ASYMPTOMATIC BACTERIURIA IN PREGNANT WOMEN ATTENDING ANTENATAL CLINIC IN A TERTIARY HOSPITAL IN ABUJA, NIGERIA

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ABSTRACT:

Context: Asymptomatic bacteriuria (ASB) predisposes to cystitis and pyelonephritis. In pregnancy it is associated with maternal morbidity and adverse perinatal outcomes. A wide range of prevalence has been reported in the literature. Efforts to improve maternal and perinatal outcomes have led to the recommendation of routine antenatal screening and treatment of clients with ASB.

Objective: To determine the prevalence of ASB, the microbial isolates and antibiotic sensitivity among antenatal clients in the National Hospital Abuja.

Patients and Methods: It was a cross sectional study of pregnant women presenting for the first antenatal clinic visit at the National Hospital Abuja. One hundred and forty six pregnant women who met the inclusion criteria and gave consent were interviewed, relevant demographic and clinical characteristics were obtained and clean catch, mid stream urine samples were collected and processed using standard bacteriological methods.

Results: Significant bacteriuria (colony-forming unit $\geq 10^5$/ml) was found in 67 (45.9%) of the 146 pregnant women tested. There was no significant difference in prevalence of ASB with respect to age (p=0.245), parity (p=0.607), occupation (p=0.172) and pregnancy trimesters (p=0.459). Staphylococcus aureus was the most common causative organism found in 24(35.8%) cases followed by Escherichia coli in 19 (28.36%) and Klebsiella species in 14 (20.9%) cases. The susceptibility rate of bacterial isolate was highest for levofloxacin (83.6%), followed by nalidixic acid (64.2%) and nitrofurantoin (62.7%). The pathogens were least susceptible to co-trimoxazole (8.3%), ampilcillin (8.8%) and amoxicillin (10.4%)

Conclusion: The prevalence of asymptomatic bacteria among the pregnant women was high. The isolated organisms were resistant to many antibiotics commonly used in the management of urinary tract infection. The practice of routine urine culture for antenatal screening for asymptomatic bacteriuria will be beneficial in our setting.

Keywords: Asymptomatic bacteriuria, antibiotic sensitivity, microbial isolates, pregnant women, urinary tract infection

INTRODUCTION

Asymptomatic bacteriuria (ASB) refers to the presence of actively multiplying bacteria, greater than 10^5 colony-forming units per milliliter (cfu/ml) of urine in the absence of symptoms of urinary tract infection.[1] If untreated, ASB can progress to

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symptomatic urinary tract infections (UTI) including cystitis and pyelonephritis. In pregnancy, due to endocrine, physiological and morphological changes, progression is enhanced leading to acute pyelonephritis in 20 – 50% of cases and adverse obstetric outcomes including preterm birth, intrauterine growth restriction, low birth weight, anaemia, hypertensive disease and perinatal mortality.[2] Routine screening and treatment of bacteriuria in pregnancy has been associated with improved maternal and perinatal outcomes.[3]

It is estimated that screening and treatment of bacteriuria in pregnancy has the potential to reduce the incidence of prematurity and low birth weight by 20 - 55% and reduce neonatal mortality due to prematurity by 15 - 40%.[4] A recent cost effectiveness analysis indicates that screening and treatment of ASB is one of the most practical and cost efficient means by which maternal and neonatal health in developing countries can be improved.[5] Screening for ASB is now part of the WHO recommended antenatal care (ANC) package in pregnancy. It is the standard practice in many developed countries.[6-10]

However, routine screening for ASB has not been introduced in Nigeria. However reports indicate that the prevalence of ASB and antimicrobial sensitivity varies across the country.[3] The objective of this study was to document the prevalence of ASB, main causative micro-organisms and the antimicrobial susceptibilities among pregnant women at the main tertiary health facility in Abuja.

PATIENTS AND METHOD

This was a cross sectional study conducted in the antenatal clinic of the department of Obstetrics and Gynaecology, National Hospital, Abuja. Approval for the study was obtained from the institution's Ethical Committee. Clients attending the antenatal clinic for the first time in the index pregnancy (booking clinic) during the study period and who met the inclusion criteria were recruited consecutively.

At the booking visit, all eligible women were counseled on the purpose of the study and informed consent obtained from those who accepted to participate. The women were interviewed with the use of a semi structured questionnaire which was filled by or for those that consented to participate. The information obtained from the subjects include name, age, parity, gestational age, occupation, presence or absence of symptoms of fever, dysuria, loin pains and urinary frequency and history of previous treatment with antibiotics in the preceding 2 weeks. The subjects were instructed on how to collect a clean-catch specimen of urine into universal sterile bottles given to them.

The collected urine specimens were promptly transported to the laboratory for standard microbiology assessment including microscopy, culture and antibiotic sensitivity testing. Laboratory procedures were as described in previous reports. [11-13] Bacteriuria was considered significant when at least 10^5 colony-forming units of a single pathogen per milliliter (10^5CFU/ml) of urine was demonstrated. Women with positive culture were offered a seven day course of antibiotic treatment based on the antimicrobial sensitivity pattern of the bacteria which are isolated from their samples

The data were entered using SPSS version 14.0 (SPSS, Chicago, Illinois, USAI software, and analyzed using STATA (release 12; Stata Corporation). Descriptive statistics were presented. Likelihood ratio Chi-square test was used to assess difference between proportions. P-value of <0.05 was considered as statistically significant.

RESULTS

Based on the estimated sample size, one hundred and forty six pregnant women who met the inclusion criteria were recruited and screened for asymptomatic bacteriuria. The demographic characteristics and gestational age of the pregnant women in relation to bacteriuria is shown in Table 1. Sixty seven (45.9%) women had significant growth of bacteria. There was no significant difference in prevalence of ASB with respect to age (p=0.245), parity (p=0.607), occupation (p=0.172) and pregnancy trimesters (p=0.459).

The organisms isolated are shown in Table 2. Staphylococcus aureus was grown in 24 out of the 67 (35.8%) cultures; this was followed by Escherichia coli, cultured from 19 samples (28. 4%) and klebsiella spp which were grown in 14 samples (20.9%).

The sensitivity patterns of the organisms cultured are shown in Table 3. Drugs with good sensitivity include Levofloxacin (83.6%), Nalidixic acid (64.2%), Nitrofurantoin (62.7%) and Ofloxacin (51.5%) while those with least sensitivity were co-trimoxazole (8.3%), ampilcillin (8.8%) and amoxicillin (10.4%)

DISCUSSION

This study was based on urine culture which is currently the standard for detection of asymptomatic bacteriuria. The prevalence of asymptomatic bacteriuria among pregnant women in this study was 45.9%. This was much higher than the values reported by Omole-Ohonsi et al in Kano (8%),[14] Oyetunji et al in Sokoto (8%),[15] Mandara et al in Zaira(4.8%),[16] Nnatu in Lagos (4.0%),[17] Obirikorang et al in Ghana (9.5%),[18] Tadesse et al in Ethiopia (18.8%),[11] Enayat et al in Iran (8.9%)[19] and Sujatha & Nawani in India (7.3%).[20] The prevalence from this study is however, similar to that obtained in Ilorin by Ajayi et al (40%),[21] Imade et al in Benin (45.3%)[22] and Ilusanya et al in Ado Ekiti (52%).[23] It is lower than the 78.7% in Abakaliki, Nigeria by Amadi et al,[24] and 86.6% reported in Benin city, Nigeria by Akerele et al.[25] The variations in ASB prevalence within and among countries have been attributed to differences in risk factors in the various geographical areas including social habits if the community, socio-economic statuses, the standards of personal hygiene, level of education of the patients studied and bacterial ecology.[3,11]

The patients studied were mainly between 26 and 35years of age, this being the peak reproductive period in the population studied. Significant bacteriuria was most common among the age group of 31-35 years, although this did not reach statistical significance. This finding is at variance with report from other studies which indicate that the prevalence of asymptomatic bacteriuria increases with age.[14,15,26,27]. Reported predisposing factors for ASB including increased sexual activity, especially with multiple sexual partners, previous contraceptive use and high parity could be possible explanation for the higher prevalence of asymptomatic bacteriuria among this age group.[27]

In this study the prevalence of ASB was highest among women who booked in the second and third trimesters, although this did not reach statistical significance. This finding is similar to reports from other studies that indicate ASB is found more often in women in their second and third trimesters.[14,15,18,21,26-29] The increase of asymptomatic bacteriuria with advancing gestational age is attributed to increasing mechanical effect of the growing fetus and hormonal changes including progesterone effect which causes urinary tract muscular relaxation and stasis thus encouraging ascension of bacteria into the urinary bladder predisposing to urinary tract infections.

Recently gram positive organisms received increasing attention as cause of bacteriuria and urinary tract infection.[19] Staphylococcus aureus was the most commom bacteria isolated in 35.8% of samples in this study. This is in contrast to most other studies that reported Escherichia coli as the commonest cause of asymptomatic bacteriuria. This high prevalence of staphylococcus aureus in this study has been corroborated by other researchers in Nigeria and in some developing countries. Staphylococcus aureus was the predominant organism causing asymptomatic bacteriuria in reports by Ajayi et al,[21] Imade et al,[22] Ilusanya et al,[23] Akinloye et al,[30] Olusanya,[31] Aboderin et al, [32] Turpin et al[33] and Hamdan et al.[33] While contamination at the time of urinary collection have been adduced as partly responsible for presence of staphylococcus aureus in urine, its presence in significant proportion in these studies in spite of taking every necessary measures at collection is an indication of possible changing trend in microbial invasion of the genitourinary tract. There is the need for more studies to determine the obstetric implication of this trend as staphylococcus aureus is a leading cause of both puerperal sepsis and early onset neonatal sepsis.[35]

Most of the isolated organisms in this study demonstrated a high level of resistance to ampicillin, amoxicillin, amoxicillin-clavulanic acid and erythromycin – antibiotics commonly used in the treatment of urinary tract infections in pregnancy. The quinolones -levofloxacin and nitrofurantoin were effective against most of the isolated organisms but their safety in pregnancy are issues of concern.

Levofloxacin has an effect on bone development and contraindicated in pregnancy. Nitrofurantoin is relatively safe in pregnancy but may cause haemolysis with anaemia in the fetus of patients with glucose 6- phosphate dehydrogenase deficiency if used close to term[16,21] This changing pattern in antimicrobial sensitivity and resistance have been noted in previous studies and can be attributed to indiscriminate use and abuse of antibiotics.

CONCLUSION

The prevalence of asymptomatic bacteriuria among pregnant women in this study is high. There is large scale antimicrobial resistance affecting most of the antibiotics commonly used in the treatment of urinary tract infection. Efforts to improve maternal health and prevent maternal and perinatal morbidity and mortality in our setting should include routine screening of pregnant women for ASB and prompt effective management of identified cases.

Table 1: Demographic Characteristics and Asymptomatic Bacteriuria

Characteristic	Asymptomatic Bacteriuria		p-value
	Negative Number (%)	**Positive (%) Number (%)**	
Age(Years)			
=15	1(1.3)	0(0)	0.245*
16-20	1(1.3)	1(1.5)	
21-25	6(7.5)	3(4.5)	
26-30	31(39.2)	23(34.3)	
31-35	31(39.2)	30(44.8)	
36-40	6(7.5)	10(15.0)	
41-45	3(3.8)	0 (0)	
Total	**79(100)**	**67(100)**	
Parity			
0	24(30)	15(22.4)	0.607*
1	24(30)	18(26.8)	
2	20(25.2)	19(28.3)	
3	5(6.3)	6(9)	
4	2(2.5)	6(9)	
5	2(2.5)	1(1.5)	
Unknown	2(2.5)	2(3)	
Total	**79(100)**	**67(100)**	
Occupation			
House wife	8(10.2)	19(28.4)	0.172*
Civil servant	19(24)	12(17.9)	
Student	6(7.6)	5(7.5)	
Business women	25(31.6)	15(22.4)	
Teachers	5(6.3)	6(9)	
Bankers	6(7.6)	2(3)	
Unemployed	3(3.8)	2(3)	
Others	7(8.9)	6(9)	
Total	79(100)	67(100)	

Gestational Age (weeks)			
5-13 (1st Trimester)	19(24.1)	11(16.4%)	0.459*
14-27 (2nd Trimester)	40(50.6)	41(61.2%)	
28-40 (3rd Trimester)	18(22.8)	12(18%)	
Unknown	2(2.5)	3(4.5%)	
Total	**79(100)**	**67(45.9%)**	

*Likelihood ratio chi-square p-value

Table 2. Bacterial Isolates Cultured From The Urine Of Pregnant Women With Asymptomatic Bacteriuria

ISOLATE	NUMBER(%)
Staphylococcus Aureus	24(35.8%)
Escherichia Coli	19(28.4%)
Klebsiella Species	14(20.9%)
Proteus Species	4(6%)
Pseudomonas aeruginosa	3(4.5%)
Streptococcus Species	3(4.5%)
Total	**67(100%)**

Table 3. Sensitivity Patterns Of Organisms Cultured From Urine Of Women With Asymptomatic Bacteriuria

DRUGS	ORGANISMS AND ANTIBACTERIAL SENSITIVITY PATTERNS													
	E. Coli		Klebsiella spp		Staph aureus		Proteus Spp		Pseudom spp		Streptococcus Spp		Percentage	
	S	R	S	R	S	R	S	R	S	R	S	R	S	R
Levofloxacin	16	3	9	5	22	2	3	1	3	Nil	3	Nil	83.6	16.4
Ofloxacin	12	7	10	4	7	17	1	3	2	1	2	1	51.5	48.5
Ceftriaxone	8	11	2	12	3	21	2	2	1	2	1	2	25.4	74.6
Cefuroxime	5	14	2	12	4	20	2	2	1	2	1	2	22.4	77.6
Nitrofurantoin	11	8	8	6	18	6	2	2	2	1	1	2	62.7	37.3
Nalidixic Acid	7	12	10	4	3	21	1	3	2	1	Nil	3	64.2	35.8
Penicillin	-	-	-	-	-	-	1	3	-	-	1	2	28.6	71.4
Ampicillin	Nil	19	Nil	14	1	23	1	3	Nil	3	1	2	8.8	91.2
Amoxicillin	Nil	19	Nil	14	5	19	1	3	Nil	3	1	2	10.4	89.6
Amoxicillin-Clavulanic Acid	4	15	Nil	14	10	14	2	2	Nil	3	2	1	26.9	73.1
Gentamycin	5	14	5	9	10	14	1	3	1	2	2	1	35.8	64.2
Tetracycline	5	14	2	12	9	15	1	3	Nil	3	2	1	28.4	71.6
Erythromycin	7	12	3	11	9	15	Nil	4	1	2	2	1	32.8	67.2
Streptomycin	Nil		Nil		Nil		1	3	Nil		1	2	28.6	71.4
Co-trimoxazole	**1**	**18**	**3**	**11**	**1**	**23**	**Nil**		**Nil**		**Nil**	**3**	**8.3**	**91.7**
Chloramphenicol	Nil		1	13	Nil		1	3	Nil		Nil	3	11.1	88.9
Cloxacillin	Nil			Nil			Nil		Nil		1	2	33.3	66.7

S, Sensitivity; R, Resistance, E, Escherichia; Spp, Species

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