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Incidence of Asymptomatic Bacteriuria During Pregnancy

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Abstract: Incidence of asymptomatic bacteriuria during pregnancy among Iranian women was examined. Midstream urine was collected from 380 pregnant women and streaked on blood agar and incubated for 24 to 48 h. Growth was considered significant if 10^5 mL^{-1} bacteria were present. Among the pregnant women, 10.1% had asymptomatic bacteriuria. Age, past history of abortion, proteinuria, level of education, number of fertility had no significant association with asymptomatic bacteriuria occurrence. But lower socioeconomic status, leucocytosis and a history of UTI were associated with an increased incidence of asymptomatic bacteriuria ($p<0.05$). The most frequently isolated pathogen was *Escherichia coli* (68.4%), followed by *Staphylococcus epidermidis* (10.5%)) and *Klebsiella pneumonia* (8.3%). According to the results, co-trimoxazole was the best antibiotic; followed by nitrofurantoin which 60.5 and 44.7% of strains were sensitive to these two antibiotics, respectively.

Key words: Asymptomatic bacteriuria, pregnancy, hamadan

INTRODUCTION

Asymptomatic bacteriuria associated with pregnancy has a direct bearing not only on the health of the woman, but also on the pregnancy[1,2]. Untreated asymptomatic bacteriuria is a well-established risk factor for the development of pyelonephritis, which is associated with an increase in fetal and maternal morbidity[3-7].

The importance of symptomatic and asymptomatic bacteriuria in pregnancy has been evaluated extensively[3,6,8]. The epidemiology of bacteriuria in pregnancy is similar to that seen in nonpregnant women[5,8]. The prevalence of asymptomatic bacteriuria in pregnancy varies from 2-11% and is similar to that observed in nonpregnant women[9,10]. In addition, many of the risk factors for bacteriuria in pregnant women are the same as those that contribute to symptomatic UTI in nonpregnant women. Some parameters that are commonly associated with increased incidence of asymptomatic bacteriuria are poor socioeconomic status, duration of pregnancy and multiparity[6]. Other factors, such as sexual intercourse and use of condoms with spermicidal jelly, increase the incidence of UTI[11,12].

We conducted a description analytical study to determine the incidence of the prevalence of asymptomatic bacteriuria in pregnant women in Hamadan-Iran.

MATERIALS AND METHODS

From February 2003 to June 2004 all pregnant women in the first three months of gestation who referred to 47 medical centers in Hamadan Iran were included in the study and tested for asymptomatic bacteriuria. Patients who had symptoms of lower urinary tract infection (except increased frequency alone) or who were taking antibiotics for any reason, or all pregnant women with gestation age of over first 3 months of pregnancy were excluded. The patients come from all areas, including Hamadan city and other cities, towns and villages. Most of the patients were of lower and lower-middle class economic status. A questionnaire was prepared including all parameters to be studied. Patient's history and physical examination were conducted according to this proforma.

Midstream urine samples were collected using sterilized bottles at the antenatal clinic. Urine samples were immediately transported to the laboratory. With a

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calibrated wire loop, urine was streaked on blood agar and incubated at 37°C for 24-48 h. Biochemical analysis of urine was carried out by the dipstick method. For microscopy, 5-7 mL of urine was centrifuged and sediment was analyzed.

A urine culture was defined as positive if the culture showed significant bacteriuria (10^5 cfu mL^{-1} of urine, regardless of the presence or absence of leucocytes). A culture w as defined as negative if there was no growth or if there was a pure culture of less than 10^5 cfu mL^{-1}. Colonies were identified by biochemical tests including: urease, MR-VP, Citrate, motility, H2S, carbohydrate fermentation and indole. Chi-squared and Fisher exact tests were used for statistical analysis.

RESULTS AND DISCUSSION

During the study period, 377 women were eligible and 38 women (10.1%) showed asymptomatic bacteriuria. The women were divided into three groups on the basis of their age and by increase in age the prevalence rate had decreased, so the prevalence was 13.8% in age group less than 21 years in compare with 3% in age group over 30 years, but there was no significant difference in difference age groups (Table 1). The majority of the women belonged to the middle and lower socioeconomic classes. There was significant difference ($p<0.05$), between socioeconomic status and asymptomatic bacteriuria in the two groups (Table 1).

To establish the relationship between level of education and incidence of asymptomatic bacteriuria, the women were divided into uneducated and educated groups. However, we found no correlation between level of education and the occurrence of asymptomatic bacteriuria in the two groups ($p>0.05$). To establish the relationship between asymptomatic bacteriuria and a past history of UTI, the study showed that 22.2% of patients with a history of UTI had asymptomatic bacteriuria, in compare with 9.1%of patients lacking a history of UTI and this difference was significant ($p<0.05$).

Evaluation of asymptomatic bacteriuria in relation to the number of fertility found that the incidence of asymptomatic bacteriuria in patients with one time fertility was 11.5%, while the least rate with 7.3% has been observed in patients with more numbers of fertility, but this difference was not significant.

The study shows that incidence of asymptomatic bacteriuria in patients with proteinuria was 2.63% in compare with 1.77% which was observed in women without asymptomatic bacteriuria, but this difference was not significant. Also 73.7% of pregnant women with asymptomatic bacteriuria had pyuria in compare with 17.3% in non-bacteriuric women and there was a significant relation between two groups ($p<0.05$).

Past history of abortion was one of the factors which were analyzed in this study, so that 13.2% of women with asymptomatic bacteriuria had a past history of abortion in compare with 12.1% in non-bacteriuric women.

The urinary pathogens isolated from the pregnant women were, *Escherichia coli* (68.4%), *Staphylococcus epidermidis* (10.5%), *Klebsiella pneumoniae* (8.3%), *Enterococcus faecalis* (5.3%), *Enterobacter cloacae* (2.5%), *Morganella morganii* (2.5%) and *Staphylococcus aureus* (2.5%).

Regarding antibiotics, the organisms exhibited significant sensitivity to co-trimoxazole, so that 60.5% of bacteria were sensitive to this antibiotic, also 5.3 and 34.2% were intermediate and resistance, respectively. The second antibiotic was nitrofurantoin and 44.7% of isolates were sensitive to this antibiotic. In contrast, 92.1% of strains were resistance to ampicillin (Table 1).

The physiological changes associated with pregnancy, such as the relaxation of the ureter under the effect of hormones which are trophoblastic in origin and increased urinary output, result in urinary stasis[3-7]. The chemical composition of urine is also affected and results in increased urinary concentration of substances, e.g., glucose and amino acids, which may facilitate bacterial growth. Furthermore, the enlarging uterus compresses the ureter as pregnancy advances[13-15].

The relationship between the incidence of asymptomatic bacteriuria and pregnancy has always been a subject of interest. The overall prevalence of asymptomatic bacteriuria in pregnancy ranges from 4 to 7%, although rates in certain groups of patients may vary from less than 2% to more than 10%[16,17]. In a meta-analysis of 19 studies, Romero *et al.*[18] reported that women with asymptomatic bacteriuria had a 54% higher risk of a low birth weight infant and twice the risk of a pre-term infant compared with non-bacteriuric women. Studies have consistently reported a decrease in acute pyelonephritis later in pregnancy from 20-30 to 2-4% for women who have been identified with asymptomatic bacteriuria in early pregnancy and treated[9,13-15].

In this study, the incidence of asymptomatic bacteriuria was significantly high; this higher rate may be due to the fact that the majority of the women belonged to the lower and middle socioeconomic groups. This is supported by a study from Saudi Arabia, which found that asymptomatic bacteriuria was higher among women of poor socioeconomic status (14.2%)[19]. Similarly, the incidence of asymptomatic bacteriuria among pregnant women in Nigeria has been reported as 23.9%[20]. These

Table 1: Incidence of asymptomatic bacteriuria according to patient´s characteristics

Results	Bacteriuric women		Non-bacteriuric women		Total	
Patient Characteristics	No	%	No	%	No	%
Age						
<21	23	13.8	144	86.2	167	100
21-30	14	7.9	163	92.1	177	100
>30	1	3	32	97	33	100
Education						
Undergraduate	16	11.2	127	88.8	143	100
Graduate	22	9.4	212	90.6	234	100
Income						
Lower	19	16.2	98	83.8	117	100
Middle	17	8.2	190	91.8	207	100
High	2	3.8	51	96.2	53	100
Number of fertility						
0	12	31.6	117	34.5	129	100
1	15	39.5	115	33.9	130	100
2	8	21.1	69	20.4	77	100
>2	3	7.8	38	11.2	41	100
History of abortion						
No	33	10	298	90	331	100
Yes	5	10.9	41	89.1	46	100
History of UTI						
No	32	9.1	318	90.9	350	100
Yes	6	22.2	21	77.8	27	100
Proteinuria						
No	37	10	333	90	370	100
Yes	1	14.3	6	85.7	7	100
Pyuria (leucocytosis)						
No	10	3.4	280	96.6	290	100
Yes	28	32.2	59	67.8	87	100

studies suggest that the higher standards of living in the industrialized world may contribute to the lower incidence rates of asymptomatic bacteriuria there.

The results of this study show that the incidence of asymptomatic bacteriuria is high among those who have a past history of asymptomatic bacteriuria Al-Sibai *et al.*[19] found that almost half (45.8%) of pregnant women suffering from asymptomatic bacteriuria had a past history of UTI. Similarly, we found that 22.2% had a past history of UTI.

It was suspected that various parameters, such as level of education, age, past history of abortion, proteinuria, number of fertility could be related to the incidence of asymptomatic bacteriuria, but we found no significant effect on its incidence. Similar findings have been reported by Attiulah *et al.*[21]. But lower socioeconomic status, leucocytosis and a history of UTI were associated with an increased incidence of asymptomatic bacteriuria and these differences were significant ($p<0.05$).

The most frequently isolated micro-organisms in our survey were similar to those in published results of other surveys and *E. coli* was still the dominant organism responsible for asymptomatic bacteriuria among women[5,7,9,13,16,18,22], but the bacterial spectrum has changed over the years and new organisms are being isolated in asymptomatic bacteriuria[5,7,9,13,16,18,23]. For example, coagulase-negative *Staphylococci* have been recognized as true pathogens and not just contaminants in asymptomatic bacteriuria and are recognized as important causes of UTIs and urinary tract complications, including stone formation. In addition, Gram-positive organisms, including group B *Streptococci* and *Enterococci* recently received more attention and have been isolated as causing bacteriuria and UTIs but are infrequently associated with asymptomatic bacteriuria.

The changing sensitivity of bacteria to antibiotics should be noted. In the most of patients, the organisms showed resistance to ampicillin (92.1%). The sensitivity of the urinary pathogens seen in pregnancy in our study was high for co-trimoxazole (60.5%) followed by nitrofurantoin (44.7%) and also to quinolones. It has been reported that quinolones can also be given in pregnancy in a controlled fashion after weighing the benefits and risks[24].

Because we saw a significant percentage of patients with asymptomatic during pregnancy and in another hand asymptomatic bacteriuria in pregnancy is clearly associated with the risk of developing symptomatic pyelonephritis later in the pregnancy and may be associated with other maternal and fetal complications of pregnancy, it is recommended that urine examination for

detection of bacteriuria be performed as part of antenatal care. If this is not economically possible, at least women who have a past history of UTI should be examined as asymptomatic bacteriuria is higher among such women.

In summary, these findings provide baseline information for further surveillance in association with prevention programmes in pregnant women.

REFERENCES

1. McGrady, G.A., J.R. Daling and D.R. Peterson, 1985. Maternal urinary tract infection and adverse fetal outcomes. Am. J. Epidemiol., 121: 377-381.
2. DeBaun, M., D. Rowley, M. Province, J.W. Stockbauer and F.S. Cole, 1994. Selected antepartum medical complications and very-low-birth-weight infants among black and white women. Am. J. Public Health, 48: 149-157.
3. Mathai, E., R.J. Thomas, S. Chandy, M. Mathai and S. Bergstrom, 2004. Antimicrobials for the treatment of urinary tract infection in pregnancy: Practices in Southern India. Pharmacoepidemiol. Drug Safety, 13: 645-652.
4. McFadyen, I.R., S.J. Eykyn, N.H. Gardner, T.M. Vanier, A.E. Bennett, M.E. Mayo and R.W. Lioyd- Davies, 1973. Bacteriuria in pregnancy. J. Obstet. Gynaecol. Br. Commonwealth, 80: 385-405.
5. McFadyen, I.R., 1986. Urinary Tract Infection in Pregnancy. In: The Kidney in Pregnancy. Ed. Andreucci, V.E. Boston: Martinus Nijhoff Inc, pp: 205-229.
6. Van Dorsten, J.P. and E.R. Bannister, 1986. Office diagnosis of asymptomatic bacteriuria in pregnant women. Am. J. Obstet Gynecol.,155: 777-780.
7. Sheikh, M.A., M.S. Khan, A. Khatoon and G.M. Arain, 2000. Incidence of urinary tract infection during pregnancy. East Mediterr Health J., 6: 265-271.
8. Patterson, T.F. and V.T. Andriole, 1997. Detection, significance and therapy of Bacteriuria in pregnancy; update in the managed health care era. Infect. Dis. Clin. North Am., 11: 593-608.
9. Patterson, T.F. and V.T. Andriole, 1987. bacteriuria in pregnancy. Infect. Dis. Clin. North Am., 1: 807-822.
10. Norden, C.W. and E.H. Kass, 1968. Bacteriuria of pregnancy - A critical appraisal. Ann. Rev. Med., 19: 431-470.
11. Fihn, S.D., R.H. Latham, P. Roberts, K. Running and W.E. Stamm, 1985. Association between diaphragm use and urinary tract infections. J. Am. Med. Assoc., 254: 240-245.
12. Peddie, B.A., S.I. Gorrie and R.P. Bailey, 1986. Diaphragm use and urinary tract infection. J. Am. Medi. Assoc., 255: 270.
13. Little, P.J., 1966. The incidence of urinary infection in 5,000 pregnant women. Lancet, 2: 925-928.
14. Kincaid-Smith, P. and M. Buller, 1965. Bacteriuria in pregnancy. Lancet, 1: 395-399.
15. Campbell-Brown, M., I.R. McFadyen, D.V. Seal and M.L. Stephenson, 1987. Is screening for bacteriuria in pregnancy worth while? Br. Med. J. Clin. Res., 294: 1579-1582.
16. Lucas, M.J. and F.G. Cunningham, 1993. Urinary infection in pregnancy. Clin. Obstet. Gynecol., 36: 855-868.
17. Stenqvist, K., I. Dahlen-Nilsson, G. Lidin-Janson, K. Lincoln, A. Oden, S. Rignell and C. Svanborg Eden, 1989. Bacteriuria in pregnancy. Am. J. Epidemiol., 129: 372-379.
18. Romero, R., E. Oyarzun, M. Mazor, M. Sirtori, J.C. Hobbins and M. Bracken, 1989. Meta-analysis of the relationship between asymptomatic Bacteriuria and preterm delivery/low birth weight. Obstet. Gynecol., 73: 576-582.
19. Al-Sibai, M.H., A. Saha and P. Rasheed, 1989. Socio-biological correlates of Bacteriuria in Saudi pregnant women. Public Health, 103: 113-121.
20. Olusanaya, O., A. Ogunledun and T.A. Fakoya, 1993. Asymptomatic significant bacteriuria among pregnant and non-pregnant women in Sagamu, Nigeria. West African J. Medi., 12: 27-33.
21. Atiullah, N., F.F. Fikree and I. Hussain, 1998. An epidemiologic study of cystitis among Muslim women attending an outpatient clinic in Karachi. J. Pak. Med. Assoc., 48: 35-37.
22. Tan, J.S. and T.M. File Jr, 1990. Urinary tract infections in infections in obstetrics and gynecology. J. Reprod. Med., 35: 339-342.
23. Hovelius, B. and P. Mardh, 1984. Staphylococcus saprophyticus: A common cause of urinary tract infection. Rev. Infect. Dis., 6: 328-337.
24. Berkovitch, M., A. Pastuszak, M. Gazarian, M. Lewis and G. Koren, 1994. Safety of the new quinolones in pregnancy. Obstet. Gynecol., 84: 535-538.