

# Prevalence of asymptomatic bacteriuria among pregnant women in Shiraz, Iran

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## ABSTRACT

**الأهداف:** تعيين مدى تكرار الإصابة بالبيلة الجرثومية اللاعرضية البول البكتيري غير المصحوب بالأعراض عند النساء الحوامل اللاتي أحلن إلى مستشفى الجامعي - Shiraz - إيران من أجل المراقبة الصحية في فترة ما قبل الولادة، وأيضاً تحديد العلاقة ما بين البيلة الجرثومية اللاعرضية والبيلة القحفية.

**الطريقة:** إن هذه الدراسة العرضية تضمنت 389 امرأة حامل بصحة جيدة، أحلن إلى مستشفى حافظ الجامعي - Shiraz - إيران من أجل العناية الصحية الأولية لما قبل الولادة ما بين الفترة مايو إلى أغسطس 2007م. ولقد جُمعت العينات من جميع المتطوعات وفُحصت وفقاً للتقنيات المخبرية المطابقة للمعايير. وتم فحص كافة العينات للبحث عن البيلة الجرثومية.

**النتائج:** كان متوسط عمر المريضات  $26.3 \pm 4.2$  عام. كان انتشار البيلة الجرثومية اللاعرضية 5.1%. ومن أصل 75 مريضة (19.2%) احتوت عيناتهن البولية على خمسة خلايا قحفية أو أكثر تم رؤيتها في المجال البصري للمجهز. كانت نتيجة زراعة البول إيجابية لدى 12 مريضة فقط (16%). وكانت أكثر المكروبات التي تم فصلها كالتالي: الإشريكية القولونية (70%) تليها استافيلوكوكوس أرووس (20%) ومن ثم إستربتوكوكوس (المجموعة ب) (5%).

**خاتمة:** لقد وجدنا أن البيلة الجرثومية في هذه المجموعة من النساء الحوامل اللواتي لم تظهر عليهن الأعراض كان قريباً من المعدلات المتوصل إليها سابقاً. إن النتائج السلبية لتحاليل البيلة القحفية ليست مؤشراً موثقاً للدلالة على عدم وجود البيلة البولية اللاعرضية لدى النساء الحوامل؛ لذلك ومن أجل الوقاية من مضاعفات البيلة الجرثومية يجب أن تخضع جميع النساء الحوامل للفحوصات الأولية لما قبل الولادة.

**Objectives:** To determine the frequency of asymptomatic bacteriuria in pregnant women referred to a University College Hospital in Shiraz, Iran for perinatal care, and also to determine the relation between asymptomatic bacteriuria and pyuria.

**Methods:** This cross-sectional case series study included 389 healthy pregnant women who were

referred to Hafez Hospital, Shiraz, Iran, antenatal care unit for regular perinatal care between May and August 2007. A specimen from each candidate was collected and processed following the standard microbiological technique. All the subjects were evaluated for bacteriuria.

**Results:** The mean age of the patients was  $26.3 \pm 4.2$  years. The prevalence of asymptomatic bacteriuria was 5.1%. From 75 (19.2%) patients who had  $\geq 5$  pus cells in high power field, only 12 (16%) had positive urine culture. The most common isolated microorganism was *Escherichia coli* (70%) followed by *Staphylococcus aureus* (20%) and *Group B Streptococcus* (5%).

**Conclusion:** We found a rate of bacteriuria in our cohort of asymptomatic pregnant subject that is well within the reported range from the literature. A negative test for pyuria is not a reliable indicator of the absence of asymptomatic bacteriuria in pregnant women. To prevent asymptomatic bacteriuria complications, all pregnant women should be screened at the first antenatal visit.

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Asymptomatic bacteriuria during pregnancy is a common medical problem with a prevalence of 2-10%.<sup>1</sup> It is also a common problem in sexually active non-pregnant women and is a strong predictor of subsequent symptomatic urinary tract infection (UTI).<sup>2</sup> Asymptomatic bacteriuria is defined as colonization of urine in the absence of clinical symptoms, which is

regarded as the presence of  $\geq 10^5$  colonies/ml urine from a specimen obtained by the clean catch, midstream collection method.<sup>3,4</sup> The prevalence of cystitis, and asymptomatic bacteriuria does not differ between pregnant and non-pregnant women. However, one of the most important risk factors for developing pyelonephritis in pregnant women is lower UTI.<sup>5,6</sup> Pyelonephritis is associated with significant morbidity during pregnancy for the mother and the fetus. Thus, exact screening and treatment of bacteriuria regardless of symptoms is a must in order to avoid further complications.<sup>5</sup> Anatomic and physiologic changes that occur during the pregnancy increase the risk of pyelonephritis in this period.<sup>5,7</sup> This is mostly because pregnancy is a common cause of obstructive uropathy and thus results in severe renal infections. In pregnancy, 20-40% of untreated women with asymptomatic bacteriuria will develop pyelonephritis.<sup>8,9</sup> As pyelonephritis usually arises from preexisting covert bacteriuria; experts recommend screening and eradication of silent infections as routine prenatal practice.<sup>10</sup> Early treatment of asymptomatic bacteriuria decreases the risk of pyelonephritis in the later stages of pregnancy by at least 75%.<sup>11</sup> Furthermore, treatment of asymptomatic bacteriuria significantly improves the adverse fetal outcomes of premature labor and low birth weight.<sup>12</sup> Stenqvist and colleagues<sup>13</sup> have shown that 18 weeks of gestation is the optimal time for performing screening culture for detecting bacteriuria. We designed this study is to determine the prevalence of asymptomatic bacteriuria in pregnant women in 2 university hospitals in Shiraz and also to determine the relation between asymptomatic bacteriuria and pyuria.

**Methods.** A total of 389 healthy pregnant women were enrolled in the study. All the participants were selected from those healthy pregnant women who were referred to the Obstetrics Clinic of Hafez and Zeynabieh Hospitals, Shiraz, Iran between May and August 2007 for routine obstetrics check-ups. The study subjects were examined at the first antenatal visit and maximum gestational age was 18 weeks. None of the patients had any sign or symptoms of classical UTI on examination. Patients with conditions associated with complicated UTI such as recent hospitalization ( $\leq 30$  days), recurrent UTI, diabetes mellitus, immunodeficiency, and antibiotic consumption during the preceeding 2 weeks were excluded from the study. The study was approved by the ethical research committee of Shiraz University of Medical Sciences. All the patients gave written consent. Clean-voided midstream urine was collected from each patient in sterile screw-capped containers. The participants were told to wipe their labia with soapy water and rinse well, then after urinating a little in the toilet fill the container (clean catch method). Uncentrifuged urine specimens were cultured using

platinum loops that added 0.001 ml urine to the surface of blood agar and McConkey agar plates for the detection of uropathogens. After 24 hours of incubation at 37°C, colonies were counted and identification performed by standard laboratory procedures. Bacteriuria was defined as uropathogens detected in a single culture at a concentration  $10^5$  colony forming units (cfu)/ml or greater in at least 2 consecutive voided specimens.<sup>11</sup> In microscopy, a quantity (10ml) of each well-mixed urine sample was centrifuged at 2000 xg for 5 minutes. A drop of the deposit was examined microscopically at high magnification for the presence of pus cells (polymorphonuclear leukocyte), red blood cells, epithelial cells, casts, crystals, *Trichomonas vaginalis* and Schistosoma ova.

All statistical analyses were performed with the Statistical Package for Social Sciences version 15.0 (SPSS Inc., Chicago, IL, USA). The results are expressed as mean value  $\pm$  standard deviation. Chi-square test was used for comparison between groups. A two-tailed *p*-value less than 0.05 was considered statistically significant.

**Results.** Overall 621 women were visited from which 232 were excluded due to different exclusion criteria. Thus the number of participants who finished the study was 389. The mean age of the participants was  $26.3 \pm 4.2$  (range, 18-36 years). The number of previous pregnancies was more than 2 in 229 (58.8%) of the participants with average of  $3.8 \pm 1.5$  (range 1-6). The mean age of the participants at menarche  $16.28 \pm 3.5$  (11-13), marriage  $13.64 \pm 1.2$  (10-16) and first pregnancy  $17.36 \pm 3.5$  (13-31). Out of the 389 samples processed, 20 (5.1%)

**Table 1 -** Microorganisms isolated in positive cultures.

Isolates	Number	(%)
<i>Escherichia coli</i>	14	(70)
<i>Staphylococcus aureus</i>	4	(20)
<i>Group B Streptococcus</i>	1	(5)
<i>Candida albicans</i>	1	(5)
<b>Total</b>	<b>20</b>	<b>(100)</b>

**Table 2 -** Association of pus cells with bacterial growth.

Number of pus cells	Number of patients	Positive culture	Negative culture	<i>P</i> -value
		n (%)	n (%)	
0	270	4 (1.5)	266 (98.5)	<i>p</i> <0.0001
1-4	44	4 (9.1)	40 (90.9)	
$\geq 5$	75	12 (16.0)	63 (84.0)	
<b>Total</b>	<b>389</b>	<b>20 (5.1)</b>	<b>369 (94.9)</b>	

showed significant bacteriuria. Thus, the prevalence of significant bacteriuria was 5.1%. The frequency of the microorganisms isolated from the urine of the study subjects is shown in Table 1. Seventy-five (19.2%) women had more than 5 pus cells in urine specimen from which 12 (16%) had positive cultures. Association of presence of pus cells with bacterial growth is shown in Table 2. Women with higher number of pus cells in urine specimen had significantly higher asymptomatic bacteriuria ( $p < 0.0001$ ).

**Discussion.** Asymptomatic bacteriuria during pregnancy is a common and important medical condition, which will result in overt renal infections such as pyelonephritis if not detected and treated.<sup>14</sup> Smaill<sup>15</sup> showed that on average treating 7 pregnant women with asymptomatic bacteriuria results in prevention of one episode of pyelonephritis. He also showed that treatment of asymptomatic bacteriuria would lead to approximately 75% reduction in pyelonephritis rate.

In this study, prevalence of asymptomatic bacteriuria was found to be 5.1%, which is comparable to those studies from developing countries.<sup>16,17</sup> The prevalence of asymptomatic bacteriuria was reported to be as high as 21% in a study from Ibadan city, Nigeria<sup>5</sup> and 86.6% in another study from Benin City, Nigeria.<sup>18</sup> Hazhir<sup>19</sup> in another study from Iran found that the prevalence of asymptomatic bacteriuria was 6.1%. He also found that asymptomatic bacteriuria was associated with lower maternal age. Significant pyuria with bacteriuria was found in 60% of our patients. So the presence of significant pyuria should not be used as a screening test for asymptomatic bacteriuria in pregnancy. Using this method for screening of asymptomatic bacteriuria in this study would have resulted in a false negative rate of 40%. This is consistent with the results of other studies. Two studies found that there was only 50% significant pyuria with positive cultured.<sup>5,20</sup>

Pyuria was found in 17.1% of negative cultures. In 2 others studies,<sup>5,20</sup> pyuria has been reported in up to 30% and 23% of negative cultured. They concluded that all samples should be sent for culture, because none of the rapid tests, including the screen for pyuria, are reliable diagnostic methods for detecting asymptomatic bacteriuria in pregnant women.<sup>5,20-22</sup> Wadland and colleagues<sup>23</sup> showed that screening for asymptomatic bacteriuria is cost saving unless the prevalence of asymptomatic bacteriuria falls below 2%, the risk of pyelonephritis with asymptomatic bacteriuria falls below 13%, or the efficacy of treatment in preventing pyelonephritis falls below 38%. Thus, in our region, this intervention remains cost saving. Finally, in accordance with Stenqvist and colleagues,<sup>13</sup> we chose 18 weeks gestation as the optimal time to perform the screening

culture in order to maximize the chances of detecting bacteriuria. However, in North America the current approach is to screen asymptomatic bacteriuria at 12 weeks of gestation.<sup>24</sup>

We note some limitations; first, we studied comparatively few patients and the study may be underpowered to show the relations. Future studies with more accumulated cases will clarify the value of screening and treatment of asymptomatic bacteriuria in pregnant women. Second, we did not perform antibiogram for the positive cultures.

In conclusion, screening all the pregnant women at the first antenatal visit for the presence of asymptomatic bacteriuria is recommended. A negative test for pyuria is not a reliable indicator of the absence of asymptomatic bacteriuria in pregnant women. Thus, all urine samples, regardless of leukocyte count, should be sent for culture.

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