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Prevalence of asymptomatic bacteriuria and its antibiotic susceptibility pattern in pregnant women attending private ante natal clinics in Umuahia Metropolitan

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Abstract

Bacteriuria is a common problem in pregnancy and is associated with risk of preterm birth and pyelonephritis if untreated. The diagnosis is based on urine culture. The incidence of antibiotics resistance has been steadily increasing over the past years resulting in limitation of therapeutic options. This study was carried out to determine the prevalence of asymptomatic bacteriuria in pregnant women and also to isolate, identify and establish antimicrobial susceptibility pattern of the pathogen responsible for asymptomatic bacteriuria. The study includes115 pregnant women with asymptomatic bacteriuria, isolates were identified by conventional methods and their antibiotic susceptibility pattern was established. A total of 72 (62.6%) had colony count of 10^5 colonies/ml or more (positive) with the highest prevalence of bacteriuria being observed in pregnant women within the 25 – 29 years group (41.7%). Coagulase negative Staphylococcus specie (26.4%) was the most predominant organism followed by *Staphylococcus aureus* (20.8%). Streptococcus speciea has 16.7% occurrence while E. coli is 12.5%. Ofloxacin, Ciprofloxacin and Pefloxacin were found to be the most effective antibiotics against the urinary isolates. Asymptomatic bacteriuria is not uncommon among antenatal patients in the population stated. Routine urine culture test should be carried out on all antenatal patients in order to identify any unsuspecting infection.This measure will go a hug way in reducing maternal and obstetric complication associated with pregnancy.

Keywords: Prevalence, Asymptomatic bacteriuria, Antibiotic susceptibility pattern, Pregnant women, Attending Private Ante natal Clinics, Umuahia Metropolitan

Introduction

UTI is defined as the presence of significant numbers of pathogenic bacteria, or other organisms, in the urinary system (Stamm, 2002). When these bacteria are present in the urinary tract (UT) of patients who do not exhibit symptoms normally associated with UTI (e.g., pain, frequency and urgency), it is termed bacteriuria (Johnson, 1991). Under these conditions, *E. coli* strains exist in an asymptomatic carrier state without any obvious symptoms of UTI (Mabbett *et al.,* 2009).

Bacteriuria may result from contamination during or after collection of urine, or it may indicate the presence of bacteria in the urinary bladder. Bacteriuria

is said to be significant when urine contains a bacterial count of 10^5CFU/mL in voided midstream urine, aseptically collected from an individual without symptoms of UTI (Forbes *et al*., 2002). Asymptomatic bacteriuria occurs more frequently in females than in males and is a major criterion of UTI.

Urinary tract infections (UTIs) are common in pregnant women. By convention, UTI is defined either as a lower tract (acute cystitis) or upper tract infection (acute pyelonephritis) and this is usually encountered in pregnancy but Obstetricians would rather start empirical treatment with antibiotics while awaiting laboratory evidence of bacteriuria. Asymptomatic bacteriuria is common among women and this could be explained by the short course of the female urethra and its proximity to the vagina and anus (Smail, 2007). Exposure of the urogenital system to bacteria during intercourse and incomplete emptying of bladder in women compared to men may also contribute to the increased risk of asymptomatic bacteriuria (Patterson and Andriole, 1997).

Asymptomatic bacteriuria is a major risk factor for developing symptomatic urinary tract infection and may be associated with adverse effects on maternal and foetal health.

Asymptomatic bacteriuria (ASB) is defined as the presence of at least 105 colony forming units per ml of urine, of a single uropathogen, and in a midstream clean catch specimen without urinary symptoms and signs such as dysuria, frequency, fever, loin pains, renal angle tenderness, suprapubic pain and tenderness (Smail *et al*., 2007; Sevki *et al*., 2011).

Aim

To determine the prevalence rate of asymptomatic bacteriuria in pregnant women attending private antenatal clinics in Umuahia metropolitan.

Specific objectives

To find the predominant causative agents associated with bacteriuria and subsequent UTI.

To differentiate the isolates according to gram reaction
To identify the isolates through biochemical reaction
To check the sensitivity of the isolates to antibiotics

Materials and Methods

Study site

This prospective hospital-based study was conducted in various antenatal clinics in Umuahia metropolitan.

Study Population

The subjects were recruited from pregnant women attending the antenatal clinic. The population was a mixture of rural and urban dwellers. Those who consented to participate in the study were enrolled and were informed about the need for this work using the study tools (questionnaire and consent form).

Inclusion Criteria

i) All pregnant women with no symptom who gave consent
ii) All women booked for antenatal care in the hospital

Exclusion Criteria

The following categories of women were excluded from the study;

1. pregnant women with symptoms of urinary tract infection,
2. HIV positive,
3. Patient that discontents to be part of the study.
4. History of diabetes mellitus, renal disease or sickle cell anaemia
5. All pregnant women who are diagnosed of parasitic plasmodiasis.
6. hypertension,
7. use ofantibiotics within the last 6 weeks and refusal of consent to participate in the study.

Study Sample Size

The sample size was calculated using the statistical formula of Araoye (2004).

$$n = z^2 \, p \, q / d^2$$

Where:
n = minimum sample size
Z = standard deviation at 95% confidence interval= 1.96
P = prevalence of asymptomatic bacteriuria (8%) as local prevalence
N= the minimum sample size = 113
P=8% = 0.08

q= 1.0 – p
(1.0 – 0.08) = 0.92

d = degree of accuracy desired usually set at 5% (0.05)

$$n = \frac{(1.96)^2 \times 0.08 \times 0.92}{(0.05)2} = \frac{0.28274176}{0.0025} = 113$$

Design

The purpose of this study was explained to the subjects before their consent to participate was sought. Structured questionnaires were used as the study tool. The questions outlined in the data forms were explained to the subjects and completed forms which contained information that included the bio-demographic data (such as subject age, gravid age, parity, educational status), provisional diagnosis and laboratory processes, such that the eventual result was noted in the data forms and communicated to the patients.

Specimen collection, transportation and processing

All the subjects were given plastic universal sterile transparent container with screw cap and were enlightened to clean the genital area three times with lukewarm water and allowed to air dry, avoiding chemicals. In addition, the cleaning should be anterior to posterior in unidirectional with the labial majora and minora held apart.

Mid-stream (clean catch) urine samples were collected in sterile disposable universal bottles as described by (Skobe, 2004; Cheesbrough, 2006). The samples were labeled with the identification number for each client which is also similar with the one on the data collection form, stored in ice packs, transported to the laboratory, and were analyzed within 30 minutes to 1hour of collection. When immediate delivery to the laboratory is not possible, it was refrigerated at 4–6 °C. Boric acid preservative was added when a delay in delivery of more than 2 hours is anticipated.

Macroscopy, microscopy, cultural characterization and antibiogram were performed.

The type and quality of specimens submitted to the laboratory usually determines the success of isolating the bacteria. Each specimen received was examined for quality, in terms of amount, sterility and presence or absence of debris (Washington *et al.,* 2006).

The urine specimen were macroscopically examined for turbidity, presence of blood and divided into two equal parts. Urine obtained from the first part (uncentrifuge urine) was used for urinalysis and Gram's stain procedure while urine from the second container were aseptically centrifuged at 3000 rpm for 5 minutes, with the supernatant discarded and the residue used in inoculating blood agar, MacConkey agar and Cysteine Lactose Electrolyte Deficient (CLED) and the remaining residue was microscopically examined, presence of pus cells was noted. Calibrated wire loop with internal diameter of 5mm that delivers 0.002 ml was used to inoculate the samples on those media. The cultures were incubated at 37°C for 18-24 hours with adequate moisture. Positive nitrite on urinalysis and presence of pus cells were considered features suggestive of urinary tract infection but the presence of at least one Gram organism per oil-immersion field in uncentrifuged urine or colony count of greater than 10^5/μl of urine from overnight growth on blood agar plate was considered significant bacteruria. After overnight incubation on the CLED, the growth characteristics were noted and pure growth was Gram stained (Washington *et al.,* 2006; Freeman *et al*., 1989). Colonies that were Gram positive were further characterized using the catalase and coagulase. Those with Gram negative were further characterized using Gram negativeidentification and indole, motility, sugar fermentation test (Freeman *et al*., 1989).

Bacterial identification

Growths on the culture media were identified using their growth characteristics, Gram stain and biochemical and sugar fermentation tests. The biochemical tests used were: Indole test for lactose fermenting bacteria particularly Escherichia coli and Klebsiella and Coagulase test to differentiate *Staphylococcus aureus* from *Staphylococcus*.

Gram stain

Principle of Gram Stain

The differences in cell wall composition of Gram positive and Gram negative bacteria accounts for the Gram staining differences. Gram positive cell wall contain thick layer of peptidoglycan with numerous teichoic acid cross linking which resists the decolorization. In aqueous solutions crystal violet dissociates into CV+ and Cl – ions that penetrate through the wall and membrane of both gram-positive and gram-negative cells.The CV+ interacts with

negatively charged components of bacterial cells, staining the cells purple.When added, iodine interacts with CV+ to form large Crystal violet iodine (CV-I) complexes within the cytoplasm and outer layers of the cell. The decolorizing agent, (ethanol or an ethanol and acetone solution), interacts with the lipids of the membranes of both gram-positive and gram-negative Bacteria. The outer membrane of the gram-negative cell (lipopolysaccharide layer) is lost from the cell, leaving the peptidoglycan layer exposed. Gram-negative cells have thin layers of peptidoglycan, one to three layers deep with a slightly different structure than the peptidoglycan of gram-positive cells .With ethanol treatment, gram-negative cell walls become leaky and allow the large CV-I complexes to be washed from the cell.

The highly cross-linked and multi-layered peptidoglycan of the gram-positive cell is dehydrated by the addition of ethanol. The multi-layered nature of the peptidoglycan along with the dehydration from the ethanol treatment traps the large CV-I complexes within the cell. After decolorization, the gram-positive cell remains purple in color, whereas the gram-negative cell loses the purple color and is only revealed when the counterstain, the positively charged dye safranin, is added. At the completion of the Gram stain the gram-positive cell is purple and the gram-negative cell is pink to red.

Smear Preparation

using a sterile wire loop a colony was picked and smeared on a clean slide with a drop of saline and was passed through flame to heat fix.

Gram Staining Procedure/Protocol

1. The air-dried, heat-fixed smear of cells was flooded for 1 minute with crystal violet staining reagent.
2. Slide was washed in a gentle and indirect stream of tap water for 2 seconds.
3. Flooded with the mordant: Gram's iodine andallowed for 1 minute.
4. The slide was washed in a gentle and indirect stream of tap water for 2 seconds.
5. It was flooded with decolorizing agent (acetone)and washed off immediately under running tap water.
6. The slide was flooded with counterstain, safranin for 30 seconds to 1 minute.
7. Slide was washed in a gentle and indirect stream of tap water until no color appears in the effluent and allowed to air dry.
8. The stained slide was observed under oil immersion using a Brightfield microscope.
9. Gram staining result: Gram-positive cell is purple and the gram-negative cell is pink to red.

Culture media

MacConkey (MAC) Agar

MacConkey Agar is used for the isolation and differentiation of lactose non-fermenting, gram negative enteric bacteria from lactose fermenting organisms.

Media preparation

1. The MacConkey agar was prepared according to manufacturer's instructions.
2. Sterilized by autoclaving at 121°C for 15 minutes.
3. Allowed to cool to 50°C.
4. 20 ml was dispensed into 15x100 mm Petri dishesforming a smooth surface withno bubbles, it was allowed to solidify.
5. The solidified media was inverted to avoid excessive moisture and subsequent condensation on the plate, dried and labeled.
6.The plates were placed in sterile plastic bags and store at 4ºC until use.

Blood Agar

Blood agar is an enriched, bacterial growth medium. Fastidiousorganisms, such as Streptococci, do not grow well on ordinary growth media. Blood agar is a type of growth medium that encourages the growth of bacteria, such as Streptococci, that otherwise wouldn't grow well at all on other types of media.Blood contains inhibitors for certain bacteria such as *Neisseria* and *Haemophilus* genera and the blood agar must be heated to inactivate these inhibitors. Heating of blood agar converts it into chocolate agar (heated blood turns a chocolate color) and supports the growth of these bacteria.

Procedure for the preparation of Blood Agar

1. Blood agar base was Prepare as instructed by the manufacturer. Sterilized by autoclaving at 121°C for 15 minutes.

2. The prepared blood agar base was Transfer to a 50°C water bath.
3. When the agar base is cooled to 50°C, 20% sterile blood was added aseptically and mix well gently. Avoiding formation of air bubbles.
4. Dispensing 15 ml amounts to sterile petri plates aseptically
5. The medium was label with the date of preparation.
6. The plates were store at 2-8°C in sealed plastic bags to prevent loss of moisture. The shelf life of thus prepared blood agar is up to four weeks.

CLED Agar

CLED (cysteine lactose and electrolyte-deficient) agar is a differential culture medium for use in isolating and enumerating bacteria in urine from the suspected cases of Urinary Tract Infection. It was prepared according to manufactures instruction and dispensed into petri-dish as stated above.

Inoculation of culture media using streaking method

Streak plate method

The loop is used for preparing a streak plate. This involves the progressive dilution of an inoculum of bacteria over the surface of solidified agar medium in a Petri dish in such a way that colonies grow well separated from each other.
The aim of the procedure is to obtain single isolated pure colonies (discrete colony).

Loosening the cap of the bottle containing the inoculum while holding the wire loop on the right hand, the loop was flamed at red hot and allowed to cool.
The neck of the test tube was flamed and a loopful of sample was aseptically taken.
Holding the charged loop parallel with the surface of the agar, the inoculum was smeared backwards and forwards across a small area of the medium.
The Petri dish was closed and the wire loop was flamed and allowed to cool.
Turningthe dish through 90° anticlockwise the plate was streaked from one area to another flaming the wire loop at interval to reduce the concentration of the inoculum so as to obtain a discrete colony

Differentiation of gram positive using the catalase and coagulase test.

Catalase test

The catalase test is important in distinguishing streptococci (catalase-negative) from staphylococci which are catalase positive. The test is performed by flooding an agar slant or broth culture with several drops of 3% hydrogen peroxide. Catalase-positive cultures bubble at once. The test should not be done on blood agar because blood itself will produce bubbles.

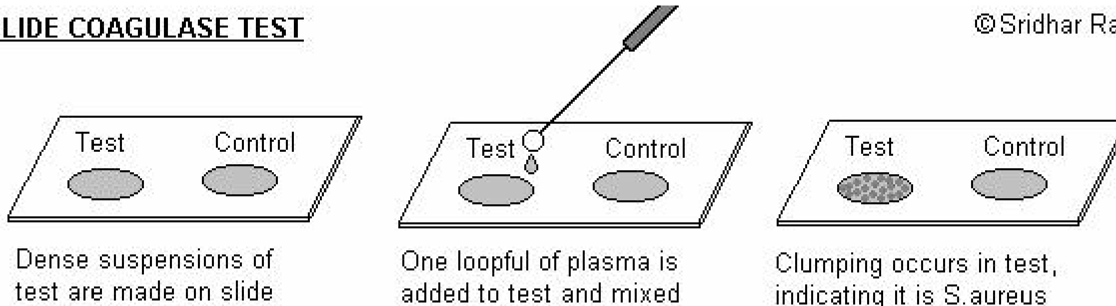
Coagulase test

Staphylococcus aureus is known to produce coagulase, which can clot plasma into gel in tube or agglutinate cocci in slide. This test is useful in differentiating *S.aureus* from other coagulase-negative staphylococci. Most strains of *S.aureus* produce two types of coagulase, free coagulase and bound coagulase. While free coagulase is an enzyme that is secreted extracellularly, bound coagulase is a cell wall associated protein. Free coagulase is detected in tube coagulase test and bound coagulase is detected in slide coagulase test. Slide coagulase test may be used to screen isolates of *S.aureus* and tube coagulase may be used for confirmation. While there are seven antigenic types of free coagulase, only one antigenic type of bound coagulase exists. Free coagulase is heat labile while bound coagulase is heat stable.

Slide coagulase test

Principle: The bound coagulase is also known as clumping factor. It cross-links the and chain of fibrinogen in plasma to form fibrin clot that deposits on the cell wall. As a result, individual coccus stick to each other and clumping is observed.

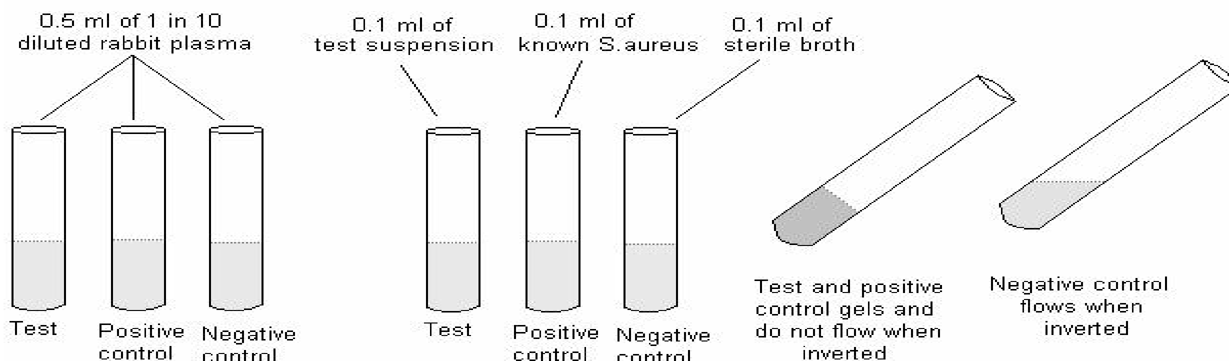
Procedure: Dense suspensions of Staphylococci from culture are made on two ends of clean glass slide. One should be labeled as “test” and the other as “control”. The control suspension serves to rule out false positivity due to auto-agglutination. The test suspension is treated with a drop of citrated plasma and mixed well. Agglutination or clumping of cocci within 5-10 seconds is taken as positive. Some strains of *S.aureus* may not produce bound coagulase, and such strains must be identified by tube coagulase test.



Tube coagulase test

Principle: The free coagulase secreted by *S.aureus* reacts with coagulase reacting factor (CRF) in plasma to form a complex, which is thrombin. This converts fibrinogen to fibrin resulting in clotting of plasma.

Procedure: Three test tubes are taken and labeled "test", "negative control" and "positive control". Each tube is filled with 0.5 ml of 1 in 10 diluted rabbit plasma. To the tube labeled test, 0.1 ml of overnight broth culture of test bacteria is added. To the tube labeled positive control, 0.1 ml of overnight broth culture of known *S.aureus* is added and to the tube labeled negative control, 0.1 ml of sterile broth is added. All the tubes are incubated at 37oC and observed up to four hours. Positive result is indicated by gelling of the plasma, which remains in place even after inverting the tube. If the test remains negative until four hours at 37oC, the tube is kept at room temperature for overnight incubation.



Application: Coagulase test is used to identify and differentiate *S.aureus* from coagulase negative staphylococci. While slide coagulase test is useful in screening, tube coagulase test is useful in confirmation of coagulase test.

Differentiation of gram negative using sugar fermentation technique and indole

Indole principle: Indole test is used to determine the ability of an organism to split amino acid tryptophan to form the compound indole. Tryptophan is hydrolysed by **tryptophanase** to produce three possible end products – one of which is indole. Indole production is detected by Kovac's or Ehrlich's reagent which contains**4 (p)-dimethylaminobenzaldehyde**, this reacts with indole to produce a red coloured compound.Indole test helps to differentiate **Enterobacteriaceae** and other genera.

Two methods are in use; First a conventional tube method requiring overnight incubation, which identifies weak indole producing organisms and secondly a spot indole test, which detects rapid indole producing organisms

Procedure of Conventional Tube method for Indole Test

Isolated colony of the test organism was emulsify in tryptophan broth and incubated at 37°C for 24 hours. 0.5 ml of Kovac's reagent was added to the broth culture.

Expected results: Positive: Reddish colored ring after addition of appropriate reagent.

Negative: No color change even after the addition of appropriate reagent. e.g. *Klebsiella Pneumoniae*
Indole positive organisms: Most strains of *E.coli,P. vulgaris*, *M. morganii* and *Providenica* are indole positive.
Indole test can also aid in species differentiation.

1. *Klebsiella* species: *Klebsiella oxytoca* is indole positive whereas *Klebsiella pneumoniae* is indole negative.
2. *Citrobacter* species: *Citrobacter Koseri* is indole positive whereas *Citrobacter freundii* is indole negative
3. *Proteus* species: *Proteus Vulgaris* is indole positive whereas *Proteus mirabilis* is indole negative.

Oxidation – fermentation (O-F) Test

This test is used to differentiate those organisms that oxidize Carbohydrates (aerobic utilization) Such as *Pseudomonas aeruginosa*, from those organisms that ferment carbohydrates (anaerobic utilization) such as members of the Enterobacteriaceae.

Principle

The test organism is inoculated into two tubes of a tryptone or peptone agar medium containing glucose (or other carbohydrate) and the indicator bromothymol blue. The inoculated medium in one tube is sealed with a layer of liquid paraffin to exclude oxygen Fermentative organisms utilize the carbohydrate in both the open and sealed tubes and the colour of the medium changes from green to yellow. Oxidative organisms, however, are able to use the carbohydrate only in the open tube. There is no carbohydrate utilization in the sealed tube (therefore no colour change).

Oxidation Fermentation (O-F) Medium

Glucose, maltose, lactose and sucrose O-F media are the most commonly used.

Motility

Motility Test (Motility Medium):

A. Reason: Used to determine if a bacteria is motile
B. Procedure:
- Use a needle to inoculate by making a single stab about two thirds down and then pull the needle up the same path.
- Incubate for 24-48 hours
C. Interpretation:
- Motile: the tube will appear cloudy and usually the organism will spread over the top of the media.
- Non-Motile: the organism will grow along the streak line only; the media will not be cloudy.

Antimicrobial Susceptibility Testing

The antimicrobial in-vitro susceptibility testing was done using agar disc diffusion method. The Clinical and Laboratory Standards Institute (CLSI) antimicrobial susceptibility testing standards M2-A9 and M7-A7 were used. The following commercially prepared antibiotics were used:Cefotaxime (30µg), Ceftazidime(30µg), Astreonam (30µg), Amoxicillin-clavulanic acid (20/10µg), Nitrofurantoin (300µg), Ampicillin (30µg), Cefuroxime Sodium (30µg), Ceftriaxone (30µg), Gentamicin (10µg), Trimethoprim-sulfamethoxazole(1.25/23.75µg%), Ciprofloxacin (5µg), Ofloxacin (5µg).

Statistical Analysis

Data were analyzed by statistical software Statistical Package for the Social Sciences (SPSS) version 14.0 (SPSS Inc, Chicago, IL) using Chi-square and percentile. Significant difference was set at P=0.05.

Results

Table 1: Prevalence of asymptomatic bacteriuria in the study population based on age distribution

Age group	No. without significant growth (%)	No. with significant growth in (%)	Total
15-19	1(2.3)	2(2.8)	3(2.6)
20-24	7(16.3)	15(20.8)	22(19.1)
25-29	13(30.2)	30(41.7)	43(37.4)
30-34	16(37.2)	20(27.8)	36(31.3)
35-39	6(14.0)	4(5.6)	10(8.7)
40-45	0(0)	1(1.4)	1(0.9)
Total	43(37.4)	72(62.6)	115

Data are presented as proportions; CFU = Colony forming unit

Table 2: Prevalence of asymptomatic bacteriuria in the study population based on trimester

Trimester	No. of pregnant women	No. without significant growth(%)	No. with significant growth(%)
1	8(7.0)	2(4.7)	6(8.3)
2	55(47.8)	28(65.1)	27(37.5)
3	52(42.2)	13(30.2)	39(54.2)
Total	115	43(37.4)	72(62.6)

Table 3. **GRAM POSITIVE AND ITS BIOCHEMICAL TEST**

	FREQUENCY	**PERCENT**	**CUMULATIVE PERCENT**
	GRAM POSITIVE		
Chains	12	26.1	26.1
Cluster	34	73.9	100.0
Total	46	100.0	
	CATALASE		
Negative	12	26.1	26.1
Positive	34	73.9	100.0
Total	46	100.0	
	COAGULASE		
Negative	19	55.9	55.9
Positive	15	44.1	100.0
Total	34	100.0	

TABLE 4 : GRAM NEGATIVE AND ITS BIOCHEMICAL TEST

	Frequency	Percent	Cumulative Percent
	Indole		
Negative	6	23.1	23.1
Positive	20	76.9	100.0
Total	26	100.0	
	Motility		
Non motile	4	15.4	15.4
Motile	19	73.1	88.5
Actively Motile	3	11.5	100.0
Total	26	100.0	
	Glucose		
Negative	4	15.4	15.4
Positive	21	80.8	96.2
Positive/Negative(±)	1	3.8	100.0
Total	26	100.0	
	Sucrose		
Negative	9	34.6	34.6
Positive	9	34.6	69.2
Positive/Negative(±)	8	30.8	100.0
Total	26	100.0	
	Lactose		
Negative	17	65.4	65.4
Positive	9	34.6	100.0
Total	26	100.0	
	D. Mannitol		
Negative	12	46.2	46.2
Positive	14	53.8	100.0
Total	26	100.0	

Table 5: Frequency of occurrence of presumed organism

Organism	Frequency	Percent	Cumulative Percent
Staphylococcus species	19	26.4	26.4
Staphylococcus aureus	15	20.8	47.2
Streptococcus specie	12	16.7	63.9
Serratia Marcesens	3	4.2	68.1
Escherichia coli	9	12.5	80.6
Proteus specie	6	8.3	88.9
Proteus Vulgaris	1	1.4	90.3

Shigella specie	2	2.8	93.1
Acaligenes specie	2	2.8	95.9
Morganella Morgani	2	2.8	98.7
Pseudomonas specie	1	1.4	100
Total	**72**	**100**	

Table 6: Sensitivity percentage Distribution of Gram Positive

	CPX	NB	APX	S	CN	LEV	RD	ERY	CH
Resistant	0	0	44.4	31.1	24.4	6.7	20	40	48.9
Sensitive	11.1	48.9	40	64.4	64.4	42.2	53.3	44.4	28.9
Moderately Sensitive	57.8	37.8	15.6	4.4	11.1	51.1	26.7	11.1	22.2
Very Sensitive	31.1	13.3	0	0	0	0	0	4.4	0

Table 7: Sensitivity percentage Distribution of Gram Negative

	OFX	NA	PEF	CN	AU	CPX	SXT	S	PN	CEP
Resistant	0	25.0	0	12.5	41.7	0	16.7	4.2	33.3	50.0
Sensitive	0	66.7	8.3	16.7	54.2	37.5	54.2	70.8	62.5	41.7
Moderately Sensitive	41.7	8.3	33.3	41.7	4.2	33.3	29.2	25.0	4.2	8.3
Very Sensitive	58.3	0	58.3	29.2	0	29.2	0	0	0	0

Discussion

The prevalence of asymptomatic bacteriuria among the pregnant women in this study was 62.6% Varying prevalence rates of asymptomatic bacteriuria in pregnant women have been reported with Hazhir (2007) reporting a prevalence rate of 6.1%, Turpin *et al.* (2007) reported a prevalence of 7.3%, Hernandez *et al*. (2007) reported a prevalence of 8.4% and Tadesse (2007) reported a prevalence of 9.8%. Prevalence rates as low as 3.3% (Moghadas and Irajian, 2009) and 3.7% (Mobasheri *et al*., 2002) have been reported and rates as high as 22.2% (Famurewa, 1992). Likewise Amadi *et al*. (2007) reported prevalence rate of 78.7% in Abakaliki, Ebonyi state, in relation to other determined rates affirms the findings which ascribed variations in prevalence to population characteristics such as age, parity, socio-economic status, sexual activity (multiple sexual partners) and health care during pregnancy .

Conclusion

This study showed that approximately 62% of the pregnant women recruited had asymptomatic bacteriuria. It is therefore imperative that pregnant women are screened for bacteriuria periodically in every trimester of the gestational period. Talks on personal hygiene and cleanliness around the urogenital and anal area to prevent faecal contamination of the urinary tract should be emphasized during antenatal visits.

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