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RESEARCH ARTICLE

IDENTIFICATION AND ANTIMICROBIAL RESISTANT PATTERN OF BACTERIAL ISOLATES FROM URINE OF PREGNANT WOMEN ATTENDING ANTE-NATAL CLINIC IN FEDERAL MEDICAL CENTRE, OWO, ONDO STATE, NIGERIA

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ABSTRACT

Background: Urinary tract infection (UTI) is a health problem of mankind, common among women during pregnancy, and is one of the leading causes of miscarriages, premature births, and underdevelopment of infants. This study aimed to isolate and identify the bacteria species present in the urine of pregnant women attending ante-natal clinic in Federal Medical Centre, Owo, Ondo State. The antibiotic resistant patterns of such isolate(s) was examined. ***Methods:*** In this study, descriptive analysis and chi square at P>0.05 and 95% confidence interval was used.One hundred(100) urine samples of pregnant women were collected in sterie universal containers, then cultured on blood agar and MacConkey agar using standard procedure. ***Results:*** Results revealed a total of 72% prevalence. Of bacterial infection. The age range of 26-30 years had the highest prevalence of UTI (36%) and age range (20-25) had the least prevalence of UTI (7%). *Escherichia coli* (43.06%) was the most prominent as the cause of infection among pregnant women, followed by *Klebsiella* spp. (25%), *Staphylococcus aureus*, (18.06%), and *Pseudomonas aeruginosa* (13.88%). Ofloxacin and augmentin have the highest resistance to all bacteria isolated while cefuroxime, gentamycin, and imipenem showed least resistance to all the bacteria isolated. ***Conclusion:*** Antibiotic resistance remains a major problem among the populace around this part of the World probably due to antibiotic abuse and misuse. Good personal hygiene will go a long way in reducing the incidence of UTI among the populace especially in pregnant women and should be a regular feature in antenatal care awareness campaign.

Key words: *Urinary tract infection, pregnancy, antibiotics, resistance, hygiene, antenatal.*

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INTRODUCTION

Micro-organisms are found everywhere and constitute a major part of every ecosystem. In these environments, they live either freely or as parasites (Sleigh and Timbury, 2018). In some cases, they live where they constitute a major health hazards as sources of community and hospital acquired infections (Evans and Brachman, 2018). Worldwide, about 150 million people are diagnosed with Urinary Tract Infection (UTI) each year which may be uncomplicated or complicated.Bacteria are ubiquitous. They play an important role in maintaining the environment in which we live. Only a small percentage of the world's bacteria cause infection and disease. These bacterial infections have a large impact on public health (Evans and Brachman, 2018). As a general rule, bacterial infections are easier to treat than viral infections, since the array of antimicrobial agents with activity against bacteria is more extensive (Sujatha *et al.,* 2014). Those against infectious diseases caused by viruses and parasites are less, however, bacterial resistance to antimicrobials is a rapidly growing problem with potentially devastating consequences. Bacteria are unique among the prokaryotes in that so many of them are normal flora that colonize the host without causing infection *(*Flemming and Wuertz, 2019*)*. Once a person is infected, clinically apparent disease may or may not be seen, and only in a small subset of infections do we see clinically significant disease (Engelkirk, and Burton, 2016) Bacterial infections can be transmitted by a variety of mechanisms.

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In order to be spread, a sufficient number of organisms must survive in the environment and reach a susceptible host. Many bacteria have adapted to survive in water, soil, food, and elsewhere. Some infect vectors such as animals or insects before being transmitted to another human. New species and new variants of familiar species continue to be discovered, particularly as we intrude into new ecosystems (Flemming and Wuertz, 2019). Both. The increased prevalence of highly immunosuppressed individuals, both due to AIDS and the increasing use of immuno-suppressive drugs as chemotherapy and for transplantation of organs, tissues, and cells, has led to a population of patients highly susceptible to types of bacterial infections that were comparatively rare earlier (Evans and Brachman, 2018). Bacteria-associated UTIs such as pyelonephritis are common during pregnancy causing significant maternal and neonatal complications, including threatened abortion, preterm labor, and neonatal mortality among others. As a result of the high exposure to risk factors especially among pregnant women from rural communities of low-resourced settings, the administration of antibiotics to treat UTI during pregnancy has become a frequent practice. Unfortunately, aside from the extensive and sometimes irresponsible administration of beta-lactam antibiotics in clinical settings by clinicians without evidence of the exact pathogen responsible for the UTI, self-medication for the treatment of UTI is fast becoming a common practice during pregnancy, especially within the communities where education on the discriminatory use of medicines for various health conditions is on the low side. Urinary tract infection poses enormous challenges in pregnancy and remains one of the risk factors for morbidity and mortality.

Urinary tract infections in pregnancy may lead to unfavorable pregnancy outcomes and complications like preterm labour, premature delivery, low birth weight, pre-eclamptictoxemia, anemia and even fetal loss.. Most cases of pyelonephritis occur during the second and third trimesters, and complications include septic shock syndrome, anemia, bacteremia, respiratory insufficiency, and renal dysfunction. The most significant factor predisposing women to UTI in pregnancy is asymptomatic bacteriuria (ASB). ASB is defined as more than 100,000 organisms/mL on a clean catch urinalysis obtained from an asymptomatic patient. If asymptomatic bacteriuria is untreated in pregnancy, the rate of subsequent UTI is approximately 25 per cent.
According to the US Centre for Disease Control and Prevention and the Association for Professionals in Infection Control and Epidemiology, simple hand washing is the single most important and effective method of preventing the spread of transmissible disease (Bloomfield *et al.,* 2017). Complete elimination is actually not possible, dissemination of microbial agents can however be reduced.

Statement of the Problem: Some bacteria species which exist as normal flora of the urinary tract could become opportunistic/ potential human pathogens as a result of the weakened immune system or due to poor personal and envirnomental hygiene which may lead to the bacterial load becoming very high and cause infections or complications to both mother and foetus during pregnancy.

Justification of the study: Several bacteria species are found in the ecosystem of man. Most of these bacteria could be normal flora; some are free living while others are pathogenic. Due to their pathogenicity, they infect the body parts of humans. This study therefore seeks to evaluate the types of bacteria species associated with urine of pregnant women attending ante-natal clinic in FMC, Owo, to isolate and make a proper comparison on the prevalence of the bacteria species present in the urine of pregnant persons, to create awareness on the possible consequences of the presence of pathogenic bacteria in urine and how to prevent the occurrence. The antibiogram of isolates will be determined.

Aim of the Study: This study is aimed at isolating and comparing the profile of bacteria species present in the urine of pregnant women attending ante-natal clinic in Federal Medical Centre (FMC), Owo, Ondo State, Nigeria.

Specific Objectives

1. To investigate the bacteria species present in the urine of pregnant persons.
2. To evaluate the composition of the species isolated. .
3. To determine the antibiogram of the identified isolates in order to make an appropriate recommendation arising from the findings.

Research Questions: This research project will provide answers to the following questions based on the objectives:

1. What are the various types of bacteria species present in the urine of pregnant persons?
2. What are the possible mechanisms of their disease transmission?
3. How can these bacteria species be prevented and controlled or be reduced to the minimal level?

Research Hypothesis

H_0: There is no presence of bacteria in urine that can cause infections and complications in pregnant women attending ante-natal clinic in FMC, Owo, Ondo State.

H_0: There is no significance between urinary tract infections and the bacteria species isolated in the urine of pregnant women attending ante-natal clinic in FMC, Owo, Ondo State.

H_0: There is no presence of antibiotic resistant bacteria in the urine of pregnant women attending ante-natal clinic in FMC, Owo, Ondo State.

MATERIALS AND METHODS

This chapter entailed the description of the materials, methods and procedures that were used in the specimen collection and analysis. These included the sampling procedure, sample size and the procedures involved in sample collection and method of analysis.

Research Design: The study was aHospital based cross-sectional study aimed to evaluate the composition of bacteria species isolated in the urine of pregnant women.

Study Area: This study was carried out on the urine of pregnant women attending antenatal clinic in Federal Medical Centre, Owo. Owo is a city in Ondo State of Nigeria founded between 1400 and 1600AD, situated in South West Nigeria Latitude of 7.1 and Longitude 4.841694.

Study Population: Owo Local Government area has a population of 222,262 based on 2006 population cencus.

Study Duration: This study was completed within the period of 3-4 months.

Sample Size: This was calculated based on the prevalence of 93% of *Escherichia coli*as the most common bacteria species found in urine (in the general population) as the hypothesized value (P) and a standard deviation of 1.96 (Z) while our level of inaccuracy at 95% confidence level was 0.05 (D).

Used the Fisher's formula;

$$n = \frac{Z^2 (p*q)}{d^2}$$

Where n= desired sample size
Z=standard normal deviation (1.96) that corresponds to 95% confidence level.
P = prevalence= 93%
q= (1 -p)
d = Precision, usually 5% (0.05)

$$n = \frac{1.96^2 \text{ x } 0.93\ (1 - 0.93)}{(0.05)^2}$$

n=100
Thus in this study, the desired sample size was 100.

Inclusion and Exclusion Criteria: Before identifying appropriately published relevant full-text articles either in local or international journals, a selection criteria checklist for study eligibility was developed by the authors.

Inclusion Criteria: All studies which met the following criteria were included in the review process:

- Studies that reported the prevalence of bacterial contamination in urine.
- Pregnant women that willingly presented themselves in Federal Medical Centre (FMC) Owo
- Studies that accurately reported the urine culture growth rate for bacterial isolates and their drug sensitivity/resistance tested against selected commercially available antibiotics used for the treatment of human infectious pathogens.

Exclusion Criteria: All persons that were not pregnant persons were automatically excluded.

- Also, pregnant persons that were not ready to participate in this research.

Informed Consent: All study participants were enlightened on the nature of this study and informed consent was obtained before the urine samples were collected.

Research Instruments/ Materials : Centrifuge, Centrifuge tubes, Incubator, Autoclave, Binocular Microscope, Hot air oven, Petri dishes, Bunsen burner, Loop wire, Hand gloves, slides, Coverslips, Sterile Pasteur Pipettes, Appropriate stains, Normal saline, Sensitivity discs, Chocolate agar and Cysteine Lactose Electrolyte Deficiency (CLED).

Data Collection

Sample Collection: A total of 100 samples of mid- stream urine were collected. Samples were collected by giving the study participants 20ml Sterile universal bottles and instructed on how to collect urine into the bottles . The samples were transported to the laboratory for clinical analysis.

Sample Analysis

Preparation of Media: The media used (Nutrient Agar) wasweighed and prepared according to manufacturer's specification under proper aseptic conditions.36 gram of the medium was suspended in one liter of distilled water, mixed well and heated with frequent agitation and boiled for one minute until complete dissolution. It was autoclaved at 121°C for 15 minutes, cooled to 50°C, mixed well and dispensed into plates. Chocolate agar was prepared by dissolving 8.4 g of the nutrient agar powder in 300 ml of distilled water in a conical flask. The flask was heated on hot plate for proper dissolution and corked with non-absorbent cotton wool and aluminium foil. The prepared media were carefully packed into the autoclave and sterilized at 121˚C for 15 minutes. Prior to use, the media were cooled to about 45˚C and then blood was added to make 5%. It was heated slowly and evenly to 65°C and cooled till 45°C and dispensed into petri dishes aseptically. It was allowed to set. The same procedures were carried out for preparation of CLED according to manufacturer"s instructions.

Isolation and Identification of Bacterial Isolates: Urine Samples taken from the pregnant women were inoculated on CLED and Chocolate agar. The inoculated plates were then covered and incubated at 37^{o}C for 24 hours. Isolates were identified by Gram's staining, differential and selective media, colonial morphology and appropriate conventional biochemical tests (Cheesebrough, 2016).

Colonial Morphology: The shape, size, colour, pigmentation, elevation, edges and odour of the bacterial species were examined on the agar plates after appropriate incubation periods. (Cowan and Steel, 1993).

Gram Staining Techniques : A thin smear was made by emulsifying a little portion of organisms picked from stocked colony of 18–24 hours old pure culture into a drop of sterile distilled water on a grease free slide. The smear was air dried and heat fixed by passing it slightly over flame. The slide was carefully placed on the staining rack and flooded with primary stain (crystal violet) for 60 seconds. Gram's iodine was added (mordant) for 30 seconds. The smear was rinsed gently with tap water. 70% ethanol was applied as decolouriser; it was then stained with the secondary stain (Neutral red) for 1 minute before rinsing with tap water and was allowed to air dry. The smear was examined under the microscope using oil immersion objective (x100). Gram positive bacteria retained purple colour of the primary dye (crystal violet) while the Gram negative bacteriaretained pink or red colour of the secondary stain (Neutral red).

Biochemical Characterization of the Isolates: These tests were carried out to further identify and classify the isolates. They included; Catalase test, coagulase test; this test was used to differentiate *Staphylococcus aureus* (positive) from *coagulase negative Staphylococci*, oxidase test (Cheesebrough, 2016), Citrate utilization test, motility test, Indole Test, Urease test, sugar fermentation test (glucose, sucrose, lactose, galactose, maltose and fructose).

Oxidase Test: This test was used to identify microorganisms containing the enzyme cytochrome oxidase (important in the electron transport chain). It was commonly used to distinguish between oxidase negativeEnterobacteriaceaeand oxidase positivePseudomonadaceae. A piece of filter paper was soaked with a few drops of oxidase reagent (Tetramethyl-p-phenylenediaminedihydrochloride). A colony of the test organism was smearedon the soaked filter paper. If the organism produced oxidase, the phenylenediamine in the reagent was oxidized to deep purple color. The change of color within 10 seconds indicated positive result.

Sugar Fermentation Test: The carbohydrate fermentation test was used to determine whether or not bacteria can ferment a specific carbohydrate. Carbohydrate fermentation patterns were useful in differentiating among bacterial groups or species. It tested for the presence of acid and/or gas produced from carbohydrate fermentation. Basal medium containing a single carbohydrate source such as glucose, lactose, sucrose or any other carbohydrate was used for this purpose. A pH indicator bromothymol blue (BTB), was also present in the medium; which detected the lowering of the pH of the medium due to acid production. Small inverted tubes called Durham tube were also immersed in the medium to test for the production of the gas (hydrogen or carbon dioxide). It's a positive test for all members of Enterobacteriaceae.

Catalase Test: This test was used to identify organisms that produced the enzyme catalase. This enzyme detoxified hydrogen peroxide (H_2O_2) by breaking it down into water and oxygen gas. This test demonstrated the presence of catalase, an enzyme characterized with the release of oxygen from hydrogen peroxide. A drop of 3% hydrogen peroxide solution was added to the sterile slide containing a loopful of the organism. Foaming or bubble indicated a positive result.

Indole Test : This test was used to identify microbes that could break down tryptophan to indole. It was used to identify bacteria of the family Enterobacteriaceae. Sterilized tubes containing tryptophan broth (4ml) were inoculated and the tubes were then incubated for 24–28 hrs. After which 0.5 ml of Kovac's reagent (mixture of isoamyl alcohol, para- dimethlaminobenzaldehyde and concentrated hydrochloric acid) was added. Presence/absence of ring indicated positive/negative test.

Citrate Utilization Test : This test was used to differentiate organisms that were capable of utilizing citrate as a carbon source. Simmon's citrate agar medium was prepared in bijou bottle and was allowed to set in a slanting position. A sterile wire loop was used to inoculate the test organism on to the slant medium and it was then incubated at 37˚C for 48 hours after which it was examined for color change. A bright blue color in the medium gave a positive citrate test.

Coagulase Test: Coagulase is an enzyme that clots blood plasma. This test was carried out on Gram positive *Staphylococcusaureus*. A drop of sterile distilled water was placed on each end of a sterile slide. A colony of test organism was then emulsified on each spot to make thick suspensions. A loopful of plasma was added to one of the suspension and mixed gently. The slide was then examined for clumping or clotting of the organism within 10 seconds. Plasma was not added to the second suspension which served as control.

Urease Test: This was used to identify those organisms that are capable of hydrolysing urea (bacteria that produce urease) to produce ammonia and carbon dioxide. It was primarily used to distinguish urease-positive protease from other Enterobacteriaceae. Organisms that hydrolyzed urea rapidly (Proteus., *Morganellamorganii*, and some *Providenciastuartii*s trains) produced strong positive reactions within 1 to 6 hours of incubation; delayed positive organisms (e.g. *Klebsiella spp., and Enterobacter*species) produced weak positive reactions in the slant in 6 hours of incubation which was intense during further incubation. The culture medium remained a yellowish colour if the organism was urease negative e.g.*Escherichiacoli*. If organism produced urease enzyme, the colour of the slant changed from light

orange to magenta. If organism did not produce urease the agar slant and butt remained light orange (medium retained original colour).

Motility Test: This test was used to examine the bacteria species that were motile. Using a sterilized wire loop, the bacteria was taken from the broth culture and a drop of the suspension was put at the centre of the coverslip. 18mm ring of plasticin was made and put on a clean grease-free slide. The coverslip was pressed gently on the slide. With a quick inversion, the slide was inverted so that the coverslip was uppermost. It was then mounted on the stage of a light microscope and examined for motility using 40x objective.

Antimicrobial Susceptibility Testing: Antimicrobial susceptibility test was performed for all isolates according to the criteria of the Clinical and Laboratory Standards Institute (CLSI). Bacterial suspensions were prepared, adjusted to the 0.5 McFarland Standards, and inoculated onto Mueller-Hinton agar (Oxoid) by surface swabbing. Using sterile forceps, the antibiotic-containing discs were placed aseptically on the inoculated plates and left on the table for 1 hour for proper diffusion to occur. The plates were incubated in an inverted position, at 37°C for 16-18 hours and thereafter examined for clear zones of inhibition. Inhibition zone diameters (IZD) around each antibiotic disk (if any), were measured using a transparent ruler, and recorded in millimeters (mm). A standardized table was used to determine if the bacterium was "Resistant", "Intermediate" or "Sensitive".

Quality Control (QC): Quality control was applied in various areas during the study period for the accurate interpretation of results. During the preparation, sterilization, storage and use of media, instructions provided by the manufacturer was strictly followed to avoid alteration of nutritional, selective, inhibitory and biochemical properties of the media. The performance of newly prepared media was tested using the control species of bacteria (i.e., known organisms giving positive and negative reactions). The QC of stains and reagents were maintained by preparing a control smear and staining it with the stains and reagents checked. The following control strains of P. aeruginosa (ATCC 27853), **S.** aureus (ATCC 25923)**,** E. coli (ATCC 25922) recommended by the Clinical and Laboratory Standards Institute (CLSI) were used for the standardization and correct interpretation of zone of inhibition of antibiotics during Antibiotic susceptibility testing.

Method of Data Analysis: The data were presented in tables and were presented as mean and standard deviation and analyzed using descriptive analysis and chi square and the level of confidence was set at 0.05 and 95% confidence interval was used in expressing differences in proportions.

RESULTS

Socio-demographic Characteristics of the Subjects: Table 1 showed the socio-demographic characteristics of the subjects studied. The results obtained showed that one hundred (100) pregnant women were recruited for this study, of which 8 (8%) belonged to age group 20-25 years, 60 (60%) belonged to age group 26-30 years, and 32 (32%) belonged to age group 31-35 years. The marital status of the subjects showed that 1 (1%) were single and 99 (99%) were married. The educational level showed that 5 (5%) of the subjects had primary school certificate, 30 (30%) had secondary school certificate and 65 (65%) had tertiary. Prevalence of Microbial Pathogens among the Subject is as shown in Table 2 below. The urine examinations revealed that, of the 100 pregnant women examined, 72 (72.00%) were positive for bacterial infection, while 28 (28%) were negative. Four different bacteria were isolated namely: *Staphylococcus aureus* 13 (18.06%), *Escherichia coli* 31 (43.06%), *Klebsiella spp. 18* (25%) and *Pseudomonas. aeruginosa* 10 (13.88%). In Table 3, the prevalence of microbial pathogens among the subjects with respect to age showed that bacterial infection was higher in age groups 26–30 years (36.0%), followed by age groups 31–35 years (29.0%) and least in age group 20–25 years (7.0%).

Table 1. Socio-demographic characteristics of the subjects

Variables	Number (n=100)	Percentage (%)
Age(years}		
20 - 25	8	8.00
26 - 30	60	60.00
31 – 35	32	32.00
Marital status		
Married	99	99.00
Single	1	1.00
Education		
Primary	5	5.00
Secondary	30	30.00
Tertiary	65	65.00

Table 2. Prevalence of microbial pathogens among the subjects (pregnant women}

Organism	Frequency	Percentage
Staphylococcus aureus	13	18.06
Escherichia coli	31	43.06
Klebsiella spp	18	25.00
Pseudomonas aeruginosa	10	13.88
Total	72	10

Table 3. Prevalence of microbial pathogens among the subjects with respect to age

Organism	20 - 25 years (n = 8)	26 - 30 years (n = 60)	31 - 35 years (n = 32)	Total
Staphylococcus aureus	2 (2%)	5 (5%)	6 (6%)	13 (13%)
Escherichia coli	4 (4%)	11 (11%)	16 (16%)	31 (31%)
Klebsiella spp	1 (1%)	13 (13%)	4 (4%)	18 (18%)
P.aeruginosa	-	7 (7%)	3 (3%)	10 (10%)
Total	7 (7%)	36 (36%)	29 (29%)	72 (72%)

[X^2= 0.207; P>0.05]

The different bacteria identified among the subjects in 20–25 years were *Escherichia coli* (4%), *Staphylococcus aureus* (2%), and *Klebsiella ssp.* (1%). The bacteria distribution in age group 26–30 years were *Klebsiella spp.* 13 (13%), *Escherichia coli* (11%), *p. aeruginosa* (7%) *Staphylococcus aureus* (5%), and while the bacteria isolated from subjects in age group 31–35 years were *Escherichia coli* (16%), *Staphylococcus aureus* (6%), *Klebsiella pneumonia* (4%) and *P. aeruginosa* (3%) respectively.

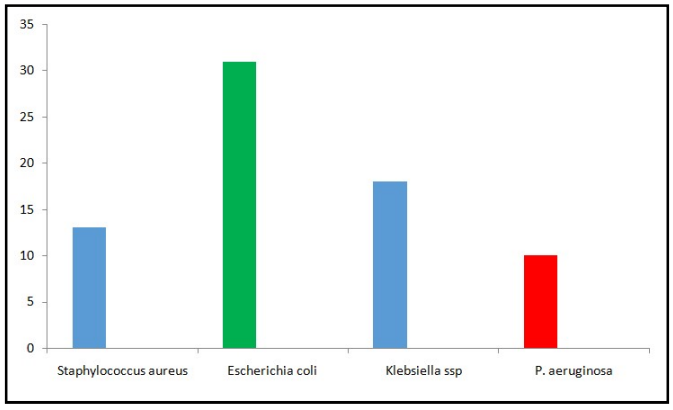

Figure 1. Prevalence of microbial pathogens among the subjects

There was no significant difference (p>0.05) in the prevalence of bacteria isolated from the subjects with respect to age. Table 4 showed the antibiotic resistant patterns of bacteria isolated from urine samples. Out of the 39 *E. coli* isolated from urine, 13(41.9%) and 26(83.9%) were resistant to Ciprofloxacin and Ofloxacin respectively ; 9(69.2%) and 12(92.3%) *Staphylococcus aureus* were resistant to Augmentin and Azithromycin respectively. Also, 9(90.0%) and 4(40%) *P.aeruginosa* were resistant to Ampiclox and Zinnacef respectively. *Klebsiellaspp.* exhibited 1(5.6%), 8(44.4%), 1(5.6%), 6(33.3%) and 3(16.7%) resistance to Ampiclox, Augmentin, Ciprofloxacin, Cefuroxime and Azithromycin respectively.

Table 4. Antibiotics Resistance Patterns of Bacteria Isolated from Urine Samples

Isolates	AM (%)	AUG (%)	IMP (%)	CIP (%)	CN (%)	CEF (%)	OFX (%)	AZM (%)	CFT (%)	ZN (%)
E. coli (n= 31)	0 (0)	0 (0)	0 (0)	13 (41.9)	0 (0)	0 (0)	26 (83.9)	0 (0)	0 (0)	0 (0)
S. aureus (n=13)	0 (0)	9 (69.2)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	12 (92.3)	0 (0)	0 (0)
P. aeruginosa (n=10)	9 (90.0)	4 (40)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	7 (70)
Klebsiella spp. (n=18)	1 (5.6)	8 (44.4)	0 (0)	1 (5.6)	0 (0)	6 (33.3)	0 (0)	3 (16.7)	0 (0)	0 (0)

KEY: AM (Ampiclox), CIP (Ciprofloxacin), AUG (Augmentin), CN (Gentamycin), CEF(Cefuroxime), IMP (Imipenem), OFX (ofloxacin), CFT (Ceftriazone), AZM (Azithromycin), ZN (Zinnacef).

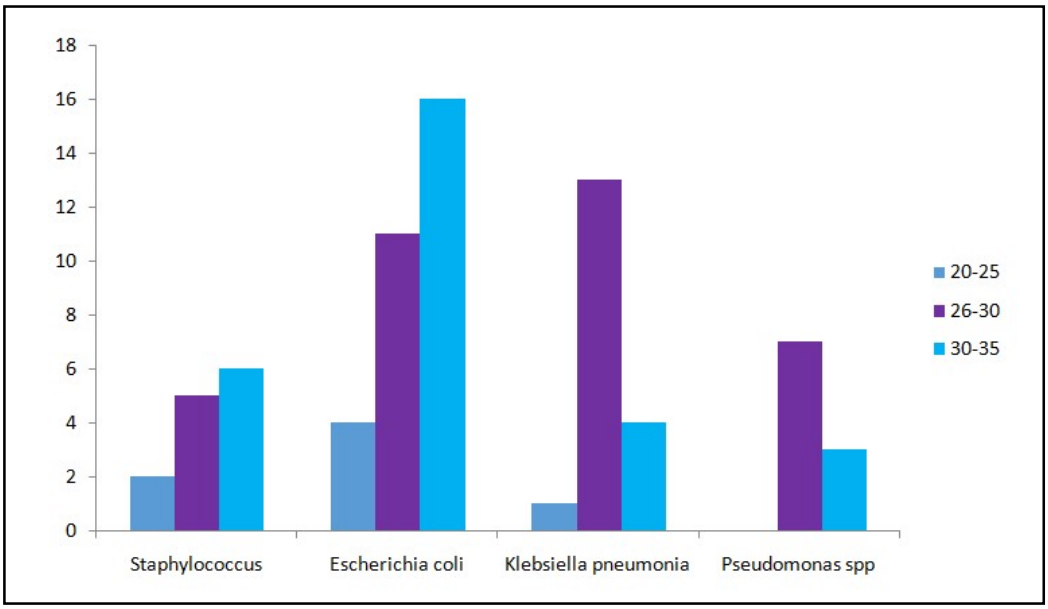

Figure 2. Distribution of microbial pathogens among the subjects with respect to age

DISCUSSION

Urinary Tract Infection (UTI) is a health problem that affects the human race especially women during pregnancy, and it is one of the leading causes of miscarriages, premature births, and the underdevelopment of infants. The early treatment of infection reduces the probability of complications that may arise which may be very dangerous to mother and the fetus (Hannan *et al.,* 2015). This study was aimed to isolate and compare the profile of bacteria species present in the urine of pregnant women attending ante-natal clinic in Federal Medical Centre, Owo, Ondo State. In this study a total of 72 (72%) out of the 100 pregnant women had UTI. The prevalence of this infection in this study was high and this agrees with the report of Chevins (2021). This prevalence is higher than the 49% obtained by Orrett (2021). In our study, we had 1% of single (unmarried) pregnant woman, and 99% of married pregnant women. These results were similar to the study of Imade *et al.,* (2016).In their study of urinary tract infection among women aged (18-40) years old in Kirkuk City, Iraq,Neupane *et al.,* (2015), Rohini *et al.,* (2017), Sujatha *et al.,* (2014) and Rajaratnam *et al.,* (2014) observed that age range of 26-30 years had the highest prevalence of UTI (36%) and age range (20-25) had the least prevalence of UTI (7%). This is in agreement with the findings of Orrett (2021). At this age range (26-30), women/girls tend to live active sexual life and promiscuity is sometimes on the increase. However the prevalence of UTI did not differ significantly within age groups in this study. The results of the present study showed that *Escherichia coli* (43.06%) was the most prominent in the cause of infection among pregnant women, followed by *Klebsiella spp.* (25%), S*taphylococcus aureus*, (18.06%), and *P. aeruginosa* (13.88%). This contrasted the report of Imade *et al*; (2023) where *Pseudomonas aeruginosa* was the most predominant followed by S*taphylococcus aureus*, *Staphylococcus saprophiticus* and *Escherichia coli*. The result, however agreed with Chevins (2021).The emergence of this high percentage of bacteria may be due to the weakness of defence mechanisms in pregnant women during pregnancy that creates a good opportunity for urinary tract infection.

The antibiotics resistance patterns of bacteria isolated from urine samples showed that Ofloxacin and Augmentin have the highest resistance to all bacteria isolated in this study while Cefuroxime, Gentamycin, and Imipenem showed the least resistance to all the bacteria isolated. Antibiotic resistance remains a major problem among the populace around this part of the world and the overuse of antibiotics is a predisposing factor toward bacteria resistance to antibiotics. (Sujathal *et al*., 2014). This is because access to antibiotics usage is not controlled in this study population resulting to abuse.

CONCLUSION

Conclusively, an overall prevalence of 72% of UTI was observed in this study and observation from this study have shown that urinary tract infection was prevalent in sexually active women (26-30). *Escherichia coli* was the predominant isolate causing UTI. Although the Cefuroxime, Gentamycin, and Imipenem were the most active antibacterial agents against the isolates while resistance to Ofloxacine, Azithromycin, Augmentin, Zinnacef and Ciprofloxacin was high.

Recommendation: It is hereby recommended that pregnant women should be educated on the importance of personal hygiene in order to help them improve their health status and manage themselves properly to avoid health risks and complications that can affect them and the growing foetus. Indiscriminate use of antibiotics in the populace should be discouraged as a result of its attendant risks such as increase of the development of resistant strains of bacteria, the consequence of which is disastrous.

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Conflict of interest: None.

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APPENDIX

APPENDIX I: QUESTIONNAIRE

Good day Ma,

I am a researcher working on **IDENTIFICATION AND ANTIMICROBIAL RESISTANCEPATTERN OF BACTERIAL ISOLATES FROM URINE OF PREGNANT WOMEN ATTENDING ANTE-NATAL CLINIC IN FEDERAL MEDICAL CENTRE, OWO, ONDO STATE, NIGERIA.**

Please kindly avail me a few minutes of your time to peruse and provide information required in this questionnaire.

Please respond honestly to the question below. The confidentiality of your response to this questionnaire is guaranteed as information provided is for research purpose only.

Thank you.

DATE ……. ……

Please kindly tick as appropriate.

SECTION A: DEMOGRAPHY OF THE RESPONDENT

a) Age range(years) 20-24( ) 25-29( ) 30-34( ) 35-39( )
b) Religion: Christianity( ) Muslim( ) Others( )
c) Ethnicity: Yoruba( ) Igbo( ) Hausa( ) Others( )
d) Level of education: Primary( ) Secondary( ) Tertiary( )
e) Occupation: Student( ) Civil servant( ) Self employed( ) Others( )
f) Social class: Poor( ) Middle( ) High( )

SECTION B: MEDICAL INFORMATION

a) Do you have any knowledge of existence of micro organisms Yes( ) No( )
b) Do you believe that micro organisms can be present in urine Yes( ) No( )
c) Are you aware of Urinary Tract Infections Yes( ) No( )
d) Are you aware that micro organisms can cause UTIs Yes( ) No( )
e) Have you been diagnosed of UTI before Yes( ) No( )
f) Are you on any medication Yes( ) No( )
If yes, specify……
g) Do you have any other sicknesses Yes( ) No( )
If yes, specify……

SECTION C: PERSONAL HYGIENE

a) Do you have any knowledge of personal hygiene Yes( ) No( )
b) Are you aware that personal hygiene prevents infection Yes ( ) No( )
c) How often do you carry out personal hygiene Always( ) Often( ) Rarely ( ) Never ( )
d) Are you living in an healthy environment Yes( ) No( )
e) How hygienic is the water you use High( ) Average( ) Low( )
f) How often do you clean your toilets Always( ) Often( ) Rarely( ) Never( )
g) How often have you had sexual intercourse during pregnancy Often( ) Rarely( ) Never( )
h) Do you clean up after sexual intercourse Yes( ) No( )

SECTION D: ANTIBIOTICS

a) Do you have any knowledge of antibiotics Yes( ) No( )
b) Have you been prescribed antibiotics before Yes( ) No( )
c) Have you ever self prescribed antibiotics Yes( ) No( )
d) How often do you self prescribe Often( ) Rarely( ) Never( )
e) Are you aware that overuse of antibiotics is bad for the body Yes( ) No( )

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