



## BACTERIURIA AMONG PREGNANT WOMEN ATTENDING DUTSE GENERAL HOSPITAL, JIGAWA STATE-NIGERIA

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### *Abstract*

**B**acteriuria, is a major cause of urinary tract infection (UTI) which is of major public health importance. In many countries it is second most common type of infection in the body with series of consequences especially in pregnant women ranging from increased mortality and morbidity, hospitalization time, loss of productivity and low birth weight. This study aimed to isolate and identify the bacterial agents of urinary tract infections and determine the susceptibility pattern of the bacterial isolates to standard antibiotics among pregnant women attending Dutse General Hospital. A total of one hundred and sixteen samples were collected out of which 29 (25%) shows significant growth, five species of bacteria were identified based on cultural, morphological and biochemical characteristics with *E. coli* being the significantly most prevalent  $P < 0.005$  species (41.4%) followed by *K. pneumonia* (31.0%), *S. aureus* (17.2%), *P. aeruginosa* (6.9%) and *P. mirabilis* (3.4%). The result of antibiotic susceptibility test shows that Netiline is the most effective antibiotic against all the test isolates followed by Levofloxacin; most of the test isolates were sensitive to the test antibiotics with exception of *P. mirabilis* which shows resistance to most of them. Good personal hygiene, drinking plenty of fluid as well as regular and proper emptying of bladder during urination can help avert urinary tract infection.

**Key words:** Antibiotic, Dutse, Urinary tract infection, Pregnant women, Sensitivity,



## INTRODUCTION

Bacteriuria may be an indication of infection of any part of the urinary system (Lentz, 2000), it is the second most common type of infection in the body and account for about 8.1 million visit to the health care providers each year (Nicole, 2008). Pregnant women are more likely to develop urinary tract infection (UTI) than other women but if it does occur then it is more likely to travel up to the kidneys causing pyelonephritis and can also increase the risk of women delivering low birth weight or premature infants (Colgan, 2011). The urinary tracts consist of various organs of the body involved in the production, storage and excretion of urine they consists of the kidneys, ureters, bladder, and urethra. Often, (UTIs) are characterized as being either upper or lower, based primarily on the anatomic location of the infection; the lower urinary tract encompasses the bladder and urethra, and the upper urinary tract encompasses the ureters and kidneys. Urinary tract infection can also be categorized as ascending or descending, Infections which are confined to the urethra or bladder are ascending and referred to as urethritis or cystitis respectively. On the other hand, pathogens can spread from another infected body site to the kidneys down along the urethra to the bladder, such descending urinary tract infection cause severe kidney infection, a condition known as pyelonephritis (Parsons, 1985).

The anatomy of the female urethra is of particular importance to the pathogenesis of UTIs. The female urethra is relatively short compared with the male urethra and also lies in close proximity to the warm, moist, perirectal region which is teeming with microorganisms; Because of the shorter urethra, bacteria can reach the bladder more easily in the female host. The invading microbes may affect the entire tract or may be localized to the upper region or the kidneys (pyelonephritis) or lower region where they may invade the bladder (cystitis), prostate (prostitis) and urethra (urethritis) or restricted to the urine only. The infections may be asymptomatic, acute, chronic or recurrent and complicated or uncomplicated (Dorth, *et al.*, 1994). For this reason, there is need to carry out a research to ascertain the incidence or prevalence of the infection and the sensitivity pattern of the isolates to a range of available antibiotics within Dutse community. This study was therefore carried out to isolate, identify and determine the prevalence of the bacterial agents responsible for UTIs and their susceptibility pattern to some standard antibiotics among pregnant women attending Dutse General Hospital.

## MATERIALS AND METHODS

### **Study area**

The study was carried out at Dutse General Hospital located in Jigawa state-Nigeria which falls within latitude of 11.7594<sup>0</sup>N and 9.3392<sup>0</sup>E, with an estimated population of about 17697 people as at 2006 population census (NPC, 2006).

### **Study population**

A total of 116 pregnant women aged 16-50 years attending the antenatal clinic at Dutse General Hospital, Jigawa state where enrolled. Written/Verbal informed consent was obtained from all women before specimen collection. Ethical approval for the study was obtained Jigawa state Ministry of Health as well as the General Hospital ethical committee.



### Sample collection

A clean-catch mid-stream urine samples were collected in sterile universal containers. The containers were labeled appropriately and then transferred immediately to the Microbiology Laboratory of Federal University Dutse for analysis while those that could not be processed on that day were stored in refrigerator at 4°C before being processed.

### Sample Processing

Each sample was mixed thoroughly and inoculated onto cystein lactose electrolyte deficient medium (CLED Agar), a primary streak was made while secondary and tertiary streaks were made from the primary streak in parallel pattern with the aid of a sterilized wire loop to make a four-way streak plate-technique. All the plates were incubated for 24 hours at 37°C. After the overnight incubation, the plates were removed from the incubator and presumptively observed for colony characteristics. Isolated colonies were then sub-cultured onto fresh nutrient agar (oxid), Eosin-methylene blue (oxid) and *Salmonella-Shigella* (oxid) agar plates for proper preliminary identification (Cheesebrough, 2000). Single isolated colonies from these plates were subjected to Gram's staining and standard biochemical tests (Catalase, Coagulase, IMViC-Iindole, Methyl red, Voges-proskauer and Citrate utilization tests).

### Antibiotic Susceptibility test

Antibiotic susceptibility test was carried out using Modified Kirby-Bauer disc diffusion method according to the Clinical and Laboratory Standards Institute 2014 guidelines (CLSI, 2014). The isolates were subjected to sensitivity testing using the following antibiotics, Tetracyclin, Amoxicillin-clavulanic acid, Ofloxacin, Ceptriazone, Gentamicin, Netiline, Levofloxacin and Cotrimoxazole. Statistical tool used was Chi-square, a p value of <0.05 was considered statistically significant.

## RESULTS

After incubation period, twenty nine (29) out of the total samples collected shows significant growth, while the remaining eighty seven (87) samples shows no bacterial growth. *Escherichia coli* had a significant ( $P < 0.05$ ) frequency of occurrence with 41.4%, followed by *Klebsiella pneumoneae* with 31.0%, *Staphylococcus aureus*, *Pseudomonas aeurugenosa* and *Proteus mirabilis* with 17.2%, 6.9% and 3.4% respectively. *E. coli* and *P. mirabis* occurred most within age group of 26-30 year with no significant difference  $P > 0.05$  while the rest of the isolates occurred most among different age groups. These are shown in Table 1.

The result of the antibiotic susceptibility test shows that Netiline is the most effective antibiotic against most of the test isolates as they show great sensitivity to that antibiotic, this is followed by Ceptriazone, Levofloxacin, Ofloxacin, Amoxycillin-Clavulanic acid, Tetracyclin, Gentamycin and Cotrimoxazole However, *P. mirabilis* was found to resist most of the antibiotics as shown in Table 2.



**Table 1: Frequency of occurrence of bacterial isolates from the urine sample**

Age group	No. of isolates & their frequency of occurrence (%)				
	<i>E. coli</i>	<i>K. pneumoniae</i>	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>
16-5	2 (6.9)	1(3.4)	2(6.9)	1(3.4)	-
21-25	4 (13.8)	4 (13.8)	1(3.4)	1(3.4)	-
26-30	5(17.2)	2 (6.9)	1(3.4)	-	1(3.4)
31-35	0 (0.0)	1(3.4)	1(3.4)	-	-
36-40	1(3.4)	1(3.4)	-	-	-
41-45	-	-	-	-	-
46-50	-	-	-	-	-
<b>TOTAL</b>	<b>12 (41.4%)</b>	<b>9(31.0%)</b>	<b>5(17.2%)</b>	<b>2(6.9%)</b>	<b>1(3.4%)</b>

**Table 2: Sensitivity pattern of the test isolates to some antibiotics and their mean zone diameter of inhibition (mm)**

Antibiotics	Isolates/Zone diameter of inhibition (mm)				
	<i>E. coli</i>	<i>K. pneumoniae</i>	<i>S. aureus</i>	<i>P. aeruginosa</i>	<i>P. mirabilis</i>
NET	19	18	18	22	20
LEV	13	14	13	7	20
CTR	12	11	19	20	6
OFL	12	9	9	16	19
AMC	10	9	16	22	3
COT	10	8	10	14	4
TET	5	6	17	23	7
GEN	13	12	12	6	6

**Result Interpretation**

<9mm= Resistance  
 9-15mm= Sensitive  
 16-18mm= Moderately sensitive  
 19-above= Highly sensitive

**Key:**

NET= Netiline, GEN= Gentamicin  
 LEV= Levofloxacin, COT= Cotrimoxazole  
 CTR= Ceptriazone, TET= Tetracyclin  
 OFL= Ofloxacin AMC=Amoxycillin- clavulanic acid



## DISCUSSION

From the findings of this research, *Escherichia coli* was significantly  $P < 0.05$  the most frequent etiologic agent of urinary tract infection among pregnant women attending Dutse General Hospital, Jigawa state with 41.4% occurrence and was more prevalent within the age groups 26-30 years. *E. coli* is a commensal of the bowel and such infection in women is mostly by faecal contamination from the anus to the urogenital tract which houses the entrance of female urinary tract due to their close proximity. Sex may be a risk factor responsible for this result, as ages 26-30 represents the sexually active age group. This result is also in agreement with the study reported by Orret *et al.*, (2006) that showed *E. coli* as the most prevalent etiologic agent of UTI. It also confirmed the work of Drew *et al.*, (2010) which reiterated the fact that *E. coli* remains the most common etiologic agent of urogenital pathogens in North America and other parts of the world including Africa.

*K. pneumoniae* was the second most prevalent from this work and the result goes contrary to the work of Dorth *et al.*, (1994) and Osazuwa *et al.*, 2010 who showed a high prevalence of *Klebsiella sp* at Benin city teaching hospital. *Klebsiella* can be found in soil and water, and it is also a normal flora of the intestinal tract, it is also known to cause bacteriuria and pneumonia, especially in patients who already have underlying health problems. The prevalence *Klebsiella* may be base on geographical locations which may also be transient as were first reported by Okubadejo *et al.*, (1969) and later by Ehinmidu (2003) and Azubike *et al.*, (1994) although this will require further investigation. This results also implied that treatment of UTI should be guided by laboratory testing, as treatment based on etiologic agent may result in ineffective treatment and low susceptibility/ resistance (Akinloye *et al.*, 2014).

Base on the antibiotic susceptibility test result, it is clear that Netiline is the most effective antibiotic and thus may be recommended for the treatment of UTI pathogens, although most of the test isolates were sensitive to the antibiotics under investigation, *Proteus mirabilis* was however resistant to most of them and even some other isolates showed lesser sensitivity to gentamicin and cotrimoxazole which could be attributed to extensive use of the broad-spectrum antibiotics in patients results in increased resistance of the bacteria (Kaye, 2000).

## CONCLUSION

According to the results obtained, it can be concluded that *E. coli* is the most etiologic agent of UTI among pregnant women attending Dutse General Hospital, Jigawa state occurring more prevalently in the age range of 26-30 years, which can be effectively treated with Netiline as it is highly sensitive to it but Levofloxacin can also be a drug of choice or as alternative to Netiline.

## RECOMMENDATIONS

Although this research agrees with the findings of different researchers, the discordance may be as a result of climatic changes but further studies are needed to know if this prevalence is transient and or restricted to certain geographical locations. To avert the problem of bacteriauria which may result in UTI, it is recommended that good personal hygiene be practiced by the pregnant women, drinking plenty of fluid as well as proper and regular emptying of bladder while urinating.



#### AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between all authors. Author MRH designed the study. Author AFY carried out the data collection. Author BSF did the statistical analysis. Authors MRH BSF and AFY managed the literature searches. Authors MRH and BSF wrote the first draft of the paper. All authors read and approved the final manuscript.

#### COMPETING INTERESTS

Authors have declared that no competing interests exist.

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