

## ASYMPTOMATIC BACTERIURIA IN PREGNANT WOMEN ATTENDING ANTENATAL CLINIC AT KOMFO ANOKYE TEACHING HOSPITAL, KUMASI, GHANA

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### SUMMARY

**Objective:** Symptomatic bacteriuria is common in pregnant women and if untreated could lead to serious complications. Although asymptomatic bacteriuria could also lead to such complications, this fact is not so well known. This study was to determine the prevalence of asymptomatic bacteriuria in pregnant women attending antenatal clinic at the Komfo Anokye Teaching Hospital (KATH) Kumasi.

**Design:** A prospective study to screen antenatal attendants for asymptomatic bacteriuria.

**Setting:** The study was undertaken at KATH.

**Participants:** All pregnant women attending antenatal clinic at KATH, Kumasi between February and April 2003 and who agreed to enter the study were clinically evaluated to exclude signs and symptoms of urinary tract infection (UTI).

**Methods:** Samples of 10-15ml urine were examined for pus cells, bacteria and parasitic ova. The samples were further cultured on cysteine lactose electrolyte deficient agar and colony counts yielding bacterial growth of  $10^5$ /ml or more of pure isolates were deemed significant.

**Results:** Of the 220 pregnant women, 16 had significant bacteriuria giving a prevalence rate of 7.3%. The highest age-specific prevalence was found in the 35-39 year-olds (13%) and the lowest in the 15-19 year-olds (0.0%). There was no significant difference in prevalence with increasing parity. The dominant bacteria isolates were *E. coli* (37%) and *Staph aureus* (31%).

**Conclusion:** The prevalence of asymptomatic bacteriuria in pregnant women at KATH is 7.3%. The predominant organisms are *E.coli* and *Staph aureus*, and most isolates are sensitive to nitrofurantoin, cefuroxime and gentamicin. .

**Keywords:** Urinary Tract Infection, antenatal, asymptomatic bacteriuria, pregnant women

### INTRODUCTION

Urinary Tract Infection (UTI) refers to both microbial colonization of the urine and tissue invasion of any structure of the urinary tract<sup>1</sup>. Bacteria are most commonly responsible although yeast and viruses may also be involved. Asymptomatic bacteriuria, in which urine culture reveals a significant growth of pathogens, that is greater than  $10^5$  bacteria/ml,<sup>2</sup> but without the patient showing symptoms of UTI, can be found in both pregnant and non pregnant women. Pregnancy enhances the progression from asymptomatic to symptomatic bacteriuria which could lead to pyelonephritis and adverse obstetric outcomes such as prematurity, low-birth weight<sup>3</sup>, and higher fetal mortality rates<sup>4,5</sup>. Although UTI may not always lead to complications in the mother, it is still a cause of significant morbidity<sup>6</sup>.

In Nigeria, Olusanya et al in Sagamu reported a prevalence rate of 23.9% in 1993<sup>7</sup>. Akerele et al also reported 86.6% in Benin City in 2001<sup>8</sup>. A prevalence rate of 7% in pregnant women has been reported in Ethiopia<sup>9</sup>. In Canada the prevalence rate varies from 4-7%. The prevalence is higher among individuals in lower socioeconomic classes and those with a past history of asymptomatic urinary tract infection<sup>4</sup>. Other reports have noted that asymptomatic bacteriuria occurs in 5 to 9% of both non-pregnant and pregnant women and that if left untreated in pregnancy progression to symptomatic UTI including acute cystitis and pyelonephritis occurs in 15 to 45%, or 4-fold higher than in non-pregnant women<sup>10</sup>.

Some studies<sup>3,5</sup> have postulated that since asymptomatic bacteriuria, usually caused by aerobic gram-negative bacilli or *Staphylococcus haemolyticus* can lead to UTI, a urine culture should be obtained from all women early in pregnancy, even

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in the absence of UTI symptoms. Bacteriuria should be treated with a 3-7 day course of antimicrobials, which reduces the risk of symptomatic UTI by 80 to 90%<sup>3,5</sup>.

The association between bacteriuria and pyuria has been reported<sup>11,12</sup>. While some workers have observed a positive correlation between pyuria and significant bacteriuria<sup>11</sup>, others have found little or no correlation<sup>12</sup>.

This study was therefore undertaken to determine the prevalence of asymptomatic bacteriuria in pregnant women attending antenatal clinic at KATH to identify the organisms involved, determine their relative proportions and their antibiotic sensitivities.

## SUBJECTS AND METHODS

The study was undertaken at the Department of Obstetrics and Gynaecology and the Microbiology Laboratory of the Kwame Nkrumah University of Science & Technology School of Medical Sciences (KNUST SMS), and the Komfo Anokye Teaching Hospital (KATH) Kumasi, Ghana between 1<sup>st</sup> February and 30<sup>th</sup> April 2003. It was approved by the KNUST SMS Ethical Committee.

All pregnant women attending antenatal clinic at KATH, Kumasi between February and April 2003 and who agreed to enter the study were clinically evaluated to exclude signs and symptoms of UTI. With the aid of a questionnaire, demographic features including age, parity, and gestational age of pregnancy were collected. After being instructed on the correct mode of self collection of urine sample and the importance of a clean catch of urine, they were provided with sterile universal bottles.

Samples of 10-15ml urine were obtained and placed in a cold box. It was microscopically examined for pus cells, bacteria and ova, and then cultured within two hours. Urine samples that were not cultured within two hours were stored at 4°C.

Samples were cultured on dried plates of Cysteine lactose electrolyte deficient agar (CLED), using a calibrated loop delivering 0.002 ml 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 deemed significant. Isolates were identified to species level using standard methods and their antimicrobial sensitivities were done using Kirby Bauer disc diffusion tech-

nique<sup>13</sup>. Urine samples producing non-significant and mixed growths did not have the test repeated.

## RESULTS

Out of 220 women examined for asymptomatic bacteriuria, 16 were positive for significant bacteriuria, giving a prevalence of 7.3% among the pregnant women. Table 1 shows the age distribution and Table 2 the parity distribution among the women studied. The highest rate of 13% was found in the age group 35-39 years and the lowest rate of 0% in the age groups 15-19 years and 45-49 years. Women with parity 4 or more had the highest prevalence of 16.1% whilst nulliparous women had the least prevalence of 3.7%. Chi-square test of association between parity and significant bacteriuria showed no significant difference. (chi-square 0.05,3 = 5.0976 as against critical value of 7.81).

**Table 1** Age distribution among pregnant women showing significant bacteriuria at KATH

Age Group	Total Number	No. with Significant Bacteriuria	Age Specific prevalence (%)
15-19	8	0	0
20-24	25	2	8.0
25-29	85	7	8.2
30-34	68	3	4.4
35-39	23	3	13.0
40-44	9	1	11.1
45-49	2	0	0
<b>Total</b>	<b>220</b>	<b>16</b>	<b>7.3</b>

**Table 2** Parity distribution among pregnant women showing significant bacteriuria KATH

Parity	No. of women with significant bacteriuria (% in parity group)	No. of women with no significant bacteriuria (% in parity group)	Total
0	2 (3.7)	52 (96.3)	54 (100)
1-3	9 (6.7)	126 (93.3)	135 (100)
≥ 4	5 (16.1)	26 (83.9)	31 (100)
<b>Total</b>	<b>16 (7.3)</b>	<b>204 (92.7)</b>	<b>220 (100)</b>

$\chi^2 = 4.70, p = 0.095$

The bacterial isolates are shown in Table 3. The dominant bacteria were *E.coli* (37%) and *Staph aureus* (31%). The other isolates were *Klebsiella*,

Providencia species, other coliforms, *Staphylococcus saprophyticus* and *Enterococcus faecalis*.

All the *E.coli* isolates were sensitive to nitrofurantoin, gentamicin, cefuroxime and nalidixic acid; only two were sensitive to ampicillin and cotrimoxazole. The five isolates of *Staph aureus* were sensitive to nitrofurantoin and ampicillin, four were sensitive to cefuroxime and three to gentamicin and cotrimoxazole. All were resistant to nalidixic acid. All except one (*Enterococcus faecalis*) of the sixteen isolates were sensitive to nitrofurantoin; thirteen were sensitive to cefuroxime and gentamicin, nine to ampicillin, and eight to nalidixic acid and cotrimoxazole.

**Table 3** Bacterial isolates among pregnant women with significant bacteriuria at KATH

Bacterial Isolate	Number of women with isolates <sup>#</sup>
Escherichia coli	6 (37.5)
Staphylococcus aureus	5 (31.25)
Providencia species	1 (6.25)
Other Coliform	1 (6.25)
Klebsiella species	1 (6.25)
Staphylococcus saprophyticus	1 (6.25)
Enterococcus faecalis	1 (6.25)
<b>Total Isolates</b>	<b>16 (100)</b>

<sup>#</sup>% of total number with asymptomatic bacteria

Ten (10) out of 16 women with asymptomatic bacteriuria were in the first trimester, 4 in the second trimester and the remaining 2 in the third trimester.

Fifty percent (50%) of the pregnant women with significant bacteriuria also had significant pyuria (or pus cells of more than 10 per high power field). Among the study subjects 19.6% had significant pyuria without significant bacteriuria.

## DISCUSSION

The study found sixteen significant bacteriuria among 220 pregnant women at KATH, giving a prevalence rate of 7.3%. Rates of 4-7% have been reported from Canada<sup>4</sup> and 7% in Ethiopia<sup>9</sup>. Nicolle stated that the prevalence rate will be higher among individuals with lower socioeconomic status<sup>4</sup>. The highest prevalence of 13% was recorded in the age-group 35-39 years and the lowest rate of 0.0% among the 15-19 age-group. In relation to parity, women with 4 or more children had a prevalence of 16.1% as against 3.7% in the nulliparous women.

The dominant organisms were *E.coli* (37.5%) and *Staphylococcus aureus* (31.25%). This is similar to the findings in previous studies by Cheesbrough<sup>14</sup> and Delzel<sup>15</sup>. This could be due to the fact that urinary stasis is common in pregnancy and since most *E. coli* strains prefer that environment, they cause UTI<sup>15</sup>. The other organisms isolated included *Staphylococcus saprophyticus*, Klebsiella species, Providencia species, *Enterococcus faecalis* and an unidentified coliform. They are less common organisms causing UTI<sup>14</sup>.

This study has found that nitrofurantoin, cefuroxime and gentamicin were very effective against most of the urinary isolates. All gram negative organisms were susceptible to nalidixic acid with the exception of the unidentified coliform isolated. The prevalence of resistance of urinary isolates to nitrofurantoin and gentamicin was 0% to 2%<sup>16</sup>. Gupta et al stated that nitrofurantoin is relatively safe in pregnancy and is effective against most UTI, but may cause haemolysis in a glucose-6-phosphate dehydrogenase deficient infant if used close to term<sup>16</sup>. Although gentamicin is also effective in treating asymptomatic bacteriuria in pregnant women, it is known to be nephrotoxic<sup>15</sup>. Gentamicin should therefore be used when absolutely necessary<sup>17</sup>. All the *E.coli* isolated were 100% susceptible to both nitrofurantoin and gentamicin.

In this study, it was observed that pregnant women with four or more children had the highest percentage of asymptomatic significant bacteriuria. It was also noted that most of the infected subjects were in their first and early second trimesters. This could be because most pregnant women report at the antenatal clinic for booking during these periods. Nicolle<sup>4</sup> stated that the gold standard in screening for asymptomatic bacteriuria is urine culture in early pregnancy of 12 to 16 weeks gestation. Indeed, the first trimester urine culture remains the screening test of choice<sup>3</sup>.

In conclusion, the prevalence of asymptomatic bacteriuria in pregnant women at Komfo Anokye Teaching Hospital is 7.3%. The predominant organisms are *E.coli* and *Staph aureus*, and most isolates are sensitive to nitrofurantoin, cefuroxime and gentamicin..

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