

Incidence of Asymptomatic Bacteruria in Pre-Term Pregnancy; A Case Controlled Clinical Study

AHMED H. ELSAWAF, M.D.*; REDA I. RIAD, M.D.*; DALIA S. ABO-ELFOTOUH, M.D.** and
NORA M.M. ALI, M.Sc.***

The Departments of Obstetrics & Gynecology and Microbiology**, Faculty of Medicine, Cairo University and
Obstetrics & Gynecology Department, Dar Elsalam Hospital***, Cairo*

Abstract

Background: Asymptomatic bacteruria (ASB) has been reported to be a risk factor for pre-term labour.

Objective: The aim of this study is to assess the prevalence of ASB in pregnant women presenting with preterm labour in Kasr Al-Aini OBGYN hospital and to determine the common pathogenic micro organisms associated with ASB and their antibiotic sensitivity.

Design and Methodology: A prospective controlled clinical study carried out on 100 preterm and 20 full term pregnant women to evaluate the incidence of ASB.

Results: The results showed that the incidence of ASB in preterm cases was 3%. The most common pathogen was found to be Klebsiella and the most sensitive antimicrobials were cefoperazone, gentamycin, nalidixic acid, norfloxacin and ciprofloxacin. The results revealed an association between a relatively reduced hemoglobin concentration and the incidence of ASB in pre-term labour.

Conclusion: It was concluded that antenatal care should include examination of urine for culture and sensitivity to reduce the risk of pre-term labour.

Key Words: Asymptomatic bacteruria – Preterm labour.

Introduction

THE physiologic changes of pregnancy predispose patients to bacteriuria. These physiological changes include urinary retention from the weight of the enlarging uterus and urinary stasis due to ureteral smooth muscle relaxation. In addition the possibility of glucosuria and aminoaciduria during pregnancy may provide an excellent culture medium for bacteria in areas of urine stasis. These changes and other hygienic factors cause urinary tract infection UTIs to become common in pregnant woman [1].

Correspondence to: Dr. Ahmed H. Elsayaf, The Department of Obstetrics & Gynecology, Faculty of Medicine, Cairo University

Urinary tract infections in pregnancy are classified as either asymptomatic or symptomatic. Asymptomatic bacteriuria is defined as the presence of significant bacteriuria without the symptoms of an acute urinary tract infection. Symptomatic urinary tract infections are divided into lower tract (acute cystitis) or upper tract (acute pyelonephritis) infections [2].

The association between ASB and preterm delivery (<37 weeks of gestation) and that between asymptomatic bacteriuria and low birth weight (<2500 gram) were unknown until 1962 when Kass observed an increased risk among untreated bacteriuric women for the delivery of low birth weight [3]. The mean duration of pregnancy among untreated bacteriuric women was found to be reduced by 1 week on average [1]. Also ASB in pregnant women as a risk factor for preterm birth and antibiotic therapy has been found to significantly reduce the risk [4,5].

The aim of this work is to assess the prevalence of asymptomatic bacteriuria (ASB) in pregnant women presenting with preterm labour in Kasr Al Einy OBGYN hospital and to determine the common pathogenic microorganisms associated with ASB and their antibiotic sensitivity.

Patients and Methods

A Case control study in 100 preterm and 20 full-term pregnancies among those attending Kasr Al-Aini OBGYN Emergency unit from April to June 2011 to evaluate the incidence of ASB.

Inclusion criteria for pre-term group:

Primigravida or multigravida, age from 20 to 30, preterm contractions after 20 weeks and before 37 completed weeks.

Inclusion criteria for full term group:

Primigravida or multigravida, age from 20 to 30, term contractions after 20 weeks and before 37 completed weeks.

Exclusion criteria:

Women with present history of UTI or any clinical presentation of UTI (frequency of micturition, burning micturition, loin pain, etc), women known to be diabetic, women who are immunocompromised as in long term corticosteroid therapy, women using vaginal douches, women presenting with any type of vaginal bleeding, women already on antibiotic therapy & women presenting with rupture of membrane or any history suggestive of rupture of membrane.

*All the patients underwent the following:**- Full history taking:*

Personal history: Age, residence, socioeconomic status; low (low income e.g., manual workers), middle (mid level e.g., employees) and high (high salary) (Encyclopedia of public health, 2002) and special habits of medical importance e.g. smoking. Complaint: Lower abdominal pain referred to the back. Present history: Full analysis of the complaint. Obstetric history: (Last menstrual period, expected date of delivery, previous deliveries and their outcome). Past history (systemic illness, past history of UTI, recent antibiotics intake, Diabetes mellitus, drug allergy and previous operations). Family history (systemic diseases, congenital anomalies and history of twins).

- Physical examination:

General examination: Vital data (to exclude cases of acute pyelonephritis); pulse, blood pressure and temperature, abdominal examination including palpation of loins and renal angles for any tenderness, swelling or rigidity & obstetric examination.

- Investigations:

Ultrasonography for gestational age and fetal wellbeing. Bacteriological examination of urine: Urine samples were taken through catheterization procedure as this may allow collection of bladder urine with less urethral contamination [8]. Samples were transported to lab within 2 hours in order to avoid bacterial multiplication. Microbiological investigations included microscopic wet preparation, Gram-stained smear and culture (serial dilutions of urine were cultured on blood agar media and colony count was performed after 24hr. (incubation at 35°C) Colony count more than 10^5 /ml in the absence of symptoms suggestive of urinary tract infection were considered positive for asymp-

tomatic bacteruria [7]. Antibiotic sensitivity using disc diffusion tests were performed and the results were interpreted according to the Clinical and Laboratory Standards Institute (CLSI) guidelines as.: Susceptible, intermediate, or resistant [8].

Statistical methodology:

Data was statistically described in terms of range, mean \pm standard deviation (\pm SD), frequencies (number of cases) and relative frequencies (percentages) when appropriate. Comparisons of quantitative variables between the study groups were done using Chi squares (X^2) test. A probability value (p -value) less than 0.05 was considered statistically significant. All statistical calculations were done using computer programs Microsoft Excel version 7 (Microsoft corporation, NY, USA) and SPSS (Statistical package for the social science; SPSS Inc., Chicago, IL, USA) version 15 for Microsoft windows.

Results

This study included 100 preterm cases and 20 full-term women (control) among those attending El Kasr El-Aini Hospital Obstetric Emergency Unit during period from April to August 2011.

The patient urine samples were taken through catheterization procedures, in which urine culture for asymptomatic bacteriuria was done as well as antibiotic sensitivity tests for positive cases. Values are expressed as means \pm standard deviation or number and percentage.

The two groups were matched as regard to age, gravidity and parity with no significant difference between the two groups ($p>0.05$).

Tables (2,3) show the incidence of (ASB) among preterm (cases) and full term (control) groups.

As shown in Tables (2,3): The incidence of asymptomatic bacteriuria (ASB) in group I (cases) was 3% (3/100cases) while the incidence of ASB in group II (control group) was 0% with no statistical significant difference between the two groups (p -value >0.05).

Table (4) shows the different micro-organisms isolated from these positive cases.

As shown in Table (4), (*Klebsiella pneumoniae*) was isolated from 66.7% of positive cases (2/3 of cases), while *Enterobacter cloacae* was isolated from 33.3% of positive cases (1/3 of cases).

The sensitivity pattern of the isolated organism revealed that all were sensitive to cefoperazone,

nalidixic acid, trimethoprim-sulphamethoxazole, gentamycin, ciprofloxacin, norfloxacin, moderately sensitive to nitrofurantoin, resistant to amoxicillin+clavulanic acid as shown in (Table 5).

As shown in (Table 5), nalidixic acid, cefoperazone, gentamycin, ciprofloxacin, norfloxacin, trimethoprim and sulphamethoxazole were considered the most effective antibiotics against the most common organisms causing asymptomatic bacteriuria in this study.

As regards to Hb level in the two groups it was noted that anaemia was more common in patients with preterm labour as shown in (Table 6), more over the 3 positive cases of ASB were anaemic as shown in (Table 7).

There is a significant difference in the level of Hb ($p < 0.05$) between term and preterm cases.

This table indicates the prevalence of ASB was higher in anaemic patients.

The results revealed that 57% of the studied population including the positive cases was of a relatively lower socioeconomic class.

As regard to past history of UTI in patients with ASB, it was noted that all cases with ASB had a past history of UTI.

Table (1): Clinical characteristics of the patients of the study.

	Cases group	Control group	<i>p</i> -value
Age	27.4±19.9	25.05±3.44	25.05±3.44
Gravidity	3.22±2.11	2.100±1.518	2.100±1.518
Parity	0.330±0.604	0.35±0.671	0.35±0.671

Table (2): Incidence of ASB and the prevalence of positive urine cultures in preterm and full term groups.

Asymptomatic bacteriuria	Negative	Positive	Total
Preterm group	97 (97%)	3 (3%)	100
Full term group	20 (100%)	0 (0%)	20
Total	117 (97.5%)	3 (2.5%)	120

Table (3): Comparison between cases and control group as regards incidence of ASB done using chi square test.

Variable	Cases group (n=100)	Control group (n= 20)	<i>p</i> -value
ASB	3%	0%	0.576
Positive cultures			

Table (4): Different micro-organisms isolated from cases with asymptomatic bacteriuria (n=3).

Organism	Number of cases	Percent
Klebsiella pneumoniae	2	66.67
Enterobacter cloacae	1	33.33

Table (5): Bacterial sensitivity to different antimicrobials of positive cases (n=3).

Antibiotic	Number of sensitive cases	Percent
Nalidixic acid	3	100
Cefoperazone	3	100
Gentamycin	3	100
Ciprofloxacin	3	100
Norfloxacin	3	100
Nitrofurantoin	1	33.33
Amoxicillin+clavulanic acid	0	0
Trimethoprim +sulphamethoxazole	3	100

Table (6): Clinical characteristics of Hb level in the study.

Variable	Cases group (n=100)	Control group (n=20)	<i>p</i> -value
Hb level	10.11±1.05	10.65±0.75	0.03

Table (7): Clinical characteristics of Hb level among positive and negative cases.

Hb level	N	Mean±St. Deviation	<i>p</i> -value
Negative cases	117	10.216±1.029	0.456
Positive cases	3	9.76±0.874	

Discussion

Asymptomatic bacteriuria (ASB) occurs in 2-10% of all pregnancies [9]. The majority of the most recent studies including observational studies from developing countries found the prevalence of asymptomatic bacteriuria in pregnant women ranged between 4-10% [10]. This range during pregnancy was reported to be as high as 21% in population from Nigeria [10]. This variation in studies can be attributed to several factors such as geographical variation, socio-economic status, ethnicity of the subjects, setting of the study (primary care, community based, or hospital), and the variation in the screening tests (urine dipstick, microscopy, and culture). Race-specific rates show significant variation, as well as there is variation within the same race living in different geographical areas or with socio-economic status. Recent studies have provided evidence that diagnosis and inter-

vention of ASB significantly reduce the rate of preterm births [5,12]. Thus, it was felt important to evaluate the prevalence of ASB Kasr El-Aini Hospital. The isolation of the responsible microorganisms and their sensitivity to antibiotics may help health care providers to prevent UTI and its complications during pregnancy.

This study reported that the prevalence of ASB among pregnant women was found to be 3% in preterm cases and 0% full-term deliveries. The reported prevalence of ASB has been 30%, 4.8%, 9.9% and 3.3-6.1 % among pregnant women in Yemen, United Arab Emirates (UAE), Qatar and Iran respectively [13]. The lower incidence of ASB in this study may be attributed to several factors such as; the strict exclusion criteria in choosing patients included in the study, strict definition for ASB (colony count more than 100.000) and small sample size.

Overall Muslim women are said to have a slightly lower risk of UTI due to the practice of ablution after micturition and defecation. Veri and colleagues [14] found a 3 times higher prevalence 6.3% among Caucasian women compared to their Bangladeshi counterparts 2% at Royal London hospital. They attributed it to difference in clothing and practice of ablution after defecation and micturition [14]. Akinloye et al. [11] in his study in Nigeria included 300 women screened for bacteriuria with 21% prevalence. The higher prevalence in their study was probably due to the fact that they considered colony count above 10.000 CFU to be positive for ASB.

Our finding regarding patients with ASB is not in harmony with Hazhir (2007) who showed significant bacteriuria in preterm and full-term groups of 36% and 12% respectively. There are many studies that link so many pregnancy complications like hypertensive disorders in pregnancy, low birth weigh, prematurity with asymptomatic bacteriuria [9] but the mechanisms are not well defined. Several investigators have observed a high incidence of pyelonephritis in bacteriuric pregnant mothers [15]. The effect of urinary tract infection on premature labour could be indirectly mediated by antenatal maternal hypertension, it is also plausible that urinary tract infection affects premature labor directly through the development of amnionitis, it has been previously suggested that bacterial infection of the amniotic fluid is a risk factor for premature delivery [16].

Another hypothesis contends that bacterial enzymes such as collagenase may weaken the fetal

membrane and predispose them to premature rupture [17].

Klibsiella has been identified as the most common pathogen isolated among pregnant women in this study, which was not consistent with other studies that have demonstrated *E. coli* as the most common pathogen [17]. This might be attributed to the small number of positive ASB cases in the present study. Thus further research is suggested with large sample size.

Like other studies Joseph et al. [18], Andriole and Cohn, [19]. The present study also indicated that cefoperazone is highly effective to the urinary pathogens at very high percentage ranging from 75 to 100%, also 100% sensitive to nalidixic acid, gentamycin, ciprofloxacin, norfloxacin, trimethoprim+sulphamethoxazole, 33% sensitive to nitrofurantoin, resistant to amoxicillin and clavulanic acid. However, this finding do not agree with Rahman et al. This may indicate that urinary pathogens became resistant day by day to the commonly used antibiotics in our country. This may be due to wide spread and indiscriminate use of the drugs [20].

In the present study, 57% of the patients were of low social class, 41% were of middle class and 2% of the patients were of high social class. The prevalence of ASB was higher in low socioeconomic class (3%) while it was 0% in middle class & 0% in high socioeconomic class. Females from lower socioeconomic status were found to have a significantly higher incidence of bacteriuria. Up to 5 times greater incidence was quoted in poor social class in other studies Younis et al. [21]. While Fatima and Ishrat [27] in a cross sectional study which included 580 women have found that prevalence of bacteriuria in low social class was 6.45% compared to 2.5% in middle and high class. This agrees with our study where the prevalence of asymptomatic bacteriuria was higher in low socioeconomic class. This result may be probably due to poor nutrition, bad personal hygiene and irregular antenatal visits.

Our results showed that mean value for Hb level in negative cases was 10.2 while mean value for Hb level in positive cases was 9.7 (Table 7), this may indicate that the prevalence of asymptomatic bacteriuria maybe higher with reduced Hb level. Moreover, a significant statistical difference was noted regarding Hb level in term and preterm cases ($p < 0.05$) (Table 6). This result agrees with Isabel et al. [23] who studied the association of anemia and asymptomatic bacteriuria. In their

study, low hemoglobin level was shown to be a risk factor for ASB. However, on logistic regression analysis, the hemoglobin level $<10.5\text{g\%}$ was found to be independently associated with asymptomatic bacteriuria. Anemia was not found to be a risk factor in the study of Fatima and Ishrat, [22]. Same result was observed in another study, conducted by Qureshi et al. [24]. On the other hand anemia associated with sickle cell trait is, however, said to double the prevalence [25].

As regards the previous history of UTI, our results showed that 72% of the studied women had negative past history of urinary tract infection, while 28% had a positive past history of urinary tract infection. There is no statistical significant difference ($p>0.05$) between bacteriuric and non bacteriuric women. Our study is different from the earlier studies, where the previous history of UTI was the most important predictor, with prevalence of bacteriuria ranging from 18.9% to 35.7% [26,22]. This may be explained by the fact that previous infection may have caused anatomical and/or functional damage to the urinary tract. Moreover, several predisposing factors that could have resulted in previous UTI may be still present e.g. Urinary tract stones.

In conclusion, the present study showed that the incidence of ASB in preterm labour at Kasr-Al Ainy obstetric ER is 3%.

The most common pathogen is Klebsiella, the most sensitive antimicrobial are cefoperazone, gentamycin, nalidixic acid, norfloxacin and ciprofloxacin.

Anaemia is associated with higher incidence of ASB. Past history of UTI is not associated with higher incidence of ASB.

Routine ANC is important in diagnosis of ASB. Urine culture is recommended during the first antenatal visit and is also recommended in each trimester.

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