PREVALENCE AND ASSOCIATED RISK FACTORS OF ASYMPTOMATIC BACTERIURIA IN ANTE-NATAL CLIENTS IN A LARGE TEACHING HOSPITAL IN GHANA

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SUMMARY

Introduction: Asymptomatic bacteriuria, the presence of bacteria in urine without symptoms of acute urinary tract infection, predisposes pregnant women to the development of urinary tract infections and pyelonephritis, with an attendant pregnancy related complications.

Objective: To measure the prevalence of asymptomatic bacteriuria among ante-natal clients at the Korle-Bu Teaching Hospital in Ghana and its' associated risk factors.

Methods: A cross-sectional study involving 274 ante-natal clients was conducted over a period of 4 weeks. A face to face questionnaire was completed and midstream urine collected for culture and antimicrobial susceptibility testing.

Results: The prevalence of asymptomatic bacteriuria was 5.5%. It was associated with sexual activity during pregnancy (Fisher's Exact 5.871, p-value 0.0135), but not with sexual frequency. There were no significant associations with educational status, parity, gestational age, marital status and the number of foetuses carried. The commonest organism isolated was *Enterococcus spp* (26.7%) although the enterobacteriaceae formed the majority of isolated organisms (46.7%). Nitrofurantoin was the antibiotic with the highest sensitivity to all the isolated organisms.

Conclusions: The prevalence of asymptomatic bacteriuria among ante-natal clients at this large teaching hospital in Ghana is 5.5%, which is lower than what has been found in other African settings. Enterococcus spp was the commonest causative organism. However, due to the complications associated with asymptomatic bacteriuria, a policy to screen and treat- all pregnant women attending the hospital, is worth considering.

Key words: Asymptomatic bacteriuria, ante-natal clients, antibiotic sensitivity, tertiary hospital, Ghana

INTRODUCTION

Asymptomatic bacteriuria (ABU) is the presence of bacteria in urine without symptoms of acute urinary tract infection.[1, 2, 3] It is a common occurrence in both non pregnant and pregnant women.[1] However, when it occurs in pregnant women anatomical and hormonal changes from the pregnancy leads to dilatation of the renal pelvis and ureters with an attendant urinary stasis.

This combined with the short nature of the female urethra and perineal colonization by enteric organisms, predisposes pregnant women to the development of urinary tract infections and pyelonephritis.[1,3,4,5] Enterobacteriaceae are responsible for 90% of asymptomatic bacteriuria cases, with *Escherichia coli* being the commonly isolated organism.[1-3, 6-10] Evidence exist that 30% of patients with asymptomatic bacteriuria if not treated go on to develop urinary tract infections.[4] Urinary tract infections and pyelonephritis in pregnancy has been associated with morbidity for both the mother and foetus. It has been associated with pre-eclampsia, polyhydramnios, pre-term birth, low birth weight.[1,4,11]

Several studies conducted have shown that treatment of asymptomatic bacteriuria in pregnancy reduces the complications associated with it. A Cochrane review article came to the conclusion that antibiotic treatment of asymptomatic bacteriuria is effective in reducing the risk of pyelonephritis in pregnancy.[12] Another study in India found that treatment of asymptomatic bacteriuria in pregnant women prevents complications like pre-eclampsia, preterm labour, low birth-weight and premature rupture of membranes.[13] The benefits of treatment has caused several institutions to advocate for screening of pregnant women for asymptomatic bacteriuria, especially in the first trimester of pregnancy.[2,3,8]

The prevalence of asymptomatic bacteriuria and its associated risk factors in Accra, the capital city of Ghana is not known. The goal of this analysis was to screen mid-stream urine of ante-natal clients at the Korle-Bu Teaching Hospital for asymptomatic bacteriuria and antibiotic sensitivities of the isolated organisms. This was to contribute to treatment policy at the teaching hospital.

METHODS
A descriptive cross-sectional study of new antenatal clinic attendants at the Korle-Bu Teaching Hospital, Accra was conducted over a one month period, between 1st August-31st August 2012.

Subject Recruitment
The study was a total enumeration of all antenatal clients presenting to the clinic for the first time within the study period at the antenatal clinic. Written informed consent was sought from all clients before recruitment into the study. Clients who refused consent were excluded from the study.

Interviewer administered structured questionnaire was used to solicit information on socio-demographic and obstetric characteristics of the index pregnancy. Gestational age of the index pregnancy was calculated using an early ultrasound scan or the first day of the last menstrual period. Clients who had symptoms of acute urinary tract infection and those who were on antibiotics or had been on antibiotics at least two weeks prior to presentation were excluded from the study.

Specimen Collection and Processing
Clients after completing the interview were given labelled sterile universal containers by the interviewer, and counselled on how to collect midstream urine without perineal cleaning. Approximately 15mls of urine were collected from each client. The urine samples were transported to the laboratory of the Department of Microbiology University of Ghana Medical School for processing, within four hours of collection. The samples were subjected to routine microscopy and culture. Microscopy involved examining uncentrifuged urine for the presence of pus cells, red blood cells, casts and epithelial cells.

Samples were then cultured on cysteine lactose electrolyte deficient agar (CLED) using a standardised wire loop. The plates were incubated at 37˚C and read after 24 hours for significant bacteriuria. Significant bacteriuria was defined as a single colony count of $\geq 10^5$ organisms. Identification of pathogens was done using standardised biochemical and sugar fermentation tests. Antibiotic susceptibility tests were conducted on the

isolated organisms using Kirby Bauer disc diffusion method.[14]

Data management and statistical analysis
Data obtained from this study was entered into SPSS version 16. Descriptive statistics such as proportions, frequencies and ratios were used. Data was presented in tables and graphs. Associations between categorical outcomes variables were conducted using the Chi squared test at the 95% significant level. A two tailed p-value of <0.05 was considered statistically significant.

Ethical issues
The University of Ghana Medical School Ethical and Protocol Review Committee gave ethical approval for the study. Written informed consent was received from all participants of the study.

RESULTS
A total of 274 women were included in the study. Their ages ranged from 16-43 years (median age was 30 years). 110 (40.1%) of the women had completed JHS whilst 22(8%) had no formal education at all, and approximately 80% (215) were married. Most of the women 176 (64.2%) had 1-3 children whilst 29.9% (82) had no children at all. 173(63.1%) women were in their third trimester of pregnancy whilst 16(5.8%) were in their first trimester. Of the index pregnancies 94.5 %(259/274) were singletons whilst 15 (5.5%) were multiple gestations, 200 (73%) of the patients were sexually active during this index pregnancy, of the women who were sexually active 106 (53%) had sex once a week as compared to 2 (1%) who had sex four or more times a week .

Table 1 Characteristics of asymptomatic bacteriuria among study patients

Characteristics	Frequency	Percentage (%)
No bacterial growth	259	94.5
asymptomatic bacteriuria	15	5.5
Total	274	100.0
Organism		
Enterococcus species	4	26.7
Proteus mirabilis	3	20.0
Escherichia coli	2	13.3
Non haemolytic streptococcus species	2	13.3
Staphylococcus epidermidis	2	13.3
Citrobacter species	1	6.7
Enterobacter species	1	6.7
Total	15	100

Table1 shows that the prevalence of asymptomatic bacteriuria among the women was 5.5%, it further shows that the commonly isolated organism was *Enterococcus spp* 4 (26.7%).

Although Enterobacteria formed the highest group of isolated organisms 7(46.7%)

Figure 1 shows that of the antibiotics tested nitrofurantoin had the highest susceptibility, 13 (86.7%) of the isolated organisms were susceptible, and there was 100% resistance to ampicillin and cotrimoxazole.
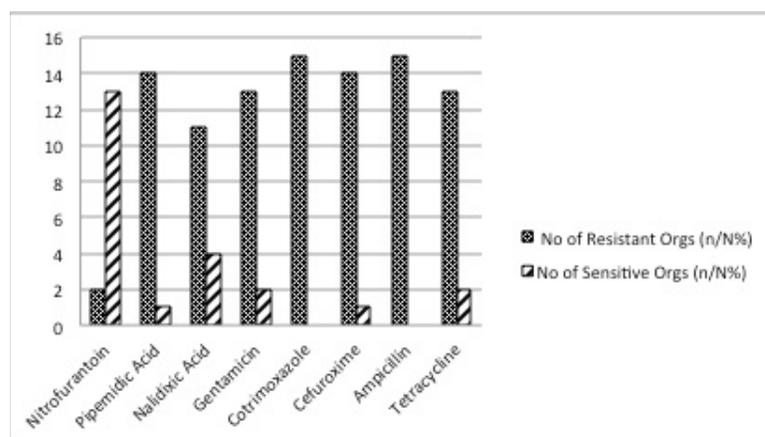

Figure 1 Antibiotic susceptibility pattern of isolated organisms.

Women who were sexually active during pregnancy were more likely to have asymptomatic bacteriuria (Fisher's Exact Score-5.871, P-value-0.0135).

However there was no association between sexual frequency and asymptomatic bacteriuria. Women in their second trimester had a higher percentage of asymptomatic bacteriuria 6 (7.1%), although there was no significant association between gestational age and asymptomatic bacteriuria. Patients in the age group 30-34years had the highest prevalence of asymptomatic bacteriuria 6 (40%). Asymptomatic bacteriuria was found only among women with singleton pregnancies; however this was not a significant association. There was also no association between educational level and asymptomatic bacteriuria.

Table 2 Association between sexual activity and asymptomatic bacteriuria

Sexual activity	No bacterial growth	Asymptomatic bacteriuria	Total	Fishers Exact	P-value
Yes	185	15	200	5.871	0.0135
No	74	0	74		
Total	259 (94.5%)	15(5.5%)	274 (100%)		

DISCUSSION

Findings from the study indicate that the prevalence of asymptomatic bacteriuria among pregnant women attending antenatal clinic at the Korle-Bu Teaching Hospital is 5.5%. This figure is comparable to the findings of 7.3% found in a similar study conducted at another large hospital, the Komfo-Anokye Teaching Hospital in Kumasi, Ghana.[10] Similar studies in Africa have shown varying prevalence rates; 18.1% in South Eastern Nigeria [8] and 28.8% in Ibadan, Nigeria[15], 14.1% in Khartoum, Sudan[16] and 13.3 % in Mulago Uganda.[9]

We also found that the age group 30-34 years had the highest prevalence of asymptomatic bacteriuria whilst the 0-19 age group had the lowest prevalence. This is comparable to the findings made in Kumasi.[10]The prevalence was also higher among patients in their second trimester of pregnancy (7.1%). This is similar to findings made in Ibadan, Nigeria and Kumasi, Ghana.[10,15]

Using educational status as a marker of socio-economic status, there was no association between asymptomatic bacteriuria and educational status. This is at variance with the findings from south-eastern Nigeria, where it was associated with the least educated individuals; and also the assertion that asymptomatic bacteriuria is associated with low socio-economic status.[1, 8]

There was an association between asymptomatic bacteriuria and sexual activity during pregnancy. This is in agreement with several studies which have found sexual activity as a risk factor for developing urinary tract infection in women.[5,17] Sex is thought to increase the risk of infection by meatal trauma, urethral massage and probably changes in vaginal flora.[5] However contrary to our expectations there was no association between sexual frequency and asymptomatic bacteriuria. Asymptomatic bacteriuria was found among only singleton pregnancies although this association was not significant.

Unlike most studies which have *Escherichia coli* as the commonly isolated organism[1,7,8,10,16], this analysis found *Enterococcus spp* as the commonly isolated organism. This was followed by *Proteus mirabilis* and *Escherichia coli* (. However, members of the enterobacteriaceae formed the commonest group of organisms isolated.

With regards to the antibiotic susceptibility patterns of the isolated organisms, nitrofurantoin had the highest susceptibility. This can be explained by the fact that nitrofurantoin as an antibiotic is currently not used routinely for treatment of urinary tract infections in Ghana.[18]

Thus antibiotic pressure resulting from repeated use has reduced and thus resistance levels to nitrofurantoin have dropped.

Gentamicin, cefuroxime, ampicillin and cotrimoxazole had low susceptibilities to the isolated organisms. Considering that cefuroxime is very commonly used and ampicillin is still used by obstetricians in this teaching hospital, culture and sensitivity as a requirement for the treatment of urinary tract infections among pregnant women in the hospital should be considered in the review of treatment guidelines and protocols of the hospital.

Some limitations of this study need to be mentioned, that the numbers of early pregnancy cases included in the study were not large enough. This was because Korle-Bu Teaching Hospital is a referral centre therefore most pregnant women come in at advanced gestational ages. However, the sample size used for the analysis was more than the minimum required for such prevalence study.

CONCLUSIONS

The prevalence of asymptomatic bacteriuria at the Korle-Bu Teaching Hospital is 5.5%, which is lower than what has been found in other African settings. Enterococcus spp is the commonest causative organism. However the complications associated with asymptomatic bacteriuria require that screening is done for all pregnant women, and the appropriate antibiotics used for treatment.

RECOMMENDATION

It is recommended that similar studies using larger population sizes be conducted at primary and secondary healthcare levels, looking specifically at asymptomatic bacteriuria in early pregnancy. This is because its' impact is significant in this population.

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