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Bacteriuria among Pregnant Women Attended on Antenatal Care Clinics in Karu Local Government Area, Nasarawa State

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Authors' contributions

This work was carried out in collaboration among all authors. Authors MMM and PA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author TTM managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Aims: This study is aimed at studying the prevalence of bacteriuria among pregnant women attending antenatal care clinics in Karu Local Government Area of Nasarawa State, Nigeria.
Study Design: A cross-sectional studies of the prevalence of bacteriuria among pregnant women at antenatal care clinics in Karu, Nasarawa State, Nigeria
Place and Duration of Study: Antenatal care clinics in Karu Local Government Area of Nasarawa State were enrolled in the study which lasted for four months between October 2017 to January 2018.
Methodology: Four hundred and fifty (450) midstream urine specimens were collected in sterile disposable urine containers and transported to microbiology laboratory of Bingham university Karu

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for analysis. A structured questionnaire was administered to all participant whose informed consent was sort and samples collected. Samples collected were analysed using microscopy, morphological characteristics of inoculum on Maconkay, blood agar and cystine lactose electrolyte deficient agar (CLED) and biochemical characteristics of the grown colony.

Antimicrobial Susceptibility Testing: From a pure culture of an identified bacterium, a loopful bacterial colony were transferred to a tube containing 5 ml of normal saline and mixed gently until it formed a homogenous suspension. The turbidity of the suspension was then adjusted to the density of mcfarland 0.5 to standardize the inoculum size. A sterile cotton swab was then dipped into the suspension and the excess was removed by gentle rotation of the swab against the surface of the tube. The swab was then used to distribute the bacteria evenly over the entire surface of Mueller-Hinton agar (oxoid). The inoculated plates were left at room temperature to dry for 3-5 minutes. Thereafter sterile needles were used to aseptically place an antibiotic disc on the surface of the inoculated plate. 30 ug sumetrolin (SXT), 30 ug chloramphenicol (CH), 10 ug sparfloxacin (SP), 10 ug ciprofloxacin (CPX), 30 ug amoxicillin (AM), 30 ug augmentin (AU), 10 ug gentamicin (CN), 30 ug pefloxacin (PEF), 10 ug ofloxacin (OFX) and 30 ug streptomycin (S) were used for gram-negative bacteria isolates while 10 ug pefloxacin (PEF), 10 ug gentamicin (CN), 30 ug ampicillin-oxacillin (APX), 20 ug cefuroxine (Z), 30 ug amoxicillin (AM), 25 ug ceftriaxone (R), 10 ug ciprofloxacin, 30 ug streptomycin (S), 30 ug sumetrolin (SXT) and 10 ug of erythromycin (E) were used for gram-positive bacteria isolates. The plates were then incubated at 37ºC for 24 hours. diameters of the zone of inhibition around the discs were measured and the isolates were classified as sensitive, intermediate and resistant according to the standardized table supplied by CLSI (2014).

Results: The results obtained showed that 285 (63.33%) of the pregnant women had bacteriuria. Out of this, there were 77.93% cases of asymptomatic and 22.03% symptomatic bacteriuria respectively. The bacteria isolated were *Escherichia coli* (25.42%), coagulase-negative S*taphylococcus* (20.34%), *Klebsiella* spp (13.56%), *Streptococcus* spp (16.94%.), *Staphylococcus aureus* (10.17%), *P. aeruginosa* (8.47%) and *Proteus mirabilis* (5.08%). Gram-negativee bacteria isolated were most susceptible to 25 ug of *A*ugmentin with susceptibility rate of 77.4% followed by 10 ug of gentamicin with 70.9% and 10 ug of Pefloxacin with 61.3% while Gram-positive isolates were most susceptible to 20 ug of Cefuroxine with 60.7% susceptibility rate followed closely by 57.1% susceptibility to both 10 ug Gentamicin and 30 ug Amoxicillin and 53.6% to 10 ug of Erythromycin. The age bracket 26-35 years had the highest prevalence of bacteriuria, (83.3%). women in their third trimesters were most infected with the prevalence rate of 91.39%. statistical analysis revealed significant differences ($p<0.05$) between bacteriuria and age, gestational age and occupation.

Conclusion: This study recorded a significantly high prevalence of bacteriuria in the study area among the participant. This high prevalence calls for concern due to the possible effect of bacteriuria on the fetus. also having a significant percentage of this prevalence being asymptomatic (i.e 77.93%), there is, therefore, need to educate the women on personal hygiene and also need for treatment. also noting the increasing rate of resistance to the commonly administered antibiotics, thus the need to embark on massive enlightenment campaign with prevention-focused messages. also, the treatment of asymptomatic bacteriuria among pregnant women needs to be made a priority to prevent birth complications.

Keywords: Bacteriuria; prevalence; urine; pregnant women; Karu.

1. INTRODUCTION

Bacteriuria is an infection caused by the presence and growth of microorganisms anywhere in the urinary tract [1]. Bacteriuria is evident when there is 10^5 CFU (colony forming units) or more of microorganisms of a single strain of bacterium per millilitre in midstream urine samples [2]. Bacteriuria affects all age groups, but women are more susceptible than men, due to their short urethra, absence of prostatic secretion, pregnancy and easy contamination of the urinary tract with faecal flora [3]. Additionally, the physiological increase in plasma volume during pregnancy decreases urine concentration and up to 70% of pregnant women develop glucoseuria, which encourages bacterial growth in the urine [4]. Women identified with asymptomatic bacteriuria in early pregnancy have a 20–30-fold increased risk of developing pyelonephritis during pregnancy, compared with women without bacteriuria [5]. These women also are more likely to experience premature delivery and to have infants of low birth weight. Prospective, comparative clinical trials have consistently reported that anti-microbial treatment of asymptomatic bacteriuria during pregnancy decreases the risk of subsequent pyelonephritis from 20%-35% to 1%-4% [6]. Also, there are associations between maternal complications of pregnancy and pyelonephritis including anaemia, amnionitis, hypertension, endometritis and preeclampsia [7]. Various microorganisms can invade the urinary tract and can be involved in the pathogenesis of bacteriuria [8].

This study is aimed at studying bacteriuria among pregnant women attending antenatal care clinics in Karu Local Government Area of Nasarawa State, Nigeria.

The objectives of the study include the following:

- To study the area base prevalence of bacteriuria among pregnant women in the study area.
- To isolated and identify bacterial uropathogens associated with bacteriuria among pregnant women in the area.
- To determine their drug susceptibility pattern to selected antibiotic agent commonly used in the study area.
- Explore the relationship between socio-demographic/ risk factor with cases of bacteriuria.

2. MATERIALS AND METHODS

2.1 Area of Study

This study was carried out in Karu Local government area of Nasarawa State, which lies between latitude 9º2' North and longitude 7º35' with an elevation of 448 m (1,470 ft). Located in the middle belt region, North Central Nigeria. Karu Local Government is a rural settlement and is the closest settlement to FCT - Abuja, Nigeria.

2.2 Study Populations

The study population included four hundred and fifty (450) pregnant women attending an antenatal clinic (ANC) at selected health care centres in Karu local government area of Nasarawa State during the study period and who did not initiate antibiotic therapy during the last two weeks and during the data collection period (October 2017 to January 2018).

2.3 Sample Collection

Four hundred and fifty (n=450) early morning clean catch mid-stream urine was collected using clean sterile urine collecting container from pregnant women, whose consent we got after careful explanation of how to collect midstream urine was explained to the subjects and structured questionnaires filled. The specimen was then transported to the laboratory and processed within an hour.

2.4 Urine Microscopy and Culture

A loop full of well-mixed centrifuged urine was examined under wet preparation procedure to detect pyuria, while noting red cells, casts, parasites and fungi, when present. Urine culture was done by inoculating 0.001 ml of well-mixed urine delivered by a sterile calibrated wire loop and plated onto CLED, MConkey and blood agar plates, which were incubated aerobically at 35-37ºC for 24 hours. Repeat culture was done for contaminated specimens. Each significant isolate was identified by colonial morphology, gram staining and biochemical reactions according to standard procedure [9].

2.5 Antimicrobial Susceptibility Testing

The antimicrobial susceptibility testing of all identified isolates of urine samples was done according to the criteria of the Clinical and Laboratory Standards Institute method (CLSI). Briefly, from a pure culture, a loopful bacterial colony were transferred to a tube containing 5 ml of normal saline and mixed gently until it formed a homogenous suspension. The turbidity of the suspension was then adjusted to the density of a McFarland 0.5 to standardize the inoculum size. A sterile cotton swab was then dipped into the suspension and the excess was removed by gentle rotation of the swab against the surface of the tube. The swab was then used to distribute the bacteria evenly over the entire surface of Mueller-Hinton agar (Oxoid). The inoculated plates were left at room temperature to dry for 3-5 minutes. Thereafter a sterile needle were used to aseptically place a multi-antibiotic disc on the surface of the inoculated plate containing 30ug Sumetrolim (SXT), 30 ug Chloramphenicol (CH), 10 ug sparfloxacin (SP), 10 ug ciprofloxacin (CPX), 30 ug amoxicillin (AM), 30 ug Augmentin (AU), 10 ug Gentamicin (CN), 30 ug Pefloxacin

(PEF), 10 ug Ofloxacin (OFX) and 30 ug Streptomycin (S) were used for Gram-negative bacteria isolates while 10 ug Pefloxacin (PEF), 10 ug Gentamicin (CN), 30 ug Ampicillin-oxacillin (APX), 20 ug Cefuroxime (Z), 30 ug Amoxicillin (AM), 25 ug Ceftriaxone (R), 10 ug Ciprofloxacin, 30 ug Streptomycin (S), 30 ug Sumetrolim (SXT) and 10 ug of Erythromycin (E) were used for Gram-positive bacteria isolates. The plates were then incubated at 37ºC for 24 hours. Diameters of the zone of inhibition around the discs were measured and the isolates were classified as sensitive, intermediate and resistant according to the standardized table supplied by Kolawole [10].

2.6 Questionnaires

A structured questionnaire was used to collect the socio-demographic data of the participants and to examine the risk factors associated with bacteriuria among pregnant women in the study area.

2.7 Data Entry and Analysis

Socio-demographic data were entered and analysed using SPSS version 20. Descriptive data are explained with tables and text. The proportion of categorical variables are compared using the chi-square test. In all cases, $P< 0.05$ was taken as statistically significant

3. RESULTS AND DISCUSSION

Out of the four hundred and fifty (450) samples collected from pregnant women at antenatal care clinics in Karu, significant bacteria growth of (i.e $1x10^5$ cfu/ml) were found among two hundred and eighty-five (285) samples collected, thus the prevalence of bacteriuria in the study area between October 2017 to January 2018 is 63.33%. There were 77.93% of cases of asymptomatic and 22.03% symptomatic bacteriuria respectively. Bacteria isolated in the study includes *E. coli* with 15 (25.42%), 8 (13.56%) *K. pneumonia*, 5 (8.47%) *P. aeruginosa,* 3 (5.08%) *P. mirabilis*, 12 (20.34%) coagulase-negative *Staphylococcus*, 6 (10.17%) and *Streptococcus* spp with 10 (16.94%) as shown in Table 1.

Gram-negative bacteria isolated in this study were most susceptible to 25 ug of Augmentin with a susceptibility rate of 77.4% followed by 10 ug of Gentamycin with 70.9% and 10 ug of Pefloxacin with 61.3% while gram-positive isolates in the study were most susceptible to 20 ug of zinnacef with 60.7% susceptibility rate followed closely by 57.1% susceptibility to both 10 ug Gentamycin and 30 ug Amoxicillin and 53.6% to 10 ug of Erythromycin.

The prevalence of bacteriuria in this study area was found to be 63.33%. This prevalence is high and is of great epidemic concern considering the proportion of the study sample with significant bacteriuria (i.e. 285(450)). This high prevalence is close to reporting by Olusanya, O. [11] that presented a 60% prevalence of bacteriuria among patients at Dalhatu Araf Specialist Hospital Lafia. The slight difference in the prevalence of bacteriuria in the two Local Government Area could be attributed to the demographic differences in characteristics of the two local government areas even though they are both in the same State. In a similar study, bacteriuria prevalence of 24% and 6% was reported among rural and urban children respectively with an annual incidence rate of symptomatic bacteriuria of 6.5 per 1000 admission as reported by Aiyegoro, et al. [12]. The prevalence of bacteriuria recorded in this study is close to reporting by Ajide, et al. [13] in whose finding reported a prevalence of 62.67% among pregnant women at two Primary Health Care antenatal care Centre in Luvu, an interior rural settlement within Karu Local Government Area, Literature has it that in Nigeria, the prevalence of bacteruria at Sagamu and Ibadan (in South-Western Nigeria), Akwa metropolis (in South-Eastern Nigeria) are 23.9%, 47.5% and 54% respectively [14,15,16]. The variation in the prevalence rate can be attributed to personal hygiene of the individuals involved in the study, the social habit of the community and certain demographic factors etc.

Our finding observed a relatively high prevalence of Gram-negative bacteria in all significant bacteriuria cases than Gram-positive bacteria with 52.5% and 47.5% respectively, this agreed with findings by Barr, et al. [17] who reported Gram-negative bacteria have a prevalent of (55.3%) than Gram-positive bacteria which were (44.71%) in a study done in Nairobi, also a similar study done in Tanzania which found Gram-negative bacteria more prevalent at (61.9%) and Gram-positive bacteria at (38.1%).

E. coli having a prevalence of 25.42% is the most isolated bacteria in the study followed by coagulase-negative *Staphylococcus* with 20.34%

occurrence. *Klebsiella pneumonia* had 13.56%, *Pseudomonas aeruginosa* had 8.45% occurrence, *Proteus mirabilis* with 5.08%, *Staphylococcus aureus* had 10.17% and a 16.94% *Streptococcus* specie. *E. coli* has been reported in several studies as the predominant bacteria involved in bacteriuria, notable among this studies are reported by Aiyegoro, et al. [12], Onifade, et al. both of which reported *E. coli* as the most predominant bacteria responsible for bacteriuria. Nwanze, et al. reported a (51.2%) *E. coli* prevalence as the most predominant bacteria in all cases of bacteriuria, Sheffield and Cunningham, stated that the contributing factors for isolating relatively higher percentage of *E. coli* is due to a number of virulence factor, specific for colonization and invasion of the urinary epithelium by *E. coli* such as P-fimbrae. *Klebsiella* spp*,* having a 13.56% prevalence is the second most predominant gram-negative bacteria, this agrees with reports by Okonko, et al. [14] and Kolawole, et al. (2009) who opined that *Klebsiella* spp are becoming an important etiologic agent of bacteriuria. Moreover, available scientific evidence indicates that *E. coli* accounts for 80%-90% of bacteriuria in pregnancy [18,19,20]. Similarly, Gram-negative bacteria, particularly *E. coli* has been reported to be the commonest pathogen isolated in patients with bacteriuria [21,22,23,24], This is because the urine of females was found to have more suitable pH and osmotic pressure for the growth of *Escherichia coli* than urine from males and an increase in the concentration of amino acids and lactose during pregnancy are believed to encourage the growth of *E. coli* in urine [25,14].

This study observed 77.93% of cases of asymptomatic bacteriuria and 22.03% symptomatic bacteriuria. Statistical analysis reveals that the relative frequency of occurrence of asymptomatic and symptomatic bacteriuria is not statistically significant at 95% confidence level. Literature had it that the prevalence of asymptomatic bacteriuria does not change during pregnancy but there is the change in pathogenesis, which keeps mother and baby at risk of complications due to bacteriuria [26,27, 13]. The prevalence of asymptomatic bacteriuria is not uncommon during pregnancy. However, the importance of asymptomatic bacteriuria lies in the insight it provides into symptomatic infections [5]. The ASB prevalence in this study is however high when compared to other studies done in Nigeria particularly Sagamu and Ibadan that reported ASB prevalence of 23.0% and 21.0% respectively Ade et al., [28].

The antibiotic susceptibility pattern of Gram-negative isolates from this study presented in Table 3 shows that gram-negative bacteria isolated in this study are more susceptible to 25 ug of Augmentin with a susceptibility rate of 77.4% followed by 10 ug of Gentamicin with 70.9% and 10 ug of Pefloxacin with 61.3%. It, however, was resistant to 30 ug of Sumetrolin and Ofloxacin with resistance rates of 61.3% and 54.8% respectively.

Gram-positive isolates in the study were more susceptible to 20 ug of Cefuroxine with 60.7% susceptibility rate followed closely by 57.1% susceptibility to both 10 ug Gentamicin and 30 ug Amoxicillin and 53.6% to 10 ug of Erythromycin while expressing resistance of 64.3% to 30 ug of Sumetrolin and 30 ug of Streptomycin and Ampicillin-oxacillin both having a resistance rate of 46.4% as presented in Table 4.

Bacteria distribution with age shows a relatively higher frequency of occurrence between the age range of 26–35 with 83.3% and least occurrence in the age range of 36–45 years with 43.75%. The distribution of bacteriuria with age is statistically significant at 95% confidence level and 3 degree of freedom. These findings agree with the report of [29] whose findings had the highest prevalence case of 75.8% of the bacteriuria among maternal age of 30 years of age, a in similar studies by [30] the highest prevalence of bacteriuria were obtained from pregnant women within the age brackets of 21-25 years followed by 26-30 year in a study at Ibadan, South-West Nigeria. This finding also agrees with the findings of [31] with the highest prevalence (33.6%) occurring within the age bracket 27-32 years.

The distribution of bacteriuria with gestation as presented in Table 6, observed a relatively higher frequency of bacteriuria in the third trimester followed by the second trimester with least occurrence in the first trimester. There is a statistically significant association between bacteriuria with gestation at 95% confidence level in this study. These findings agree with reports by Ajide, et al. [13], The increasing prevalence of bacteriuria in the third trimester could be due to the increased size of the uterus on the ureter also, the pressure on the bladder from the descending part may lead to stasis of urine which increases the multiplication of bacteria and thus bacteriuria. It could also be attributed to a decrease in urinary progesterone and estrogens in the different trimester.

The distribution of bacteriuria with gravidity in this study shows a higher prevalence of bacteriuria among prim gravid participant compared to multigravida with 75.26% and 54.62% prevalence rate respectively as presented in Table 7. There is a statistically significant association between the prevalence of bacteriuria with gravidity at 95% confidence level. This finding agrees with a study conducted by Obiogbolu CH [15] in whose study affirms to the association between bacteriuria gravidity.

The distribution of bacteriuria with occupation as presented in Table 8 observes a relatively higher prevalence rate of bacteriuria among students with 85%, followed by traders with 78.95% and the least prevalence was among civil/public servants with 37.22%. Statistical analysis indicates that there is a significant association between the occurrence of bacteriuria and occupation of the participant at a 95% confidence level at 2 degrees of freedom. This finding agrees with the report of Ezeigbo, et al. [32] that reported the least prevalence of bacteriuria among civil servants, it, however, disagree on the relative prevalence of bacteriuria with regards to occupation as traders and students. While our finding reported higher prevalence in students relative to traders (i.e, 85% to 78%), Ezeigbo, et al. [32] however reported 51.8% to 89.7% student to traders, relative prevalence respectively. This study also disagrees with the report by Ajide, et al. [13] that reported the highest prevalence among traders with 41.48%.

The distribution of bacteriuria relative to the level of education obtained by the participants is as presented in Table 9. The findings show that the highest prevalence of bacteriuria occurring among participant with non-formal education (77.05%), followed by those who attained primary education (63.64%) and the least among participants with a tertiary level of education (42.55%) with no statistically significant association of bacteriuria with the level of education attained. This study disagrees with finding by Schieve, et al. [27], who reported that there is a significant association between asymptomatic bacteriuria and level of education of the participants.

Table 1. Percentage occurrence and distribution of bacterial in the study

Bacterial isolates	Number isolated	% Prevalence
E. coli	15	25.42
Klebsilla pneumonia	8	13.56
P. aeruginosa	5	8.47
Proteus mirabilis	3	5.08
CoNs	12	20.34
S. aureus	6	10.17
Streptococcus spp	10	16.94

Key: CoNs: coagulase-negative Staphylococcus

Table 2. Distribution of Bacteria in Symptomatic and asymptomatic bacteriuria in the study

Bacteria isolates Asymptomatic No (%) Symptomatic No (%) Total No (%)	Bacteria isolates Asymptomatic No (%) Symptomatic No (%) Total No (%)	Bacteria isolates Asymptomatic No (%) Symptomatic No (%) Total No (%)	Bacteria isolates Asymptomatic No (%) Symptomatic No (%) Total No (%)
E. coli	10(66.67)	5(33.33)	15(25.42)
Klebsiella pneumonia	5(62.50)	3(37.50)	8(13.56)
P. aeruginosa	5(100)	0(0)	5(8.47)
Proteus mirabilis	3(100)	0(0)	3(5.08)
Gram-Negative	**23(74.19)**	**8(25.81)**	**31(52.54)**
CoNs	10(83.33)	2(16.67)	12(20.34)
S. aureus	6(100)	0(0)	6(10.17)
Streptococcus spp	7(70)	3(30)	10(16.94)
Gram-Positive	**23(82.14)**	**5(17.86)**	**28(47.46)**
Total	**46(77.93)**	**13(22.03)**	**59(100)**

Calculated $_{X}{}^{2}$ = 42.72; Tabulated $_{X}{}^{2}$ = 12.59; df= 6; 95% confidence level

Table 3. Antimicrobial susceptibility pattern of Gram-negative bacteria in the Study Area

			Antimicrobial agent tested									
Bacteria isolate	**Total**	**Pattern**	**SXT 30 ug**	**CH 30 ug**	**SP 10 ug**	**CPX 10 ug**	**AM 30 ug**	**AU 25 ug**	**CN 10 ug**	**PEF 10 ug**	**OFX 30 ug**	**S 30 ug**
			No.(%)	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**	**No.(%)**
E. coli	15	R	5(33.3)	4(26.6)	7(46.6)	3(20)	4(26.6)	3(20)	2(13.3)	5(33.3)	10(66.6)	10(66.6)
		I	2(13.3)	0(0)	0(0)	0(0)	1(6.6)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	8(53.3)	11(73.3)	8(53.3)	12(80)	10(66.6)	12(80)	13(86.6)	10(66.6)	5(33.3)	5(33.3)
Klebsilla spp	8	R	2(25.0)	6(75.0)	4(50)	6(75.0)	7(87.5)	2(25.0)	4(50)	4(50)	3(37.5)	6(75.0)
		I	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	6(75.0)	2(25.0)	4(50)	2(25.0)	1(12.5)	6(75.0)	4(50)	4(50)	5(62.5)	2(25.0)
P. aeruginosa	5	R	3(60.0)	4(80)	3(60)	4(80)	1(20)	2(40)	3(60.0)	2(40)	3(60)	3(60)
		I	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	2(40.0)	1(20)	2(40)	1(20)	4(80)	3(60)	2(40)	3(60)	2(40)	2(40)
Proteus spp	3	R	2(66.6)	0(0)	1(33.3)	1(33.3)	2(66.6)	0(0)	0(0)	1(33.3)	1(33.3)	0(0)
		I	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	1(33.3)	3(100)	2(66.6)	2(66.6)	1(33.3)	3(100)	3(100)	2(66.6)	2(66.6)	3(100)
Total		R	12(38.7)	14(45.2)	14(45.2)	14(45.2)	14(45.2)	7(22.6)	9(29.0)	12(38.7)	17(54.8)	19(61.3)
n=31		I	2(6.5)	0(0)	0(0)	0(0)	1(3.2)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	17(54.8)	17(54.8)	16(51.6)	17(54.8)	16(51.6)	24(77.4)	22(70.9)	19(61.3)	14(45.2)	12(38.7)

KEY: Pefloxacin (PEF), Gentamicin (CN), Ampiclox (APX), Cefuroxime (Z), Amoxicillin (AM), Ceftriaxone (R), Ciprofloxacin (CPX), Ofloxacin (OFX), Augmentin (AU), Streptomycin (S), Sumetrolin (SXT) and Erythromycin (E)

Table 4. Antimicrobial susceptibility pattern of gram-positive bacteria in the Study Area

			Antimicrobial agent tested									
Bacteria isolate	**Total**	**Pattern**	**SXT 30 ug**	**S 30 ug**	**CPX 10 ug**	**E 10 ug**	**AM 30 ug**	**Z 20 ug**	**CN 10 ug**	**PEF 10 ug**	**APX 30 ug**	**R 25 ug**
			NO(%)	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**	**NO(%)**
S. aureus	6	R	4(66.6)	2(33.3)	2(33.3)	2(33.3)	4(66.6)	0(0.0)	1(16.6)	1(16.6)	3(50.0)	1(16.6)
		I	0(0.0)	1(16.6)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	0(0.0)	2(33.3)	1(16.6)	0(0.0)
		S	2(33.3)	3(50.0)	4(66.6)	4(66.6)	2(33.3)	6(100.0)	5(83.3)	3(50.0)	2(33.3)	5(83.3)
Streptococcus spp	10	R	4(40)	2(20)	4(40)	2(20)	1()	2(20)	1(10)	2(20)	3(30)	2(20)
		I	2(20)	1(10)	1(10)	0(0)	2(20)	1(10)	0(0)	2(20)	0(0)	1(10)
		S	4(40)	7(70)	5(20)	8(80)	7(70)	7(70)	9(90)	6(60)	7(70)	7(70)
CoNs	12	R	10(83.3)	10(83.3)	6(50)	7(58.3)	5(41.6)	8(66.6)	10(83.3)	10(83.3)	8(66.6)	10(83.3)
		I	0(0)	0(0)	1(8.3)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)	0(0)
		S	2(16.6)	2(16.6)	4(33.3)	3(25)	7(58.3)	4(33.3)	2(16.6)	2(16.6)	4(33.3)	2(16.6)
Total n(28)		R	18(64.3)	14(50)	12(42.6)	11(39.3)	10(35.7)	10(35.7)	12(42.6)	13(46.4)	14(50)	13(46.4)
		I	2(7.1)	2(7.1)	2(7.1)	0(0)	2(7.1)	1(3.6)	0(0)	4(14.3)	0(0)	1(3.6)
		S	8(28.6)	12(42.6)	13(46.4)	15(53.6)	16(57.1)	17(60.7)	16(57.1)	11(39.3)	13(46.4)	14(50)

Key: (CoNs) Coagulase Negative Staphylococcus, Sumetrolin (SXT), Chloramphenicol (CH), Sparfloxacin (SP), Ciprofloxacin (CPX), Amoxicillin (AM), Gentamicin (CN), Pefloxacin (PEF), Ofloxacin (OFX), Cefuroxime (Z), Ampicillin-oxacillin (APX) and Streptomycin (S)

Table 5. Distribution of bacteriuria with age in the study area

Variable	No. Examined	No. Positive (*SB)	Prevalence %
12 – 25	158	105	66.45
26 – 35	156	130	83.33
36 – 45	96	42	43.75
46>	40	8	20
Total	450	285	63.33

*Calculated x^2 = 27.77; *SB: Significant Bacteriuria; Tabulated x^2 = 7.81; degree of freedom =3; 95% confidence level*

Table 6. Distribution of bacteriuria in relation to gestation in the study area

Variable	No. examined	No. positive (SB)	%Prevalence
First trimester	69	20	28.99
Second trimester	288	180	62.5
Third trimester	93	85	91.39
Total	450	285	63.33

*Calculated x^2 = 8.52; *SB: Significant Bacteriuria; Tabulated x^2 = 5.99; degree of freedom = 2; 95% confidence level*

Table 7. Distribution of bacteriuria with gravidity in the study

Variable	No. examined	No. positive(SB)	%Prevalence
Prim gravida	190	143	75.26
Multi gravida	260	142	54.62
Total	450	285	63.33

*Calculated x^2 = 7.39; *SB: Significant Bacteriuria; Tabulated x^2 = 3.84; degree of freedom = 1; 95% confidence level*

Table 8. Distribution of bacteriuria with the occupation of the participant

Variable	No. examined	No. positive (SB)	%Prevalence
Students	80	68	85
Traders	190	150	78.95
Public/civil servants	180	67	37.22
Total	450	285	63.33

*Calculated x^2 = 32.63; *SB: Significant Bacteriuria; Tabulated x^2 = 5.99; degree of freedom = 2; 95% confidence level*

Table 9. Distribution of bacteriuria with the level of education of the participant

Variable	No. examined	No. positive (SB)	%Prevalence
Tertiary	47	20	42.55
Secondary	116	66	56.89
Primary	165	105	63.64
None	122	94	77.05
Total	450	285	66.33

*Calculated x^2 = 7.59; *SB: Significant Bacteriuria, Tabulated x^2 = 7.81; degree of freedom = 3; 95% confidence level*

4. CONCLUSION

This study recorded a significantly high prevalence of bacteriuria among the subject with 63.33%, having a significant percentage of this being asymptomatic. Also having an increasing rate of resistance to the commonly administered antibiotics, thus the need to embark on massive enlightenment campaign with prevention-focused messages. Also, treatment of asymptomatic bacteriuria needs to be made a priority to prevent birth complications.

CONSENT

As per international standard ,patient's written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical consideration for the study was obtained from Nasarawa States Ministry of Health ethical review committee.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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