavulanate, IMP=Imipenem, OFX=Ofloxacin, GN=Gentamicin, NA=Nalidixic Acid

Table 11: Antibiogram for Gram positive isolates obtained from pregnant women

Sample code	CAZ	CXM	GN	CTR	ERY	CXC	OFL	AUG
59	R	I	S	S	S	R	R	R
50	R	R	S	R	R	R	I	R
94	R	R	S	R	R	R	R	R
91	R	R	S	R	R	R	R	R

R – resistance, S – sensitive, I – intermediate

CAZ=Ceftazidime, CRX= Cefuroxime, GN=Gentamicin, CTR=Ceftriaxone, ERY=Erythromycin, CXC=Cloxaltin, OFX=Ofloxacin, AUG=Augmentin

4.0 Discussion

This study was designed to investigate the prevalence of bacteria in pregnant women with urinary tract infection (UTI).The prevalence of urinary tract infection observed in our study population was 19.0%. This is lower than the reported figures in other African studies [7-11].A higher percentage of pregnant women (42.1%) with UTI was found within the age bracket of 25-30 years. The aforementioned age group having the highest infection is in conformity with previous studies [12]. Meanwhile, the age groups with the least percentage (5.26%) are the participants less than 15 years only 15.8% of the participants within the age bracket of 31-39 years displayed bacteriuria. The older pregnant women (40-50 years) did not present with bacteriuria at all.Although a reports states that advanced maternal age (≥35 years) is a risk factor for asymptomatic bacteriuria in pregnancy [11], this study does not conform with that research as older participants had fewer instances of bacteriuria, even more so in pregnant women 40 years and older. It did not conform with the result from Johnson *et al*. [13], where there was 20% increase in the prevalence of bacteriuria in elderly women aged between 41-45years.

The result on the incidence of bacteriuria in relation to education status of the women in this study revealed that class of women with only primary school education accounted for 37.4% while the class of women with only secondary school education accounted for 26.5% both combining to give a 63.9% in prevalence. This could be attributed to their low level of exposure, awareness as well as poor knowledge about the subject matter.

According to this study, A higher percentage of pregnant women with UTI was found amongst the housewives (57.9%), and within the business women (26.3%) based on their occupations. The civil servants recorded a 15.8% bacteriuria. The high bacteriuria in the housewives could be attributed to poor adherence to proper hygiene, same case could be attributed to the business women also in this study.

Women in polygamous marriages recorded the highest percentage (68.4%) of bacteriuria in relation to family types of the subjects. The women in monogamy recorded 21.1% prevalence. This supports the finding from Johnson[14], which reported a high bacteriuria in women from large families. This could be as a result of overstretching the use of toilet facilities. It was observed from the study that women with 8-11 parity history, recorded the highest bacteriuria of 68.4% and those with 4-7 parity history recorded 21.5% bacteriuria. The higher the parity recorded in women, the higher is the number of women with urinary infection and the lesser the number of women without urinary infection. This means that parity levels increase the chance of women getting urinary incontinence. This can be explained by the fact that older women are at higher risk of urinary tract infection than their younger counterparts. Married women had the highest record of bacteriuria (63.1%) compared to the single women with 27.3% and the divorced women with 10.5% bacteriuria.

The organisms that were isolated from the 19 samples having significant bacteriuria include *Proteus mirabilis*, *Escherichia coli*, *Serratia* sp., *Pseudomonas* sp., *Salmonella* sp.,*Staphylococcus aureus*and *Streptococcus* sp.*Escherichia coli* have theability to colonize the vagina and periurethral mucosa aided by the expression of pili such as fimbriae[10]. The breakdown of organic matterin the urine by early colonizers in the vagina can alter condition in the urine to encourage the growth of other uropathogens.Anatomical changes during pregnancy could also shape the vagina microflora[7]. The bladder is progressively elevated by the enlarging uterus due to the pressure it exerts and this may predispose pregnant females to urinary tract infection. The normal microbial ecology of the vagina may also be an important factor in the cause of urinary tract infection. Several factors that disrupt the normal flora promote the development of a uropathogenic predominantly vaginal flora. Such factors that disrupt the normal flora include the use of spermicides for contraception, the resent use of B-lactam antimicrobials and the postmenopausal state supplemented by exogenous estrogens [15]. Thus, isolates with low incidence were those unable to withstand physiological condition of the urethral microenvironment.

The percentage distribution of organisms isolated in this study revealed*E. coli* as thedominant(33.3%), followed closely by *Klebsiella spp.* (25%), *and Serratia* sp. was the least. The results of the studyrevealed a high prevalence of *E. coli* and *Klebsiella* both of which collectively accounted for 58.6% of all the isolates. *Escherichia coli* was the most prevalent etiologic agent of urinary tract infection among pregnant women studied. The higher prevalence of *E. coli* in this study aligned with the popular believe that *Escherichia coli* is responsible for 80-90% of urinary tract infections [8]. This research is in disagreement agreement with a previous study carried out in 2007 at the University of Ilorin Teaching Hospital (UITH) which reported lower incidence of *Escherichia coli* (4%) [11].

Bacterial uropathogen isolated from patients with UTIs revealed the presence of high levels of single and multiple antimicrobial resistances against commonly prescribed drugs.Amin ET AL. [16] similarly reported high incidence of multidrug resistance among uropathogens Gram-negative isolates showed higher resistance pattern in comparison to Gram-positive for most of commonly prescribed antibiotics.

Conclusion

Theincidence of asymptomatic urinary tract infection in pregnant women in Obio cottage hospital, Port Harcourt, Rivers State was 19%.The age of pregnant woman might not be such a big risk factor for urinary tract infection in the study area. Thepredominant *Enterobacteriaceae* uropathogens in the study area are *Escherichia coli*and *Klebsiella* sp.and *Pseudomonas* sp.Overall, there were high multiple antibiotic resistance among all the isolates. The high incidence of UTI among asymptomatic pregnant women calls for screening for the infection at each ante-natal clinic visit and commencement of treatment with suitable antibiotics.

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