

TWO-YEAR REVIEW OF ANTIBIOTIC SUSCEPTIBILITY PATTERN OF BACTERIURIA IN PREGNANT WOMEN ATTENDING ANTE NATAL CLINIC IN JOS NIGERIA

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Abstract

Background: Urinary tract infections acquired during pregnancy can result in the development of symptomatic cystitis and up to 50% of women develop pyelonephritis. Asymptomatic bacteriuria is also associated with intrauterine growth retardation and delivery of low-birth-weight infants. Most published literature of Urinary tract infections in pregnancy come from developed countries and there is scanty information from developing countries. The objective of this study was to determine the antibiotic susceptibility pattern of bacteriuria in pregnant women attending the antenatal clinic of Jos University Teaching Hospital (JUTH) Plateau state, Nigeria.

Methods: A retrospective review of microscopy, culture and antibiotic susceptibility of urine specimens from pregnant women in JUTH between 1st June 2007 and 31st May 2009.

Results: The total number of urine samples submitted during the period of study was 1340, out of which 1242 had pus cells of 10 and below per high power field. Prevalence of 12.4% significant bacteriuria was obtained from a total of 166 organisms isolated from culture. The most frequently isolated organism was *Escherichia coli* 36(38.6%) from which 89.1% was susceptible to nitrofurantoin while 100% was resistant to cotrimoxazole and erythromycin. The organism least isolated from culture was *Pseudomonas* species 3(1.8%) which was sensitive to ofloxacin and gentamycin but resistant to tetracycline, erythromycin, chloramphenicol and nitrofurantoin

Conclusion: The prevalence of bacteriuria amongst pregnant women attending ANC at JUTH is high but routine urine screening at the first antenatal visit with subsequent treatment will prevent the sequelae of bacteriuria.

Key words: Bacteriuria, pregnancy, antibiotics, *Escherichia coli*

Introduction

Urinary tract infections in adults may cause painful, frequent urination with a feeling of incomplete emptying of the urinary bladder, perineal pain, fever, chills and backpain. Most elderly patients are asymptomatic, and in small children, the symptoms are nonspecific.¹

Urinary tract infections (UTIs) are common during pregnancy, and the most common causative organism is *Escherichia coli*. Asymptomatic bacteriuria can lead to the development of cystitis or pyelonephritis if left untreated. All pregnant women should be screened for bacteriuria and subsequently treated with susceptible antibiotics such as nitrofurantoin or cephalexin.²

Pyelonephritis can be a life-threatening illness, with increased risk of perinatal and neonatal

morbidity. Recurrent infections are common during pregnancy and require prophylactic treatment.^{2,3,4} Pregnant women are at increased risk for UTIs. Beginning from the 6th week of pregnancy and peaking during weeks 22 to 24, approximately 90 percent of women develop urethral dilatation, which will persist until delivery (hydronephrosis of pregnancy). This dilatation, along with increased bladder volume, decreased bladder tone, and decreased ureteral tone, contribute to increased urinary stasis and ureterovesical reflux.⁵ These factors may all contribute to the development of UTIs during pregnancy. UTIs have three principal presentations: asymptomatic bacteriuria, acute cystitis and pyelonephritis. The diagnosis and treatment of UTI depends on the presentation.

Significant bacteriuria may exist in asymptomatic patients. In the 1960s, Kass⁶ noted the subsequent increased risk of developing pyelonephritis in patients with asymptomatic bacteriuria. Significant bacteriuria is defined as finding more than 10⁵ colony-forming units per mL of urine.⁷

Asymptomatic bacteriuria is common, with a prevalence of 10 percent during pregnancy.^{6,8} Thus, routine screening for bacteriuria in pregnancy is advocated.

The American college of Obstetricians and Gynaecologists recommends that a urine culture be done at the first antenatal visit⁹ and a repeat in the third trimester.

Up to 30 percent of patients with untreated asymptomatic bacteriuria later develop symptomatic cystitis.⁶ Acute cystitis is distinguished from asymptomatic bacteriuria by the presence of symptoms such as dysuria, urgency and frequency in afebrile patients with no evidence of systemic illness. Acute pyelonephritis during pregnancy is a serious systemic illness that can result in complications like maternal sepsis, preterm labour and premature delivery. Pyelonephritis occurs in two percent of pregnant women; up to 23 percent of these women have a recurrence during the same pregnancy.¹⁰ The majority of UTIs are caused by gastrointestinal organisms and even with appropriate treatment, the patients may experience a re-infection of the urinary tract from the rectal reservoir. UTIs recur in approximately 4 to 5 percent of pregnancies, and the risk of developing pyelonephritis is the same as the risk with primary UTIs. A single, post coital dose or daily suppression with cephalixin or nitrofurantoin in patients with recurrent UTIs is effective preventive therapy.¹¹ A post partum urologic evaluation may be necessary in patients with recurrent infections since they are likely to have structural abnormalities of the renal system.^{10,12,13} Patients who are found to have urinary stones, who have more than one recurrent UTI or who have a recurrent UTI while on suppressive antibiotic therapy should undergo a post partum evaluation.^{12,13}

The maternal and neonatal complications of a UTI during pregnancy can be devastating. Thirty percent of patients with untreated asymptomatic bacteriuria develop symptomatic cystitis and up to 50 percent develop pyelonephritis.⁶ Asymptomatic bacteriuria is also associated with intrauterine growth retardation and low-birth weight infants.^{14,15}

Few reports exist on the prevalence of UTI in pregnancy as well as the antibiotic susceptibility pattern in the North central part of Nigeria. The aim of this study was to look at the urine bacteriology amongst women attending the ante natal clinic in Jos University Teaching Hospital.

Materials and Methods

This is a retrospective study conducted at the Department of Medical Microbiology and Parasitology, Jos University Teaching Hospital in North central Nigeria. All results of urine samples of pregnant women who attended ANC between 1st June 2007 and 31st May 2009 were retrieved and analysed. Details extracted included findings of urine microscopy, culture and antibiotic susceptibility. The data was analysed using EPI Info version 3:4:2 (2007).

Results

A total of 1340 urine samples from pregnant women were processed within the two year period. Out of this, 1242 had pus cells of 10 and below per high power field, from which 113(9%) had significant growth on culture plate. The remaining 98 samples had pus cells greater than 10 per high power field, from which 53(54.1%) had significant growth on culture medium. Table I. A total of 166 separate organisms were isolated from cultures of 1340 samples showing prevalence of bacteriuria of 12.4%; *Escherichia coli* was the most frequent 64(38.6%), followed by *Klebsiella pneumonia* 58(34.9%). Other organisms included; *Staphylococcus aureus* 26(15.7%); *Proteus species* 15(9%) and *Pseudomonas aeruginosa* 3(1.8%). Table II.

The antibiotic susceptibility pattern in Table III shows the following; of the 64 *Escherichia coli* isolated 89.1% was susceptible to nitrofurantoin while 100% was resistant to cotrimoxazole and erythromycin; 79.3% of the 58 *Klebsiella pneumoniae* isolated was sensitive to nitrofurantoin while 100% was resistant to erythromycin and chloramphenicol; 65.4% of the 26 *Staphylococcus aureus* isolated were sensitive to gentamycin while 96.2% was resistant to cotrimoxazole; 66.7% of the 15 *Proteus species* isolated was sensitive to ofloxacin while 100% was resistant to cotrimoxazole, erythromycin and chloramphenicol; all of the three *Pseudomonas aeruginosa* were sensitive to ofloxacin and gentamycin but resistant to cotrimoxazole, tetracycline, erythromycin, chloramphenicol and nitrofurantoin.

Table I: Relationship between number of pus cells and significant growth

	No of Pus cells/hpf(%)	No with sig growth
	≤ 10	113(9.0)
98	> 10	53(54.1)
1340		

Table II: Prevalence of Individual organisms isolated from urine samples.

Organism	Number	(%)
Escherichia coli	64	38.6
Klebsiella pneumoniae	58	34.9
Staphylococcus aureus	26	15.7
Proteus species	15	9.0
Pseudomonas	3	1.8
Total	166	100

Table III: Anti biotic susceptibility pattern of isolated organisms

Antibiotics	Organism % S(%R)				
	E.coli	Klebsiella	Proteus	S.aureus	Pseudomonas
Gentamycin	67.2(32.8)	67.2(32.8)	46.7(53.3)	65.4(34.6)	100.0(0)
Nalidixic acid	46.9(53.1)	48.3(51.7)	33.3(66.7)	11.5(88.5)	33.3(66.7)
Nitrofurantoin	89.1(10.9)	79.3(20.7)	53.3(46.7)	42.3(57.7)	0.0(100.0)
Erythromycin	0.0(100.0)	0.0(100.0)	0.0(100.0)	11.5(88.5)	0.0(100.0)
Chloramphenicol	1.7(98.4)	0.0(100.0)	0.0(100.0)	30.8(69.2)	0.0(100.0)
Ofloxacin	85.9(14.1)	77.6(22.4)	66.7(33.3)	38.8(61.2)	100.0(0.0)
Augment	57.8(42.2)	41.4(58.6)	40.0(60.0)	57.7(42.3)	66.7(33.3)
Cotrimoxazole	0.0(100.0)	3.4(96.6)	0.0(100.0)	38.8(96.2)	0.0(100.0)
Tetracycline	3.1(96.9)	8.6(91.4)	6.7(93.3)	7.7(92.3)	0.0(100.0)

Discussion

In this study, a total of 1340 urine sample results were retrieved and analysed. The prevalence of bacteriuria 12.4% as revealed by this study is higher than the prevalence 10% reported by Gratacos and co-workers.⁸ This higher prevalence may likely be due to low health education and awareness campaign and even low socio-economic status of the patients. *Escherichia coli* was the most prevalent bacterium constituting 38.6% of all the bacteria, followed by *Klebsiella pneumoniae* which accounted for 34.9%. The least isolated organism was *Pseudomonas aeruginosa* which accounted for 1.8%. These findings however, agree with the findings by Robbye and workers in Illinois, who reported *Escherichia coli* (58.3%) as the most prevalent bacterium.¹⁶ This re-echoes the fact *Escherichia coli* is still the leading cause of UTI; The most isolated uropathogen *Escherichia coli* was demonstrated to be highly susceptible to nitrofurantoin, an old antimicrobial used in the management of UTI; with sensitivity of 89.1%

compared with the 71.3% by Garau.⁴ Also, the rate of resistance to nitrofurantoin by *Escherichia coli* in the USA and Canada was 1.1% from outpatient urinary isolates, but this study revealed 10.9%.⁴ This variation can be due to rational drug use in the two study settings. The least isolated uropathogen based on the study, *Pseudomonas aeruginosa* (1.8%) was found to be highly susceptible (100%) to ofloxacin and gentamycin. The rate of resistance on the other hand, was 100% to tetracycline.

Conclusion

Urinary tract infections during pregnancy are a common cause of serious maternal and perinatal morbidity but with appropriate screening and treatment, morbidity can be limited. The findings of 12.4% prevalence of bacteriuria, 38.6% prevalence of *Escherichia coli* with 89.1% been susceptible to nitrofurantoin underscores the need for routine urine cultures, to be carried out at first antenatal visit and treatment with appropriate antibiotic therapy instituted early to prevent possible complications ensuing.

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