

Prevalence and Outcome of Asymptomatic Bacteriuria among Antenatal Women in a Tertiary Care Centre

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Abstract

Asymptomatic bacteriuria (ASB) is common in pregnancy due to hormonal and physiological changes causing urinary stasis. ASB may cause maternal complications like Acute Pyelonephritis, PET, PROM, PPROM, PTL and foetal complications like LBW, IUGR and perinatal death.

This study was conducted to know the prevalence and outcome of ASB among antenatal women attending OPD in a tertiary care hospital. A total of 100 women with no clinical history of UTIs were included in the study for six months, followed up till delivery and discharge. Clean catch mid-stream urine was collected aseptically and processed by standard conventional bacteriological techniques. Out of 100 samples processed, 47 (47%) showed Significant bacteriuria ($>10^5$ CFU/ml) with infection rate of 47%. Organisms isolated were *Staphylococcus aureus* 15 (31.9%), *Staphylococcus saprophyticus* 8 (17.02%), *Staphylococcus epidermidis* 6 (12.76%), *Enterococcus faecalis* 5 (10.6%), *Escherichia coli* 9 (19.14%), *Klebsiella sps* 4 (8.5%), *Micrococci* 3 (6.38%). Maximum cases were in second trimester 25 (53.19%) followed by 3rd trimester 15 (31.9%) and 1st trimester 7 (14.89%). Women with positive cultures were administered antibiotics for 1 week and pregnancy was uneventful. In women with ASB in the last trimester, 10 (58.82%) developed maternal complications, 5 (29.41%) premature rupture of membranes, 2 (11.76%) puerperal pyrexia, 3 (17.64%) Threatened preterm labour, 1 case of PTL (1.85%) and foetal complication of Low birth weight. 53 (53%) women who are culture negative were without any maternal and foetal complications.

The present study concludes that undetected ASB leads to various maternal and foetal complications. Hence, it is mandatory to screen all antenatal women for ASB to initiate appropriate treatment so as to minimise maternal and foetal complications.

Keywords: Urinary Tract Infection (UTI); Asymptomatic Bacteriuria (ASB); Premature Rupture of Membranes; Low Birth Weight (LBW); *Staphylococcus aureus*

Abbreviations

ASB: Asymptomatic Bacteriuria; PTL: Pre Term Labour; PROM: Premature Rupture of Membranes; LBW: Low Birth Weight; IUGR: Intra Uterine Growth Restriction; PET: Pre Eclamptic Toxaemia; CFU: Colony Forming Units; OPD: Out Patient Department; UTI: Urinary Tract Infections; GDM: Gestational Diabetes Mellitus; PIH: Pregnancy Induced Hypertension; *S. aureus*: *Staphylococcus aureus*; *S. saprophyticus*: *Staphylococcus aureus*; *S. epidermidis*: *Staphylococcus epidermidis*; *E. coli*: *Escherichia coli*; *Klebsiella sps*: *Klebsiella species*; *E. faecalis*: *Enterococcus faecalis*; CLSI: Clinical and Laboratory Standards Institute; CLED: Cystine-lactose-electrolyte-deficient Medium.

Introduction

Urinary tract infections (UTIs) are the most common bacterial infections during pregnancy [1]. Asymptomatic bacteriuria (ASB) is defined as persistently and actively multiplying bacteria in significant numbers i.e., 10^5 CFU/ml within the urinary tract without any obvious symptoms [2]. Asymptomatic bacteriuria is found in 8 to 45% of pregnant women, affecting all age groups. The pregnant females are two times more commonly affected than age matched non pregnant females [3]. The reason behind is urinary stasis due to progesterone effect and also different anatomical changes develop during pregnancy.

Undetected ASB may cause acute pyelonephritis, hypertensive disease, anaemia, prematurity, low birth weight babies and prenatal death if it is not promptly diagnosed and treated [4].

The most common infecting organism is *Escherichia coli*, which is responsible for 80 - 90% of bacteriuria during pregnancy in various studies [5]. Early detection and treatment is of considerable importance not only to forestall acute pyelonephritis and chronic renal failure in the mother, but also to reduce premature delivery and fetal mortality [6]. The Gold standard investigation for detection of asymptomatic bacteriuria is urine culture. Therefore, urine culture at first booking visit or in first trimester should be considered as a universal screening test of choice [7].

Materials and Methods

This prospective study was undertaken in 100 antenatal women of 18-38 years with mean age of 24.34 yrs, attending antenatal OPD at NILOUFER HOSPITAL FOR WOMEN AND CHILDREN HYDERABAD over a period of six months from JULY 2018 to DEC 2018. Urine culture and Antibiotic sensitivity was performed in Microbiology laboratory using Standard Microbiological guidelines and techniques.

A total of 500 antenatal women attending outpatient department were screened and 100 patients fulfilling the inclusion criteria were enrolled into the study.

Inclusion criteria

All antenatal women without any signs and symptoms of urinary tract infections.

Exclusion criteria

Women with symptoms of Urinary tract infection, Gestational Diabetes Mellitus, Pregnancy Induced Hypertension, H/O Antibiotic use in previous 2 weeks, H/O Fever.

Sample size

As per formula $4P \times Q / L^2$ sample size has been calculated.

Detailed demographic data along with clinical history and informed consent was taken. All the antenatal women in the study were counselled and instructed regarding the collection of "clean catch" mid-stream urine sample in a sterile, wide mouthed container.

After collection urine samples were transported to the microbiology laboratory within 30 minutes and processed within 1-2 hours of collection, using standard microbiological procedures. Each sample was separated into two sterile containers under aseptic precautions. One part subjected to culture and another for urine analysis.

Inclusion criteria

A calibrated 100 µl wire loop was used to inoculate uncentrifuged urine onto MacConkey agar and 5% sheep blood agar by semi-quantitative standard loop method. Inoculated plates were incubated aerobically at 35 - 37°C for 18 - 24 hours. Prolonged incubation was done for further 24 hours if no growth is observed. Culture isolates were identified by standard biochemical tests as per Cowan and Steels Manual. Antimicrobial susceptibility testing was performed to all significant culture isolates by Kirby-Bauer disc diffusion method as per CLSI guidelines. The antibiotics selected were Co-trimoxazole, Nitrofurantoin, Ciprofloxacin, Norfloxacin, Cefotaxime, Ceftazidime, Cefipime, Ampicillin, Amikacin, Amoxicillin-Clavulanic acid, Erythromycin, Piperacillin-Tazobactam, Imipenem, and Ceftazidime-Sulbactam. The growth was interpreted as Significant if the number of colonies corresponded to 10^5 colony forming units (CFU) per ml and Insignificant growth was reported if colony count was less than 10^5 CFUs per ml and reported as sterile if no growth is obtained. All culture positive pregnant women were given antibiotic treatment for 1 week as per WHO guidelines depending on Antibiotic sensitivity test results.

Urine microscopy

Microscopic examination of a wet film of uncentrifuged urine was carried out to detect the presence of the pus cells, erythrocytes, micro-organisms, casts etc. Gram stain was also done.

Urine analysis

Dipstick by uristrip

It was done to rule out pathological, renal and metabolic causes of UTI. Urinary dipstick test was performed by immersing the uristrip for 60 seconds in urine and observed for colour change and test strip was compared with the colour scale provided with the kit and findings were noted.

Results and Discussion

Significant growth was observed in 47 (47%) samples. No growth observed in 53(53%) samples.

The highest number of culture positive 33 (70.2%) cases were observed in age group of 18 - 24 years followed by 25 - 31 years 18 (38.29%) and 31 - 38years 3 (6.3%).

In the present study maximum number of culture positive cases were noted in second trimester 25 (53.19%), followed by third trimester 15 (31.9%) and first trimester 7 (14.89%) (Figure 2).

The commonest organisms isolated was *Staphylococcus aureus* 15 (31.9%), followed by *Staphylococcal saprophyticus* 8 (17.02%), *Staphylococcal epidermidis* 6 (12.76%), *Enterococcus faecalis* 5 (10.6%) and un gram negative organisms *Escherichia coli* 9 (19.14%) was major isolate followed by *Klebsiella* spp 4 (8.51%).

Figure 1: Age wise distribution of culture positive cases.

Trimesters	Culture Positive	Culture Negative
1 st Trimester	7 (14.89%)	14 (26.41%)
2 nd Trimester	25 (53.19%)	24 (45.28%)
3 rd Trimester	15 (31.92%)	15 (32.07%)

Table 1: Trimester wise distribution.

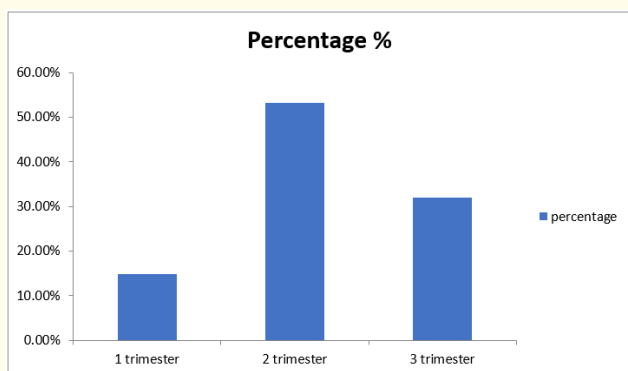


Figure 2: Trimester wise distribution.

In our study *Staphylococcus aureus* was sensitive to Nitrofurantoin (90%) Cotrimoxizole (84%), Ciprofloxacin (87.5%), Amikacin (75%) and showed high sensitivity to Nitrofurantoin (90%) and highest resistance to Ampicillin (53.0%). whereas Gram Negative organisms showed high sensitivity to Cefipime (100%), resistance to Ampicillin (90%).

Urinary tract infection is one of the most common diseases encountered in clinical practise. The urinary tract undergoes profound physiological and anatomical changes during pregnancy facilitating the development of bacteriuria both symptomatic and asymptomatic in pregnant women [8]. Symptomatic bacteriuria is easy to diagnose and treat due to its overt symptoms but asymptomatic bacteriuria of pregnancy needs special attention due to its adverse consequences [8]. It is important to detect Asymptomatic

Figure 3: Sensitivity pattern of different isolates.

bacteriuria in early pregnancy because 50% of untreated women develop complications [9].

In the present study, the prevalence of ASB was found to be 47%. The prevalence of ASB in Western studies ranges from 2 - 7%, in various Indian studies reported prevalence between 8 - 45%. There are not many studies on the incidence of ASB in India. In a study which was done by Lavanya SV, *et al.* [12] the prevalence of ASB was 8.4% in a south Indian population, Kasinathan, *et al.* [6] study showed prevalence of 12.6%, Neupane, *et al.* (26%) [13], Imade, *et al.* (45.3%) [10]. The present study is correlating with Imade, *et al.* A cost evaluation study reported that screening for pyelonephritis is appropriate when the prevalence of ASB is greater than 2% so, screening all antenatal women in first and second trimester by urine culture is recommended.

Staphylococcus aureus was the most common organism isolated in our study which was similar to study done by Imade, *et al.* (2010) but majority of the studies reported Gram negative bacilli as common cause of ASB. *Staphylococci* are mostly normal skin flora and can be introduced into the urinary tract causing infection. Increase in prevalence of *Staphylococcal aureus* is reported in our study. The prevalence and the isolate may vary with the different environmental conditions and depends on personal hygiene, social habits of community, basic health education, socioeconomic status, availability of basic amenities. The organisms are mostly normal skin flora and can be introduced into the urinary tract during sexual intercourse [10,14-16].

In this study Antenatal women in age group 18 - 24 years had highest prevalence of infection 33 (70.2%) majority of women are multiparous. Similar findings were observed in other studies [17,18]. Multiparity is a risk factor for acquiring asymptomatic bacteriuria in pregnancy [10]. In the present study, most culture positive cases were seen in second trimester 25 (53.1%), which was similar to Girishbabu R J study [2] and Nath, *et al.* study [11], Kasinathan, *et al.* [6].

All women in the study group were followed up till delivery and discharge. On follow-up a special note was made for the development or presence of maternal complications like Preterm labour, Threatened PTL, Premature rupture of membranes, Pre eclamptic toxemia indirect cause of Pre Eclampsia, anaemia and UTI.

Antenatal and Postnatal period was uneventful in all culture negative women. 7 women with positive culture in first trimester and 25 women in second trimester were given antibiotic coverage for 1 week and had no maternal and foetal complications.

Out of 15 women with positive culture in third trimester 10 developed complications, 5 women without complications were observed to have normal delivery without any maternal and foetal complications. In rest of the 10 women 7 were not administered with antibiotics, 3 were given antibiotics. Out of the 7 non treated women 5 were admitted with premature rupture of membranes (on per speculum examination clear fluid draining from cervix at term /37 wk of gestation, before onset of labour), 2 women developed puerperal pyrexia within 24 hours, 3 women with antibiotic coverage presented with Threatened PTL in 32 weeks gestational age may be due to inadequate antibiotic usage and fail to follow up. Low birth weight of 1.8 kg was noted in case of multi who had preterm labour due to asymptomatic bacteriuria. Two women with 24 weeks GA diagnosed with Pre eclamptic toxemia (PET), had proteinuria of 3+ was put under observation and treated conservatively and discharged. Similar maternal and foetal complications were observed by Mithra, *et al.* (1977), Lavanya, *et al.* (2002), Rajashekhar, *et al.* (2013). Screening and treatment of asymptomatic bacteriuria during antenatal care will be one of the most cost effective interventions at the primary care level for mothers and newborns in developing countries. In the present study women who were early diagnosed with asymptomatic bacteriuria were treated with the antibiotics and had no complications whereas late detected women showed complications. In our study the accuracy of the Dipstick is very low and inconsistent when urine leucocytes were considered but it could be able to detect conditions associated with proteinuria (Pre eclampsia).

Conclusions

The present study showed highest occurrence of ASB in second trimester 25 (53.19%). *Staphylococcus aureus* was the predominant pathogen. All women with significant bacteriuria are multiparous in age group of 18 - 24 yrs. It is also demonstrated that ASB in late pregnancy was found to be associated with various maternal and neonatal complications. All antenatal women should be screened for ASB in their first booking visit/1st antenatal visit preferably in 1st trimester followed by second screening in second trimester to screen and treat Asymptomatic bacteriuria to avoid maternal and foetal complications.

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