



(RESEARCH ARTICLE)



Asymptomatic bacteriuria in pregnant women attending antenatal clinic in a tertiary hospital, South-South Nigeria

Ebidor Lawani-Luwaji *, Tolulope Alade and Inokoba Hannah

Niger Delta University, Wilberforce Island, Nigeria.

World Journal of Advanced Research and Reviews, 2023, 19(03), 679–684

Publication history: Received on 04 August 2023; revised on 14 September 2023; accepted on 14 September 2023

Article DOI: <https://doi.org/10.30574/wjarr.2023.19.3.1681>

Abstract

Asymptomatic bacteriuria is a common problem in pregnancy and is associated with the risk of preterm birth and pyelonephritis if untreated. This study aims to determine the prevalence and aetiology of asymptomatic bacteriuria and the susceptibility pattern in pregnant women attending antenatal clinics in a tertiary hospital in South-South Nigeria. Urine samples from 30 pregnant women were analysed using conventional microbiology techniques, and the mean age of the respondents was 29.57 ± 5.89 years. The prevalence of asymptomatic bacteriuria in this study is 66.6%, with a higher prevalence in the third trimester (73.3%). The subjects aged 31-35 had the highest prevalence of *Klebsiella pneumoniae* as the common isolate, followed by *Escherichia coli* at 45% to 40%, respectively. Reflacine was more susceptible to *Escherichia coli* (87.5%), while ciprofloxacin was more susceptible to *Klebsiella pneumoniae* (88.8%) in this study. Asymptomatic bacteriuria is not uncommon among antenatal patients in the population studied. Routine urine culture tests should be conducted on all antenatal patients to identify any unsuspecting infection. This measure will go a long way in reducing maternal and obstetric complications associated with pregnancy, such as preterm labour and low birth weight babies.

Keywords: Asymptomatic bacteriuria; Pregnancy; Prevalence; Risk

1. Introduction

Asymptomatic bacteriuria (ASB) is a condition where bacteria are present in urine without any symptoms of a urinary tract infection. This condition threatens pregnant women, as it can lead to the development of urinary tract infections, pyelonephritis, and related complications (Schnarr & Small, 2008).

The anatomical and hormonal changes during pregnancy cause dilation of the renal pelvis and ureters, resulting in urinary stasis. Additionally, the short length of the female urethra and perineal colonisation by enteric organisms predispose factors that can contribute to developing urinary tract infections and pyelonephritis (Musona-Rukweza et al., 2017). During pregnancy, changes in the urinary tract and immune system can increase the likelihood of asymptomatic bacteriuria (ASB) and may lead to symptomatic infections. This poses significant risks to both the mother and fetus. Risk factors for UTI in pregnant women may include advancing age, multiple pregnancies, diabetes, sickle cell anaemia, past UTI history, urinary tract disorders, and immune deficiencies (Smaill & Vazquez, 2019).

Untreated bacteriuria during pregnancy can lead to complications, including preterm labour, pre-eclampsia, hypertension, pyelonephritis, anaemia, amnionitis, low birth weight, neonatal deaths (stillbirths), bacteremia, and toxic septicemia (Kazemier et al., 2015).

During antenatal visits for women in Nigeria and other developing countries, urine microscopy, culture, and sensitivity (M/C/S) are typically not included in standard laboratory investigations. This may be due to the cost and delay in

* Corresponding author: Ebidor Lawani-Luwaji

obtaining culture results, as noted in a study by Imade et al. in 2010. However, the absence of M/C/S testing can lead to improper management of women with asymptomatic bacteriuria (ASB) and increase the risk of pregnancy complications.

According to a systematic review and meta-analysis of bacterial profiles and asymptomatic bacteriuria among pregnant women in Africa, it was found that a significant number of women in Africa suffer from asymptomatic bacteriuria (Awoke et al., 2021).

Pregnant women in Bayelsa, Southern Nigeria, may likely experience a high burden of ASB (asymptomatic bacteriuria) and its associated complications, which is still underestimated. Therefore, this study seeks to determine the prevalence of ASB among pregnant women who attend antenatal clinics at the Niger Delta University Teaching Hospital Okolobiri.

2. Material and methods

2.1. Study area

The research was conducted at the Niger Delta University Teaching Hospital (NDUTH) in the Yenagoa Local Government Area of Bayelsa State. Yenagoa is located between latitude 4°15'North, 5°23'South and longitude 5°22'West and 6°45'East.

2.2. Ethical clearance

Ethical clearance was obtained from the Ethical Committee of the Niger Delta University Teaching Hospital Okolobiri, Yenagoa Local Government Area, Bayelsa State, and oral consent was received from each pregnant woman before they participated in the study.

2.3. Study Design

A cross-sectional study was conducted between February and May 2023 in Okolobiri, located in the South-South region of Nigeria. Participants who met the inclusion criteria and agreed to participate in the study were recruited as they attended the antenatal clinic at the Niger Delta Teaching Hospital, Okolobiri, Bayelsa.

All expectant mothers at the antenatal clinic were provided with comprehensive details regarding the study. Only those who met the entry criteria and were deemed healthy by the gynaecologist were chosen to participate. Each participant's personal information was collected. Any pregnant women exhibiting urinary tract infection symptoms or undergoing antibiotic treatment were not considered for the study.

2.4. Sample size

Using Taro Yamane's method for sample size calculation, midstream urine was collected with sterile universal containers from 30 pregnant women attending the antenatal clinic.

2.5. Sample processing

To detect bacteriuria, we used a semi-quantitative technique. We spread a standard bacteriological loopful of urine on the surface of Cystine Lactose Electrolyte Deficiency (CLED) agar plates. After incubating the plates at 37°C for 24 hours, we counted the bacteria colony-forming units on each CLED agar medium by examining their morphological and cultural features. We considered plates with 10⁵ bacteria/ml or more colony-forming units (CFU) to have significant bacteriuria (Patterson & Andriole, 1987).

2.6. Antibiotic Susceptibility Testing

To determine the susceptibility and resistance of bacterial isolates, we utilized the disc diffusion method for gram-negative and gram-positive strains. A colony from each isolate was inoculated into peptone broth and allowed to sit for 3 hours. Next, approximately 2mL of the broth was used to flood the surface of a nutrient agar plate and then discarded. Antimicrobial sensitivity discs were then placed on the nutrient agar plate for gram-positive and gram-negative strains, which were then incubated at 37°C for 18 hours. The zone of inhibition was measured, and the susceptibility and resistance of the isolate were determined.

2.7. Data Analysis

Data was analyzed with Microsoft Excel 2007 and SPSS version 25.

3. Results

3.1. Demographic Data of Respondents

Out of the total number of pregnant women observed the results showed that the highest number of subjects (15) were in their 3rd trimester, while the lowest (1) were in their 1st trimester. The mean age of the respondents was 29.57 ± 5.89 years, with the highest mean age (30.81 ± 5.27 years) observed in the 3rd trimester, while the lowest age (28.0 years) was observed in the 1st trimester. The prevalence of bacteriuria was highest in the 3rd trimester, with 73.33% of pregnant women being affected. As shown in Table 1 below.

| Pregnancy period | N | Mean Age (YRS) | Bacteriuria | |
|---------------------------|----|----------------|-----------------|-----------------|
| | | | Positive (N, %) | Negative (N, %) |
| 1 st Trimester | 1 | 28.0 | 1(100) | 0 |
| 2 nd Trimester | 14 | 6(42.86) | 28.64±6.69 | 8(57.14) |
| 3 rd Trimester | 15 | 30.81±5.27 | 11(73.33) | 4(26.67) |
| Total | 30 | 29.57±5.89 | | |

Table 2 displays the breakdown of bacterial species isolated based on the trimester of the pregnant women. The findings indicate that the highest frequency of bacteriuria was observed in the 3rd trimester, while the lowest incidence was recorded in the 1st trimester.

Table 2 Prevalence of bacteria species according to trimester

| Trimester/Bacteria isolated | <i>S. aureus</i> | <i>E.coli</i> | <i>P. aeruginous</i> | <i>K. pneumoniae</i> |
|-----------------------------|------------------|---------------|----------------------|----------------------|
| 1st trimester | - | - | - | 1 |
| 2nd trimester | - | 4 | - | 4 |
| 3rd trimester | 1 | 4 | 2 | 4 |
| Total | 1 | 8 | 2 | 9 |

The information in Table 3 displays the various biochemical tests conducted on the isolates.

Table 3 Biochemical test

| Organism/Biochemcals | Catalase | Coagulase | Indole | Citrate | Oxidase | KIA |
|----------------------|----------|-----------|--------|---------|---------|-----|
| <i>S. aureus</i> | 1 | 1 | - | - | - | - |
| <i>E. coli</i> | - | - | 8 | - | - | 8 |
| <i>K. pneumoniae</i> | - | - | - | 9 | - | 9 |
| <i>P. auruginosa</i> | - | - | - | - | 2 | - |

Table 4 shows the drug susceptibility pattern of the various antibiotics used for the drug sensitivity test for the different isolates. The highest susceptibility of *K. pneumoniae* was seen in Ciprofloxacin, with 88.8% of isolates. The results also showed resistance to Ceporex, Nalidixic Acid and Amplicin (9). Intermediate sensitivity was observed in Gentamycin.

The results show that the highest susceptibility of *E.coli* was to Reflaxine (87.5%) and resistance to Ceporex, Nalidixic Acid and Amplicin (0%). Intermediate sensitivity was observed in Augmentin and streptomycin.

Table 4 Antimicrobial Susceptibility Percent of Isolates

| Isolate/antibiotic | Tarivid (OFX) | Reflaxine (PEF) | Ciprofloxacin (CPX) | Augmentin (AU) | Gentamycin (CN) | Streptomycin (S) | Ceporex (CEP) | Nalidixic Acid (NA) | Seprtrin (SXT) | Amplicin (PN) |
|----------------------|---------------|-----------------|---------------------|----------------|-----------------|------------------|---------------|---------------------|----------------|---------------|
| <i>K. pneumonia</i> | 77.9% | 66.7% | 88.8% | 33.3% | 11.1% | 66.6% | 0 | 0 | 66.6% | 0 |
| <i>E. coli</i> | 87.5% | 87.5% | 50% | 12.5% | 50% | 50% | 0 | 0 | 50% | 0 |
| <i>P. aeruginosa</i> | 50% | 50% | 50% | 50% | 50% | 50% | 0 | 0 | 50% | 0 |
| <i>S. aureus</i> | 0% | 0% | 0% | 0% | 0% | 50% | 0% | 0% | 0% | 0% |

4. Discussion

Asymptomatic bacteriuria is a common issue during pregnancy that requires proper screening to prevent complications such as kidney inflammation, stillbirth, and low birth weight babies. Our study shows a high prevalence of 66.3%, with *K. pneumoniae* being the most common isolate. This significantly contrasts previous studies in Nigeria that reported lower prevalence rates ranging from 4-21%. (Odigie & Anugweje, 2010). However, more recent reports from various regions of Nigeria include reports from Port Harcourt 16.6% (Smart et al., 2021), Uyo 9.1% (Imaobong et al., 2021), 29.5% from Abuja (Dakolo et al., 2020), Benin 45.3% (Okwu et al., 2021) and 40.3% (Maureen et al., 2021). Therefore, it is crucial to prioritise proper screening during pregnancy to avoid any potential complications.

Our findings align with those of previous studies conducted in Nigeria, such as in Kebbi state, where the prevalence was 55.5% (Kalgo et al., 2022), and Abakaliki, where it was 78.7% (Amadi et al., 2007). However, our results indicate a higher prevalence than reports from other regions worldwide, including Uganda (3.75%). Ghana at 13.7% (Ahiatrogah et al., 2021), Babylon at 6.3% (Najlaa and Al-Salman, 2019), Nepal at 42% (Yadav and Prakash, 2019), and India at 10% (Bharat et al., 2023). The variation in results may be due to the environment, social habits of the community, socioeconomic status, personal hygiene and the study population (Maureen et al., 2021).

The study results show that *K. pneumoniae* is the predominant bacteria, making up 45% of the total, consistent with Bharat et al.'s (2023) findings in India. However, this finding deviates from most studies conducted in Nigeria and globally, where *E. coli* is the most prevalent bacterium, accounting for 60-90% of cases, followed by *K. pneumoniae* and *S. aureus* (Yadav & Prakash, 2019).

A study conducted in Turkey by Tudela et al. (2019) found that the prevalence of ASB was higher in women aged 25 and above. This finding was consistent with a study in Kumasi, Ghana, by Turpin et al. (2007). Similarly, this study revealed that women aged 25-35 had more infections than younger women. A preexisting renal disease may promote bacteria multiplication, which could be more frequent in women of this age group (Oli et al., 2010).

The occurrence of ASB during the third trimester in this study was higher at 73.3%. This finding is consistent with previous reports from South Eastern Nigeria (65%) and India (Manasi et al., 2017). However, it contrasts with a report from Kebbi, which found ASB rates of 67.2% in the second trimester and 35% in the third trimester (Kalgo et al., 2022). The difference may be attributed to the expansion of the uterus in the second and third trimesters and the increasing relaxing effect of pregnancy hormones on smooth muscles. These factors can lead to decreased bladder pressure and urine stasis, encouraging the multiplication of bacteria.

This study found that uropathogenic bacteria had varying sensitivity levels to different antibiotics. *Klebsiella pneumoniae* was found to be most susceptible to ciprofloxacin, consistent with previous studies (Kalgo et al., 2022) that reported a 48.5% susceptibility to ciprofloxacin and Reflaxine. However, the urinary pathogens were found to be least

sensitive to nalidixic acid, ampicillin, amoxicillin, and cotrimoxazole. The resistance to these antibiotics may be due to self-medication, inappropriate use of antibiotics, and the availability and low cost of drugs. While antibiotic susceptibility and resistance can vary from community to community and hospital to hospital, several studies (Bharat et al., 2022) have shown that similar to this study, many urinary tract pathogens are still highly susceptible to imipenem and aminoglycosides

5. Conclusion

It has been observed that poor hygiene and incomplete bladder emptying can lead to a high prevalence of asymptomatic bacteriuria in the third trimester of pregnancy. To ensure early detection of any unsuspecting infection, it is recommended that all antenatal patients undergo routine urine cultural testing. This measure can significantly reduce the risk of maternal and obstetric complications associated with pregnancy, such as preterm labour and low birth weight babies.

Recommendation

Regular urine culture and urinalysis are crucial for accurately diagnosing asymptomatic bacteriuria during pregnancy. Effective and clear communication between clinicians, nurses, and laboratory personnel is an absolute necessity to achieve this

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

Statement of ethical approval

Ethical clearance was obtained from the Ethical Committee of the Niger Delta University Teaching Hospital Okolobiri, Yenagoa Local Government Area, Bayelsa State.

Statement of informed consent

Oral consent was received from each pregnant woman before they participated in the study.

References

- [1] Schnarr, J., & Smaill, F. (2008). Asymptomatic bacteriuria and symptomatic urinary tract infections in pregnancy. *European journal of clinical investigation*, 38, 50-57.
- [2] Musona-Rukweza, J., Haruzivishe, C., Gidiri, M. F., Nziramasanga, P., & Stray-Pedersen, B. (2017). Asymptomatic bacteriuria in pregnancy: a concept analysis. *Journal of Microbiology Research and Reviews*, 4(1), 1-11.
- [3] Smaill, F. M., & Vazquez, J. C. (2019). Antibiotics for asymptomatic bacteriuria in pregnancy. *Cochrane database of systematic reviews*, (11).
- [4] Kazemier, B. M., Koningstein, F. N., Schneeberger, C., Ott, A., Bossuyt, P. M., de Miranda, E., ... & Geerlings, S. E. (2015). Maternal and neonatal consequences of treated and untreated asymptomatic bacteriuria in pregnancy: a prospective cohort study with an embedded randomised controlled trial. *The Lancet Infectious Diseases*, 15(11), 1324-1333.
- [5] Awoke, N., Tekalign, T., Teshome, M., Lolaso, T., Dendir, G., & Obsa, M. S. (2021). Bacterial Profile and asymptomatic bacteriuria among pregnant women in Africa: A systematic review and meta analysis. *EClinicalMedicine*, 37.
- [6] Taro Yamane Formular In Calculating Sample Size For Research | by Projectclue12 | Medium Accessed 25/03/2023.
- [7] Patterson, T. F., & Andriole, V. T. (1987). Bacteriuria in pregnancy. *Infectious disease clinics of North America*, 1(4), 807-822.
- [8] Odigie, J. O., & Anugweje, K. C. (2010). Asymptomatic bacteriuria in pregnancy in Port Harcourt. *Asian Pacific Journal of Tropical Medicine*, 3(7), 580-583.

- [9] Smart Enoch Amala, Rita Karibi-Botoye, Easter Godwin Nwokah and Monsi Tombari Pius (2021). Prevalence of Asymptomatic Bacteriuria in Pregnancy and Urinary Tract Infection in Nonpregnant Symptomatic Women. *Am. J. Biomed. Sci.*13(4),172-183, doi:10.5099/aj210400172.
- [10] Imaobong O Iwang, Augustine Vumoh, Aniekan M, Abasiattai Ifeanyi A (2021). Prevalence of Asymptomatic Bacteriuria in Pregnant women attending antenatal clinic in a teaching hospital, Uyo. *Nigeria Journal of medicine* 34(4) 383-389.
- [11] Dakolo Dise J, Otubu Joseph A.M.,Oji Samuel K., Aigere Egbaname O.S (2021) Asymptomatic Bacteriuria in Pregnant Women:A Community Survey in Ushafa. *Tropical Journal of Obstetrics & Gynaecology / Published by Journal Gurus*
- [12] Okwu M, Imade O, Akpoka O A, Olley M, Ashi-ingwu B (2021). Prevalence of Asymptomatic Bacteriuria among Pregnant Women Attending Antenatal Clinics in Ovia North East Local Government Area, Edo State, Nigeria. *Iran J Med Microbiol*; 15 (2) :227-231
- [13] Maureen Okwu, Odaro Imade, Obhioze Augustine Akpoka, Mitsan Olley, Blessing Ashi-ingwu (2021). Prevalence of Asymptomatic Bacteriuria among Pregnant Women Attending Antenatal Clinics in Ovia North East Local Government Area, Edo State, Nigeria. *Iran J Med Microbiol*, 15(2): 227-231
- [14] Kalgo, ZM1, Yusuf AB, Umar S, Mohammed, BD, Aliyu B, Gulumbe BH (2022). Prevalence of Asymptomatic Bacteriuria Among Pregnant Women in Kebbi State, Nigeria *Int J Women's Health Care*, Volume 7 |Issue 3 | 129
- [15] Amadi ES, Enemou OB, Nwosu OK, Onyeagba RA, Ugbogu OC (2007). Asymptomatic bacteriuria among pregnant women in Abakaliki, Ebonyi State, Nigeria. *J Med Sci*, 7: 698 - 700. DOI:10.3923/jms.2007.698.700
- [16] Nteziyaremye, J., Iramiot, S. J., Nekaka, R., Musaba, M. W., Wandabwa, J., Kisegerwa, E., & Kiondo, P. (2020). Asymptomatic bacteriuria among pregnant women attending antenatal care at Mbale Hospital, Eastern Uganda. *PLOS ONE*, 15(3), e0230523. <https://doi.org/10.1371/journal.pone.0230523>
- [17] Ahiatrogah, D. K., Annan, J. J., Ofori, L. A., Awudzi, B., Owusu-Ofori, A., Owusu, M., & Sylverken, A. A. (2021). Microbiological profile of asymptomatic bacteriuria in pregnant women in Volta Region, Ghana. *Journal of Microbiology and Antimicrobials*, 13(2), 27-36.
- [18] Najlaa Abass Al-Mamoryi, Abdulrazzaq Salman Al-Salman (2019). Prevalence of Symptomatic Urinary Tract Infections and Asymptomatic Bacteriuria in Iraqi Pregnant Women of Babylon Governorate *Medical Journal of Babylon* | Volume 16 | Issue 1
- [19] Yadav, K. and Prakash, S., 2019. Prevalence of asymptomatic bacteriuria during pregnancy at a Tertiary Care Hospital of Province No. 2, Nepal. *Tribhuvan University Journal of Microbiology*, 6, pp.32-38.
- [20] Bharat Talukdar, Deepjyoti Kalita, Sangita Deka, Sangita Mahela (2023). Prevalence and its antibacterial susceptibility pattern of asymptomatic bacteriuria in pregnancy of a teaching hospital. *The New Indian Journal of OBGYN*. 9(2) DOI - 10.21276/obgyn.2023.9.2.5
- [21] Tudela, P., Molinos, S., Esquerrà, A., & Carreres, A. (2019). Asymptomatic bacteriuria in emergency. A frequent cause of diagnostic error. *Med Clin (Barc)*, 152(1), 29-32. doi:10.1016/j.medcli.2018.05.018.
- [22] Turpin C., Minkah B, Danso K., Frimpong E (2007). Asymptomatic bacteriuria in pregnant women attending antenatal clinic at Komfo Anokye Teaching hospital, Kumasi, Ghana. *Ghana Med J*. 41(1).
- [23] Oli A., Okafor C., Ibezim E., Akujobi C., Onwunzp M (2010). The prevalence and bacteriology of asymptomatic bacteriuria among antenatal patients in Nnamdi Azikiwe University Teaching Hospital Nnewi; South Eastern Nigeria. *Niger J Clin Pr*.13(4):409–12.
- [24] Manasi Patnaik, Kumudini Panigrahi, Banya Das, Basanti Pathi, Nirmala Poddar ,Priya Ranjan Lenka, Dipti Pattnaik (2017). Prevalence, risk factors and causative organisms of asymptomatic bacteriuria in pregnancy *International Journal of Advances in Medicine* Vol 4, Issue 5 Page 1348