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RESEARCH ARTICLE

Prevalence of Asymptomatic Bacteriuria in Pregnant Women in AL-Kharj city, Saudi Arabia

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Abstract

Objective: The aim of this study was undertaken to determine the incidence of asymptomatic bacteriuria (ASB) during pregnancy and its prevalence in the three trimesters, also to find out the optimal screening weeks for asymptomatic bacteriuria.

Subjects and Methods;

A total of 1534 healthy pregnant women who were attending the antenatal clinic of the Department of Obstetrics and Gynaecology at Salman Bin Abdulaziz university hospital and king Khaled hospital .with no urinary tract complaints for a regular prenatal care were evaluated for bacteriuria. The study carried out between December 1st, 2013 and September 30, 2014 during this period 1534 pregnant women were involved. After perineal cleaning, urine sampled was obtained from all patients for culture and microscopic evaluation. Approximately one ml urine was sampled using mid –stream catch technique. Patients with bacteriuria counts over 10⁵ with the mid –stream catch technique were considered to have asymptomatic bacteriuria (ASB). Patients fulfilling the criteria for bacteriuria were treated with either ampicillin 500 mg three times daily or cephalosporin 250 mg four times daily for one week, depending on the in- vitro sensitivity tests.

Results; the frequency of asymptomatic bacteriuria (ASB) was 8%. E. coli was isolated as the pathogenic organism in 83.7% of the cases with ASB. ASB was found to be more frequent in patients between 20 -30 years old (p<0.001). ASB was diagnosed in 123 patients; 34 were in the first trimester, 50 were in second trimester and 39 were in third trimester. Clustering in the second trimester was found to be statistically significant (p<0.05). Maximum peak of bacteriuria was found at 18th week of gestation.

Conclusion: Prevalence rate of ASB in the first, second, and third trimester was 2.2%, 3.2% and 2.5% respectively. The women between 20 -30 years high frequent bacteriuria (p. <0.001). Women with no bacteriuria in their initial examination in the first trimester developed bacteriuria in the later trimesters. We therefore, suggest that it would be prudent to screen pregnant women for bacteriuria in second and third trimesters. The 18th week of gestation is the optimal time for a single screen of bacteriuria.

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INTRODUCTION

Urinary tract infection (UTI) is a common health problem among women compared with men due to shorter urethra, closer proximity of the anus with vagina, and pathogen entry facilitated by sexual activity (Feitosa DCA ,2009 ; Abdullah AA ,2005). It is estimated that one in three women of childbearing age contracts UTI (Duarte G, 2008), which may manifest symptoms or remain asymptomatic. Pregnant women are more susceptible to UTI, owing to altered anatomical and physiological state during pregnancy (Abdullah AA, 2005).

Asymptomatic bacteriuria (ASB) is a presence of a significant quantity of bacteria in a properly collected urine specimen from a person without symptoms or signs of UTI (Schnarr J, 2008). A prevalence of asymptomatic UTI ranging from 2% to 15% was reported compared to symptomatic UTI in pregnant women (Ipe DS, 2013). Socioeconomic factors and history of asymptomatic urinary tract infection were related with UTI in pregnancy (Turck M, 1962; Nicolle LE, 1994). About 30% of women with untreated asymptomatic bacteriuria during pregnancy develop pyelonephritis [3], which might lead to delivery of premature or low-birth-weight infants (Schults R, 1991). We proposed to identify the frequency of bacteriuria in our pregnant population and its prevalence in the three trimesters and relationship with age, parity, educational level, and past history of UTI, and to find out the optimal screening weeks for asymptomatic bacteriuria.

Subjects and Methods;

The study was done on the pregnant women attending the antenatal clinic of the Department of Obstetrics and Gynaecology at our tertiary hospital. The study carried out between December 1st, 2013 and September 30, 2014 during this period 1534 pregnant women were involved. The women were asked about their age, parity, educational level, past history of urinary tract infection (UTI). They were also asked about present symptoms that were suggestive of UTI. Women with UTI excluded from the study. The women were asked to clean the perineum with a sterile soap-soaked sponge and collect a Mid- Stream urine sample from morning urine in a sterile container. These were transported within the hour to the microbiology laboratory for processing (urine analysis and culture). All urine specimens were cultured on 5-7% human blood agar and Eosine Metilen Blue (EMB) plates, and incubated at 37 °C for 18-24 h before directing quantitative bacterial counts. Those women with urine specimens containing $\geq 10^5$ organisms/ml of a single species were considered to have significant bacteriuria.

These investigation was repeated in all three trimesters, in first trimester was done at booking, in second trimester done between 16-20 weeks, in third trimester done between 32-36 weeks. Asymptomatic bacteriuria (ASB) was defined as presence of significant bacteriuria in the urine culture without any presenting symptoms. Symptomatic bacteriuria was defined as presence of significant bacteriuria in the urine culture with the patient presenting at least one of the following symptoms: dysuria; frequency; urgency; nocturia; haematuria; or lower abdominal pain. Patients were treated for seven days with ampicillin 500 mg three times daily or cephalosporin 250 mg four times daily according to the results of antibiotic sensitivity tests. Repeat cultures were obtained one week after the completion of the antibiotic therapy and patients with no growth on control cultures were considered successfully treated. Data were evaluated by chi-square test, Fisher's exact test and Z test (Z test used for comparison between the two percentages) A P value less than 0.05 was considered significant.

Result;

The mean age of the pregnant women was 27.47 ± 5.93 . Of the 1534 pregnant women, 123(8%) had bacteriuria.

The bacteriuria rate was 12.8% in women between 20 -30 years compared with 3.1% and 5.4% in women younger than 20 years of age and >30 years, respectively ($p < 0.001$)

(Table 1).

Nulliparous women showed higher frequency of bacteriuria compared with those had at least one delivery (parous women). Bacteriuria did not have significant relation with level of education ($P = 0.31$) and body mass index (BMI) ($P = 0.39$).

Bacteriuria was significantly associated with parity; 12.7% in nulliparous women compared with 5.1%, 4.3% and 5.8% in women with one delivery, two deliveries and > two deliveries respectively ($p < 0.001$) (table 1).

ASB were diagnosed in 34 cases in the first trimester with a prevalence rate of 2.2%, 50 cases in the second trimester with a prevalence rate of 3.2%, and 39 cases in the third trimester with a prevalence rate of 2.5%.

Women enrolled in the study were monitored throughout their pregnancy beginning with first trimester. As to trimester distribution of 123 women with ASB, 34 were in the first trimester (27.6%), 50 were in the second trimester (40.6%), and 39 were in the third trimester (31.7). The difference between first and third trimester not statistically significant, however the difference between first and second trimester was statistically significant ($P < 0.05$) (table 2).

The maximum peak of bacteriuria was seen at 18th week of gestation (figure 1). The frequency of previous UTI was examined for a possible relationship with bacteriuria. Of the total clinical population, 26.9% (414/1534) had had a history of UTI; of these 8.4% (35/414) had bacteriuria on the other hand, 7.8% (88/1120) of the women with no past history of UTI were bacteriuria. Bacteriuria frequency did not show statistically significant according to past history of UTI ($P > 0.05$). Incidence of UTI in our study 31.4% (11/35) in women with bacteriuria and had a history of UTI compared to 8.2% (31/379) in women without bacteriuria and no history of UTI ($P = 0.002$) which is statistically significant.

Incidence of UTI in women with bacteriuria and no history of UTI 10.2% (9/88) compared to 3.1% (32/1032) in women without bacteriuria and no history of UTI ($P = 0.003$) which is statistically significant.

Incidence of UTI in women with bacteriuria and had history of UTI 31.4% compared to women with bacteriuria and no history of UTI ($P = 0.013$) which is statistically significant. (Table 3)

Culture results of the 123 women with ASB revealed most common organism is *E. coli* 83.7%; second common organism is group B streptococcus 8.1%. (Table 4)

Patients with bacterial growth in their cultures were treated for seven days with either penicillin or cephalosporin according to the results of antibiotic sensitivity tests. No growth was observed on repeat cultures taken one week after termination of therapy and recurrence were observed in ten patients throughout their pregnancies. Pyelonephritis was observed in eight patients with ASB (8/20), and the remains of patients develop any other urinary tract infections.

Patients Characteristic of ASB in pregnant women (Table 1)

Characteristic	Positive urine culture %	Total NO.	P
Age, y			
• <20	12(3.1%)	383	P < 0.001
• 20-30	84(12.8%)	655	
• >30	27(5.4%)	496	
Parity			
• Nulliparous	72(12.7%)	565	P < 0.001
• Para 1	14(5.1%)	272	
• Para 2	11(4.3)	254	
• >para 2	26(5.8)	443	
BMI, Kg/m²			
• <20	18(5.9%)	302	P = 0.310*
• 20-25	52(8.2%)	634	
• >25	53(8.8%)	598	

Education			
• Illiterate	3(3.3%)	90	P=0.392*
• Primary education	44(8.3%)	525	
• Second education	45(8.4%)	530	
• High school education	30(7.7%)	589	
Total	123	1534	

*Not significant

Prevalence and distribution of ASB according to trimesters (Table 2)

	1st trimester	2nd trimester	3rd trimester
• Number of patients with ASB	34	50	39
• Prevalence of cases according to the trimester (%)	2.2	3.2**	2.5
• Distribution of cases according to the trimester (%)	27.6	40.6**	31.7

**P <0.05; ASB: asymptomatic bacteriuria

The relationship between previous history of UTI, ASB, UTI in pregnancy (Table 3)

previous history of UTI		ASB		UTI in pregnancy		
history	NO.	Finding	NO.	-ve NO.	+ve NO.	P
Positive	414	Positive	35	24 68.6%	11 31.4%	P=0.002*
		Negative	379	348 91.8%	31 8.2%	
Negative	1120	Positive	88	79 89.8%	9 10.2%	P=0.003*

		Negative	1032	1000 96.9%	32 3.1%	
Total	1534		1534	1451	83	

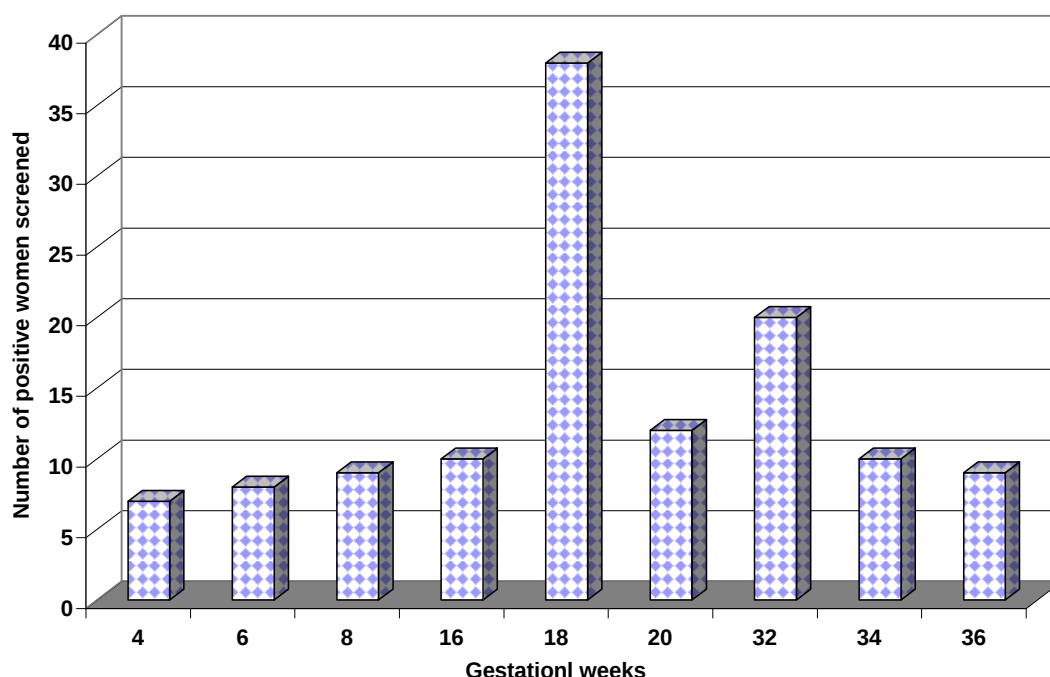
*P<0.001; NO.: number, +ve: positive, -ve: negative

Microbiology of bacteriuria in pregnancy (Table 4)

Organisms	Number	%
1. Gram —negative		
• E. coli	103	83.7%
• Klebsiella	5	4%
• Pseudomonas	4	3.3%
• Enterobacter	1	0.8%
2. Gram —positive		
• group B streptococcus	10	8.1%

Figure 1

Relationship between the gestational weeks with bacteriuria (defined as number of positive urine culture/gestational weeks)



Discussion;

Most of the anatomic and physiologic changes in pregnancy influence the urinary tract and can result in urologic diseases and changes in kidney function, which are serious threats for both mother and fetus. ASB must be treated during pregnancy in order to prevent complication such as Pyelonephritis, premature labor, hypertension, pre-eclampsia and septicaemia (Raz R, 2003) Incidence of ASB shows great variation depending on socio-economic status, quality of medical care, age, parity, methods used in screening, and definition of bacteriuria. In our study, the frequency of bacteriuria in pregnancy was 8% similar to study performed in turkey (Tugrul S, 2005), in their study 110 pregnant women were evaluated and the prevalence of ASB was reported to be 8.1% and was higher in women older than 25 years, which agree with our study, but in their studying prevalence of bacteriuria being more prevalent in third trimester which is contrast our study prevalence more in second trimester. In another study, 270 pregnant women were evaluated and prevalence of ASB was reported to be 9.3% (Uncu Y, 2002).

In other studies frequency of bacteriuria in pregnancy were reports of 14.2% from Saudi Arabia (al-Sibai H, 1989) and 16.7% from Trinidad and Tobago (Orrett FA, 1995), higher rate in their studies may be due to low socio-economic status, under utilization of health care facilities, poor hygiene practices. The women with bacteriuria, about one-third were asymptomatic; this supports the concept suggested by Kass (Kass EH, 1978) that UTI cannot diagnosed by symptoms alone (al-Sibai H, 1989). Some studies have shown a higher prevalence of bacteriuria in teenage pregnant women (al-Sibai H, 1989; Orrett FA, 1995), while other researchers were observing a progressive rise in the prevalence of bacteriuria with increasing age (Foxman B, 2002). In our study, bacteriuria frequency higher among women between 20 -30 years old (12.8%) which is statistical significant ($P < 0.001$), we can explain prevalence common in this age in our study because this age is suitable age for women for pregnancy. It is known that some factors, such as lower socio-economic status, increased parity and increased maternal age, increase the prevalence of bacteriuria (Uncu Y, 2002; al-Sibai H, 1989; Qureshi RN, 1994) some researchers observed no association between bacteriuria and parity (Qureshi RN, 1994). The most studies showed that bacteriuria was higher in multiparous women than in nulliparous women (Razzaque SM, 1977; Andriole VT, 1991), in our study showed that nulliparous

women higher frequency of bacteriuria ($P < 0.001$). We can explain common in nulliparous in our study probably due to two reasons: 1) honeymoon cystitis, which not treated or under treated. 2) Abnormal sexual behavior.

In 1989 Stenqvist et al; evaluated the relationship between the duration of gestation and risk of bacteriuria in 3254 pregnant women with finding of 0.8% at the 12th week and 1.93% at term. According to their finding the peak risk of bacteriuria was between the 9th and 17th weeks and, therefore, they have recommended starting screening for bacteriuria at 16th week. In our study (Stenqvist K, 1989) incidence peaked in the second trimester with maximum peak of bacteriuria seen at 18th week of gestation. We therefore, feel that screening for ASB is necessary in second and third trimesters. According to distribution of ASB to the time of gestation, 34 were in the first trimester (27.6%), 50 were in the second trimester (40.6%), and 39 were in the third trimester (31.7). The difference between first and third trimester was not statistically significant, however the difference between first and second trimester was statistically significant ($P < 0.05$) (table 2). Gils trap et al (CHstrapLC, 1981) reported an ASB rate of 67% and Cunningham et al (Cunningham FG, 1984) the rate 98% in second and third trimester. In our study, 72.3% of the cases were diagnosed in second and third trimester. With enlargement of the uterus intraperitoneal pressure increase and with increase gestational age serum progesterone level increase. As a result, as pregnancy progress, the risk for UTI increases. The pathogenic organism in most of the reported cases of UTI during pregnancy is *E. coli* with a range of 60-90 %. *Klebsiella*, *Proteus*, another Gram —negative bacteria, *B hemolytic streptococci* and anaerobes follow. Gold et al; reported an isolation rate of 70% for *E. coli*; while the rate was reporting by Manson et al; was 90% and the rate reported by Low et al; was 60% (Cunningham FG, 1997) . In our study the isolation rate for *E. coli* was 83.7 %.(Table 2)

In our study, 26.9% of pregnant women had a past history of UTI, which is similar to the observations of other researcher, 30.3% in Saudi Arabia, 30% in Trinidad (al-Sibai H, 1989; Orrett FA, 1995) In Little's study (Little PJ, 1966) , 23.4% of bacteriuric women had a past history of UTI (Orrett FA, 1995) .

No significant difference was found between women with past history of UTI compared with women with no such history.

Conclusion;

Bacteriuria was present in about 8% of our antenatal attending women but this small percentage contributor substantially to the total population of pregnant women with UTI. A combination of both asymptomatic bacteriuria and previous history of UTI signifies a considerable risk to develop the infection in pregnancy, further testing and antibiotic prophylaxis is therefore more worthwhile in this group. The 18th week of gestation is the optimal time for a single screen of bacteriuria but around one third of all women who develop bacteriuria in late pregnancy will be missed.

Women at increased risk of Pyelonephritis should be screened for asymptomatic bacteriuria every four weeks throughout pregnancy.

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