

## Antibiotic Sensitivity Patterns of Microbial Isolates from the Urine of Pregnant Women with Urinary Tract Infections.

Oliver C. Ezechi, Olusola B. Fasubaa and Francis O. Dare.

Department of Obstetrics and Gynaecology, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Nigeria.

### Abstract

**Context:** Urinary tract infections are the most common bacterial infections during pregnancy. Though the causative organisms have remained essentially the same over time, they have become increasingly resistant to the usual antibiotics.

**Objective:** To determine the current microbial isolates and their pattern of antibiotic sensitivity in pregnant women with urinary tract infection.

**Patients and Methods:** This was a descriptive study done in the Obstetric Unit of the Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria. Midstream urine specimens of all pregnant women with features of urinary tract infection were collected and subjected to microscopy, culture and sensitivity before commencement of antibiotic therapy.

**Results:** The incidence of urinary tract infection in pregnancy was 6.2%. The commonest organisms isolated were *Escherichia coli* (42.2%), *Staphylococcus aureus* (21.9%), *Klebsiella* spp (12.8%), unspecified coliform organisms (11.7%) and *Streptococcus faecalis* (4.2%). Nitrofurantoin (83.7%), gentamicin (61.2%) and pefloxacin (54.2%) were the only antibiotics to which at least 50% of the organisms isolated were sensitive.

**Conclusion:** Gram-negative organisms remain the leading group of organisms infecting the urinary tract of pregnant women at Ile-Ife, Nigeria and they are generally sensitive to nitrofurantoin, gentamicin and pefloxacin.

**Key Words:** Urinary Tract Infection, Pregnancy, Antibiotic Sensitivity [Trop J Obstet Gynaecol, 2003, 20: 113-115]

### Introduction

Urinary tract infection (UTI) is a common infection in pregnancy, not only in our environment but worldwide<sup>1,2</sup>. An incidence range of 2 to 8% has been reported<sup>1,3,4</sup>, which is not surprising because pregnant women are at an increased risk of having UTIs as a result of the anatomical and physiological changes of pregnancy<sup>2</sup>. In our environment, low socio-economic class, poor perineal hygiene and high parity are contributory factors<sup>1,3,5,6</sup>.

Several complications may follow UTI, both to the mother and the fetus<sup>2,6</sup>. These include abortions, preterm births, intrauterine growth restriction, stillbirths, maternal anaemia, maternal hypertension, abruptio placentae, chronic pyelonephritis and renal failure<sup>6,7</sup>.

The organisms that cause UTIs during pregnancy are usually the same as those found in non-pregnant patients<sup>2</sup>. *Escherichia coli* accounts for 80 to 90% of infections<sup>1,2</sup>. Other gram-negative rods such as *Proteus mirabilis* and *Klebsiella* species are also commonly isolated from the urine of patients with UTI<sup>1,2,3,8</sup>. The gram-positive organisms such as

streptococci and staphylococci are less frequent causes of UTI<sup>2</sup>.

In view of the changing trends in the sensitivity pattern of microorganisms affecting man due to the emergence of drug-resistant strains, the availability of broad-spectrum antibiotics and the need to commence treatment before culture results are available, it becomes necessary to re-evaluate from time to time the antibiotic-sensitivity patterns of micro-organisms in our environment. This study was done to determine the current microbial isolates and antibiotic sensitivity pattern in pregnant women with urinary tract infection in our centre.

### Subjects and Methods

This study was conducted at the obstetric units of the two tertiary hospital of Obafemi Awolowo University Teaching Hospitals Complex (OAUTHC), Ile-Ife, Osun State, Nigeria over a period of three and a half years (1st July 1996 to 31st December 1999).

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**Correspondence:** Dr Oliver C. Ezechi, P.O. Box 488, Surulere, Lagos, Nigeria. E-mail: [oezechi@yahoo.co.uk](mailto:oezechi@yahoo.co.uk)

The mid stream urine samples of all women seen with clinical features of UTI were collected before the commencement of antibiotic therapy. The urine specimens were sent to the central laboratory in each hospital unit of the Complex and subjected to microscopy, culture and sensitivity. Only laboratory proven cases were included in the analysis.

The data from the laboratory results were fed into an IBM compatible personal computer and analysed using the SPSS for Windows, version 7.5, statistical package.

## Results

A total of three hundred and thirty seven laboratory confirmed cases of UTI were seen, out of five thousand four hundred and twenty six obstetric patients seen in the hospital during the period; an incidence of 6.2%. Three hundred and fifty eight microbes were isolate from these urine specimen. More than one organisms were isolated in twenty one urine specimens.

The organisms isolated in these urine specimens are shown in Table 1. *Eshcherichia coli* was isolated in 42.2% of the urine specimens. Other gram-negative rods such as *Klebsiella* (12.8%), *Proteus* (4.2%) and *Pseudomonas* (3.9%) were also isolated. The Gram-

positive organisms isolated were *Staphylococcus aureus* (21.9%) and *Streptococcus faecalis* (4.2%).

Nitrofurantoin was effective against 83.7% of all the organisms isolated. Except for *Staphylococcus aureus* and some unspecified coliform organisms, it was also effective against more than 85% of the other organisms isolated. Only two other antibiotics, gentamicin and pefloxacin, were effective against more than an aggregate of 50% of the organisms they were tested against.

The organisms isolated were, on the average, poorly sensitive to the commonly available antibiotics like ampicillin, cloxacillin, nalidixic acid, erythromycin and cefuroxime. On further analysis, some of the organisms individually were very sensitive to the commonly available antibiotics (Table 1).

## Discussion

This study, like previous studies<sup>1,2,3</sup>, has shown that urinary tract infection is a common complication of pregnancy, occurring in 6.2% of all deliveries in our centre. With the high prevalence of predisposing factors such as poor socio-economic class, poor perineal hygiene and high parity, this frequency seems low when compared with the 8% reported from some developed countries<sup>2,4</sup>.

**Table 1**

**Microbial Isolates and their Antibiotic Sensitivity Patterns**

Microbial Isolates	<i>Escherichia coli</i>	<i>Staphylococcus aureus</i>	<i>Klebsiella</i>	<i>Proteus</i>	<i>Pseudomonas</i>	Unspecified Coliforms	<i>Streptococcus faecalis</i>	Total
N (%)	151 (42.3)	75 (21.9)	46 (12.8)	15 (4.3)	14 (3.9)	42 (11.7)	15 (4.2)	358 (100.0)
<b>Antibiotic Sensitivity*</b>								
<i>Nitrofurantoin</i>	142 (94.0)	44 (58.7)	44 (94.7)	15 (100.0)	12 (85.7)	25 (59.5)	15 (100.0)	297 (83.0)
<i>Ampicillin</i>	59 (39.1)	20 (26.7)	34 (74.9)	10 (66.7)	12 (85.7)	7 (16.7)	15 (100.0)	157 (43.9)
<i>Ceftilin</i>	37 (24.5)	17 (22.7)	17 (40.0)	6 (40.0)	6 (42.9)	39 (92.9)	- (0.0)	122 (34.1)
<i>Gentamicin</i>	63 (41.7)	69 (92.0)	43 (93.5)	10 (66.7)	8 (57.1)	16 (30.1)	19 (66.7)	219 (61.2)
<i>Unasyn</i>	- (0.0)	3 (4.0)	- (0.0)	4 (26.7)	- (0.0)	3 (7.1)	- (0.0)	10 (2.8)
<i>Chloramphenicol</i>	52 (34.4)	49 (65.3)	6 (13.0)	5 (33.3)	11 (78.6)	13 (31.0)	11 (73.3)	147 (41.2)
<i>Ceftazidime</i>	23 (15.2)	19 (25.3)	42 (91.3)	- (0.0)	9 (64.3)	22 (52.4)	- (0.0)	115 (32.1)
<i>Cotrimoxazole</i>	8 (5.3)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	23 (54.8)	2 (0.0)	10 (2.8)
<i>Nalidixic Acid</i>	46 (30.5)	30 (40.0)	26 (56.5)	9 (60.0)	8 (57.1)	24 (57.1)	9 (60.0)	152 (42.5)
<i>Cloxacillin</i>	- (0.0)	34 (45.3)	32 (69.6)	- (0.0)	7 (50.0)	- (0.0)	10 (66.7)	83 (23.2)
<i>Erythromycin</i>	- (0.0)	41 (54.7)	- (0.0)	- (0.0)	- (0.0)	- (0.0)	8 (53.3)	49 (13.9)
<i>Cefuroxime</i>	24 (15.9)	49 (65.3)	26 (56.5)	3 (20.0)	4 (28.6)	26 (61.9)	12 (80.0)	144 (40.2)
<i>Azithromycin</i>	42 (27.8)	52 (69.3)	12 (26.1)	6 (40.0)	4 (28.6)	10 (23.8)	11 (73.3)	137 (38.3)
<i>Ofloxacin</i>	12 (7.9)	- (0.0)	6 (13.0)	- (0.0)	- (0.0)	- (0.0)	7 (46.7)	25 (7.0)
<i>Pefloxacin</i>	64 (42.4)	49 (65.3)	21 (45.7)	9 (60.9)	9 (64.3)	29 (69.8)	13 (86.7)	194 (54.2)

\* Proportions in parentheses

Though the reason for this low incidence is not immediately obvious, it might be related to the kind of patients using our services and the frequency in our center, being a teaching hospital, may not reflect the true incidence in the community. Moreover, our study was restricted to patients with overt clinical features of UTI.

Organisms from the anorectal flora have been implicated in several reports as being responsible for most UTIs<sup>2,3</sup>, lending credence to the theory that the rectum or lower gastrointestinal tract is the reservoir of most organisms causing UTI<sup>2,3,4</sup>. Thus, urinary tract infections are preceded by the colonisation of the introital mucosa of the vagina and accounts for the higher incidence in women with poor perineal hygiene<sup>2,3,5</sup>. The organisms isolated from our patients are similar to those found in previous studies<sup>1,2,6,8</sup>.

A major problem in the management of UTI is the emergence of drug resistant organisms<sup>2,9</sup>. Though some resistance develops *de novo* as part of the evolutionary process of adaptation, majority are due to wrong choice of antibiotics or inappropriate use of the antibiotics<sup>9,10</sup>. Various mechanisms of resistance to antibiotics have been described, but the commoner ones are the production of enzymes that inactivate the drugs, alteration of the drug receptor sites, the development of alternative metabolic pathways by the organisms or plasmid-mediated resistance<sup>10</sup>. The problems of antibiotic resistance are even more difficult to deal with in obstetric practice because of the limited choice of safe antibiotics available<sup>2</sup>.

This study identified nitrofurantoin as having the highest and widest spectrum of activity against organisms responsible for UTI. Other drugs with good spectrums are gentamicin and pefloxacin. Other drugs such as ampicillin, chloramphenicol, cefuroxime and nalidixic acid have a limited range of effectiveness.

Although drugs like chloramphenicol have a good range of effectiveness, they are not safe for use in pregnancy and are therefore not recommended. Ampicillin and cefuroxime, though very effective against *Klebsiella*, *Proteus*, *Pseudomonas* and *Streptococcus faecalis*, its alteration of the faecal and vaginal flora may lead to the development of recurrence with more virulent or resistant strains. Hence, they are no longer drugs of first choice<sup>1,3</sup>. In recent years, *Escherichia coli* has become increasingly resistant to ampicillin and resistant strains may constitute over 20% of isolates<sup>2,11,12</sup>.

With non-availability of parenteral nitrofurantoin, gentamicin and pefloxacin are the preferred options in patients with severe nausea and vomiting, or complicated UTI, while awaiting culture results. Though some of the commonly available antibiotics like cloxacillin and erythromycin rated poorly overall, they still have a place were culture results confirms sensitivity of isolates to them. The gram-negative organisms are still the leading cause of UTI in our women and nitrofurantoin has retained its effectiveness and should be the drug of first choice while waiting for culture results.

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