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Original Article

Frequency of Asymptomatic Bacteriuria at Term Pregnancy and its Relation to Maternal and Neonatal Outcome

Ahmed Mohamed Ibrahim [1*]; Ahmed Taha Abdelfattah[1]; Mohamed Saad Elden Radwan[2]; Mohamed Ibrahim Mohamed[1]

[1] Department of Obstetrics and Gynecology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.
[2] Department of Clinical Pathology, Faculty of Medicine, Al-Azhar University, Cairo, Egypt.

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*Corresponding author

Email: malakelsaies2019@gmail.com

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Abstract

Background: When there is considerable bacteriuria present but no signs of a urinary tract infection [UTI], this condition is known as asymptomatic bacteriuria [ASB]. In 2-10% of pregnant women, ASB occurs, which may be associated with adverse maternal and neonatal outcomes. The current work aimed to study the association between asymptomatic bacteriuria at term pregnancy and the various maternal and neonatal outcomes

Patients and Methods: A prospective observational included 100 pregnant women at gestational age between 37 to 40 weeks. Urine culture was analyzed for all women, then follow-up for reporting adverse maternal and neonatal outcomes.

Results: The frequency of cases with ASB was 24%. ASB was significantly associated with preterm labor [33.3% and 19.7% among positive culture and negative culture groups respectively; P=0.021]. The percentage of PROM among the mothers with positive culture was higher as compared with the negative culture group [20.8% and 15.8% respectively], but, no statistically considerable value was reached [p=0.280]. Neonates born to mothers with ASB had significant lower birth weight [P=<0.001] and 5-min Apgar score [P=0.024].

Conclusion: Asymptomatic bacteriuria was frequent among women at term pregnancy in the current study. It was associated with preterm labour, low birth weight and decreased 5-min Apgar score at birth, Further studies are needed.

Keywords: Asymptomatic Bacteriuria; Urine Culture; Preterm Labor; Pyelonephritis; Birth Weight.

INTRODUCTION

Significant bacteriuria without the signs of a urinary tract infection [UTI] is known as asymptomatic bacteriuria [ASB]. In 2-10% of pregnant women, ASB occurs [1]. Finding more than 10 CFU per mL of urine has previously been considered to be considerable bacteriuria. A 10% incidence of asymptomatic bacteriuria is typical throughout pregnancy [2].

Pregnancy-related ASB may result in major consequences for the mother and the fetus. Both pregnant women and women who are not pregnant experience the same level of ASB [3].

Pregnancy-related alterations to the anatomy and physiology of the urinary tract, mostly induced by the gravid uterus' relative blockage of urine output and progesterone's relaxing of smooth muscles, allow germs to infect the kidneys rather than be flushed out of the body [4].

Escherichia coli causes more than 80% of simple UTIs, making it the most common causal bacterium in asymptomatic bacteriuria [5].

About 30% of patients with untreated asymptomatic bacteriuria go on to acquire symptomatic cystitis, and up to 50% of women may go on to acquire pyelonephritis. On the other hand, ASB may be associated with premature rupture of membranes [PROM], fetal growth restriction, low birth weight [6].

The current study's objective was to study the association between asymptomatic bacteriuria at term pregnancy and the various maternal and neonatal outcomes.

PATIENTS AND METHODS

A prospective observational research was conducted at the emergency room and outpatient clinic of the Al-Mataria Teaching Hospital, Egypt. Between June 2020 and June 2021, the research was carried out. There were 100 pregnant women in the research.

Inclusion criteria: Pregnant women at gestational age 37-40 weeks at their antenatal visit or to record the results of their birth for the mother and the baby, age ≥18 years, singleton pregnancies and vertex presentation.

Exclusion criteria: Patients with a history of UTI in the past year or during this gestation, patients with diabetes, hypertension, or other underlying medical conditions, patients who have recently taken antibiotics, and pregnant women with signs of UTI like lower abdomen pain, fever, burning urination, frequency, or dysuria.

Patients consent: Before including them in the research, a written informed permission was acquired from each participant outlining the purpose of the investigation and the steps that would be taken.

Ethical consideration: The Al-Azhar University Faculty of Medicine's Ethical Committee gave its approval to the whole research design. At every stage of the investigation, confidentiality and personal privacy were observed. Patients may leave the research at any moment without facing any repercussions. No further use has been made of or is planned for the collected data.

Methodology

The following was carried out across all subjects

Complete history: Demographic data [Age, gender, and other demographic information], obstetric history, general medical history, and concomitant conditions [gravidity, parity, and, if applicable, the presence of past pregnancy problems] and menstrual history [to verify the date and be certain of her LMP].

Clinical evaluation: General and abdominal evaluation: To evaluate for any sign if of pregnancy, presence of scars and ensure that the uterine fundus is no more than the upper border of symphysis pubis. **Vaginal examination:** To ensure that the cervix is closed without vaginal bleeding.

Obstetric ultrasound [trans-abdominal]: Was done to ensure the gestational age and to exclude cases with any of the exclusion criteria.

Laboratory investigations: variables examined: regular examination of the urine, urine culture, and urine sensitivity.

Clean catch method: The patient is told to spread their labia, bathe the periurethral region with soap and water, and then collect 30 cc of midstream pee in a sterile container. The samples were sent right away to the lab, where they were processed in an hour. After the urine sample was cultured for a quantitative bacterial count, a microscopic inspection was performed to look for leucocytes.

Microscopic check for pus cells: Pus cells per high power field were estimated when unspun urine was inspected under a microscope directly. UTI is indicated by a count of 10 or more pus cells per high power field.

Quantitative bacteriology

Calibrated loop direct streak method: One biconvex loop full of well-mixed, uncentrifuged urine specimen was put on blood agar plate and MacConkey's agar plate employing a flame-sterilized, cooled, 4 mm platinum loop that delivered 0.01ml.

Organism identification: Through the use of common biochemical and sugar usage assays, suspected infections were identified [7].

Clear zones of inhibition surrounding the antibiotic disc were used to evaluate the sensitivity of the plates after 24 hours of incubation, whereas the lack of such zones indicated antibiotic resistance.

Follow up: Following the collection of the urine culture, none of the individuals gave birth for more than 72 hours. At the neonatal care section, every newborn was routinely monitored.

Primary outcome: Development of pyelonephritis during hospital stays or six weeks after delivery was chosen as the study's main endpoint. Pyelonephritis was described as having UTI symptoms, a temperature [above 38°C], a positive urine culture, and at least one of the following: chills, nausea, or discomfort along the costovertebral joint.

Secondary outcomes: Adverse maternal and newborn outcomes were identified as secondary outcomes and included: Instrumental/ cesarean birth, post-partum fever, intrapartum fever, preterm labor and low birth weight.

Statistical analysis of data: Statistical Package for Social Sciences [SPSS] version 22 for Windows was employed to code, process, and analyze the obtained data [IBM SPSS Inc, Chicago, IL, USA]. Numerical data were described as mean, standard deviation, median and range. Categorical data were described as frequency and percentages. For numerical values, Student t test or Mann-Whitney tests were used to compare two groups. For Categorical values, Chi square or Fisher's exact tests were used to compare two groups. P value at < 0.05 was significant.

RESULTS

The median age was 27.27 ± 5.17 years with range between 18 and 38 years. The highest percentage of the cases were between 21 and 30 years [68%] followed by the age more than 30 years [23%] **Figure [1]**.

The median number of gravidities was 3 with range between 1 and 6 while the median number of parities was 2 with range between 0 and 4 **[Table 1]**.

Table [2] shows that out of 100 cases, 24 cases [24%] had Positive culture [significant growth] or ASB, 76 cases [76%] had no significant bacteriuria.

Figure [2] shows that out of the cases with positive organism growth; the most frequent detected organism was Escherichia coli in 50% of the cases. Other detected organisms included *klebsiella pneumonia* [16.7%], *staphylococcus saprophyticus* [12.5%], *staphylococcus aureus* [8.3%] and *enterococcus faecalis*, *pseudomonas aeruginosa* and acintobacter species each in 1 case [4.2%].

There was no statistically significant difference in the mean age and mean BMI in the cases with positive culture and negative culture. Also, there was no statistically significant difference between the two groups regarding the residence. The median number of parities in the group with positive culture was 1 with range between 0 and 3 while in the cases with negative culture was 2 with range between 0 and 4, with no statistically substantial variation between the two groups [p=0.274] **[Table 3]**.

The percentage of CS delivery among the mothers with positive culture was higher as compared with the negative culture group [79.2% and 72.4% respectively], but no statistically substantial value was obtained [p=0.218]. The percentage of intrapartum fever among the mothers with positive culture was higher as compared with the negative culture group [8.3% and 2.6% respectively], but no statistically substantial value was obtained [p=0.256]. The percentage of postpartum fever among the mothers with positive culture was higher as compared with the negative culture group [8.3% and 3.9% respectively], but no statistically substantial value was obtained [p=0.327]. The percentage of PROM among the mothers with positive culture was higher as compared with the negative culture group [20.8% and 15.8% respectively], but no statistically substantial value was obtained [p=0.280]. The percentage of cystitis among the mothers with positive culture was higher as compared with the negative culture group [58.3% and 50% respectively], but no statistically substantial value was obtained [p=0.120]. The percentage of preterm labour among the mothers with positive culture was higher as compared with the negative culture group [33.3% and 19.7% respectively], with a statistically significant value [p=0.021] **[Table 4]**

The birth weight was statistically significant lower in the positive culture group as compared with the negative culture group [P < 0.001]. The median 5-min APGAR score was statistically significantly lower in the positive culture group as compared with the negative culture group [p= 0.024]. The incidence of NICU in the neonates delivered to the mothers with positive culture was higher as compared with the negative culture group [16.7% and 6.6% respectively], but no statistically substantial value was obtained [p=0.056]. The incidence of perinatal mortality was only 1 case in each of the two groups with no statistically substantial variation between the two groups **[Table 5]**.

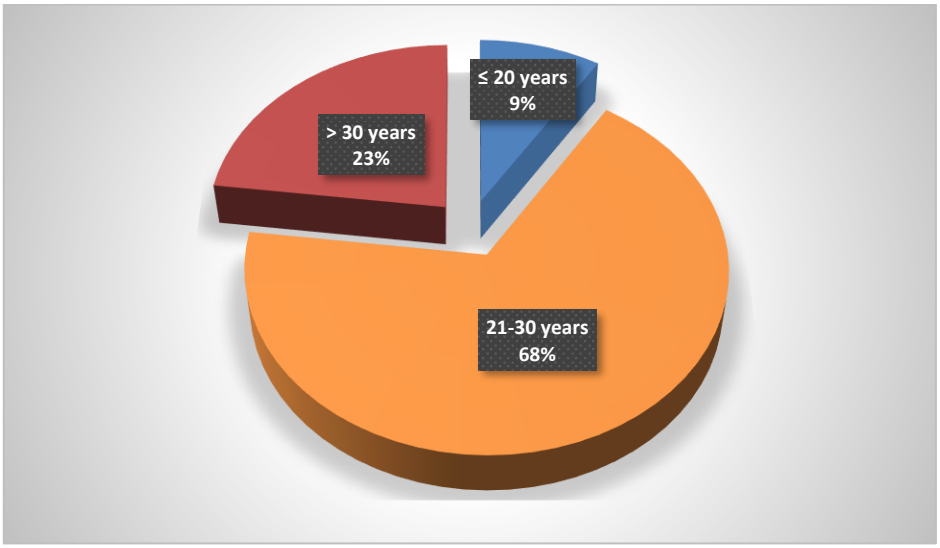

Figure [1]: Age group distribution among the studied cases

Table [1]: Obstetric data among the studied cases

Items		Study subjects n=100
Gravidity	Mean ± SD	3.12 ± 1.46
	Median [min-max]	3 [1 - 5]
Parity	Mean ± SD	2.03 ± 1.06
	Median [min-max]	2 [0 - 4]

Table [2]: Culture results among the studied cases

Items	Study subjects [n=100]
Culture results	
Positive culture [Significant growth] [ASB]	**24 [24%]**
Negative culture	**76 [76%]**

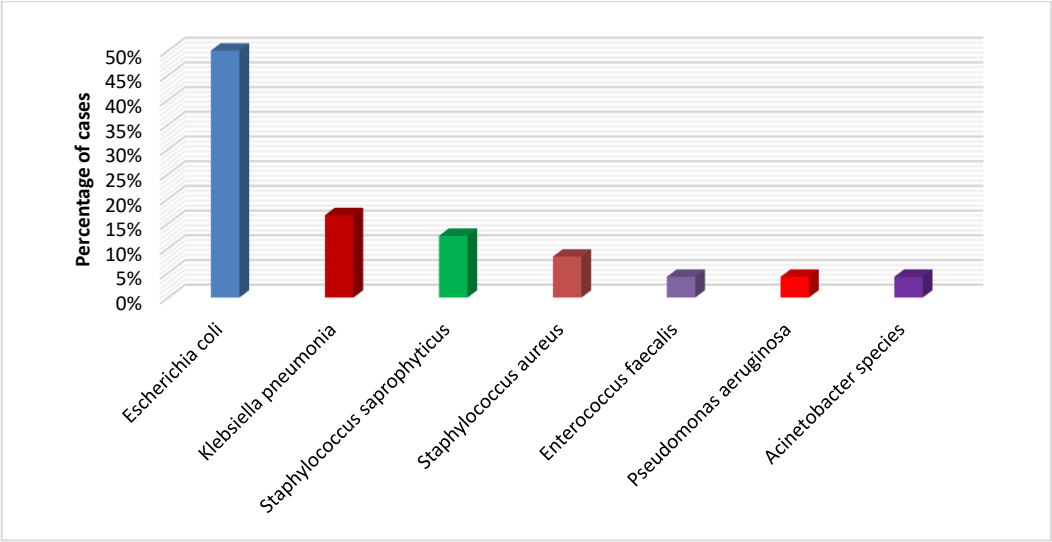

Figure [2]: Types of organisms in the two study groups

Table [3]: Demographic data and obstetric history of cases in the two studied groups [According to culture results]

Variable	Positive culture [ASB] [n= 24]	Negative culture [n= 76]	Test	p
Age [Years] [mean±S]	26.42 ± 4.62	27.38 ± 5.19	0.956	0.342
BMI [Kg/m2] [mean±S]	28.35± 6.59	27.83± 5.77	1.107	0.375
Gravidity [median [IQR]]	3[1 – 5]	2[1 – 5]	2.266	0.322
Parity [median [IQR]]	1[0 – 3]	2[0 – 4]	2.589	0.274
Residence [n,%]				
Urban	13 [54.2%]	44 [57.9%]	1.987	0.101
Rural	11 [45.8%]	32 [42.1%]		

Table [4]: Obstetrical and maternal outcomes within the studied groups [According to culture results]

Variables		Positive culture [ASB] [n= 24]	Negative culture [n= 76]	Test	p
Mode of delivery	**Vaginal**	5 [20.8%]	21[27.6%]	2.435	0.138
	CS	19[79.2%]	55[72.4%]		
Intrapartum fever		2 [8.3%]	2 [2.6%]	1.849	0.256
Postpartum fever		2 [8.3%]	3 [3.9%]	1.508	0.326
PROM		5 [20.8%]	12[15.8%]	1.679	0.280
Cystitis		14[58.3%]	38 [50%]	2.701	0.120
Preterm labour		8 [33.3%]	15[19.7%]	3.628	0.021*

Table [5]: Analysis of the neonatal outcomes in the studied groups [According to culture results]

Variables	Positive culture [ASB] [n= 24]	Negative culture [n= 76]	Test	p
Birth weight [gm]	2738.84 ± 368.23	3106.22 ± 419.42	**9.784**	**< 0.001***
5 min ARGAR score	7[4 – 9]	9[6 – 10]	**2.962**	**0.024***
NICU	4 [16.7%]	5 [6.6%]	2.809	0.056
Perinatal mortality	1 [4.2%]	1 [1.3%]	1.451	0.366

DISCUSSION

Early detection and management of asymptomatic bacteriuria, as well as assessment of the outcomes for both the mother and the fetus, were the goals of this research.

In the current study, out of 100 cases, there were 24 cases [24%] had positive culture [significant growth], 76 cases [76%] had no significant bacteriuria. Depending on the group under examination, several studies have shown occurrences ranging from 2-3% [8]. Our findings came in accordance with **Suganya *et al.*** [9] who revealed that asymptomatic bacteriuria was prevalent in 22% of the total 500 patients included in their analysis; however, 88% of them had urine cultures that were negative. This percentage was comparable to the findings of other investigations in India [25.3%] [10], Ethiopia [21.2%] [11] and Nigeria [29.5%] [12]. However, this percentage was greater than that revealed by **Sonkar *et al.*** [13] who showed that A 16.7% prevalence of ASB was found in pregnant women. **Prasanna *et al.*** [14] in their study, 125 pregnant women were studied; of them, 113 [90.4%] were between the ages of 15 and 25 years, and 12 [9.6%] were between 26 and 35 years. Out of 125 women, 21 [16.8%] had substantial bacteriuria**.**

In the current study, out of the cases with positive organisms' growth, the most common detected organism was *Escherichia coli* in 50% of the cases. Other detected organisms included *klebsiella pneumonia* [16.7%], staphylococcus saprophyticus [12.5%], *staphylococcus aureus* [8.3%] and *enterococcus faecalis, pseudomonas aeruginosa* and *acintobacter* species each in 1 case [4.2%]. Our results were in accordance with **Sisodia and Khanapure** [8] who showed that *Escherichia coli* isolates made up 48.71% of the study's most common isolates. Other, less prevalent pathogens were *klebsiella pneumoniae*, coagulase-negative staphylococcus, and *alpha hemolytic streptococci*. This agreed with the results reported by **Sonkar *et al.*** [13] who showed

that According to their investigation, E. coli was the most prevalent bacterial isolate [61.1%]. In the work of **Asemota *et al.*** [15], the most typical uropathogens identified were *Escherichia coli* and *Staphylococcus aureus* [35.0% and 40%, respectively]. In addition, *Klebsiella* [10%], *Bacteroides* [5%], *Proteus mirabilis* [5%] and *Staphylococcus Saprophyticus* [5%], among other species, were identified.

Opposite to all these studies, including the current study, **Perlitz *et al.*** [16] reported that, in 13 positive urine cultures, Group *B Streptococcus* was the most prevalent isolate [40.6%], following by *Enterococcus faecalis* in 10 cases [31.2%], *Escherichia coli* in 6 cultures [18.7%], *Klebsiella pneumonia* in two [6.2%], and *Pseudomonas aeruginosa* in one [3.1%].

The average age in the patients with positive culture and those with negative culture in the present research did not vary statistically significantly. Our findings corroborated these findings by **Asemota *et al.*** [15] who showed that age as risk factor was not significantly associated with bacteriuria.

Within the same context, **Ayoyi *et al.*** [17] also reported that asymptomatic bacteriuria was not significantly impacted by the pregnant women's age. However, several researches have shown that as maternal age rises, the frequency of asymptomatic bacteriuria increases [18].

The variation could be explained due to different sample size and different time for inclusion of the pregnant females in the different studies.

In the current study, there was no statistically substantial variation between the case with positive culture and negative culture regarding the number of gravidities [p=0.322] and parities [p=0.274]. However, increased parity and bacteriuria in pregnancy have a substantial correlation, according to earlier research in the literature. This has been shown to substantially enhance the risk of asymptomatic bacteriuria in pregnant women by twofold [19, 20].

This may be because of considerable physiologic changes that occur across the whole urinary system during pregnancy and have a significant influence on the normal course of UTI throughout gestation. These alterations differ from patient to patient and are more common in women who have had their first pregnancy or who have had many pregnancies quickly [20].

It was reported that Women with bacteriuria are 1.5–2 times more likely to deliver preterm and have babies that are underweight, which also raises the possibility of fetal and postnatal death [21].

In the current study, the percentage of intrapartum fever and postpartum fever among the mothers with positive culture was higher as compared with the negative culture group, but it didn't reach a statistically considerable value. Similar findings were shown by **Guntoory *et al.*** [22] who showed that none of the three groups showed a discernible rise in the probability of puerperal pyrexia.

In the current study, the percentage of PROM among the mothers with positive culture was higher as compared with the negative culture group [20.8% and 15.8% respectively], but no statistically substantial value was obtained [p=0.280]. This agreed with **Byna *et al.*** [23] who showed that PROM was seen in 14% of ASB patients and 5% of the control group. ASB and PROM had a statistically considerable relationship [P=0.03]. Our results were also in accordance with **Jain *et al.*** [24], **Sheiner *et al.*** [25] who showed that PROM is a recognized ASB complication that causes premature labor, chorioamnionitis, endometritis, and feto-maternal sepsis, all of which have a negative impact on the mother [26].

In the present study, the percentage of preterm labour among the mothers with positive culture was higher as compared with the negative culture group [33.3% and 19.7% respectively], with a statistically significant value [p=0.021] Our results came in agreement with **Byna *et al.*** [23] who showed that Preterm labor occurred in 18% of ASB patients and 7% in the control group. In their investigation, there was a statistically substantial correlation between ASB and premature labor [P=0.03]. Similar findings were also reported by **Sheiner *et al.*** [25].

In the present research, the percentage of cystitis among the mothers with positive culture was higher as compared with the negative culture group [58.3% and 50% respectively], but no statistically substantial value was obtained [p=0.120]. Within the same context, **Byna *et al.*** [23] showed that 3.5% of patients with ASB had pyelonephritis, compared to none in the control group. All three of the individuals who later developed pyelonephritis had hydronephrosis or hydroureter. In their analysis, there was no statistically substantial link between ASB and pyelonephritis [P=0.69].

In the current study, the birth weight was statistically significant lower in the positive culture group as compared with the negative culture group [P < 0.001]. The median 5-min APGAR score was statistically significantly lower in the positive culture group as compared with the negative culture group [p= 0.024]. Within the same context, Laura A. **Schieve *et al.*** [27] revealed that pregnant women who get UTI run a higher chance of giving birth to early, low birth weight, and preterm babies.

Numerous researches are taking into account the connection between ASB and prematurity/low birth weight [LBW]. A study by **Tahir *et al.*** [28] Researchers that looked into the connection between untreated ASB and low birth weight [LBW] or preterm delivery came to the conclusion that antibiotic therapy is beneficial in lowering the incidence of LBW. However, **Verma *et al.*** [6] reported that Preterm delivery and low birth weight were not significantly associated with unfavorable perinatal outcomes in either the instances with or without ASB [p>0.05]. On the other hand, some studies reported no effect of ASB on the neonatal outcomes. Like **Perlitz *et al.*** [7] revealed that, in terms of the APGAR score, cord pH <7.1, postpartum neonatal fever, antibiotic therapy, any diagnosis of an infectious condition, birth weight, or neonatal intensive care unit [NICU] stay, no variations between the instances with and without ASB were found.

In the current study, there was just one perinatal death in each of the two groups, and there was no statistically substantial variation between them. On the other hand, a link between a urinary tract infection and perinatal mortality was only discovered in people aged 20 to 29 in the study done by **Verma *et al.*** [6].

The main strength point of this study is that it is one of the few studies that explored the ASB issue specifically at term. The short sample size and absence of a control group are the key drawbacks and that we didn't illustrate the effect of treatment on the different maternal and neonatal outcomes.

Conclusion: Asymptomatic bacteriuria was frequent among women at term pregnancy in the current study. It was associated with preterm labour, low birth weight and decreased 5-min Apgar score at birth, Further studies are needed.

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