

PREVALENCE OF ASYMPTOMATIC BACTERIURIA IN PREGNANT WOMEN

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Abstract

Introduction: Women with asymptomatic bacteriuria during pregnancy are more likely to deliver premature or low birth weight babies and having a 20 – 40 percent increased risk of developing pyelonephritis during pregnancy compared with women without bacteriuria. Asymptomatic bacteriuria is a microbiological diagnosis based on urine culture from persons without signs or symptoms of urinary tract infection.

Objectives: The aim of this study was to determine the prevalence of asymptomatic bacteriuria in pregnant women and also to determine the relationship between the asymptomatic bacteriuria and pyuria to isolate the causative pathogens and to find out the antimicrobial susceptibility pattern of the isolates.

Methods: A total of 540 urine specimen were collected from 540 asymptomatic pregnant women for urinary tract infection, over a period 2 years from January 2011 to December 2012 at Border Guard Bangladesh (BGB) Hospital, Pilkhana, Dhaka. All specimens were processed using standard microbiological procedures. All the subjects were evaluated for bacteriuria.

Results: The prevalence of asymptomatic bacteriuria was 10.2%. Pyuria was found in 15.9% of cases. Escherichia coli (80%) was the commonest causative agent of asymptomatic bacteriuria followed by Staphylococcus saprophyticus (14.5%) and Pseudomonas spp.(5.5%). Nitrofurantoin was found to be highly sensitive to most of the isolates.

Conclusion: Screening for bacteriuria in pregnancy and proper treatment of diagnosed cases must be considered as an essential part of antenatal care in our country. To prevent complications of asymptomatic bacteriuria, all pregnant women should be screened at the first antenatal visit. A negative test for pyuria is not a reliable indicator of the absence of asymptomatic bacteriuria in pregnant women.

Key-words: Asymptomatic bacteriuria, Pyuria, Pregnancy, Urine isolates, Antimicrobial sensitivity.

Introduction

Urinary tract infection (UTI) affects all age groups, but women, particularly pregnant women are more susceptible than men, due to short urethra, easy contamination of urinary tract with fecal flora and various other reasons¹. Asymptomatic bacteriuria is a microbiological diagnosis based on the isolation of a specified quantitative count of bacteria in a properly collected specimen of urine from persons without signs or symptoms, who were not referable for urinary tract infection. Thus culture is the gold standard screening technique for asymptomatic bacteriuria during pregnancy^{1,2,3}. Asymptomatic bacteriuria was one of the first subclinical infections where an association with an adverse perinatal outcome was identified⁴. In pregnancy, 20-40% of untreated women with asymptomatic bacteriuria will develop pyelonephritis⁵. Studies have consistently reported that treatment of asymptomatic bacteriuria in pregnancy decreases the risk of subsequent pyelonephritis from a range to 1 to 2 percent⁶.

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The prevalence of asymptomatic urinary tract infection has been reported to be 2 to 11% in pregnant women⁷. But the global prevalence of asymptomatic bacteriuria varies widely in pregnancy². The incidence of bacteriuria in pregnancy is very common in Bangladesh. Among the healthy mothers attending at the Institute of Post graduate Medicine and Research, 30% had asymptomatic bacteriuria. In rural Rajshahi, 24% of pregnant mothers suffered from bacteriuria among them 12% were asymptomatic⁸. Increased number of neutrophils in urine is termed as pyuria which indicates presence of infection or inflammation of urinary tract⁹. Pyuria has been reported up to 30% of negative bacterial cultures. So, all the samples should be sent for culture, because none of the rapid tests, including screening of pyuria are reliable for detecting asymptomatic bacteriuria in pregnant women¹⁰. Bacteria originate from large bowel and colonize in the urinary tract transperineally. The most common infecting organism is *Escherichia coli*, which is responsible for 80-90% of bacteriuria in pregnancy. Other organisms that have been isolated are *Staphylococcus saprophyticus*, *Pseudomonas* spp. and other coliform bacteria^{2,11,12}. Multi drug resistance was observed in Gram negative isolates. Routine screening for asymptomatic bacteriuria is therefore recommended throughout pregnancy to avoid adverse fetal and maternal outcomes¹³. Present study was carried out to determine the prevalence of asymptomatic bacteriuria in pregnancy; its causative agents and their antimicrobial susceptibility pattern and also to determine the relationship between asymptomatic bacteriuria and pyuria.

Methods and Materials

The study was conducted over a period of 2 years from January 2011 to December 2012 in the Pathology Department of BGB Hospital, Pilkhana, Dhaka. A total of 540 pregnant women within the age group of 18-35 years, attending the family out patient department (OPD) and Obstetric department were selected for the study. Only women who fulfilled the criteria of apparently normal health, without any signs or symptoms of UTI, were included in the study. Patients with pyrexia and those taking antibiotics or having taken antibiotics in the previous two weeks were excluded from the study. About 10 ml of clean catch mid-stream urine samples were collected in sterile container, after giving instructions to the mother regarding the sample collection. All the samples were collected in the sample collection room in the Pathology Department.

The specimens were first processed in the laboratory for culture by the semi quantitative calibrated wire loop technique on blood agar and Mac Conkey's agar medium. A loopful of well mixed uncentrifuged urine was streaked on to the surface of the culture plates. Incubation was done aerobically at 37°C for 24 hours². The detection of single uropathogen >10⁵ colony forming unit (CFU)/ml in a single voided midstream urine is accepted as a practical, adequate and cost effective method for diagnosing asymptomatic bacteriuria^{4,6}. Pure growth between 10³ -10⁵ CFU /ml and mixed growth were taken as having doubtful significance and the culture was repeated with fresh sample, while pure growth of 10³ was taken as insignificant bacteriuria². Significant bacterial isolates were identified by standard procedures and were subjected to antibiotic susceptibility by the Kirby-Bauer's disc diffusion method². The antibiotic disc used were: Amoxicillin-clavulanic acid, Gentamicin, Co-trimoxazole, Nitrofurantoin, Nalidixic acid, Cephalexin, Ciprofloxacin, Ceftriaxone, Ceftazidime and Cefixime. In microscopy a quantity of 10 ml urine sample was centrifuged at 2000xg for 5 minutes. A drop of the deposit was examined microscopically at high magnification for the presence of pus cells. The quantity is expressed as per high power field in centrifuged deposit as follows⁹:

1. 0 to 10 /HPF : few pus cells (Normal)
2. 10 to 20/ HPF : moderate number of pus cells
3. >20/HPF : many pus cells (Numerous)

Results

Of the 540 asymptomatic pregnant women 55, (10.2%) showed significant bacteriuria. Thus the prevalence of asymptomatic bacteriuria was 10.2% in the present study. Four fifty four participants had normal urinary pus cells, among them 21(4.6%) had significant bacteriuria. Pyuria was found in 86 (15.9%) cases, among them 34(39.5%) were culture positive (Table-I).

Table-I: Association of pus cells with bacterial growth (n=540)

Number of pus cells/HPF	Number of pregnant women	Positive culture number (%)	Negative culture number (%)
0 - 10	454 (84.1)	21(4.6)	433 (95.4)
> 10	86 (15.9)	34 (39.5)	52 (60.5)
Total	540 (100)	55 (10.2)	485 (89.8)

n =Total number

HPF= High power field

Women with higher number of pus cells in urine specimen had significantly higher asymptomatic bacteriuria. Pus cells of >20/HPF were found in 60 cases, of them 30(50%) showed significant bacteriuria. Pus cells ranging from 10-20/HPF were found in 26 cases of them 4(15.4%) were culture positive (Table-II).

Table-II: Distribution of pus cells with bacterial growth (n=540)

Number of Pus Cells/HPF	Number of Pregnant Women	Positive Culture Number (%)	Negative Culture Number (%)
0 - 10	454	21 (4.6)	433 (95.4)
10 - 20	26	04 (15.4)	22 (84.6)
> 20	60	30 (50)	30 (50)
Total	540	55 (10.2)	485 (89.8)

n = Total number; HPF= High power field

Table-III shows age distribution of the culture positive cases. The highest rate (43.6%) was found in the age group of 31—35 years and the lowest rate (12.7%) in the age group of 18—20 years.

Table-III: Age distribution of the culture positive cases(n = 55)

Age groups in years	Total no of culture Positive cases	Percentage (%)
18 - 20	7	12.7
21 - 25	11	20
26 - 30	13	23.6
31 - 35	24	43.7
Total	55	100

Escherichia coli was isolated in 44(80%) culture positive cases followed by *Staphylococcus saprophyticus* in 8 (14.5%) and *Pseudomonas spp.* in 3 (5.5%) cases (Table-IV).

Table-IV: Microorganisms isolated in positive cultures (n=55)

Isolates	Number	(%)
<i>Escherichia coli</i>	44	80
<i>Staph saprophyticus</i>	08	14.5
<i>Pseudomonas spp.</i>	03	5.5
Total	55	100

n = Total number

Antimicrobial sensitivity pattern of isolated organisms is shown in Table-V. *Escherichia coli* was 86.4% sensitive to Nitrofurantoin, 38.6% to Ciprofloxacin and Ceftriaxone. Cephalixin was only sensitive in 4.6%

cases. *Staphylococcus saprophyticus* showed 75% sensitivity to Nitrofurantoin, ceftriaxone and gentamicin. *Pseudomonas spp.* was isolated in 3 cases; two of them showed 33.3% sensitivity to Nitrofurantoin and Ciprofloxacin and all other antimicrobials used in the study were resistant, one isolate of the *Pseudomonas spp.* was resistant to all the antimicrobials used in the study but was found to be sensitive to Amikacin and Azithromycin.

Table-V: Antimicrobial sensitivity pattern of isolated organisms.

Antibiotics	<i>Escherichia Coli</i> (n = 44)	<i>S. saprophyticus</i> (n = 8)	<i>Pseudomonas spp</i> (n = 3)
Nitrofurantoin	38 (86.4)	6 (75)	1(33.3)
Ciprofloxacin	17 (38.6)	3 (37.5)	1(33.3)
Ceftriaxone	17 (38.6)	6 (75)	0 (0)
Ceftazidime	16 (36.4)	1 (12.5)	0 (0)
Cotrimoxazole	11 (25)	2 (25)	0 (0)
Gentamicin	8 (18.2)	6 (75)	0 (0)
Cefixime	7 (15.9)	1 (12.5)	0 (0)
Amoxi clav	4 (9.1)	3 (37.5)	0 (0)
Cephalexin	2 (4.6)	2 (25)	0 (0)
Nalidixic acid	2 (4.5)	0 (0)	0 (0)

Figures in the parentheses indicate percentage.

Discussion

Women with asymptomatic bacteriuria during pregnancy are more likely to deliver premature or low birth weight infants and having a 20 – 40 percent increased risk of developing pyelonephritis during pregnancy when compared with women without bacteriuria⁶. The prevalence of asymptomatic bacteriuria found in this study was 10.2%. A similar study carried out in Bangladesh by Ullah et al¹⁴ showed the prevalence rate to be 12%. A review literature revealed a prevalence rate varying from 4 to 23.9% in studies conducted by various authors¹³. These results well correlate with the present study. The prevalence of asymptomatic bacteriuria varies from one community to another. For example in Asian studies, the prevalence of the asymptomatic bacteriuria varied from 6 to 16% in India^{1,13,15,16,17}, in Pakistan it was from 6.2 to 28.5%^{5,16} and in Nepal the prevalence was 9.8%¹². Similarly in African studies the prevalence of asymptomatic bacteriuria in Ethiopia, Tanzania, Ghana and Nigeria was 10.6%,13%,37.5% and 43.3% respectively¹⁸⁻²¹.

Studies in developed countries revealed the same differences. For example the prevalence of asymptomatic bacteriuria in USA varies from 2 to 7% ; in Canada 4 to 7% and it reaches up to 16% among Spanish pregnant women²². The variation can be attributed to several factors such as geographical variation, ethnicity of the subjects, setting of the study (primary care, community based or hospitals), and the variation in screening tests (urine dipstick, microscopy and culture)². In the present study, out of 540 cases, pyuria was found in 86 cases. Among those 86 cases bacteriuria was found in only 39.5% cases. Again in 4.6% cases bacteriuria was found in cases with normal pus cells. So presence of significant pyuria should not be used as a screening test for asymptomatic bacteriuria in pregnancy. These findings are consistent with the results of other two studies where cases of significant pyuria was found in 50% to 60% of positive cultures and pyuria was found in 17.1% to 21% of negative cultures. They concluded that all samples should be sent for culture, because none of the rapid tests, including the screening for pyuria, are reliable diagnostic methods for detecting asymptomatic bacteriuria in pregnant women^{5,10}. Pyuria also can be associated with other clinical diseases such as vaginitis, and therefore is not specific for UTI²³. Present study showed that higher number of pus cells in urine specimen had higher asymptomatic bacteriuria (i.e. bacteriuria increased from 4.6 to 50%, accordingly to the increased level of urinary pus cells). It correlates with two other studies carried out in Iran and Kashmir^{5,10}. In this study, age group of 31-35 years had the highest percentage of bacteriuria (43.6%), which correlates with the other studies of Girishbabu et al¹ and Imade et al²¹. It has been observed that advanced maternal age is a risk factor for asymptomatic bacteriuria in pregnancy. 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^{1,21}. *Escherichia coli* was the most common isolate found in 80 % of the culture positive cases in this study. The current finding is in general agreement with the majority of the studies carried out in different parts of

the world as well as in Bangladesh, which reported *Escherichia coli* as the most common UTI associated pathogen^{1,7,8,10,14,24}. Other organisms found were *Staphylococcus saprophyticus* (14.5%) and *Pseudomonas spp.*(5.5%). The findings of the study showed that *Staphylococcus saprophyticus*, which was believed to be normal commensal, was recognized as the second most common pathogen accounting to 16.68%, 19.5% and 16.8% prevalence rate in different studies^{3,14,24}. *Pseudomonas spp.* was found in 4.83% cases. in one study carried out in India, which correlates with the present study². Bacterial isolates have been changing from time to time and from place to place. Organisms isolated in our study correlate with various other studies^{3,8,20}. In our study Nitrofurantoin was found to be highly sensitive to most of the isolates. This finding well correlates with the other studies carried out in Bangladesh, Pakistan and Ghana^{3,8,20}. Nitrofurantoin in pregnancy appeared to be safe and a survey on physicians confirmed that most practitioners adhered to recommend prescribing nitrofurantoin in pregnancy⁴. The present study found that most of the commonly used antibiotics were resistant to the isolated organisms. The upsurge in antibiotic resistant pattern could be due to antibiotic abuse and self medication¹. Wadland and colleagues²⁵ showed that screening for asymptomatic bacteriuria is cost saving if the prevalence of asymptomatic bacteriuria is more than 2%. As in our study the prevalence of asymptomatic bacteriuria is 10.2%, so screening for asymptomatic bacteriuria by urine culture in pregnant women of our region remains cost saving.

Conclusion

Screening for bacteriuria in pregnancy and proper treatment should be considered as an essential part of antenatal care. To prevent complications of asymptomatic bacteriuria, all pregnant women can be screened at the first antenatal visit. A negative test for pyuria is not a reliable indicator of the absence of asymptomatic bacteriuria in pregnant women. Thus, all urine specimens regardless of leukocyte count, should be sent for culture and sensitivity.

References

1. R J Girishbabu, R Srikrishna, S T Ramesh. Asymptomatic bacteriuria in pregnancy. Int J Biol Med Res 2011;2(3):740-742.

2. Gayathree L, Shetty S, Deshpande S R . Screening for asymptomatic bacteriuria in pregnancy: An evaluation of various screening tests at the Hasan district hospital, India. *Journal of clinical and diagnostic research* 2010 August;(4):2702-2706.
3. Aziz Marjan Khattak, Habib-Ullah khan, Ihsan-Ullah Mashud, Bushra Ashiq and Syed Humayun Shah. Antimicrobial sensitivity pattern of urine isolates from asymptomatic bacteriuria during pregnancy. *E:/Biomedica vol.22(Jan-Jun 2006)*.
4. Fiona Smaill. Asymptomatic bacteriuria in pregnancy. *Best practice and research clinical obstetrics and gynaecology* 2007; 21(3):439-450.
5. Maryam Kasraeian, Nasrin Asadi, Fariborz Ghaffarpasand. Prevalence of asymptomatic bacteriuria among pregnant women in Shiraz, Iran. *Saudi Med J.* 2009; 30(7):917-920.
6. Colgan R, Nicolle LE, Mcglone A, Hooton T A. Asymptomatic bacteriuria in adults. *Am Fam Physician* 2006;74(6):985-90.
7. Samad Hazhir. Asymptomatic bacteriuria in pregnant women. *Urol J (Tehran)* 2007;4:24-7.
8. A.B.M Selimuzzaman, M A Ullah, M J Haque. Asymptomatic bacteriuria during pregnancy: Causative agents and their sensitivity in Rajshahi city. *The Journal of Teachers association RMC, Rajshahi* 2006;19(2):66-69.
9. Sabitri Sanyal, Arpana Bhattacharya. *Clinical pathology a practical manual.* 2nd ed. India: Elsevier;2008.p-261.
10. Shamweel Ahmed, Shehla Shakooh, Sajad Ahmad Salati, Abdul Muniem. Prevalence of asymptomatic bacteriuria among pregnant women in Kashmir. *Sri Lanka Journal of obstetrics and gynaecology* 2011;33:158-162.
11. Jennifer Perera. Asymptomatic bacteriuria in pregnancy. *Sri Lanka Journal of obstetrics and gynaecology* 2009;31:108-109.
12. R Marahatta, B Acharya Dhungel, P Pradhan, SK Rai and D Roy Choudhury. Asymptomatic bacteriuria among pregnant women visiting Nepal medical college teaching hospital, Kathmandu, Nepal. *Nepal Med Coll J.* 2011;13(2):107-110.
13. Humera Qudsia Fatima Ansari, Aruna Rajkumari. Prevalence of asymptomatic bacteriuria and associated risk factors among antenatal women attending a tertiary care hospital. *J Med Allied Sci* 2011;1(2):74-78.
14. M. Anayet Ullah, A. Barman, M. A. Siddique and A. K. M. E. Haque. Prevalence of asymptomatic bacteriuria and its consequences in pregnancy in a rural community of Bangladesh. *Bangladesh Med Res Counc Bull* 2007;33:60-64.
15. Urmila. Karya, Uzma. kausar, Manjul. Bhatnagar. Prevalence of asymptomatic bacteriuria among pregnant women and its association with pregnancy outcome. *Indian Journal of public health research and development.* Jan-Mar 2012; 3(1):168.
16. Lata R. Chandel, Anil kanga, kamlesh Thakur, Kiran K. Mokta, Anuradha Sood, Smriti Chauhan. Prevalence of pregnancy associated asymptomatic bacteriuria: A study done in a tertiary care hospital. *J Obstet Gynaecol India.* 2012 October;62(5):511-514.
17. S.V. Lavanya, D. Jogalakshmi. Asymptomatic bacteriuria in antenatal women. *Indian J Med Microbiol* 2002;20(2):105-6.
18. Assefa A, Asrat D, Woldeamanuel Y, G/Hiwot Y, Abdella A, Melesse T. Bacterial profile and drug susceptibility pattern of urinary tract infection in pregnant women at Tikur Anbessa specialized hospital Addis Ababa, Ethiopia. *Ethiop Med J.* 2008 Jul;46(3):227-35.
19. Masinde A, Gumodoka B, Kilonzo A, Mshana SE. Prevalence of urinary tract infection among pregnant women at Bugando medical centre. Mwanza, Tanzania. *Anzan J Health Res.* 2009 Jul;11(3):154-9.

20. C.A.Turpin, Bridget Minkah, K.A. Danso and E.H. Frimpong. Asymptomatic bacteriuria in pregnant women attending antenatal clinic at Komfo Anokye teaching hospital, Kumasi, Ghana. Ghana Medical Journal. March 2007. 41(1):26-29.

21. Paul Erhunmwunse Imade, Patience Emiolu Izekeor, Nosakhare Odeh Eghafona, Onaiwu Idahosa Enabulele, Endurance Ophori. Asymptomatic bacteriuria among pregnant women. N Am J Med Sci. 2010 June; 2(6):263-266.

22. Hanis S. Faidah, Ahmed M. Ashshi, Ghada A. Abou El-Ella, Ahmad K. Al-Ghumdi and AMR M. Mohamed. Urinary tract infections among pregnant women in Makkah, Saudi Arabia. Biomed. & Pharmacol. J. 2013; 6(1):01-07.

23. Betty A. Forbes, Daniel F. Sahm, Alice S. Weissfeld. Baily and Scott's Diagnostic Microbiology. 11th ed. USA: Mosby; 2002:932.

24. Kalantar Enayat, Farhadifar Fariba, Nikkho Bahram. Asymptomatic bacteriuria among pregnant women referred to outpatient clinics in Sanandaj, Iran. International Braz J Urol. Nov-Dec 2008; 34(6):699-707.

25. Wadland WC, Plante DA. Screening for asymptomatic bacteriuria in pregnancy. A decision and cost analysis. J Fam Pract 1989; 29:372-376.