

Original
ArticleMedical
Science

Incidence, Aetiology and Antibiotic Susceptibility Profile of Asymptomatic Bacteriuria in Pregnant Women in Nsukka Urban, Enugu State, Nigeria

Okoro S CHUKWU ¹, Ifeoma M EZEONU ², Victor M AGAH ³, Moses N ALO ¹, Uchenna UGAH ⁴, Jacob O OWOLABI ¹, Oluwatosin O OLAOSEBIKAN ¹

ABSTRACT [ENGLISH/ANGLAIS]

Asymptomatic bacteriuria in pregnancy is the major risk factor for developing symptomatic urinary tract infection during pregnancy. The incidence of asymptomatic bacteriuria amongst pregnant and non-pregnant women in Nsukka was determined using culture techniques. Out of the 200 pregnant women that were screened, 22(11.0 %) had asymptomatic bacteriuria (ASB positive) while only 4.5% of the non-pregnant women were ASB positive. Thirteen (59.1%) of the samples from pregnant women yielded single bacterial isolates while nine (40.9%) yielded mixed bacterial isolates. Bacteria associated with asymptomatic bacteriuria in both pregnant and non-pregnant women were *Escherichia coli*, *Staphylococcus aureus*, coagulase negative *Staphylococcus*, *Klebsiella* species, and *Pseudomonas* species. *Escherichia coli* with 56.8% occurrence was the most frequently isolated organism followed by coagulase negative *Staphylococcus*, *Staphylococcus aureus*, *Klebsiella* species and *Pseudomonas* species. There was a high degree of antibiotics resistance (7.5% to 100%) among the bacterial isolates. The most resisted antibiotic was septrin and augmentin while the least resisted was ofloxacin. The most resistant organism was *Pseudomonas* species while the least resistant organism was *Staphylococcus aureus*. There was association between pregnancy and asymptomatic bacteriuria but no association between occupation, age, level of education, parity, gestational age and asymptomatic bacteriuria.

Keywords: Pregnancy, bacteriuria, significant bacteriuria

RÉSUMÉ [FRANÇAIS/FRENCH]

La bactériurie asymptomatique pendant la grossesse est le principal facteur de risque de développer une infection des voies urinaires symptomatiques pendant la grossesse. L'incidence de la bactériurie asymptomatique chez les femmes enceintes et non enceintes à Nsukka a été déterminée en utilisant des techniques de culture. Sur les 200 femmes enceintes qui ont été rejetés, 22 (11,0%) avait bactériurie asymptomatique (ASB positif), tandis que seulement 4,5% des femmes non enceintes étaient ASB positif. Treize (59,1%) des échantillons provenant de femmes enceintes a donné isolats bactériens simples tout neuf (40,9%) a donné des isolats bactériens mixtes. Bactéries associées à la bactériurie asymptomatique chez les femmes enceintes et non enceintes étaient *Escherichia coli*, *Staphylococcus aureus*, *Staphylococcus* coagulase négative, *Klebsiella* et *Pseudomonas* spp. *Escherichia coli* avec 56,8% d'occurrence est le plus fréquemment isolé organisme suivie par *Staphylococcus* à coagulase négative, de *Staphylococcus aureus*, *Klebsiella* et *Pseudomonas* spp. Il y avait un degré élevé de résistance aux antibiotiques (7,5% à 100%) parmi les isolats bactériens. L'antibiotique le plus résisté était septrin et augmentin tout le moins résisté a l'ofloxacin. L'organisme le plus résistant était l'espèce *Pseudomonas* tout l'organisme moins résistant était *Staphylococcus aureus*. Il y avait une association entre la grossesse et la bactériurie asymptomatique mais aucune association entre la profession, l'âge, le niveau d'éducation, la parité, l'âge gestationnel et la bactériurie asymptomatique.

Mots-clés: Grossesse, bactériurie, bactériurie significative

Affiliations:

¹ Department of Biological Sciences, Faculty of Science and Technology, Federal University, Ndufu-Alike Ikwo

² Department of Microbiology, Faculty of Biological Sciences, University of Nigeria Nsukka

³ Department of Microbiology, Faculty of Biological Sciences, Ebonyi State University, Abakaliki

⁴ Department of Medical Biochemistry, Faculty of Basic Medical Sciences Federal University, Ndufu-Alike Ikwo

* Email Address for Correspondence/ Adresse de courriel pour la correspondance: bhgs1@gmail.com

Accepted/Accepté: April, 2014

Full Citation: Chukwu OS, Ezeonu IM, Agah VM, Alo MN, Uгах U, Owolabi JO, Olaosebikan OO. Incidence, Aetiology and Antibiotic Susceptibility Profile of Asymptomatic Bacteriuria in Pregnant Women in Nsukka Urban, Enugu State, Nigeria. World Journal of Life Science and Medical Research 2014;3(3):94-100.

INTRODUCTION

Asymptomatic bacteriuria (AB) is the presence of significant number of bacteria (≥ 105 bacteria cells/ml) in a

sample of mid-stream urine, without the individual showing symptoms of urinary tract infection (UTI) such as dysuria, frequent urination, pain during urination,

cramping in the lower abdomen and burning sensation. Asymptomatic bacteriuria in pregnancy is the major risk factor for developing symptomatic urinary tract infection during pregnancy. Asymptomatic bacteriuria occurs in both pregnant and non-pregnant women, due to shortness of the urethra and its close proximity to the rectum. Although AB may resolve without treatment in non-pregnant women, it rarely results spontaneously during pregnancy. Pregnant women with AB are more likely to have acute pyelonephritis, premature delivery, infant low birth weight, fetal mortality, pre-eclampsia, pregnancy induced hypertension, anemia, preterm labor, thrombocytopenia, septicemia and transient renal insufficiency compared with women without AB. The incidence of these complications can be reduced by screening pregnant women at all stages of pregnancy, identifying the organisms and instituting treatment. The objective of this study were to access the prevalence of AB among pregnant women in Nsukka urban, determine the susceptibility of AB in pregnant women, identify and characterized the bacteria profile associated with AB, associate prevalence of AB with level of parity in pregnant women, determine age and prevalence among pregnant women with AB and associate the prevalence of AB with UTI among pregnant women in Nsukka urban.

MATERIALS AND METHODS

Study Population

A cross-sectional study was carried out using 200 pregnant women attending antenatal clinic at Bishop Shanahan Memorial Hospital (93 pregnant women) and Nsukka General Hospital (117 pregnant women) between January and May 2010. The control group comprised of 200 non-pregnant women of childbearing age. A structured validated questionnaire was used to determine the presence of symptoms of UTI and subjects with symptoms were excluded from the study. Age, gestational stage, parity level, occupation, educational status and medical history of the participants were also obtained.

Specimen Collection and Processing

Urine samples (10-15 ml) were collected from the subjects (pregnant and non-pregnant). The samples were microscopically examined for the presence of bacteria after which analyses were carried out to check the color, odor and the presence of blood, protein, pH and nitrate. The samples were also cultured on bacteriological media

using a calibrated loop delivering 0.002ml of each sample on dried plates of cysteine lactose electrolyte deficient agar (CLED) and isolates were Gram stain. Asymptomatic bacteriuria was determined quantitatively by counting the number of bacteria per ml of each urine sample. Isolated organisms were identified by their morphology and standard biochemical reactions. The isolated bacteria were subjected to antibiotics susceptibility tests using modified Kirby Bauer disk diffusion techniques and the results were interpreted following the National Committee on Clinical and Laboratory Standards (NCCLS) guideline.

Statistical Analysis

Statistical analyses were performed using the Statistical Package for the Social Sciences (SPSS), Version 16 for Windows. Continuous variables were summarized using descriptive statistics at 95% confidence interval, while Chi-square (χ^2) test was used to compare the incidence of AB in pregnant and non-pregnant groups. P-values less than 0.05 were considered significant.

RESULTS

Pregnant women in their first trimester had the highest incidence of AB (14.0%), followed by those in the second trimester (10.0%). Pregnant women within the age bracket of 36-40 years had the highest incidence of AB (25.0%), while those in the 21-25 years age bracket had the least incidence (6.2%). For non-pregnant women, the highest incidence was recorded in women within the 26-30 years age bracket. In terms of level of education, the highest

Figure 1: Incidence of asymptomatic bacteriuria (ASB) in different sampled group

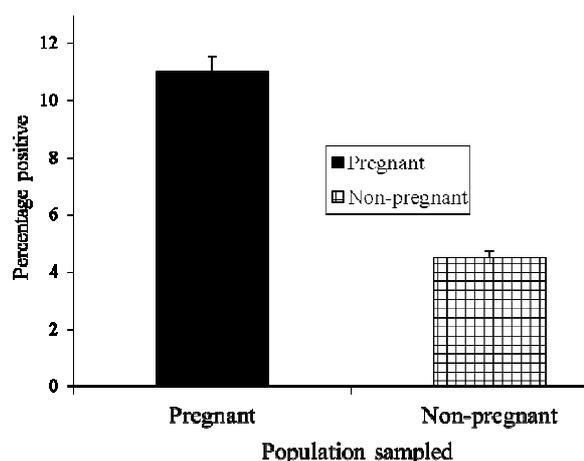


Figure 2: Proportion of bacterial isolates from urine samples

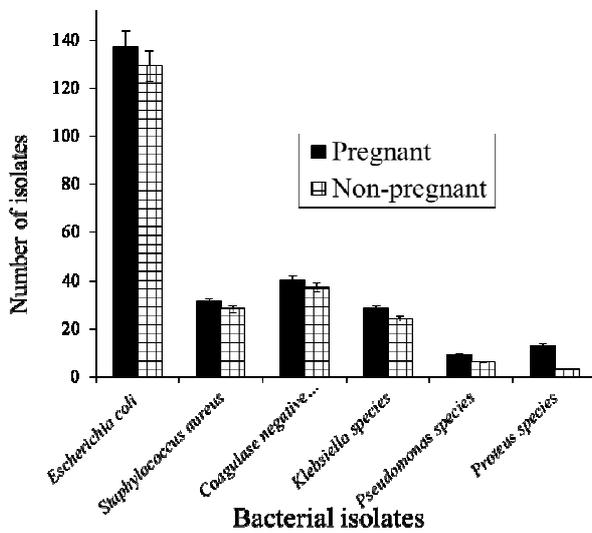
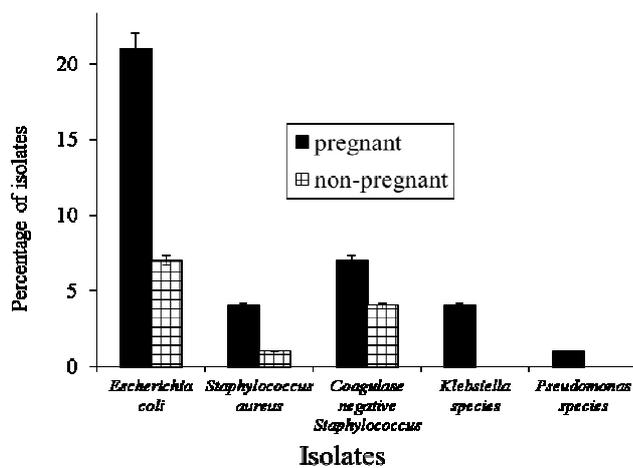


Figure 3: Bacterial agents isolated from ASB-positive urine samples



incidence (33.3%) was recorded in pregnant women who had no formal education, while for occupation, traders/farmers had the highest incidence (12.8%). In terms of parity level, the highest incidence was recorded in women with four pregnancies. Statistical analyses however indicated positive association between AB and pregnancy ($p < 0.05$) but not between AB and education, occupation and parity level. There was a high degree of antibiotic resistance among the bacteria isolated from AB patients with some bacteria exhibiting as much as 95-100% resistance to some antibiotics and resistance to

Figure 4: Incidence of ASB with respect to gestation age

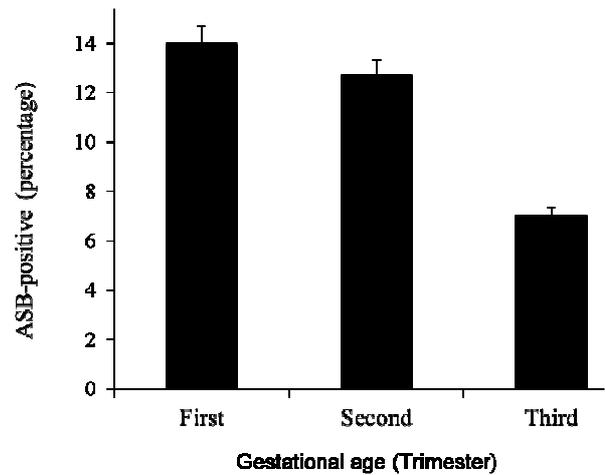
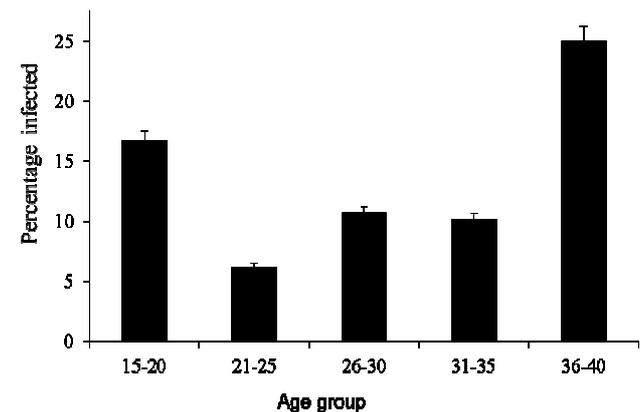


Figure 5: Incidence of ASB with respect to age of pregnant women



multiple antibiotics. The most resistant organism was *Pseudomonas* while the least resistant was *Staphylococcus aureus*. Septrin and augmentine were the most resisted antibiotics while ofloxacin was the least resisted (figure 1-14).

DISCUSSION

In this study, pregnant women were screened for asymptomatic bacteriuria and non-pregnant women were used as control. The prevalence of asymptomatic bacteriuria in pregnant women in this study was 11.0% while non-pregnant was 4.5%. This is higher than the prevalence of 6.2% reported by Aziz and colleagues [1] in pregnant women and 2.85% in non-pregnant in Karachi,

Pakistan and 7.3% reported for pregnant women by a study in Kumasi, Ghana [2]. Abdullah and Al-Moslih [3] in Sharjah, United Arab Emirate, reported a prevalence of 4.8%, Sharifa in Jeddah, Saudi Arabia, reported 1.7% [4], Samad reported 6.1% in Tabriz, Iran [4] while 7.0% was reported in Ethiopia. It is also higher than 7.5% reported by Jayalashmi and Jayaram in Coimbatore, Tamil Nadu, India [6], 8.4% was reported by Lavanya and Jogalakshmi in Visakhapatnam [7] while 9.8% was reported by Tadesse and colleagues in Gondar, North West Ethiopia [8].

Figure 6: Incidence of ASB with respect to age of non-pregnant women

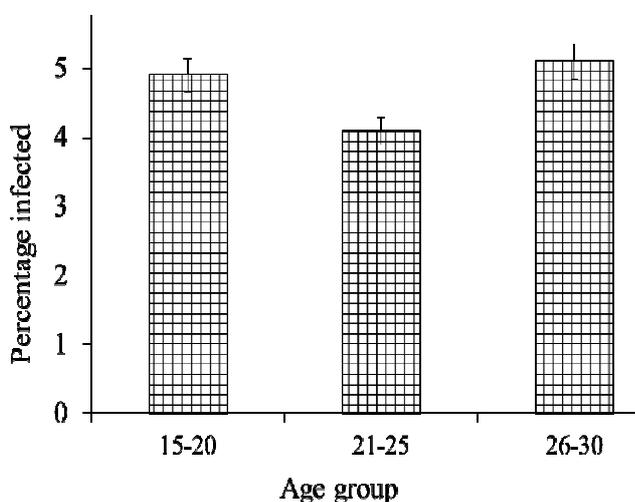
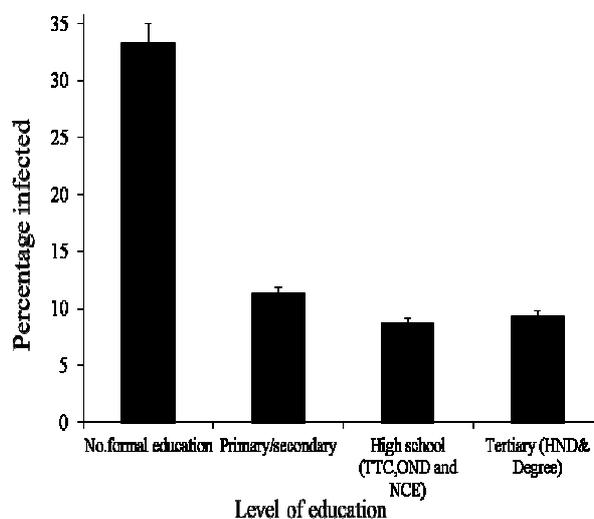


Figure 7: Incidence of ASB with respect to level Education of the pregnant women



The prevalence recorded in this study, is also lower than 17.6% reported in Owerri; by Akujo and workers [9], 23.9% in Sagamu [10], 45.3% in Benin City [11], 8.7 % in Abakaliki [8], and 86.6% in Benin City [13]. *Escherichia coli* with 56.8% occurrence was the most frequently isolated organism followed by coagulase negative *Staphylococcus*, There was a high degree of antibiotics resistance (7.5% to 100%) among the bacterial isolates. The most resisted antibiotic was septrin and augmentin while the least resisted was ofloxacin.

Figure 8: Incidence of ASB with respect to occupation of the pregnant women



Figure 9: Incidence of Asymptomatic bacteriuria(ASB) with respect to parity level

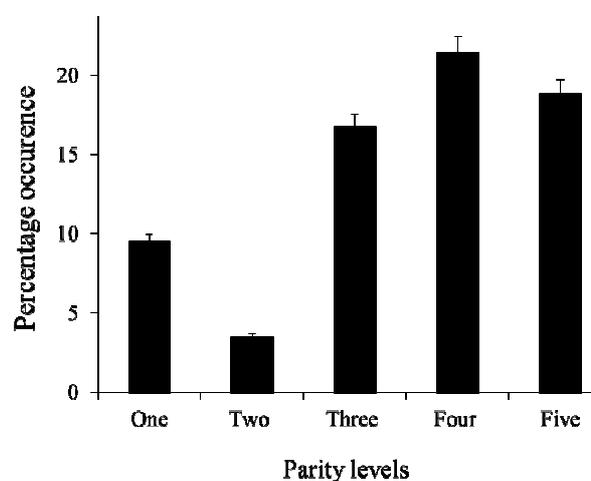
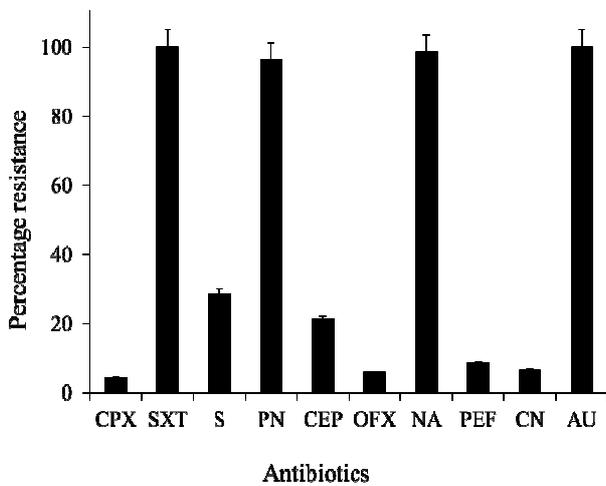
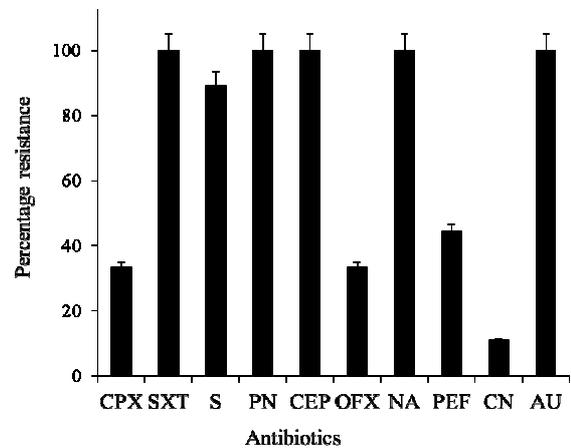


Figure 10: Antibiotics resistance pattern of *E.coli* isolated from urine of ASB-positive pregnant women



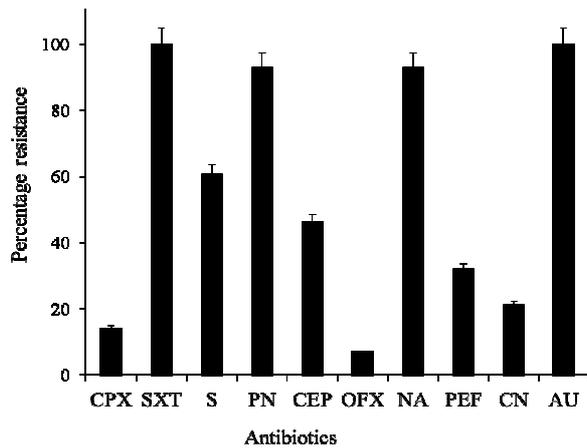
Key: generic (trade) name. CPX=Ciprofloxacin (ciprobay), SXT= Septrin (septrin), S= Streptomycin (streptomycin sulfate), PN= Penicillin (bicillin L-A, CEP= Cefpodoxin (vantin), OFX= Ofloxacin (ocuflox), NA= Nalidixic acid (negGam), PEF= Pefloxacin (peflacine), CN= Gentamicin (garamycin) AU= Amoxicillin-clauvalanate (Augmentine)

Figure 12: Antibiotics resistance pattern of *Pseudomonas* species isolated from urine of ASB-positive pregnant women



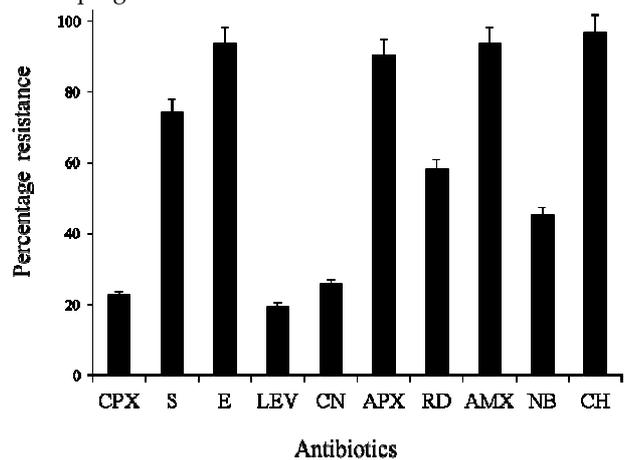
Key: generic (trade) name. CPX=Ciprofloxacin (ciprobay), SXT= Septrin (septrin), S= Streptomycin (streptomycin), PN= Penicillin (bicillin L-A), CEP= Cefpodoxine (vantin), OFX= Ofloxacin (floxin), NA= Nalidixic acid (negGam), PEF= Pefloxacin (peflacine), CN= Gentamicin (garamycin), AU= Amoxicillin-clauvalanate (Augmentine)

Figure 11: Antibiotics resistance pattern of *Klebsiella* species isolated from urine of ASB-positive pregnant women



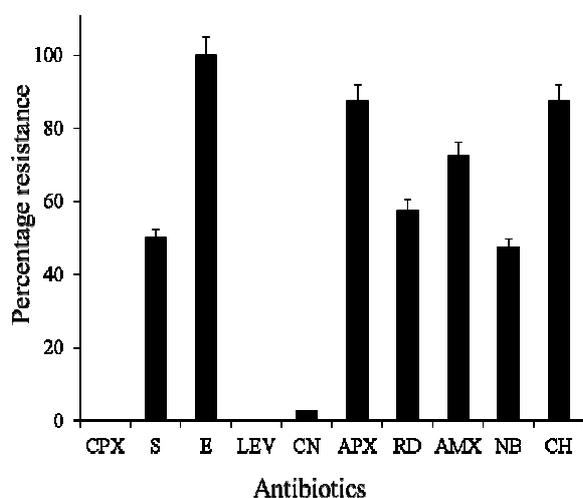
Key: generic (trade) name. CPX= Ciprofloxacin (ciprobay), SXT= Septrin (septrin), S= Streptomycin (streptomycin sulfate), PN= Penicillin (bicillin L-A), CEP= Cefpodoxin (vantin), OFX= Ofloxacin (ocuflox), NA= Nalidixic acid (negGam), PEF= Pefloxacin (peflacine), CN= Gentamicin (garamycin) AU= Amoxicillin-clauvalanate (Augmentine)

Figure 13: Antibiotics resistance pattern of coagulase negative *Staphylococcus* isolated from urine of ASB-positive pregnant women



KEY: Generic (trade) name. CPX= Ciprofloxacin (ciprobay), Streptomycin (streptomycin sulfate), E= Erythromycin (E-mycin), LEV= Levofloxacin (cravit), CN= Gentamicin (garamycin), APX= Ampicillin (ampiclox), RD= Rifampin (rifadin), AMX= Amoxicillin (amoxil), NB= Norfloxacin (noroxin), CH= Chloramphenicol (chloromycetin)

Figure 14: Antibiotics resistance pattern of *Staphylococcus aureus* isolated from urine of ASB-positive women



Key: Generic (trade) name. CPX=Ciprofloxacin(ciprobay), S=Streptomycin (streptomycin sulfate), E= Erythromycin (E- mycin), LEV=Levofloxacin (cravit), CN=Gentamycin (garamycin), APX= Ampicillin (ampiclox), RD= Rifampin(rifadin), AMX=Amoxicillin (amoxil), NB= Norfloxacin (normoxin) CH= Choramphenicol (chloromycetin)

REFERENCES

- [1] Aziz MK, Salim K, Habibullah K, Bushra A, Dur, M and Mohammad R. Prevalence of Asymptomatic Bacteriuria in Pregnant women of local population in Karachi. Pakistan Journal of Medical Sciences, 2008;22(2):162-6.
- [2] Turpin CA, Minkah B, Danso KA and Frimpong EH. Asymptomatic bacteriuria in pregnant women attending Antenatal clinic at Komfo Anokye Teaching Hospital, Kumasi, Ghana. Ghana Medical Journal, 2007;41(1):26-29.
- [3] Abdullah AA. and Al-Moslih MI. Prevalence of asymptomatic bacteriuria in pregnant women in Sharjah, United Arab Emirates. Eastern Mediterranean Health Journal, 2005;11(5&6):1-8.
- [4] Sharifa A, Sibiani AI. Asymptomatic bacteriuria in pregnant women in Jeddah. West region of Saudi Arabia. Journal King Abdulaziz University (JKAU), Medical Sciences 2010;17(1):29-42.
- [5] Samad H. Asymptomatic bacteriuria in pregnant women referred to the medical centers of Tabriz, Iran, for prenatal care. Urology Journal, 2007;4(1): 1-4.
- [6] Jayalakshmi J, and Jayaram VS. Evaluation of various screening tests to detect asymptomatic bacteriuria in pregnant women. Indian Journal of Pathology and Microbiology, 2008;51:379-381.
- [7] Lavanya SV, Joglekshmi D. Asymptomatic bacteriuria in antenatal women. Indian Journal of Medical Microbiology, 2002;20(2): 105 – 106.
- [8] Tadesse A, Nogash M, Ketema L. Asymptomatic bacteriuria in pregnancy: assessment of prevalence, microbial agents and their antimicrobial sensitivity pattern in Gondar Teaching Hospital, Northwest Ethiopia. Ethiopian Medical Journal, 2007;45(2): 143 – 149.
- [9] Akujobi CO, Ogbulie JN, Umeh SI Abanno NU and Nwachukwu IN. Asymptomatic bacteriuria in pregnant women of the outpatient clinic of some government hospitals in Imo State, Nigeria. International Journal of Biological and Chemical Sciences, 2009;3(3): 1.
- [10] Olusanya O, Ogunledum A, Fakoya TA. Asymptomatic significant bacteriuria among pregnant and non-pregnant women in Sagamu, Nigeria. West Africa Journal of Medical, 1993;12:27-33.
- [11] Imade PE, Izekor PE, Eghafona, NO, Enabulele OI, and Ophori E. Asymptomatic bacteriuria among pregnant women. North America Journal on Medical Science; 2010;2:263-266.
- [12] Amadi ES, Enemuob OB, Uneke CJ, Nwosu OK, Onyeagba RA, Ugbogu OC. Asymptomatic bacteriuria among pregnant women in Abakaliki, Ebonyi State Nigeria. Journal of Medical Sciences, 2007;7(4):698–700.
- [13] Akinloye O, Ogbolu DO, Akinloye OM and Terry Ail OA. Asymptomatic bacteriuria of pregnancy in Ibadan, Nigeria: a re-assessment. British Journal of Biomedical Science, 2006;63:109-12.

ACKNOWLEDGEMENT / SOURCE(S) OF SUPPORT

We wish to express our gratitude to the management and nurses in Antenatal units of Nsukka General Hospital and Bishop Shanahan Memorial Hospital for their permission and assistance.

CONFLICT OF INTEREST

No conflicts of interests was declared by authors.

How to Submit Manuscripts

Manuscript must be submitted online. The URL for manuscript submission is <http://rrpjournals.org/submit>

Manuscript submissions are often acknowledged within five to 10 minutes of submission by emailing manuscript ID to the corresponding author.

Review process normally starts within six to 24 hours of manuscript submission. Manuscripts are hardly rejected without first sending them for review, except in the cases where the manuscripts are poorly formatted and the author(s) have not followed the guidelines for manuscript preparation, <http://rrpjournals.org/guidelines>

Research | Reviews | Publications and its journals (<http://rrpjournals.org/journals>) have many unique features such as rapid and quality publication of excellent articles, bilingual publication, and so on.