

FREQUENCY OF ASYMPTOMATIC BACTERIURIA AND ITS CAUSATIVE ORGANISMS IN PREGNANT WOMEN

¹Dr. Mubasher Saeed Pansota (FCPS Gynecology), ²Dr. Mudassar Saeed Pansota (MS Urology), ³Dr. Asra Aleem (FCPS Urology), ⁴Dr. Muhammad Burhan Barkat (MS Urology), ⁵Dr. Muhammad Shahzad Saleem (FCPS Urology)

¹Consultant Gynecologist., Assistant Professor, Department of Urology, Shahida Islam Medical College, Lodhran, Punjab, Pakistan.

²Assistant Professor, Department of Urology, Shahida Islam Medical College, Lodhran, Punjab, Pakistan.

³Assistant Professor of Department of Urology, Ghazi Medical College/D.G Khan Teaching Hospital, Punjab, Pakistan.

⁴Senior Registrar of Department of Urology and Renal Transplantation, Bahawal Victoria Hospital/Quaid-e-Azam Medical College, Bahawalpur, Punjab, Pakistan.

⁵Assistant Professor, Department of Urology, Bahawal Victoria Hospital, Bahawalpur.

*Corresponding Author: Dr. Mubasher Saeed Pansota

Consultant Gynecologist., Assistant Professor, Department of Urology, Shahida Islam Medical College, Lodhran, Punjab, Pakistan.

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ABSTRACT

Introduction: ASB during pregnancy relates to the physiologic and anatomic changes in the urinary tract. The prevalence of ABS in pregnant women is estimated to be approximately 1.9–15%. **Objectives:** To determine the frequency of asymptomatic bacteriuria and its causative organisms in pregnant women. **Materials & Methods:** A total of 191 pregnant women with gestational age >24 weeks, 16 to 40 years of age were included. Patients with genital tract trauma and antibiotic therapy taken within two weeks were excluded. Then clean-catch midstream urine was collected from each woman into a sterile universal container. Samples were cultured on dried plates of blood agar and cysteine lactose electrolyte deficient agar (CLED), using a calibrated drop delivering 0.002ml of urine. Plates were incubated aerobically of 37°C overnight. Colony counts yielding bacterial growth of 105/ml or more of pure isolates were regarded as significant for bacteriuria. Also the causative organism as described in operational definitions was noted by the researcher herself. **Results:** Age range in this study was from 16 to 40 years with mean age of 28.68 ± 3.86 years. Majority of the patients 108 (56.54%) were between 16 to 30 years of age. Mean parity was 3.15 ± 0.98. In our study, frequency of asymptomatic bacteriuria in pregnant women was found in 29 (15.18%) patients (Figure III). Escherichia coli is the most predominant organism (34.48%) followed by Staphylococcus aureus (31.03%), klebsiella species (13.79%), candida albicans (13.79%) and proteus species (6.90%). **Conclusion:** This study concluded that frequency of asymptomatic bacteriuria in pregnant women was 15.18% with Escherichia coli being the most common causative organism.

KEYWORDS: Asymptomatic bacteriuria, pregnancy, Escherichia coli.

INTRODUCTION

Urinary Tract Infections (UTIs) commonly occur pregnancy, due to the morphological and physiological changes that take place in the genitourinary tract. UTIs are of two types, symptomatic and asymptomatic. Asymptomatic Bacteriuria (ASB) is defined as the presence of actively multiplying bacteria, which is greater than 105/ml of urine within the urinary tract, excluding the distal urethra, at a time when the patient has no symptoms of a UTI.^[1,2] ASB during pregnancy relates to the physiologic and anatomic changes in the urinary tract. The prevalence of ABS in pregnant women is estimated to be approximately 1.9–15%.^[3,4]

The most commonly reported etiologic agent of bacteriuria is Escherichia coli (E. coli) (80–90%),

followed by Proteus mirabilis (P. mirabilis), Klebsiella pneumonia (K. pneumonia) and Pseudomonas aeruginosa (P. aeruginosa). Gram-positive organisms, including B streptococci, Enterococcus faecalis (E. faecalis) and coagulase-negative staphylococci (CoNS), are less commonly recognised as etiologic agents of bacteriuria.^[5,6]

In a study, prevalence of asymptomatic bacteriuria in pregnant women was found to be 45.3% with Escherichia coli as the most predominant organism (27.1%) followed by Staphylococcus aureus (24.4%), klebsiella species (11.9%), proteus species (8.7%) and candida albicans (11.8%).^[7] Pregnant women with ASB are at an increased risk for severe outcomes so that without antibiotic therapy, approximately 30% of

pregnant women affected by symptomatic bacteriuria may have complications such as preterm delivery and low birth weight infants. In addition, the risk of developing pyelonephritis during pregnancy is approximately 20–30 fold higher than that in women without bacteriuria.^[8]

Significant morbidity associated with asymptomatic bacteriuria has been documented only in pregnant women. Approximately 30% to 40% of pregnant women with asymptomatic bacteriuria identified in the first trimester who are not treated with antimicrobials develop pyelonephritis later in pregnancy; this occurs most frequently at the end of the second or beginning of the third trimester.^[9] Pyelonephritis during pregnancy usually requires hospitalization. As with any febrile illness occurring later in pregnancy, pyelonephritis is also associated with premature labor. Asymptomatic bacteriuria during pregnancy in the absence of acute pyelonephritis has also been associated with intrauterine growth retardation and premature rupture of membranes, but bacteriuria may only be an associated condition rather than the cause of these adverse pregnancy outcomes.^[10]

Urinary tract infection (UTI) cases have shown increasing antimicrobial drug resistance in recent years.^[11] Accurate bacteriologic records of culture results may help guide the determination of empirical therapies before sensitivity patterns are available. My study will be performed to determine the prevalence of asymptomatic bacteriuria and its causative organisms in pregnant women in local population. As routinely, urine culture cannot be emphasized in our setups and majority of our population belongs to rural areas as well as not well aware of the precautions during antenatal period. My study will not only be a useful addition in the international as well as national literature but will also provide us the magnitude of the problem. Then based on these results, routine urine cultural test can be made a routine on all antenatal patients in order to identify any unsuspecting infection. This measure will go a long way in reducing maternal and obstetric complications associated with pregnancy.

METHODOLOGY

This descriptive, cross-sectional study was conducted at the Department of Urology and Department of Obstetrics & Gynaecology, Shahida Islam Medical & Dental College/Teaching Hospital, Lodhran, and Kidney Centre, Bahawal Victoria Hospital, Bahawalpur, from July 2021 to June 2022. A sample of 191 pregnant women of age 16-40 years with gestational age >24 weeks were selected through consecutive non probability sampling technique and by taking 95% confidence level, 4% margin of error and taking expected percentage of proteus species as 8.7%.⁷ Women with history of antibiotic therapy taken within two weeks and history of genital tract trauma were excluded. Informed written consent was taken from each woman. Then clean-catch

midstream urine was collected from each woman into a sterile universal container. Samples were cultured on dried plates of blood agar and cysteine lactose electrolyte deficient agar (CLED), using a calibrated drop delivering 0.002ml of urine. Plates were incubated aerobically of 37°C overnight. Colony counts yielding bacterial growth of 10⁵/ml or more of pure isolates were regarded as significant for bacteriuria. Also the causative organism as described in operational definitions was noted by the researcher herself. This all data including demographic data was recorded on a specially designed proforma. The collected information was analyzed by computer software SPSS version 25.0. Quantitative variables were presented as mean and standard deviation. Qualitative variables were presented as frequency and percentage.

RESULTS

Age range in this study was from 16 to 40 years with mean age of 28.68 ± 3.86 years. Majority of the patients 108 (56.54%) were between 16 to 30 years of age. Mean parity was 3.15 ± 0.98. Mean height was 157.31 ± 13.56 cm. Mean weight was 74.89 ± 9.42 kg. Mean BMI was 27.48 ± 3.03 kg/m².

In our study, frequency of asymptomatic bacteriuria in pregnant women was found in 29 (15.18%) patients (Figure I). *Escherichia coli* is the most predominant organism (34.48%) followed by *Staphylococcus aureus* (31.03%), *klebsiella* species (13.79%), *candida albicans* (13.79%) and *proteus* species (6.90%) as shown in Table I.

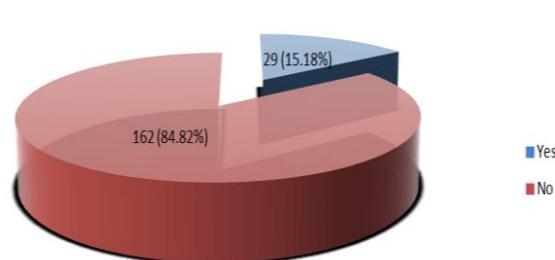


Figure I: Frequency of asymptomatic bacteriuria in pregnant women (n=191).

Table I: Frequency of causative organisms for asymptomatic bacteriuria in pregnant women (n=29).

Causative Organisms	No. of Patients	%age
<i>Escherichia coli</i>	10	34.48
<i>Staphylococcus aureus</i>	09	31.03
<i>Klebsiella</i> species	04	13.79
<i>Proteus</i> species	02	6.90
<i>Candida albicans</i>	04	13.79

DISCUSSION

Urinary Tract Infections (UTIs) commonly occur pregnancy, due to the morphological and physiological changes that take place in the genitourinary tract. UTIs are of two types, symptomatic and asymptomatic. Asymptomatic Bacteriuria (ASB) is defined as the presence of actively multiplying bacteria, which is

greater than 105/ml of urine within the urinary tract, excluding the distal urethra, at a time when the patient has no symptoms of a UTI.^[12] ASB can be found in both pregnant and non-pregnant women. The prevalence of ASB was found to be 2-11% in pregnant women. Pregnancy enhances the progression from ASB to symptomatic bacteriuria, which could lead to acute pyelonephritis in 20-50% of cases and to adverse obstetric outcomes such as prematurity, postpartum hypertensive disease, anaemia, UTIs, and higher foetal mortality rates, if it is left untreated.^[13,14] Asymptomatic bacteriuria is a microbial diagnosis which is based on the isolation of a specified quantitative count of bacteria in a specimen of urine which is properly collected from a pregnant woman who does not have any signs or symptoms. Thus, urine culture is the gold standard screening technique for ASB which occurs during pregnancy.^[15,16] The predominant organism that causes UTIs during pregnancy is *Escherichia coli*, which accounts for 80-90% of infections.^[17] The relatively high prevalence of ASB during pregnancy, the significant consequences faced by women and their pregnancies, and the ability to avoid undesired outcomes with treatment, justify screening and treatment of ASB in pregnancy. The frequencies of isolated pathogens and their antimicrobial resistance patterns can vary in different geographical regions.^[18]

I have conducted this study to determine the frequency of asymptomatic bacteriuria and its causative organisms in pregnant women. Age range in this study was from 16 to 40 years with mean age of 28.68 ± 3.86 years. Majority of the patients 108 (56.54%) were between 16 to 30 years of age. In our study, frequency of asymptomatic bacteriuria in pregnant women was found in 29 (15.18%) patients (Figure III). *Escherichia coli* is the most predominant organism (34.48%) followed by *Staphylococcus aureus* (31.03%), *klebsiella* species (13.79%), *candida albicans* (13.79%) and *proteus* species (6.90%). In a study, prevalence of asymptomatic bacteriuria in pregnant women was found to be 45.3% with *Escherichia coli* as the most predominant organism (27.1%) followed by *Staphylococcus aureus* (24.4%), *klebsiella* species (11.9%), *proteus* species (8.7%) and *candida albicans* (11.8%).^[7]

In another study¹, significant bacteriuria was found in only 22 cases (7.3%). Growth of contaminants was seen in 40 cases (13.3%). Among cases which showed positive cultures, 48.9% were primigravidae and 51.1% were multigravidae. Highest incidence was reported in age group of 21-30 years. The predominant organisms which were isolated were *Escherichia coli*, followed by *Klebsiella pneumoniae*, *Enterococcus faecalis*, *Staphylococcus aureus* and *Proteus mirabilis*.^[1] Labi AK *et al*^[19] has shown the prevalence of asymptomatic bacteriuria as 5.5%. It was associated with sexual activity during pregnancy (Fisher's Exact 5.871, p-value 0.0135), but not with sexual frequency. There were no significant associations with educational status, parity,

gestational age, marital status and the number of fetuses carried. The commonest organism isolated was *Enterococcus spp* (26.7%) although the enterobacteriaceae formed the majority of isolated organisms (46.7%). Nitrofurantoin was the antibiotic with the highest sensitivity to all the isolated organisms.^[19]

In a study²⁰, a total of 173 samples were screened; 154 women showed no growth on culture; 19 women had significant bacteriuria with a prevalence rate of 10.98%; 15 women in the age group of 18-25 years and 4 women in the age group of 26-35 years had significant bacteriuria; 83 women were multiparous and 11 (57.89%) women in this group had significant bacteriuria, while only 8 (42.1%) out of 90 women in the nulliparous group had significant bacteriuria. With respect to trimester, 10 (52.63%) out of 19 culture positive cases were in second trimester. In our study, the organisms isolated were *Escherichia coli*, *Staphylococcus aureus* and *Klebsiella pneumoniae*. The bacteria grown were most sensitive to Ampicillin+Sulbactam (68%), Nitrofurantoin (73%), Amikacin (84%) and Meropenem (100%).^[20]

According to a study conducted by Gayathree *et al*^[21] from Hassan, Karnataka (2009), *Escherichia coli* emerged as the most frequent cause of ASB with 32 cases (51.61%), followed by *Proteus mirabilis* with 9 cases (14.51%), *Staphylococcus aureus* and *Klebsiella pneumoniae* with 6 cases (9.67%) each, *Acinetobacter spp.*, with 5 cases (8.05%), *Pseudomonas aeruginosa* with 3 cases (4.83%) and *Enterococcus faecalis* with one case (1.61%).^[21] According to a study by Madhu Udawat *et al*^[22] in India (2013), there was an increasing trend in the prevalence of *S.aureus* infection (15.28%). This dramatic increase in prevalence rate can be attributed to the emergence and global spread of *Staphylococcus aureus*. Hence, recognizing this change in the spectrum of uropathogens remains important to guide changes in empirical antimicrobial therapy. According to Nithyasree *et al*^[23] from Tamilnadu (2013), majority of isolates were gramnegative bacteria (81.39%). Gram-positive organisms were responsible only for 18.6%. *E.coli* (65.11%) was the most prevalent uropathogen isolated followed by *Klebsiella pneumoniae* and *Staphylococcus aureus* which accounted 11.62% each. The least prevalent bacteria isolated were *Proteus mirabilis* (4.65%).

However parity, education level, and place of living of the participants did not have any statistical significant influence on ASB in this study. The age distribution of the participants in this study appeared to have significant association on ASB ($P = 0.05$). Parity, not having an influence on ASB, in this study is similar to previous reports in Ibadan, Nigeria, Ghana and Iran.^[24-26] However this did not agreed with another study where ASB in pregnancy was associated with increasing parity.^[27] The age distribution of the participants in this

study appeared to have statistical significant association on prevalence of ASB. This is not agreed with a study done in Abakaliki Nigeria.^[24] However other studies have reported advancing maternal age having significant association on prevalence of ASB. Educational level attained may be an indicator of the socioeconomic status of the women. Lower levels of education and low socioeconomic status have been related to higher prevalence of ASB in many studies and reports.^[29] This is because education improves the attitudes and beliefs of women. However education level of the participants in this study did not have any significant association with ASB, which agreed a study done by Onu.^[24]

CONCLUSION

This study concluded that frequency of asymptomatic bacteriuria in pregnant women was 15.18% with *Escherichia coli* being the most common causative organism. So, we recommend that early screening of asymptomatic bacteriuria in pregnant women should be done so that empirical therapy instead of waiting for the culture report can be given for reducing the progression of symptomatic infection during that pregnancy.

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