ASYMPTOMATIC BACTERIURIA AND PYURIA IN PREGNANCY

M. Rahimkhani[1]*, H. Khavari-Daneshvar[2] and R. Sharifian[1]

1) Faculty of Allied of Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran
2) Cancer Researches Center, Cancer Institute, Tehran University of Medical Sciences, Tehran, Iran

Abstract- Pregnant women are at increased risk for urinary tract infection (UTI) but in many cases infection is asymptomatic. This study was performed to determine the incidence of asymptomatic bacteriuria and pyuria in pregnant women. A total of 86 pregnant women during first trimester and 56 nonpregnant women were evaluated. All subjects were clinically identified to have no signs and symptoms of UTI. Clean catch midstream urine samples were collected for both groups. Urine samples were examined microscopically and were cultured. Bacteriological examination revealed asymptomatic bacteriuria in 25 (29.1%) and 3 (5.4%) of the study group and controls, respectively ($P < 0.05$). Microscopic analysis of urine revealed pyuria in 18 (20.9%) and 3 (5.4%) of the study group and controls, respectively ($P < 0.05$). In study group, *Escherichia coli* were found in 20%, *Staphylococcus epidermidis* in 36%, *Staphylococcus haemolyticus* in 12%, streptococcus group D in 12%, *Staphylococcus saprophyticus* in 12% and *Proteus mirabilis* in 8%. In control group, *E. coli* were found in 33.3% and *S. epidermidis* in 66.7%. Our results show that the incidence of asymptomatic bacteriuria is significantly higher in pregnant women than nonpregnant women. The main finding in the present study was that 29.1% of the pregnant women who were in first trimester had asymptomatic bacteriuria which is much higher than figures reported from other countries. The use of microscopic urinanalysis was not an effective method of detecting asymptomatic bacteriuria and urine culture is necessary for screening these pregnant women.

Acta Medica Iranica 2008; 46(5): 409-412.

Key words: Pregnancy, asymptomatic bacteriuria, pyuria, urine culture

INTRODUCTION

A urinary tract infection (UTI), also called bladder infection, is a bacterial inflammation in the urinary tract. UTI is a serious health problem affecting millions of people each year.

Infections of the urinary tract are common (only respiratory infections occur more often). Women have a higher risk of developing a UTI than men; approximately 50% to 70% of women will have UTI during their lifetimes, and 20% to 30% of women will have recurrent episodes (1).

Pregnant women are at increased risk for UTI (starting in week 6 through week 24), because uterus sits directly on top of the bladder and displaces it. Shift in the position of the urinary tract and hormonal changes during pregnancy make it easier for bacteria to travel up the urethras to the kidneys. For these reasons, many doctors recommend periodic testing of urine.

In many cases, however, pregnant women with positive urinary tests have no symptoms of UTI. Presence of bacteria in urine without symptoms is known as an asymptomatic bacteriuria and presence

Received: 28 Feb. 2007, Revised: 2 Sep. 2007, Accepted: 13 Jan. 2008

*** Corresponding Author:**
Monireh Rahimkhani, Faculty of Allied of Medical Sciences, Tehran University of Medical Sciences, Tehran, Iran, Ghods st, Poorsina st, P.O.Box:14155-4331
Tel: +98 21 88964009, 09124253368
Fax: +98 21 88964009
E-mail: rrahimkhani@sina.tums.ac.ir

of leukocytes in urine is called pyuria. Asymptomatic bacteriuria is common during pregnancy. Its average prevalence is 6%. It is an important risk factor for low birth weight and prematurely (2, 3). Therefore, if causative bacteria are detected in urine, pregnant women will be treated even if symptoms are not present.

This study was performed to determine the incidence of asymptomatic bacteriuria and pyuria in pregnant women to gain insight into the prevalence rate, clinical characteristics and microbiological assessment of the causative agents (3).

MATERIALS AND METHODS

A total of 86 pregnant women referred and evaluated for an initial obstetric examination during first trimester of pregnancy were evaluated. Fifty-six non-pregnant control women were also included in this study. All participants were screened for significant asymptomatic bacteriuria (colony count >100000 CFU/ml) and pyuria (WBC > 10/HPF). The study was approved by Ethics Committee of Tehran University of Medical Sciences and written informed consent was obtained from all subjects.

All the subjects were clinically identified to have no signs and symptoms of UTI. Clean catch midstream urine samples were collected for both groups. Urine samples were examined microscopically and cultured by placing on EMB agar, M.C. agar and blood agar culture media and incubated for 24 hours (sometimes extended to 48 hours) at 37° C. Isolated organisms were identified by standard laboratory techniques and were tested for antimicrobial sensitivity. *In vitro* susceptibility testing was performed using the Kirby Bauer disc method.

Microscopic urinalysis applied to determine the rate of leukocytes and bacteria in sedimented urine. Pyuria was defined as existence of more than 10 leukocytes per high-power field.

Data were analyzed with SPSS 10.5 (SPSS Inc). $P < 0.05$ was considered statistically significant.

RESULTS

In this study, 86 pregnant and 56 non-pregnant control women were screened for significant, asymptomatic bacteriuria and pyuria. All the subjects were clinically identified to have no signs and symptoms of UTI. The age ranges of the study and control group were 17 to 38 years and 20 to 35 years, respectively; with means of 26.8 (SD = 5.53) and 27.6 (SD = 5.62) years for case and control groups, respectively.

Bacteriological screening revealed that 25/86 (29.1%) in the study group and 3/56 (5.4%) in control group were positive for asymptomatic bacteriuria ($P < 0.05$, Fischer test). Microscopic analysis of urine revealed that 18/86 (20.9%) in the study group and 3/56(5.4%) in the control group had pyuria (> 10 leukocyte per high-power field) ($P < 0.05$, Fischer test).

Further biochemical species identification in study group showed *Escherichia coli* in 5/25 (20%) followed by *Staphylococcus saprophyticus* in 3/25 (12%), *Staphylococcus epidermidis* in 9/25 (36%), *Staphylococcus haemolyticus* in 3/25 (12%), Streptococcus group D in 3/25 (12%) and *Proteus mirabilis* in 2/25 (8%) cases (Table 1).

In the control group, biochemical species identification showed *E. coli* in 1/3 (33.3%) and *S. epidermidis* in 2/3 cases (66.7%).

Table 1. Bacterial agents in asymptomatic bacteriuria in pregnant and no pregnant women*

Subjects	*E. coli*	*S. saprophyticus*	*S. epidermidis*	*S. haemolyticus*	Strep. Group D	*P. mirabilis*	Total
Pregnant	5 (20%)	3(12%)	9(36%)	3(12%)	3(12%)	2(8%)	25(100%)
No pregnant	1 (33.3%)	--	2(66.7%)	--	--	--	3(100%)
Total	6 (21.4%)	3(10.7%)	11(39.3%)	3(10.7%)	3(10.7%)	2(7.1%)	28(100%)

*Data are given as number (percent).

DISCUSSION

Normal urine is sterile. It contains fluids, salt and waste products, but is free of bacteria, viruses and fungi. An infection occurs when microorganisms, usually bacteria from the digestive tract, climb the opening of the urethra and begin to multiply. Most infections arise from one type of bacteria, *E. coli* which normally live in the colon. The urinary system is structured in a way that prevents entry of infection. The ureters and bladder normally prevent urine from backing up toward the kidneys, and the flow of urine from the bladder help wash bacteria out of the body (4).

Bladder and urinary tract infection symptoms are the same whether a woman is pregnant or not. A UTI or bladder infection can cause a burning sensation or a strong urinary odor during urination. Blood may be present in the urine. A UTI also causes increased urination. More frequent urination is normal for pregnancy, however, and pregnant women may dismiss this symptom if no other UTI symptoms are present (5). The urinary tract undergoes profound physiologic and anatomic changes during pregnancy that facilitate the development of symptomatic urinary tract infections in women with bacteruria.

The adverse effects of asymptomatic bacteriuria on maternal and fetal health continue to be debated. It is clear that asymptomatic bacteriuria is the major risk factor for developing symptomatic urinary tract infection and symptomatic infection is associated with significant maternal and fetal risks. Because the majority of symptomatic urinary tract infections develop in women with bacteriuria earlier in pregnancy, treatment of bacteriuria is undertaken to prevent symptomatic infections. All women should be screened at the antenatal visit, which is reliably and inexpensively done with a dipstick culture. Short-course therapy is as effective as prolonged therapy and should be followed with a repeat to documentation of the bacteriuria. Failure to eliminate bacteriuria with repeated therapy or recurrence by the same organism is indicative for renal parenchymal infection or a structural abnormality. All women with persistent bacteriuria or recurrent infection should have follow-up cultures and a complete urologic evaluation after delivery (6).

A urinary tract infection itself is no threat to a pregnant woman or the fetus, but a UTI may spread to the bladder. From the bladder, the infection can spread to the kidneys, where it can cause pregnancy complications. Once a UTI infects the bladder and kidneys, a pregnant woman is at the risk of hypertension, preeclampsia, anemia (low red blood cell count) and amnionitis: an infection of the amniotic membrane. Bladder and kidney infections increase the chance of premature labor, premature birth and low birth weight (7). Fortunately, prompt treatment of bladder and urinary tract infections in most pregnant women usually prevents kidney infection. To avoid UTI complications during pregnancy, a pregnant woman should contact her doctor immediately (8).

The main finding in the present study was that, about 29.1% of the pregnant who were in the first trimester, had asymptomatic bacteruria, which is much more than which was reported in the same papers from other countries. Baleiras *et al.* had suggested that the prevalence ranging of asymptomatic bacteriuria in pregnant women was 5% to 10% (9). In a Turkish clinical unit, Kutlays had suggested that the prevalence of ASB was 10.6 % of pregnant women, admitted for an initial obstetric examination during the first trimester (10).

In our study *S. epidermidis* was predominant organism that was isolated from urine of pregnant women with asymptomatic bacteriuria. All of the subjects with asymptomatic bacteriuria, have pyuria but in four pregnant women with asymptomatic bacteriuria, pyuria was not found. The use of microscopic urine analysis was not a clinically effective alternative method of detecting asymptomatic bacteriuria, so urine culture is necessary for screening these pregnant women.

The aim of treatment is to maintain sterile urine throughout pregnancy without causing toxicity to mother or fetus. However, the best mode of achieving this aim is still unclear (11). In low come countries this situation is further complicated by lack of data in drug resistance to bacterial UTI in pregnancy, cost of drugs and relative inaccessibility to information on safety and efficacy of newer antimicrobials. Antibiotics are the usual treatment for bladder infections and other urinary tract

infections. Seven to ten days of antibiotic therapy is usually required, although some infections may require only a single dose of antibiotics. It is important that all of the antibiotics should be taken as prescribed and not be stopped before completing of the treatment (12).

This paper is a case-controlled study, matched ages and absence of symptoms of urinary tract infection, which examined for bacteriuria and pyuria among pregnant women. Our results show that the incidences of asymptomatic bacteriuria were significantly higher in pregnant women in first trimester than nonpregnant women. Thus asymptomatic bacteriuria in these pregnant women can lead to acute, symptomatic UTI, including acute pyelonephritis, which in turn is associated with preterm labor and low birth weight. Therefore, early screening for asymptomatic bacteriuria in pregnancy especially in the first trimester by methods with high sensitivity and treatment with appropriate antimicrobial regimens can decrease the risk of asymptomatic urinary tract infection.

Conflict of interests

The authors declare that they have no competing interests.

REFERENCES

1. Gupta K, Hooton TM, Roberts PL, Stamm WE. Patient-initiated treatment of uncomplicated recurrent urinary tract infections in young women. Ann Intern Med. 2001 Jul 3; 135(1):9-16.
2. Abyad A. Screening for asymptomatic bacteriuria in pregnancy: urinalysis vs urine culture. J Fam Pract. 1991 Nov;33(5):471-474.
3. Gebre-Selassie S. Asymptomatic bacteriuria in pregnancy: epidemiological, clinical and microbiological approach. Ethiop Med J. 1998 Jul; 36(3):185-192.
4. Hägglund D, Olsson H, Leppert J. Urinary incontinence: an unexpected large problem among young females. Results from a population-based study. Fam Pract. 1999 Oct;16(5):506-509.
5. Lee BE, Chawla R, Langley JM, Forgie SE, Al-Hosni M, Baerg K, Husain E, Strong J, Robinson JL, Allen U, Law BJ, Dobson S, Davies HD. Paediatric Investigators Collaborative Network on Infections in Canada (PICNIC) study of aseptic meningitis. BMC Infect Dis. 2006 Apr 10;6:68.
6. Patterson TF, Andriole VT. Bacteriuria in pregnancy. Infect Dis Clin North Am. 1987 Dec;1(4):807-822.
7. Niduvaje K, Amutha C, Roy J. Early neonatal streptococcal infection. Indian J Pediatr. 2006 Jul; 73(7):573-576.
8. Callahan TL, Caughey AB, Heffner LJ. Blueprints in obstetrics and gynecology. 2nd Edition. MA: Blackwell publishing; 2001.
9. Baleiras C, Campos A, Lourenço I, Revez AI. [Urinary tract infections and pregnancy]. Acta Med Port. 1998 Oct;11(10):839-846. Portuguese.
10. Kutlay S, Kutlay B, Karaahmetoglu O, Ak C, Erkaya S. Prevalence, detection and treatment of asymptomatic bacteriuria in a Turkish obstetric population. J Reprod Med. 2003 Aug;48(8):627-630.
11. De Wals P. Immunization strategies for the control of serogroup C meningococcal disease in developed countries. Expert Rev Vaccines. 2006 Apr;5(2):269-275.
12. Mathai E, Thomas RJ, Chandy S, Mathai M, Bergstrom S. Antimicrobials for the treatment of urinary tract infection in pregnancy: practices in southern India. Pharmacoepidemiol Drug Saf. 2004 Sep; 13(9):645-652.