

# Asymptomatic bacteriuria among pregnant women

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## Abstract

**Background:** Asymptomatic bacteriuria is the significant presence of bacteria in the urine of an individual without symptoms. In pregnancy, the apparent reduction in immunity of pregnant women tends to encourage the growth of pathogens. **Aim:** This study was carried out to determine the prevalence of asymptomatic bacteriuria in pregnant women attending a primary health centre in Benin City, Nigeria. **Materials and Methods:** A total of 1,228 pregnant women were recruited for this study. All subjects were clinically identified to have no signs and symptoms of UTI. Clean catch midstream urine sample was collected from each patient into sterile universal container. The urine samples were examined microscopically and by cultural method. Identification of isolates was by standard microbiological technique. **Result:** A total of 556 (45.3%) were positive for significant bacteriuria. There was a significant difference in the prevalence of asymptomatic bacteriuria with respect to age ( $P < 0.0001$ ). Trimester did not show any significant difference ( $P = 0.2006$ ) in the prevalence of asymptomatic bacteriuria. *Escherichia coli* was the most predominant organism followed closely by *Staphylococcus aureus*. Ciprofloxacin, Ceftriaxone and Augmentin were found to be the most effective antibiotics against the urinary isolates. **Conclusion:** Asymptomatic bacteriuria is not uncommon among antenatal patients in the population studied. Routine urine cultural test should be carried out on all antenatal patients in order to identify any unsuspecting infection. This measure will go a long way in reducing maternal and obstetric complications associated with pregnancy.

**Keywords:** Asymptomatic bacteriuria, UTI, pregnant women, antenatal, trimester

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## Introduction

Asymptomatic bacteriuria refers to the presence of bacteria in urine. It is a condition in which urine culture reveals a significant growth of pathogens that is greater than  $10^5$  bacteria/ml, but without the patient showing symptoms of urinary tract infection (UTI) [1]. This is common during pregnancy. The apparent reduction in immunity of pregnant women appears to encourage the growth of both commensal and non-commensal microorganisms [2]. The physiological increase in plasma volume during pregnancy decrease urine concentration and up to 70% pregnant women develop glucosurea, which encourages bacterial growth in the urine [3,4].

Pregnancy enhances the progression from asymptomatic to

symptomatic bacteriuria which could lead to pyelonephritis and adverse obstetric outcomes such as prematurity, low birth weight [5] and higher foetal mortality rates [6, 7]. The adverse effects of undiagnosed asymptomatic bacteriuria on mother and child have made researchers to suggest routine culture screening for all pregnant women attending antenatal clinic [8] in order to prevent mother and child from any form of complication that may arise due to infection.

However, in many hospitals in developing countries including Nigeria, routine urine culture test is not carried out for antenatal patients probably due to cost implication and time factor for culture result (usually 48 hours period) instead many clinicians opt for the strip urinalysis method

for assessing urine in pregnant women. The true picture of such urine specimen cannot be fully assessed as the strip cannot quantify the extent of infection in such a patient as well as provide antimicrobial therapy which is usually seen in the case of culture test. In many health centers in developing countries, the attention of clinicians and health care providers is usually on the presence of glucose and protein in urine specimens with less attention on possible asymptomatic infection. Against this background, this work is aimed at determining asymptomatic bacteriuria among pregnant women attending antenatal clinic in a primary health centre in Benin City, Nigeria.

## Patients and Methods

**Study Area:** This study was carried out in Benin City, Edo State, Nigeria. Benin City is the capital of Edo State located in southern Nigeria. The state has approximately 4 million people and is bounded in the south by Delta state, in the west by Ondo state, in the north by Kogi state and in the east by Kogi and Anambra states. Benin City has an estimated population of about 1,147,188 [9].

Iwogban primary health centre is a primary health institution that attends to the primary health needs of the people within and around the locality. It attends to cases such as antenatal clinic, malaria, diarrhea, postnatal immunization of infants and other minor ailments within the scope of available equipment and manpower. All other cases are referred to either secondary or tertiary institution. It has an average number of about 150 patients per day and it is situated on the outskirts of Benin City. It is a rural setting with a fast growing population of new residents from the main city along side with the original inhabitants of the community.

**Study Population:** This study was carried out at Iwogban Primary Health Centre, Benin City, Nigeria. A total of 1,228 pregnant women attending antenatal clinic at the centre were assessed for asymptomatic bacteriuria between January 2007 and December 2008. Verbal informed consent was obtained from each patient prior to sample collection. Socio-demographic data were obtained by means of personal interviews. Exclusion criteria included signs and symptoms of UTI, and antibiotic usage within one week. Ethical approval was obtained from the State Ministry of Health.

**Specimen collection and processing:** Clean-catch midstream urine was collected from each patient into a sterile universal container. Samples were cultured on dried plates of blood agar and cysteine lactose electrolyte deficient agar (CLED), using a calibrated drop delivering 0.002ml of urine. Plates were incubated aerobically at 37°C overnight. Colony counts yielding bacterial growth of 10<sup>5</sup>/ml or more of pure isolates were regarded as significant for infection. Similarly, 10ml of each patient urine was transferred into sterile centrifuge tubes and then centrifuged at 3000rpm for 10-15 minutes. The supernatant was discarded and the deposit examined microscopically at high magnification for pus cells, red

blood cells, epithelial cells, casts, crystals, yeast-like cells and Trichomonas vaginalis. Pus cells > 5 per high power field were also considered significant for infection.

The isolated organisms from culture plates were identified by standard laboratory techniques [10]. Antimicrobial in-vitro susceptibility testing was performed using agar disc diffusion method. The National Committee for Clinical Laboratory Standard (NCCLS) operating procedure (11) was followed.

**Statistical analysis:** Statistical analysis was performed by the chi-square ( $\chi^2$ ) test. A P-value of < 0.05 was deemed statistically significant.

## Results

Out of 1,228 pregnant women examined for asymptomatic bacteriuria, 556 were positive for significant bacteriuria, giving a prevalence of 45.3%. Out of the 556 positive culture, 448 (80.6%) yielded single bacterial isolates while 108 (19.4%) yielded mixed bacterial isolates, giving a total of 664.

There was a significant difference in the prevalence of asymptomatic bacteriuria with respect to age (P<0.001) (Table 1). However, there was no significant difference with respect to trimester (P=0.2006) (Table 2). The prevalence of uropathogens showed *Escherichia coli* as the most predominant organism. This was closely followed by *Staphylococcus aureus* (Table 3). The overall antimicrobial susceptibility pattern showed Ciprofloxacin to be the most effective antibiotic. This was followed by Ceftriaxone and Augmentin (Table 4).

**Table 1** Prevalence rate with respect to age group.

Age group (years)	Number of patients	No infected	% infected
15-20	134	51	38.1
21-25	268	102	38.1
26-30	343	182	53.1
31-35	217	113	52.1
36-40	141	74	52.5
41-45	87	23	26.4
46-50	38	11	29.0
<b>Total</b>	<b>1,228</b>	<b>556</b>	<b>45.3</b>

**Table 2** Prevalence rate with respect to trimester

Trimester	Number of patients	Number (%) infected
First	602	271 (45.0)
Second	405	195 (48.1)
Third	221	90 (40.7)
<b>Total</b>	<b>1,228</b>	<b>556 (45.3)</b>

**Table 3** Prevalence of uropathogens

Organism	Number (%) prevalence
<i>Escherichia coli</i>	180 (27.1)
<i>Staphylococcus aureus</i>	162 (24.4)
<i>Klebsiella</i> species	79 (11.9)
<i>Proteus</i> species	58 (8.7)
<i>Citrobacter</i> species	41 (6.2)
<i>Providencia</i> species	37 (5.6)
<i>Pseudomonas aeruginosa</i>	29 (4.4)
<i>Candida albicans</i>	78 (11.8)
<b>Total</b>	<b>664 (100)</b>

**Table 4** Antimicrobial susceptibility pattern of bacteria isolates

Bacteria	No. tested	No. (%) susceptible to							
		AMP	CLX	ERY	F	GEN	AUG	CRO	CIP
<i>Escherichia coli</i>	180	4(2.2)	8(4.4)	8(4.4)	85(47.2)	102(56.7)	131(72.8)	142(78.9)	156(86.7)
<i>Staphylococcus aureus</i>	162	2(1.2)	5(3.1)	6(3.7)	71(43.8)	88(54.3)	112(69.1)	128(79.0)	140(86.4)
<i>Klebsiella</i> species	79	4(5.1)	9(11.4)	8(10.1)	43(54.4)	56(70.9)	64(81.0)	69(87.3)	71(89.9)
<i>Proteus</i> species	58	3(5.2)	7(12.1)	8(13.8)	35(60.3)	38(65.5)	41(70.7)	46(79.3)	49(84.5)
<i>Citrobacter</i> species	41	2(4.9)	5(12.2)	5(12.2)	22(53.7)	20(48.8)	27(65.9)	30(73.2)	35(85.4)
<i>Providencia</i> species	37	2(5.4)	4(10.8)	3(8.1)	12(32.4)	21(56.8)	25(67.6)	28(75.7)	31(83.8)
<i>Pseudomonas aeruginosa</i>	29	0(0.0)	0(0.0)	0(0.0)	11(37.9)	13(44.8)	16(55.2)	17(58.6)	19(65.5)
<b>Total</b>	<b>586</b>	<b>17(2.9)</b>	<b>38(6.5)</b>	<b>38(6.5)</b>	<b>279(47.6)</b>	<b>338(57.7)</b>	<b>416(71.0)</b>	<b>460(78.5)</b>	<b>501(85.5)</b>

AMP = Ampicillin, CLX = Cloxacillin, ERY = Erythromycin, F = Nitrofurantoin, GEN = Gentamicin, AUG = Augmentin, CRO = Ceftriaxone, CIP = Ciprofloxacin.

## Discussion

The prevalence of asymptomatic bacteriuria in pregnant women in this study was 45.3%. This is higher than the 23.9% from the study in Sagamu, Nigeria [12], 7.3% reported in Ghana [13] and 7% reported in Ethiopia [14]. It is lower than the 86.6% earlier reported in Benin City, Nigeria [15] and 78.7% reported in Abakaliki, Nigeria [16].

There was a significant difference in the prevalence of asymptomatic bacteriuria with respect to age group ( $P < 0.0001$ ). Age group 26-30 years had the highest percentage of infection (53.1%). This was closely followed by age group 36-40 (52.5%) and 31-35 (52.1%) respectively (Table 1). The aforementioned age groups having the highest infection was also observed in previous studies [13, 16]. Advanced maternal age ( $\geq 35$  years) was reported as risk factor for asymptomatic bacteriuria in pregnancy [17]. Another reason could also be due to the fact that many women within this age bracket are likely to have had many children before the present pregnancy and it has been reported that multiparity is a risk factor for acquiring asymptomatic bacteriuria in pregnancy [17, 18].

There was no significant difference in the prevalence of asymptomatic bacteriuria with respect to trimester ( $P = 0.2006$ ). This agrees with earlier studies [19, 20]. The most prevalence organism observed in this study was *Escherichia coli* (27.1%), followed by *Staphylococcus aureus* (24.4%). This finding agrees with earlier reports [13, 21-23] who observed the same predominant trend in *Escherichia coli* infection pattern. This could be due to the fact that urinary stasis is common in pregnancy and since most *Escherichia coli* strains prefer that environment, they cause UTI [24]. Another reason could be as a result of poor genital hygienic practices by pregnant women who may find it difficult to clean their anus properly after defecating or clean their genital after passing urine.

The prevalence of *Staphylococcus aureus* was also high (24.4%) in this study. This agrees with previous studies [15,16] which observed an increasing trend in the prevalence of *Staphylococcus aureus* infection among asymptomatic pregnant women. The other organisms isolated included *Klebsiella* species, *Proteus* species, *Citrobacter* species, *Providencia* species and *Pseudomonas aeruginosa*. They are less common organisms causing UTI [22].

This study revealed that Ciprofloxacin, Ceftriaxone and Augmentin were very effective against most of the urinary isolates. Gentamicin and Nitrofurantoin were moderately effective against the urinary isolates. Ampicillin, Cloxacillin and Erythromycin were highly resistant to the isolates.

The upsurge in antibiotic resistant pattern seen in this study could be due to antibiotic abuse and self medication being practiced in many developing countries including Nigeria. Also low cost and availability of these drugs could be another contributing factor for antibiotic resistance in this locality [25].

## Conclusion

This study revealed 45.3% prevalence of asymptomatic bacteriuria among pregnant women. This is far more on a high side compared to the low prevalence in studies in Ghana, and Ethiopia. This is worrisome because UTI in pregnancy may have serious consequences for both the mother and the child. The most predominant organisms were *Escherichia coli* and *Staphylococcus aureus*.

Ciprofloxacin, Ceftriaxone and Augmentin were very effective against most of the urinary isolates. Routine urine culture test should be carried out on all antenatal women to detect asymptomatic bacteriuria.

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