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### URINARY TRACT INFECTIONS AMONGST PREGNANT WOMEN ATTENDING A MEDICAL CENTRE IN KADUNA, NIGERIA

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#### ABSTRACT

Urinary tract infection (UTI) constitutes a major health problem in pregnant women due to their relatively short urethra, which promotes the ascending of the pathogens to the bladder, urethra and the kidneys. It is also more common in pregnant women due to the anatomical and physiological changes that occur during pregnancy.

**Aim:** To determine the incidence of Urinary Tract Infections and the antimicrobial susceptibility of the microbial isolates from the urine samples of pregnant women prior to treatment.

**Methods:** Fifty (50) mid stream urine (MSU) samples were collected and analyzed using standard Microbiological Techniques, and the antimicrobial sensitivity tests determined using Kirby Bauer disc diffusion techniques.

**Results:** Of the 50 urine samples obtained from pregnant women, 3 different microbes were isolated indicating 28%. *Staphylococcus aureus* 18%, *Escherichia coli* 8%, *Candida albicans* 4%; and a 2% co-infection of *Candida albicans* and *Staphylococcus aureus*.

*Staphylococcus aureus* and *Escherichia coli* were highly sensitive to Ciprofloxacin, Ofloxacin (Cilox), Paflacin and Cephalosporine.

**Conclusion:** Undetected and untreated urinary tract infection in pregnancy leads to discomfort associated with abdominal pains, itching, vaginal discharge and dysuria which may lead to more serious medical complications.

**Keywords:** Microbial isolates; pregnant women; anti-microbial susceptibility; microbiological techniques; Disc diffusion.

### INFECTIONS DE VOIES URINAIRES PARMIS LES FEMMES ENCEINTES EN CONSULTATION AU CENTRE MEDICAL DE KADUNA, NIGERIA

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#### RÉSUMÉ

L'infection de voies urinaires (ITU) constitue un problème majeur de santé chez les femmes enceintes due à leur court urètre, ce qui favorise l'ascendance des agents pathogènes dans la vessie, l'urètre et les reins. Il est également plus fréquent chez les femmes enceintes en raison des modifications anatomiques et physiologiques qui surviennent pendant la grossesse.

**But :** déterminer l'incidence des infections de voies urinaires et la sensibilité antimicrobienne des souches microbiennes isolées des échantillons d'urine chez les femmes enceintes avant les traitements.

**Matériel et méthodes :** Cinquante (50) échantillons d'urine du milieu de jet ont été collectés et analysés selon les techniques microbiologiques standards et les tests de sensibilité aux antibiotiques selon les techniques de diffusion de disque de Kirby Bauer.

**Résultats :** sur 50 échantillons d'urine obtenus chez les femmes enceintes, 3 agents microbiens différents ont été isolés représentant 28%. *Staphylococcus aureus* 18%, *Escherichia coli* 8%, *Candida albicans* 4%, et 2% de co-infection de *Candida albicans* et *Staphylococcus aureus*. *Staphylococcus aureus* et *Escherichia coli* sont très sensibles à la ciprofloxacine, à l'ofloxacine (Cilox), au Paflacine et à la céphalosporine.

**Conclusion :** L'infection de voies urinaires non détectée et non traitée pendant la grossesse entraîne de l'inconfort associée à des douleurs abdominales, des démangeaisons, un écoulement vaginal et une dysurie qui peuvent conduire à des complications médicales graves.

**Mots-clés:** isolats microbiens; les femmes enceintes; sensibilité aux agents antimicrobiens; techniques microbiologiques; Diffusion du disque.

## INTRODUCTION

Urinary tract infection (UTI) is a common bacterial infection during pregnancy and a significant cause of perinatal and maternal morbidity and mortality (1). It may be symptomatic, in form of urethritis, cystitis, pyelonephritis; or it may remain asymptomatic (2).

Urinary Tract Infection is more common in women than in men due to their short urethra, promoting ascending infection to the bladder (cystitis) and occasionally the kidney (2).

When it affects the lower urinary tracts, it is known as cystitis and when it affects the upper urinary tracts, it is known as pyelonephritis. Acute cystitis refers to infection of the bladder (lower urinary tract); it can occur alone or in conjunction with pyelonephritis (infection of the kidney-the upper urinary tract) (3). There has been an increasing resistance by the bacterial agents to the commonly available antibiotics (1,2)

The prevalence of UTI is increased by several risk factors. Poor socio-economic status is reported to be a major risk factor with indigent patients having a five-fold increased risk (4). Other risk factors include age, high parity, poor perinatal hygiene, history of recurrent UTI, diabetes mellitus, neurogenic bladder retention and anatomic bladder retention, anatomic or functional urinary tract abnormality and increased frequency of sexual activity (1, 5 ,6).

More than 90% of urinary tract infections are caused by bacteria species that are part of the normal body flora; and consequently can readily contaminate the genital area and invade the urinary tract(7)

*Staphylococcus aureus* has been reported to colonize the vagina in 4%-22% of pregnant women (8). *Escherichia coli* is responsible for between 72% and 55% of cystitis cases in younger women, and more than 50% in women over 50 years (9).

Of 500 asymptomatic pregnant women screened, 433 clinical specimens showed significant bacteriuria, representing an incidence of 86.6% (10). Of this number, 38 (7.4%) were mixed bacteria colonies, while 395(91%) were of single bacteria colonies. *Staphylococcus aureus* (29.8%), *Escherichia coli* (29.1%) and *Klebsiella pneumoniae*(21.5%) were most frequently isolated pathogens. On the average, the pathogens were sensitive to Ciprofloxacin(99.7%),

Ceftazidime(81.6%), Cotrimoxazole(79.4%), Augmentin(71.4%), Nalidixic Acid (61.7%), Nitrofuradantoin (61%), Gentamicin(56.9%) and Ampicillin(25.4%) (10).

The positive culture rate seen in previous studies carried out in Nigeria are: 46.5% in Ebonyi, Eastern Nigeria; 35.5% in Ilorin (North Central Nigeria); 31.6% in Kano (Northern Nigeria); 32.7% in Benin (Southern Nigeria)(1,12,13).

There have been reported cases of resistance to antibiotics by the UTI-causing organisms (1,11,14).

Following frequent use of broad spectrum antibiotics, the prevalence of these resistant bacteria is mainly due to widespread use of antibiotics in people and animal feeds (1,11, 15).

The aim of this retrospective study is to determine the incidence of Urinary Tract Infections and the antimicrobial susceptibility of the microbial isolates from the urine samples of pregnant women attending Shehu Muhammed Kangiwa Clinic of the Kaduna Polytechnic, prior to treatment.

## MATERIALS AND METHODS

### COLLECTION OF URINE SAMPLES

Fifty (50) sterile universal containers were distributed to pregnant women registered with the ante natal clinic of the Shehu Muhammed Kangiwa medical centre, Kaduna Polytechnic. The study period was March to May 2012.

They were advised on how to collect clean-catch mid stream urine sample which includes the cleansing of the urethral opening with sufficient amount of clean water, dry the area, and collect the urine with the labia held apart (16). The first portion of the urine voided and about 10-15 ML of the mid stream urine samples was collected into the sterile universal bottles containing 0.15g of Boric acid crystals (1% w/v) (16). The bottles were labeled correctly and distributed to the patients. The staff within the antenatal clinic helped to supervise these patients; and the specimens were brought to the laboratory for analysis. Using standard microbiological techniques, microscopy, culture and sensitivity tests were carried out on the urine samples (16).

## MICROSCOPY

5-10ML of The urine samples were centrifuged at 2500 Rpm to obtain deposit. The supernatant were discarded into a disinfectant jar. The bolt (base) of the test tube was tapped with finger to agitate the deposit. A drop of the deposit was placed onto a clean microscope slide after being cultured, covered with cover slip and examined microscopically for presence of pus cells, epithelial cells, casts, and RBC.

Candida yeasts are seen microscopically as small, oval with their characteristic budding. On Sabouraud agar, Candida albican appears as cream colored pasty colonies after 24 hours incubation at 37°C. (7).

## CULTURE

A well mixed urine sample was inoculated on CLED and MacConkey agar plates using aseptic procedures. Standard wire loop was used in streaking the specimen on the solidified, dried culture media in order to obtain discrete microbial colonies. It was incubated at 37°C overnight and the plates read after 24 hours.

The presence of 10<sup>5</sup> single bacterial colony counts per ML of urine and a microscopy of 3-5 pus cells per high field were used as baseline for determining significant bacteriuria.

Suspected pathogens were identified using morphological features of the colonies and standard biochemical and sugar utilization tests (16).

Following isolation and identification, the microbial isolates were subjected to antibiotic sensitivity testing using the disc diffusion techniques. The measurement of zone of inhibition taken in accordance with the chart used in Kirby- Bauer method (16).

Information on socio-demographic factors were obtained from patients. these includes age, parity, religion, gestational age, marital status and socio-economic status as determined by (17).

All information about a client was entered into a standard register specially designed for this study and are treated with utmost confidentiality

## RESULTS

Of the 50 samples analyzed, there was a monomicrobial growth in 13, representing 26% of the samples. Polymicrobial growth in 1 patient represented 2%; and no microbial isolate in 36, representing 72% (TABLE 1).

9 (18%) patients were infected with *Staphylococcus aureus*; 4 (8%) patients were infected with *Escherichia coli*; and 1 (2%) patient was co-infected with *Staphylococcus aureus* and *Candida albicans*, (TABLE 2).

**TABLE 1: INCIDENCE OF MONOMICROBIAL /POLYMICROBIAL GROWTH**

NUMBER OF ORGANISM	NUMBER OF CASES	PERCENTAGE
No growth	36	72
One	13	26
Two	1	2
TOTAL	50	100

**TABLE 2: NUMBER OF ORGANISMS**

ORGANISM	NUMBER	PERCENTAGE
<i>Staphylococcus aureus</i>	9	18
<i>Escherichia Coli</i>	4	8
<i>Candida albican</i>	1	2
TOTAL	14	28

Majority of the patients were between 25 and 35 years. Higher infection rates were associated with this age group and 40 years and above, although the association was not statistically significant (TABLE 3).

**TABLE 3: MICROBIAL ANALYSIS ACCORDING TO AGE GROUP OF URINE SAMPLES OBTAINED FROM 50 PREGNANT WOMEN**

AGE GROUP	NUMBER OF SAMPLES SCREENED	NUMBER OF INFECTED SAMPLES	NUMBER OF UN-INFECTED SAMPLES	PERCENTAGE OF INFECTED SAMPLES
15-19	1	-	1	-
20-24	7	2	5	14.29
25-29	15	4	11	28.57
30-34	13	3	10	21.43
35-39	7	1	6	7.14
40 and above	7	4	3	28.57
TOTAL	50	14	36	100

On the average, the pathogens were highly sensitive to quinolones (Ciprofloxacin (99.8%), Cilox (98.7%),

**TABLE 4: ORGANISMS WITH ANTIBIOTIC SENSITIVITY (%)**

Antibiotic	Staphylococcus aureus	Escherichia coli	% sensitive
Amoxicillin	10	80	45
Ceftazidime	97	98	97.5
Ofloxacin(Cilox )	100	97	98.7
Peflacin	99.2	98.0	98.6
Ciprofloxacin	100	97.6	98.8
Erythromycin	45.1	40	42.6
Genticin	75	60	67.5
Septrin	35	15	25
Tetracycline	30	10	20
Penicillin	26	-	26

## DISCUSSION

The positive culture rate seen in previous studies carried out in Nigeria are: 46.5% in Ebonyi, Eastern Nigeria, 35.5% in Ilorin (North Central Nigeria), 31.6% in Kano (Northern Nigeria), and 32.7% in Benin(Southern Nigeria)(1,12,13). Non pregnant women have lower positive culture rates (10).

The usefulness of Quinolones for the treatment of UTI found in this study is similar to other studies elsewhere (18),(19). Quinolones are however associated with teratogenicity in the first trimester of pregnancy; and are secreted in the breast milk. They

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pefloxacin (98.6%)), and Cephalosporin (ceftazidime) (97.5%) (TABLE 4).

are therefore not recommended for the treatment of UTI in pregnancy.

Cephalosporines, though expensive, are known to be safe in pregnancy.

## RECOMMENDATIONS

The above results indicated that the microbes found to be responsible for the urinary tract infection in pregnant women studied are: *Staphylococcus aureus*, *Escherichia coli* and *Candida albican*. It is therefore recommended that UTI in pregnancy be treated with a cephalosporin; and with antifungal agent where *Candida* is found.

Couples should be educated on ways of preventing urinary tract infections. It is highly recommended that pregnant women be properly treated to avert the negative effects of urinary tract infections on both the mother and the foetus.

Government should further encourage the funding for the diagnosis and treatment of urinary tract infections in pregnancy in the healthcare service plans.

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