

Asymptomatic Bacteriuria (ASB) In Pregnant Women Attending A Tertiary Health Care Centre In Makurdi, Central Nigeria

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Abstract: To determine the prevalence of Asymptomatic bacteriuria, four hundred and thirty eight (438) urine samples from pregnant women were collected from attendees of a tertiary hospital in Makurdi, the Benue State capital of Central Nigeria between September 2014 and April of 2015. The urine samples were screened for the presence of bacteria species using standard cultural and biochemical procedures. A total of 277 (63.2%) had levels of bacteria indicative of asymptomatic bacteriuria comprising of *Escherichia coli* 87 (31.4%), *Staphylococcus spp* 60 (21.7%), *Proteus spp* 34 (12.3%), *Klebsiella spp* 31 (11.2%), *Pseudomonas spp* 28 (10.1%), *Enterobacter spp* 22 (7.9%), *Streptococcus spp* 10 (3.6%), *Corynebacteriaspp* 3 (1.1%) and *Serratiaspp* 2 (0.7%). Higher prevalence were found among 21-30 years age group 116 (69.9%), $P < 0.05$; 0.080, those in their third trimester 126 (70.0%), $P < 0.05$; 0.049 and among greater than fifth parity (number of pregnancy) patients 29 (69.1%) $P < 0.05$; 0.480 with results not statistically different when tested using the chi-square analysis for differences in age group and Parity, but was significantly associated with trimester (age of pregnancy). The findings affirm the fact that asymptomatic pregnant women harbor bacteria in their urinary tract which could predispose them to pyelonephritis relating to negative outcomes for both mother and child.

Keywords: Asymptomatic, Bacteriuria, Makurdi, Central Nigeria.

I. INTRODUCTION

Asymptomatic bacteriuria (ASB) in pregnancy relates to anatomic and physiologic changes in the urinary tract that alter the host environment. Compression of the ureters at the pelvic brim may predispose to upwards reflux of urine; thus, ASB more readily progresses to pyelonephritis during pregnancy. Decreased concentration of urine, glucosuria, and progesterone effects (promote ureteric dilatation) also influence infection (Hazhir 2007; Ipeet *al.*, 2013). It has been reported that pregnant women are more prone to asymptomatic bacteriuria because of urinary stasis and ureteric reflux (Hutchonet *al.*, 1982), as well as anatomical changes, which prevent easy passage of urine (Bellanti, 1978). Physiologic changes of pregnancy may predispose patient to

bacteriuria, these include urinary retention from the weight of the enlarging uterus and urinary stasis due to urethral smooth muscle relaxation caused by increases in progesterone (Woodman, 2001). Approximately 90 percent of pregnant women develop ureteral dilation, which will remain until delivery (hydronephrosis of pregnancy), increased bladder volume and decreased bladder tone, along with decreased ureteral tone. These factors contribute to increased urinary stasis and ureterovesical reflux (Patterson and Andriole, 1987). Additionally, the physiological increase in plasma volume during pregnancy decreases urine concentration; up to 70 percent of pregnant women develop glycosuria, which encourages bacterial growth in the urine (Patterson and Andriole, 1987; Lucas and Cunningham, 1993). Increases in urinary progestins and estrogens may lead to decreased ability

of the lower urinary tract to resist invading bacteria; this decreased ability may be caused by decreased ureteral tone or possibly by allowing some strains of bacteria to selectively grow (Lucas and Cunningham, 1993). Women with asymptomatic bacteriuria during pregnancy are more likely to deliver premature or lowbirth-weight infants and have a 20- to 30-fold increased risk of developing pyelonephritis during pregnancy compared with women without bacteriuria (Smaill, 2007).

II. MATERIALS AND METHODS

SAMPLE COLLECTION

The study was carried out in a tertiary hospital in Makurdi, Middle belt region of Nigeria between September 2014 and April 2015. The hospital serves as a referral Centre for over half a million people within 40 km radius of the city. The town is divided by the River Benue into the north and south banks. Owing to its location in the Benue River, Makurdi experiences warm temperature most of the year.

A purposive selection consisting of pregnant women attending the ante-natal clinic was taken. This included women in the three trimesters of pregnancy. Patients were excluded if they had symptoms of urinary tract infection, had taken antibiotics during the previous week, or had any signs of labor.

A total of 438 pregnant women participated in this study. Information regarding each patient's medical and obstetric history was recorded on a predesigned proforma before collection of urine specimen. Information required on the proforma includes the age, parity, Trimester *i.e.* gestational age and how they wash their private parts, either from front to back or from back to front.

COLLECTION OF SPECIMENS

Written informed consent was obtained from the women for the collection of each specimen, in accordance with the ethical guidelines of the medical Institution.

Each of the women were instructed on how to collect a clean-catch midstream urine sample in a sterile container.

PROCESSING AND ISOLATION OF SAMPLES

The culture media used for isolation of bacteria from urine samples were Cystein-Lactose Electrolyte-Deficient (Difco Co, USA), Blood and chocolate agar plates. Each urine sample was inoculated and streaked with the aid of heat-flamed standard wire loop (delivering 0.001 ml urine) on to the agar plates. The plates were incubated aerobically at 37°C for 24hrs and then examined. Only plates with significant growth (*i.e.* at least 100cfu/ml) were considered significant and further analyzed. The cultural and morphological characteristics of distinct and isolated colonies were studied. This included size, elevation, opacity and colour. Distinct and isolated colonies from each significant growth were Gram stained.

Data was coded, computed and analyzed using SPSS version 20.0 and p values ≤ 0.05 were considered to be statistically significant

III. RESULTS

From 438 urine samples screened for ASB, 277 were positive for significant bacteriuria (10^5 cfu/ml) giving a prevalence rate of 63. 3%. The bacteria isolated from the culture of the urine samples of pregnant women with asymptomatic bacteriuria were identified based on colony morphology, Gram staining reaction and biochemical tests. The distribution of uropathogens among asymptomatic bacteriuric pregnant women attending in Makurdi are presented on Table 1. Results showed that organisms present in the urine essentially belong to nine (9) genera, predominantly Gram-negative organisms constituting 66.6%.

Gram reaction	Organisms Isolated	Number (%)
Gram negative	<i>Pseudomonas aeruginosa</i>	28 (10.1)
Gram negative	<i>Escherichia Coli</i>	87(31.4)
Gram negative	<i>Klebsiellaspp</i>	31(11.2)
Gram negative	<i>Proteus spp</i>	34(12.3)
Gram negative	<i>Serratiaspp</i>	2(0.7)
Gram positive	<i>Staphylococcus spp</i>	60(21.7)
Gram positive	<i>Streptococcus spp</i>	10(3.6)
Gram positive	<i>Corynebacteriaspp</i>	3(1.1)
Gram negative	<i>Enterobacter spp</i>	22(7.9)

Table 1: Distribution of Uropathogens isolated from pregnant women in Makurdi

Fig. 1 displays the prevalence of ASB in relation to age. The majority of the subjects screened for bacteriuria were in the 21-30 years age group with those below or equal to 20 years recording the least population. Women in the age group 31-40 years had the highest prevalence of asymptomatic bacteriuria at 69.9% that is approximately 70 %.

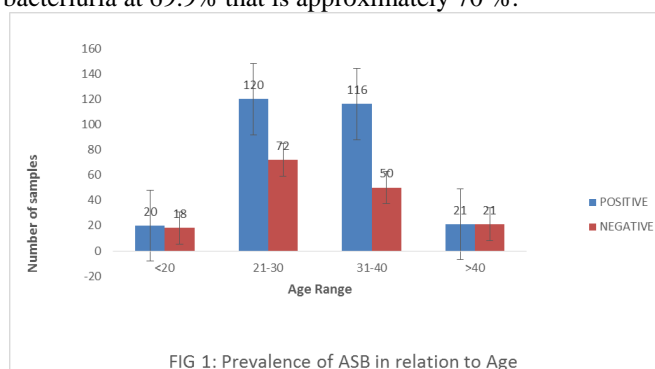


FIG 1: Prevalence of ASB in relation to Age

Figure 1

The percentage prevalence of asymptomatic bacteria was relatively lower in women carrying their third pregnancy (57.0%) while those with greater than five (5) pregnancies recorded the highest prevalence of ASB with 69.1%. See Fig. 2.

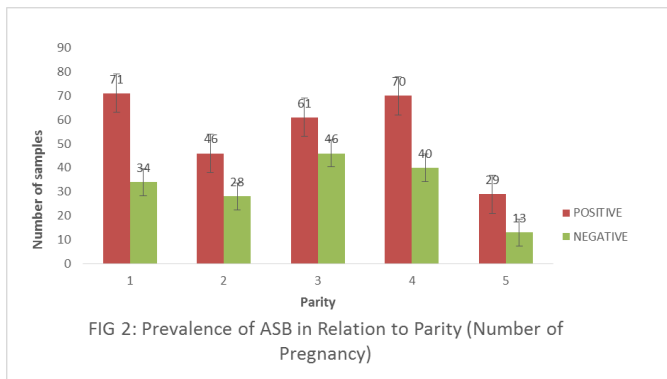


Figure 2

The prevalence of ASB in relation to trimester is shown on Fig. 3. Results shows a varying high prevalent asymptomatic bacteriuria across the three trimesters but relatively highest during the third trimester with a percentage of 70.0%. When tested using the SPSS Chi-square statistic, results showed significance with 0.049; p value < 0.05.

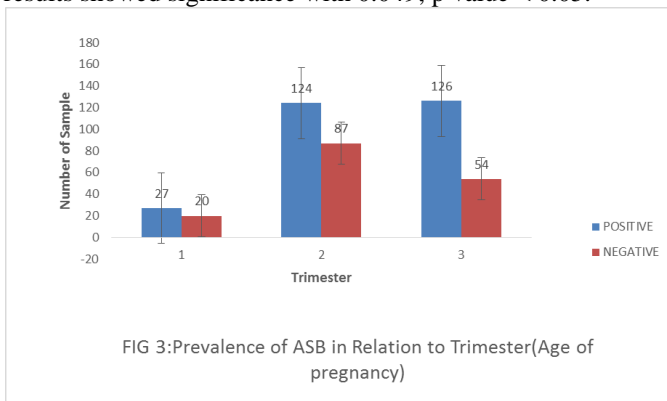


Figure 3

The prevalence of ASB in relation to occupation suggests that the nurses had the highest rate of ASB with 75.0%. The civil servants records the least prevalence rate of 58. 2% (Fig. 4).

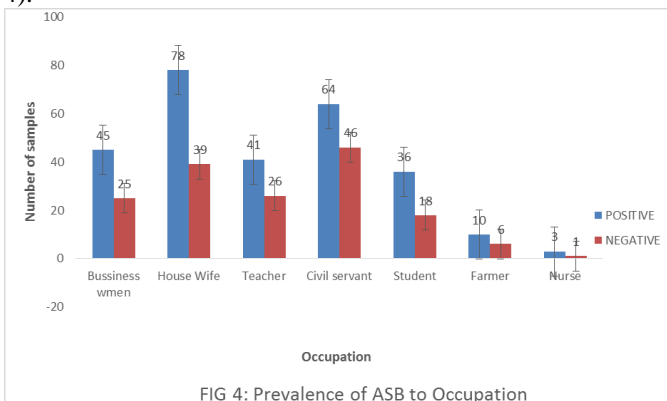


Figure 4

The women that wash their vagina from front to back comprised of the greatest number of women screened for asymptomatic bacteriuria recording 64.2% prevalence against their counterpart who wash from back to front having a prevalence rate of 57.8% (Figure 5)

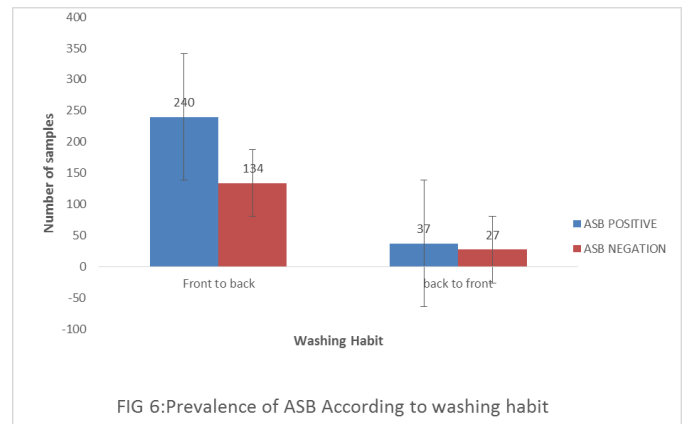


Figure 5

IV. DISCUSSION

In this study, the prevalence of gram negative rods (66.6%) was more than gram positives (33.4%). Similar results were obtained in a previous study (Tuladhar et al., 1990) who suggested that the presence of a unique structure in gram negative bacteria which helps for attachment to the uroepithelial cells and prevent bacteria from urinary lavage, allowing for multiplication and tissue invasion – resulting in invasive infection and pyelonephritis could be involved in it. Among the isolates, E. coli was found to be the most predominant organism followed by *Staphylococcus* spp. E. coli is the most common microorganism in the rectal area (Jazayeri and Irajian, 2009), the close proximity of the region might be the reason behind this. It is suggested that E. coli is the most predominant organism to colonize the urethral meatus (Schaeffer and Chmiel, 1983) and perineum (Leigh, 1990) before ascending to the bladder. Pathogenic E. coli expresses specific adhesions such as P fimbriae and produce alpha and beta hemolysins. Strains of E. coli appear well adapted to invade urinary tract which forms the majority of isolates of UTI (Chakraborty, 2001). This ability of E. coli may be the reason to be the most frequent organism to cause UTI. Several studies have also demonstrated that the geographical variability of pathogens occurrence in case of UTI is limited by the predominance of Gram negative, usually Enterobacteriaceae and particularly (Staphylococcus) were the second most common urine isolate and are similar to the findings of Enayat et al. (2008).

This study shows that of the 438 women examined, 277 (63.2%) showed significant bacteriuria. In a similar study carried out by Olusanya et al., (1984) among 510 pregnant women and 304 non-pregnant women at Ogun State University Teaching Hospital, Sagamu South-West Nigeria, 23.9% of the population examined showed significant bacteriuria. The value obtained in our study is higher than the 23.9% in their study, Differences in the location, and different cultural habits of the people living within these geographic zones may account for variation in findings. In this study nurses had the highest colonization with ASB standing at 75.0%, this may be justified by the fact that some organisms are nosocomial and since these women work in a hospital setting, they may have acquired it from the hospital environment being more exposed

to the risk. The risk of acquiring bacteriuria increases with the duration of pregnancy from 0.8% of women with bacteriuria in the 12th gestational week to 2% at the end of pregnancy. (Nicolle, 2003) agreeing with findings in this study that showed highest prevalence, 70% of ASB women in their third trimester (gestational age of 6-9 months). There was statistical significance of 0.049; $p < 0.05$ among women across the three trimesters. About 69.1% of the women who had more than five pregnancies recorded the highest colonization with ASB, though there was no significant difference among parity. The prevalence of bacteriuria not only increases with age but also with sexual activity and parity (Khatun and Mahmood, 1998). ASB is found with an incidence of about 2% in primigravidae (women carrying their first pregnancy) under the age of 21 and in 8-10 in multiparae over the age of 35 (Reddy and Campbell, 1986). Women who washed their private parts from front to back recorded the highest colonization with ASB than those who washed from back to front. This association may be due to poor knowledge and practice of personal hygiene in pregnancy. Another reason could be as a result of poor genital hygiene practices by antenatal women who may find it difficult to clean their anus and genitals properly after defecating or passing urine.

V. CONCLUSION

In this study, the prevalence of asymptomatic bacteriuria was found to be 63.2% (and since approximately 25-30% of asymptomatic bacteriuria in pregnancy will progress to symptomatic infection, 3-4 times as great progression as in non-pregnant women), there is need for early routine screening of all antenatal patients presenting or not presenting with clinical symptoms of urinary tract infection, in order to prevent adverse outcome both to the mother and child. In this study *E. coli* is still the leading cause and prevalence of the organisms causing asymptomatic bacteriuria. *Proteus* spp.

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