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Original Research Article

Asymptomatic bacteriuria in pregnancy and its effect on maternal and fetal outcomes

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ABSTRACT

Background: Asymptomatic bacteriuria is the most common infection encountered in pregnancy and can lead to multiple complications both in mother like acute pyelonephritis, sepsis and in the fetus like LBW, preterm labour, PROM, if left untreated. The present study was done to determine the current prevalence of ASB and its maternal and perinatal outcome.
Methods: A prospective cohort study was conducted at a tertiary centre on 150 antenatal females. Urine culture and sensitivity was conducted for each participant and the fetomaternal outcome between affected and unaffected women were compared and p value <0.05 was considered significant.
Results: 27 females had ASB making the prevalence of 18% out of which 12 (44.4%) cultures yielded *Klebsiella* and 15 (55.5%) samples were sensitive to nitrofurantoin. There was no significant increase in antenatal complications, mode of delivery, post natal complications, neonatal outcomes.
Conclusions: There is no significant risk associated with ASB, therefore the next question opens regarding the need for treatment.

Keywords: Asymptomatic bacteriuria, Fetomaternal outcome, Prevalence

INTRODUCTION

When a pregnant female comes for an ANC visit, the primary objective of regular obstetrical care is to diagnose any unforeseen difficulty and risk to maternal or foetal health. Urinary tract infection (UTI) is one of the most common bacterial infections seen during pregnancy.[1] Pregnant women are affected twice as compared to non-pregnant women in acquiring urinary tract infections because of the anatomical and physiological changes such as increased bladder volume, decrease in tone of ureter and bladder occurring in pregnancy.[2]

Asymptomatic bacteriuria is found in 2-10% of pregnant women.[3] A major study comparing normal and high risk pregnant women reported 6% prevalence of ASB in healthy women; 12.2% rate in diabetic women and 18.7% in women with previous history of urinary tract infection.[4] Since most of the women with colonized urine are asymptomatic, they never receive treatment, and only some go on to develop frank symptoms and signs of urinary tract infection such as burning micturition, dysuria, increased frequency and fever.[5] The presence and absence of symptoms depend upon the presence and absence of pathogenic fimbriae respectively.

"When a same microorganism with colony count of more than 10^5/ml of urine is obtained in a clean catch midstream urine in a women without symptoms is defined as asymptomatic bacteriuria".[6] Urine routine and microscopy also is helpful in the diagnosis as it shows the presence of mucous, puscells and bacteria. Proteinuria and glycosuria can also be screened as they make the urine moresuitable growth media for the pathogen.

Complications associated with untreated bacteriuria include neonatal complications like low birth weight and preterm babies, intrauterine growth retardation and also increased Perinatal mortality and morbidity.[7] Maternal complications include anaemia, hypertensive diseases, preterm labour, chorio amnionitis, and postpartum endometritis.[7] The association between asymptomatic bacteriuria and pre term may be due to the pyrogens which increases the myometrial activity and also the endotoxins produced from the gram negative bacteria has an oxytocic effect on the myometrium. Rupture of membranes and initiation of labour can occur prior due to the bacterial enzymes like proteases and collagenase.

If untreated 25-40% of them will develop symptomatic urinary tract infection spreadingto upper urinary tract to cause acute pyelonephritis and 40% will involve lower urinary tract symptoms in the form of acute cystitis.[8] Treatment of ASB has been shown to reduce the rate of pyelonephritis in later part of pregnancy and therefore regular screening for and appropriate treatment of ASB with antibiotics has become a standard of obstetrical care.[9]

This study determined the etiology of ASB, their microbial sensitivity and resistanceto antibiotics, the associated risk factors and complications of asymptomatic bacteriuria and itseffect on maternal and foetal outcome and hence the need for vigilance.

METHODS

This was a prospective observational cohort study in the department of obstetrics and gynecology of Holy Family hospital, Okhla Road, South Delhi on 150 pregnant women attending antenatal OPD at Holy Family hospital during March 2023 - March 2025.

Inclusion criteria

Pregnant women attending antenatal OPD at Holy Family Hospital, patient with no h/o symptoms of UTI in current pregnancy like fever, burning micturition, frequency, urgency, dysuria.

Exclusion criteria

Symptoms and signs of UTI, patient who has taken antibiotic for UTI in this pregnancy, known cades of renal disease with renal anomalies, patient not willing to participate in the study.

The mid-stream urine sample was collected in sterile containers and sent for ‘routine microscopy’ and ‘culture and sensitivity’ at the time of first visit.

Patients with culture positive were treated appropriately. Repeat urine culture and sensitivity was done to check for persistent bacteria after 3 weeks.

Both culture positive and negative females were followed up till delivery for maternal and fetal outcome. Data was analyzed using Statistical Package for Social Sciences (SPSS) version 25.0. P value of <0.05 was taken significant.

RESULTS

The study was conducted in the department of obstetrics and gynecology of Holy Family hospital, Okhla Road, South Delhi. 150 pregnant women with no history of symptoms of UTI in current pregnancy were included in the study. Incidence of asymptomatic bacteriuria in pregnancy was assessed and results are as follows.

Table 1: Incidence of asymptomatic bacteriuria in pregnant women.

Total number	Culture positive (%)	Culture negative (%)
150	27 (18)	123 (82)

Out of 150, 27 (18%) patients were found to have culture positive while 123 (82%) remained negative.

Both the groups were comparable with respect to age, past history, family history, parity and body mass index.

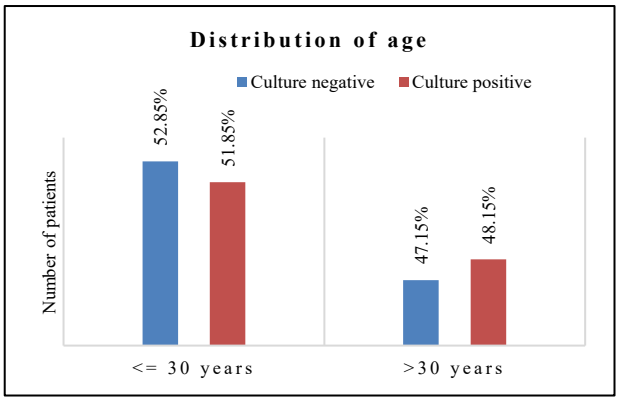

Figure 1: Distribution of age.

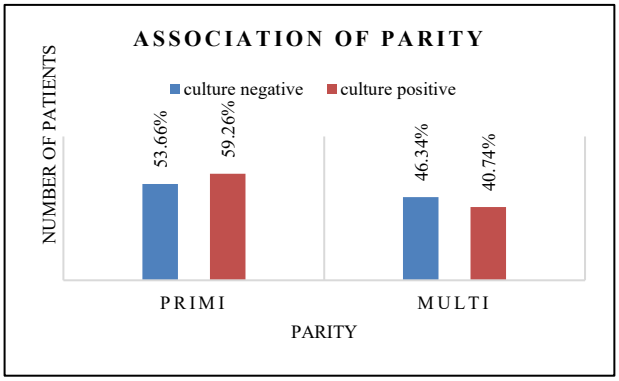

Figure 2: Distribution of parity.

Compared to patients with culture-negative results, those with culture-positive results showed no significant differences in hemoglobin levels (mean±SD: 11.08±1.31 gm/dl versus 11.07±1.27 gm/dl, p=0.985) or total leukocyte count (mean±SD: 9283.17±3056.44 cells/mm^3 versus 9342.59±2322.54 cells/mm^3, p=0.924).

Compared to patients with culture-negative results, those with culture-positive results did not show significant differences in urine albumin (p=0.295) or urine sugar (p=0.451) or urine epithelial cells (p=0.123).

In the study, the urine culture showed that 27 cases had growth out of which maximum were found to have *Klebsiella*, 12 (44.44%), 10 (37.03%) cases had *E. coli*, 2 (7.40%) cases had Staphylococcus aureus, 2 (7.40%) cases had *Enterococcus faecalis*, and 1 (3.70%) case of *Staphylococcus hemolyticus*.

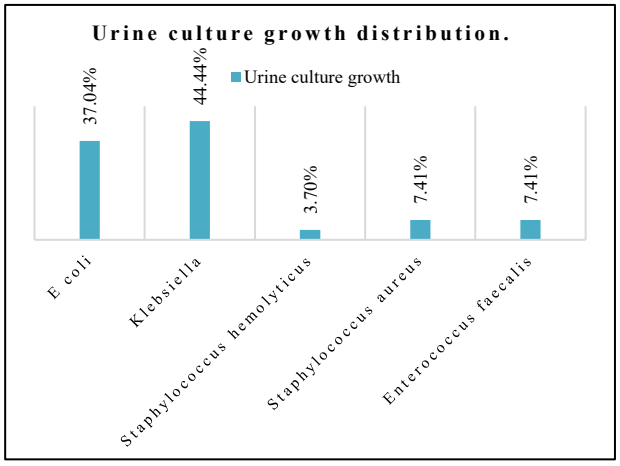

Figure 3: Distribution of urine culture growth.

In this study, antibiotics were given to culture positive cases. Antibiotics administered included nitrofurantoin in 15 cases (55.56%), fosfomycin in 5 cases (18.52%), ampicillin in 2 cases (7.41%), cefixime in 2 cases (7.41%), clindamycin in 2 cases (7.41%), and amoxicillin in 1 case (3.70%).

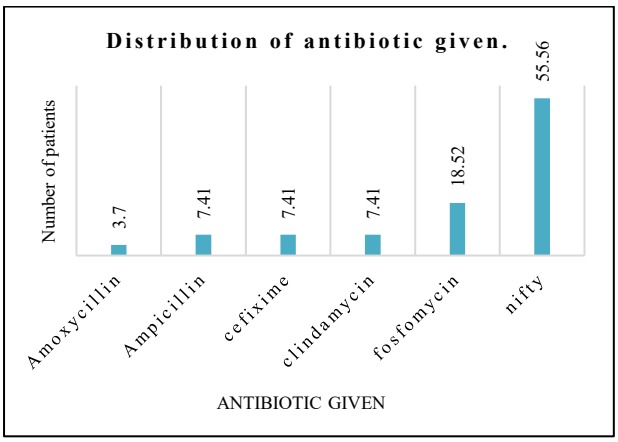

Figure 4: Distribution of antibiotics given.

Antenatal complications were found to be comparable in both culture negative and positive groups. Most common complication in culture negative was hypothyroidism (23.58%) while in culture positive was obstetric cholestasis and GDM (18.52%). Both the groups had equal distribution of mode of delivery, type of vaginal delivery, term/preterm.

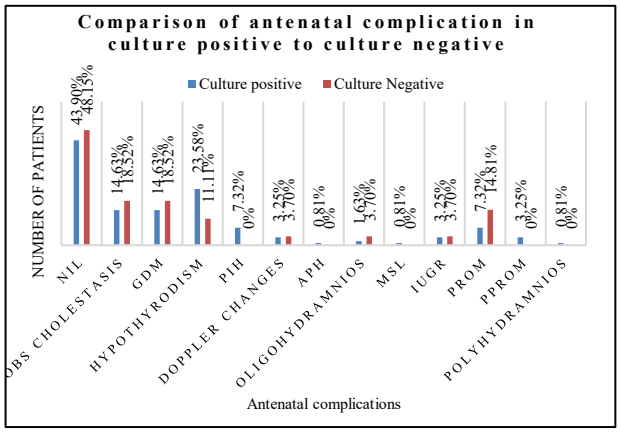

Figure 5: Comparison of antenatal complication in culture positive to culture negative.

Fetal distress was significantly more common as an indication for CS in the culture-positive group compared to the culture-negative group (33.33% versus 12.16%, p=0.029). Failed induction also trended higher in the culture-positive group (27.78% versus 13.51%), although this difference was not statistically significant (p=0.142). No significant difference was seen in other indication of CS between culture negative and positive. Overall, the most prevalent indication for CS in both culture-negative and culture-positive groups was previous CS, with rates of 36.49% and 22.22%, respectively. Other indications such as failed induction, severe pre-eclampsia, cephalo-pelvic disproportion (CPD), and non-progress of labor (NPOL) did not show statistically significant differences between the groups.

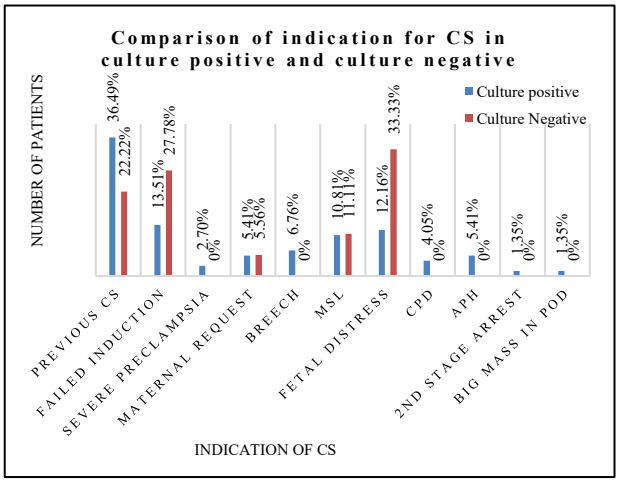

Figure 6: Comparison of indication for CS in culture positive and culture negative.

Fetal parameters like birthweight, APGAR score, NICU admission rate was found to be similar in both the groups. Most neonates had no complications in both the groups (81.48% versus 76.42%, p=0.57). Rest of the complications had similar distribution across both groups with no significant difference.

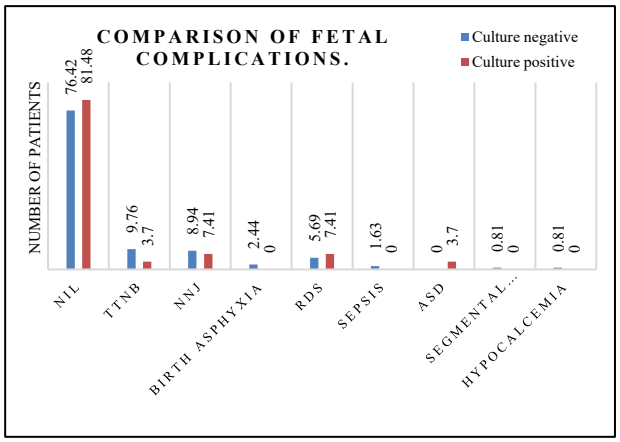

Figure 7: Comparison of neonatal complications in culture positive and culture negative.

DISCUSSION

UTI is one of the most common perinatal complications affecting approximately 8% of pregnancies.[10,11] The severity is variable from Asymptomatic bacteriuria (ASB), to symptomatic cystitis to serious pyelonephritis which can further progress to urosepsis.[12] Although ASB may not require treatment in non-pregnant females, it is empirical to treat in pregnancy since it can lead to various pregnancy complications such as preterm labour, PROM, chorioamnionitis, LBW babies, IUGR etc.

In our study, the age varied from 21-41 yrs. with mean being 30.25 years. There was no significant association between age and ASB, the respective means being 30.28 and 30.11.

In the study conducted by Izuchukwu had similar age distribution i.e. the mean ages of the positive and negative groups were 30±4.5 and 29.8±4.3 years respectively and was not significant.[13] In relation to parity, both the groups were comparable in our study with most of the patients being primigravida, 59.26% in culture positive versus 53.66% in culture negative with no significant difference.

In a study conducted by Neelima et al, subjects with significant bacteriuria, majority were of 2nd gravida (42.9%) while those with insignificant growth, majority were primigravida (75%) but this was not significant.[14]

Most of the patients in our study were in the overweight bracket, (51.85% in culture positive vs. 46.34% in culture negative). The mean BMI in both the groups was similar, i.e. culture-negative group (29.42±4.37 kg/m^2) and the culture-positive group (29.72±4.5 kg/m^2), not being significant.

In the study by Neelima et al, the results for BMI were similar to our study being females with significant bacteriuria, majority had BMI 25 to 29.9 (52.4%) and those with insignificant growth, majority of subjects had BMI 25 to 29.9 (50%).

In our study, compared to patients with culture-negative results, those with culture-positive results showed no significant differences in hemoglobin levels (mean±SD: 11.08±1.31 gm/dl versus 11.07±1.27 gm/dL, p=0.985) or total leukocyte count (mean±SD: 9283.17±3056.44 cells/mm^3 versus 9342.59±2322.54 cells/mm^3, p=0.924). In the study conducted by Neelima et al, majority Hb in control group was >11 gm/dl (75%) while in cases with significant growth, majority had Hb 10-10.9 gm/dl (42.9%). The difference was not significant. TLC count in cases was 100% in range of 4000-11000 while only 75% of insignificant growth had between 4000-11000. This showed significant association between TLC and Urine culture sensitivity. In another study by Edae et al, 71.4% female with significant bacteriuria had anemia which was comparable to 68% anemics in control group. The p value was 0.621, making it not significant.[15]

In our study, results did not show significant differences in urine albumin (p=0.295) or urine sugar (p=0.451) or urine epithelial cells (p= 0.123). In the study done by Neelima et al, there was significant association between urine albumin and culture reports i.e. women with significant bacteriuria, (23.8%) had albumin traces in urine and (4.8%) had 1+ Urine albumin compared to insignificant growth group where (50%) had traces of albumin. In the study none of the pregnant women had urine sugar and urine casts while 100% of them had pus cells. In another study by Thakur et al, the number of pus cells had no significant difference in prevalence of asymptomatic bacteriuria (p=0.084).[16]

In our study 27 out 150 females had asymptomatic bacteriuria that is had culture positive reports making the prevalence 18% overall. This was lesser when compared to study done by Kenneth in which 65 females were positive out of 220 recruited making the prevalence of 29.5%. In another study by Neelima et al, the incidence was 24%.[14] Third study done by Jain et al, the prevalence was 16.9% which was similar to ours.[17]

Maximum samples in our study were found to have *Klebsiella*, 12 (44.44%), 10 (37.03%) cases had *E. coli*, 2 (7.40%) cases had *Staphylococcus aureus*, 2 (7.40%) cases had *Enterococcus faecalis*, and 1 (3.70%) case of *Staphylococcus hemolyticus*. The pathogens isolated were similar to the study done by Kenneth in which, out of the 65 positive urine culture, 23 (35.38%) grew *Klebsiella*, 16 (24.61%) grew *Escherichia coli*, 13 (20.00%) grew *Staphylococcus*, 7 (10.77%) grew *Pseudomonas* and 6 (9.23%) grew coliform organisms. While in Neelima et al study, most common organism isolated was *E. coli*

(22.7%) followed by *Staphylococcus aureus* (18.2%), *Klebsiella Pneumoniae* (9.1%), *Klebsiella Oxytoca* (9.1%), CONS (9.1%), *Citrobacter freundii* (9.1%), *Pseudomonas* species (9.1%), *Enterobacter aerogenes* (4.5%), *Acinobacter* (4.5%), and *Streptococci* (4.5%). And in the study done by Kamel et al the frequency was- *E. coli* (57.14%), followed by *proteus* (28.57%) followed by *Klebsiella pneumoniae* (14.28%).[18]

In our study, antibiotics were administered to culture positive cases and included nitrofurantoin in 15 cases (55.56%), fosfomycin in 5 cases (18.52%), ampicillin in 2 cases (7.41%), cefixime in 2 cases (7.41%), clindamycin in 2 cases (7.41%), and amoxicillin in 1 case (3.70%). In Izuchukwu et al study, fifty-eight (89.23%) of the organisms were sensitive to nitrofurantoin, 50 (76.92%) were sensitive to ceftaxidime, 42 (64.61%) to gentamycin, 40 (61.54%) to augmentin and ofloxacin respectively and 38 (58.46%) to cefuroxime.

We observed that antenatal complications were found to be comparable in both culture negative and positive groups out of which most common complication in culture negative was hypothyroidism (23.58%) while in culture positive was obstetric cholestasis and GDM (18.52%). Similar to this, even in study done by Kenneth et al, there was no statistical difference between development of anemia and PIH in both groups. Similarly, Gehani et al observed that maternal complications reported were 15.53% in intervention arm respectively, and 15.45% in control arm respectively. No significant difference was found between intervention arm and control arm with respect to maternal complications (p=0.9871).

Most of the patients, in our study, were term deliveries, 91.06% being in culture negative and 96.30% in culture positive which was similar to Kenneth study. We observed that the mean birth weight was 2.96±0.46 kg in the culture-negative group and 3.02±0.39 kg in the culture-positive group which was comparable. In Vidhyalakshm et al study, they observed that fetal growth restriction was present in 10% of patients with preterm labour pain in Ultrasonogram which is statistically significant when compared with none in the control group.[19]

Both groups had comparable rate of NICU admission, 20.33% in the culture-negative group and 11.11% in the culture-positive group (p=0.413). Most neonates had no complications in both the groups (81.48% versus 76.42%, p=0.57). Rest of the complications had similar distribution across both groups with no significant difference. Neelima et al observed 9.5% babies had NICU admission rate in significant growth while none got admitted in insignificant growth although it was not significantly different.

CONCLUSION

Asymptomatic bacteriuria is the most common infection encountered in pregnancy, therefore being an important question for its complication, outcome, and management.

We found out that there was no significant impact on the maternal or fetal outcome in the cases of asymptomatic bacteriuria. But the question that still prevails is should we treat ASB in obstetric cases? Or should we only reserve the antibiotics for symptomatic mothers just like we do in non-pregnant females with culture positive reports?

Therefore, it is important to do more such studies on a larger scale to see the real impact of ASB on maternal and neonatal outcomes, and if the results are similar, may be the next step should include studies where ASB is not treated and then comparing it cases who received antibiotics, justifying our use of antibiotics for asymptomatic cases.

After all the antibiotic prevalence and resistance is in our hands and should be used vigilantly, since there might be times when these become futile even for symptomatic cases.

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