Asymptomatic bacteriuria and its relation to the age, gravidity and sexual activity during pregnancy in women attending the antenatal clinic in Kerala

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Abstract

**Background:** Pregnant women with asymptomatic bacteriuria (ASB) are at increased risk of maternal and fetal complications. However, little is known about ASB and its relationship with age, gravidity and sexual activity. **Aim:** Hence, this study aims at evaluating the role of ASB in pregnancy and its relationship with age, gravidity, and sexual activity.

**Subjects and Methods:** Two hundred and forty (240) pregnant, sexually active women in a monogamous relationship, attending the antenatal clinic of our hospital were included in this cross-sectional study. They had no signs and symptoms of urinary tract infection. We took a detailed history from the participants followed by microscopy, culture and sensitivity of midstream urine samples. Causative organisms were detected using Standard biochemical tests. The SPSS version 20 (Chicago Illinois, USA) was used for statistical analysis, and the Chi-square test to determine the relationship between asymptomatic bacteriuria in pregnancy and some variables like age, gravidity, and sexual activity.

**Results:** Out of the urine samples of 240 pregnant, sexually active women in monogamous relationship, pus cells were found in 78 urine samples, but bacteria were identified in only 32 samples. ASB was found to be positive in 13.3% (32/240) of the pregnant women. The relation between ASB and the age of the pregnant women was insignificant; 15.6% (5/32) of the positive ASB cases were below 20 years of age, 31.3% (10/32) were between 20-29 years, and 53.1% (17/32) were 30 years or more (\( P = 0.40 \) (95%CI; 0.22 - 0.45), 0.20 (95%CI; 0.12 - 0.34), and 0.07 (95%CI; 0.01 - 0.09); respectively). Also, the relation between ASB and duration of pregnancy was found to be insignificant; 31.3% (10/32) of the positive ASB cases were in the first trimester, 25% (8/32) in the second trimester, and 43.7% (14/32) in the third trimester (\( P =1.00 \) (95%CI; 0.5 - 1.5), 0.80 (95%CI; 0.65 - 0.9), and 1.00 (95% CI; 0.5 -1.5; respectively). ASB was also found to be high in multi-para compared to primipara (81.2% (26/32) versus 18.8% (6/32), respectively) (\( P <0.01 \) (95% CI; -0.02 - 1.25)). The isolated organisms significantly differed from each other; E. coli in 68.8% (22/32) of cases, followed by Staphylococcus aureus in 25% (8/32), and Klebsiella species in 6.2% (2/32) (\( P< 0.01 \) (95% CI; -0.01 - 1.55)).

**Conclusions:** Asymptomatic bacteriuria was positive in 13.3% of the studied pregnant women. Asymptomatic bacteriuria was higher in multi-para compared to primipara and was not related to the pregnancy duration or the age of the studied women.

**Keywords:** Asymptomatic, Bacteriuria, Pregnancy.

Introduction

Asymptomatic bacteriuria (ASB) occurs when urine culture reveals a significant growth of pathogens greater than 10^5 bacteria per ml, without any urinary symptoms.[1,2]

ASB accounts for 2-10% pregnancies in developed countries and up to 86.6% in case of the developing countries.[3]

The pregnant women with ASB are at higher risk of maternal and fetal complications.[4]
Maternal complications of ASB include overt urinary tract infection (UTI) in 30-40% of cases with pregnancy progress and preterm delivery.[5] The fetus is at higher risk of prematurity, low birth weight, intrauterine growth retardation (IUGR), and perinatal mortality.[5,6] The prevalence of ASB is more in rural population, especially those belonging to low socioeconomic status. The reasons might include poor sanitation conditions, lack of general hygienic and failure to attend thje ante-natal clinic. Clinic.[7]

It is critical to find the etiological agents responsible for ASB in pregnant women to enable the caregivers to take a quick decision and prescribe proper and safe antimicrobial agents. It has been established that E. coli is the commonest pathogen causing ASB, followed by other Gram-negative and Gram-positive organisms.[8] It has also been established in randomized control trials that the treatment of ASB in pregnancy decreases the risk of preterm birth and low birth weight infants.[8]

A Cochrane systematic review reported that the treatment of ASB in pregnancy decreases the risk of pyelonephritis, improves fetal outcomes, with reductions in the frequency of low birth weight infants and preterm delivery.[8] Thus, early diagnosis and treatment of ASB are crucial to avoid adverse fetal and maternal complications.

Although several studies have examined ASB during pregnancy, the relationship between some socio-demographic variables and ASB showed conflicting reports depending on the sociocultural settings.[1,7-9]

In addition, there is paucity of literature on the topic in the authors sociocultural setting. Therefore, the study was designed to evaluate ASB in pregnant women and its relation to the age, gravidity, and sexual activity.

Subjects and Methods
Two hundred and forty (240) pregnant, sexually active women in a monogamous relationship with no signs and symptoms of urinary tract infection (UTI), attending the antenatal clinic of Athira Hospital, Chavara, Kollam, Kerala, India, were included in this observational study. The women were randomly recruited between December 2014 and December 2015. Written consent was obtained from the patients. Ethical approval was obtained from the local institutional ethical committee. Exclusion criteria included pregnant women who had signs and symptoms of UTI, diabetes mellitus or immune-suppressed status, history of the previous bladder catheterization, and antibiotic therapy taken within last four weeks. A detailed history was taken from all the participants about their age, gravidity, last menstrual period, expected date of delivery, socioeconomic data, literacy status, sexual practice, hygiene, and antibiotic usage.

Before collecting the midstream urine in a sterile container, proper instruction was given to the women to clean their vulva with a piece of sterile cotton soaked in plain water in a direction from the front to back twice. The urine samples were shaken, and a drop of urine was examined under the microscope to detect the presence of pus cells in the urine samples.
Thereafter, the samples were transferred to the laboratory for culture. All samples were cultured overnight at 37°C on blood agar, nutrient agar and MacConkey agar plates using a calibrated loop. The culture plates were examined the next day. A Colony count yielding bacterial growth of $10^5$/ml or more of pure isolates was processed for the identification and isolation of organisms. Standard biochemical tests were performed for identification of the isolates.

**Sample Size and Statistics**

The required sample size was calculated using G-Power software version 3.17 (Heinrich Heine Universität; Düsseldorf; Germany), setting $\alpha$-error probability at 0.05, power (1- $\beta$ error probability) at 0.95%, and sufficient sample size ($w$) at 0.3. Statistical analysis was done using statistical package for social sciences version 20 (Chicago, IL, USA). Chi-square test ($X^2$) was used for inferential statistical analysis. The significance level was set at 0.05.

**Results**

The socio-demographic characteristics of the studied women are presented in Table 1, in which 68.75% (165/240) of the pregnant women were found to be illiterates with the remaining as literates. None of them were aware of sexual hygiene or safe sexual practices.

Out of the 240 studied urine specimens, pus cells were found in 78 samples, whereas bacteria were identified in only 32 samples. ASB was found to be positive in 13.3% (32/240) of the studied pregnant women.

**Table 1. Socio-demographic characteristics of the studied women**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Studied pregnant women (n = 240)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal Age (Years) Mean (SD)</td>
<td>22.7 (7.2)</td>
</tr>
<tr>
<td>Parity</td>
<td></td>
</tr>
<tr>
<td>Multi-para n (%)</td>
<td>178 (74.2)</td>
</tr>
<tr>
<td>Primi-para n (%)</td>
<td>62 (25.8)</td>
</tr>
<tr>
<td>Gestational age at inclusion (Weeks' gestation) Mean (SD)</td>
<td>31.5 (2.4)</td>
</tr>
<tr>
<td>Educational level</td>
<td></td>
</tr>
<tr>
<td>Literates n (%)</td>
<td>165 (68.8)</td>
</tr>
<tr>
<td>Illiterates n (%)</td>
<td>75 (31.3)</td>
</tr>
</tbody>
</table>

%: Percentage  
N: Number  
SD: Standard deviation

The relation between ASB and age of the pregnant women was found to be insignificant as shown in Table 2.

The relation between ASB and duration of pregnancy was also found to insignificant as shown in Table 2.

ASB was high in multi-para compared to primipara (81.2% (26/32) versus 18.8% (6/32); respectively). In addition, a significant difference was observed in the case of the isolated organisms, such as E. coli in 68.8% (22/32) of cases, followed by Staphylococcus aureus in 25% (8/32), and Klebsiella species in 6.2% (2/32) ($P < 0.01$ (95% CI; -0.01 - 1.55)).
Table 2. Relation between ASB and age of the studied women and pregnancy duration

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total number of studied cases (out of 240 women)</th>
<th>Number of positive ASB (%)</th>
<th>P value, (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age below 20 years</td>
<td>56 (23.3)</td>
<td>5 (15.6)</td>
<td>0.40 (0.2 - 0.5)</td>
</tr>
<tr>
<td>20-29 years</td>
<td>112 (46.7)</td>
<td>10 (31.3)</td>
<td>0.20 (0.1 - 0.3)</td>
</tr>
<tr>
<td>≥ 30 years</td>
<td>72 (30)</td>
<td>17 (53.1)</td>
<td>0.07 (0 - 0.1)</td>
</tr>
<tr>
<td>Total</td>
<td>240 (100)</td>
<td>32 (100)</td>
<td></td>
</tr>
<tr>
<td>First trimester</td>
<td>75 (31.3)</td>
<td>10 (31.3)</td>
<td>1.00 (0.5 - 1.5)</td>
</tr>
<tr>
<td>Second trimester</td>
<td>55 (22.9)</td>
<td>8 (25)</td>
<td>0.80 (0.7 - 0.9)</td>
</tr>
<tr>
<td>Third trimester</td>
<td>110 (45.8%)</td>
<td>14 (43.7%)</td>
<td>1.00 (0.5 - 1.5)</td>
</tr>
<tr>
<td>Total</td>
<td>240 (100%)</td>
<td>32 (100%)</td>
<td></td>
</tr>
<tr>
<td>Parity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-para</td>
<td>178 (74.2%)</td>
<td>26 (81.2%)</td>
<td>P &lt; 0.01</td>
</tr>
<tr>
<td>Primi-para</td>
<td>62 (25.8%)</td>
<td>6 (18.8%)</td>
<td>(0 - 1.3)</td>
</tr>
<tr>
<td>Total</td>
<td>240 (100%)</td>
<td>32 (100%)</td>
<td></td>
</tr>
</tbody>
</table>

ASB: Asymptomatic bacteriuria; CI: Confidence Interval; Data presented as number and percentage; 
P < 0.05 = Significant; P > 0.05 = Non-significant; Statistical analysis was done using chi-square test.

Discussion

Previous studies reported variation in ASB positive cases between 8.4-18.2%, whereas, in the present study, ASB was found to be positive in 13.3% of the studied pregnant women cases.\[10,11\]

The relation between ASB and age of the pregnant women as well as pregnancy duration was found to be insignificant. However, Turpin et al.\[11\] found that ASB was more prevalent in older age. This can be explained by decreased level of sex hormones in the aging process. Apart from this, the increase in age is also associated with increased glycogen deposition, reduced Lactobacillus colonization, acidification of the vagina, and prevention of pathogen colonization, leading to increased susceptible to ASB and UTI.\[11\]

Although, in this study, there was no relation between ASB and duration of pregnancy, Oli et al.\[10\] noticed a higher incidence of ASB in the third trimester, probably because of the anatomical and physiological changes related to higher gestational age.

Gayathree et al.\[12\] concluded that screening for ASB in all trimesters is mandatory to prevent severe fetal and maternal complications.

In this study, ASB was high in multi-para compared to primipara, Lavanya et al.\[1\] observed a high prevalence of ASB in primigravida compared to the prim-para, and also explained regarding the meticulous care and support given to the pregnant women from their families during their first pregnancy to overcome stress and anxiety, which was an exception in the present study.

Oli et al.\[10\] has also recorded a higher prevalence of ASB in illiterate people compared to the literate.
Illiteracy leads to lack of awareness to personal hygiene, lack of ante-natal checkups and safe sexual practices. There was a significant difference observed between the isolated organisms in the studied cases with positive ASB. The causative organisms may vary from person to person and so as the sensitivity. Hence, an appropriate and safe antimicrobial agent needs to be administered to the pregnant women with ASB that is of critical importance to prevent the higher incidence of ASB recurrence.[11,13]

A Cochrane systematic review conducted by Guinto et al.[14] was not able to draw any definite conclusion on the most effective and safest antibiotic regimen for the treatment of ASB in pregnancy, as there was no significant difference seen between the groups treated with different antibiotics.[14] Because of lack of such conclusive evidence, it is useful for clinicians to consider factors, such as cost, local availability and side effects for choosing the best treatment option.[14]

Another Cochrane Database systematic reviews conducted by Widmer et al.[15, 16] Concluded that the single-dose regimen of antibiotics was less effective than the seven-day regimen. The study also established the standard treatment regimen of antibiotics for the pregnant women with ASB until more data is made available for testing the seven-day regimen compared to the three- or five-day regimens.

This was the first cross-sectional study conducted in Kerala, measuring the role of ASB in pregnant women and its relation with age, gravidity, and sexual activity. Lack of control group and follow-up of the pregnant women with ASB has been faced as limitations during this study. However, it forms a baseline for further studies which will include sexually active, non-pregnant women in their reproductive age, as the control group.

In conclusion, the prevalence of ASB in this study was found to be 13.3%. ASB was higher in multi-para compared to primipara, and was not related to the duration of pregnancy or the age of the studied women.

A study by Sujatha et al. [13] concluded that the association of ASB with pregnancy complications. It is therefore, imperative that pregnant women must be screened for bacteriuria, on a periodical basis in every trimester of the pregnancy. Routine urine cultures should be carried out for all antenatal women to detect ASB and caregivers should treat positive ASB cases with proper antibiotic therapy, to prevent ASB-related complications.

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Conflict of interest
Authors declare no conflict of interest related to this study.

Financial Disclosure
It was a self funding study.

References
[2]. Whalley PJ, Cunningham FG. Short-term versus continuous antimicrobial therapy for asymptomatic bacteriuria in pregnancy. Obst


