ANALYSIS OF BACTERIAL URINARY TRACT INFECTION AMONG PREGNANT WOMEN IN TERTIARY HOSPITAL KATSINA

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ABSTRACT
Urinary Tract Infection (UTI) is an infection caused by the presence and replication of microorganisms in the urinary tract. The aim of this study is to evaluate the distribution of UTI pathogens associated with pregnant women attending Federal Medical Center, Katsina. The research was a prospective study conducted among 126 antenatal attendees. Urine microscopy and culture technique were conducted for each participant. Statistical analysis of data was done using Graph Pad Prism Statistical software. Twenty-five out of the participants had asymptomatic bacteriuria giving a prevalence of 19.8%. However age (P=0.66), educational status (P=0.19) and settlement (P=0.91) are not statistically significant. While tribe and gestational age (trimester) are found to be statistically significant (P = 0.02). Staphylococcus aureus is found to be the most prevalent organism (40%), followed by coagulase negative Staphylococcus (32%) and the least is Eschericia coli (4%). However, comparison between Hausa and Yoruba had shown that Hausa tribe has more chance of infected with Asymptomic bacteriuria during pregnancy and high risk than Yoruba tribe! Therefore, UTI has the potentiality to pose serious life threatening consequences when left untreated. This is more likely to be the case where access to or availability of timely and appropriate medical intervention due to inadequate numbers of health care providers.It is therefore, recommended that pregnant women should be subjected for urine laboratory screening for the detection of UTI during the first trimester and treatment follows immediately for the positive results.
Key Word: Bacteriuria, Infection, Pregnancy, and Urine culture.

INTRODUCTION

Urinary tract infections (UTIs) refer to both microbial colonization of the urine and tissue invasion of any structure of the urinary tract (Aminu and Aliyu, 2015). Bacteria are most commonly responsible although yeast and viruses may also be involved (Turay *et al.,* 2014).

Females are believed to be more affected than males except at the extremes of life, this is because bacteria can reach the bladder more easily in women, partially due to the short and wider female urethra, and its proximity to the anus (Oleghe *et al.*, 2014).

Available scientific information indicates that bacteria easily travel up to the urethra from the rectum and thereby causing infection, of interest, is the fact that urinary tract infections in pregnancy increases during the gestational period, beginning from the sixth week of the first trimester and peaking in the 22nd to 24th week of the second trimester (Turay *et al.*, 2014). At this period, approximately 90% of pregnant women develop ureteral dilatation which remains until delivery, leading to increase in bladder volume and decreased bladder and ureteral tones, causing increase in urinary stasis and ureterovesical reflux (Joanna *et al.*, 2015).

Urinary tract infections (UTIs) represent the most common bacterial infection in pregnant and non-pregnant women (Oleghe *et al.*, 2014). Urinary tract infections can be grouped into two; complicated and uncomplicated urinary tract infections (Marcelo *et al.*, 2014) and have been sub-grouped into acute uncomplicated cystitis, acute uncomplicated pyelonephritis, complicated cystitis and complicated pyelonephritis (Ramesh and Aggarwal, 2012). Urinary tract infections can be asymptomatic or symptomatic (Aminu and Aliyu, 2015). Urinary tract infections have been classified into 3;asymptomatic bacteriuria, cystistis and pyelonephritis (Joanna *et al.*, 2015).

The pathogenesis of urinary tract infection involves ascending infection with coliform bacteria colonizing the perineum in susceptible women. Bacteria associated with urinary tract infection include *Eschericia coli, Staphylococcus saprophyticus , Proteus* and other Gram negative rods (Lawani *et al.*, 2015).

Common symptoms associated with urinary tract infection include dysuria (painful urination) urgency (the enhanced desire to void the bladder and increased frequency of urination) (Mordi *et al.,* 2015). Urinary tract infections have not been thought to cause significant mortality, however if left untreated or undertreated urinary tract infection have the potential for serious and life threatening sequel (Lawani *et al.,* 2015). Possible sequela include pyelonephritis which can lead to renal scarring and sepsis (Minassian *et al.,* 2013). Pregnancy predisposes women to developing a urinary tract infection however a broader risk factor analysis is important in assessing any additional therapeutic measure that might be required such as drainage in case of renal obstruction or abscess (Grabe *et al.,* 2014).

Screening of pregnant women for urinary tract infections can minimize these urinary tract infections associated complications (Botto *et al.,* 2008). Symptomatic urinary tract infections occurs in 1% to 2% of pregnancies, while asymptomatic bacteriuria has been reported in 2% to 13% of pregnant women (Grabe *et al.,* 2008).

The factors that predispose a woman to urinary tract infections in pregnancy appear to be related to the anatomical and physiological changes in the kidney and urinary tract that occur during pregnancy (Chairman *et al.,* 2008).

Bacteriuria during pregnancy is associated with a significant increase in the number of low-birth-weight infants (< 2500 g), low gestational age (< 37 weeks), and neonatal mortality (Chairman *et al.,* 2008).

Treatment of the bacteriuria lowers this risk, it is therefore generally recommended that pregnant women should be screened for bacteriuria by urine culture at least once in early pregnancy, and they should be treated if results are positive (Botto *et al.,* 2008).

MATERIALS AND METHODS
Study Area
This study was carried out at Federal Medical Centre Katsina. It is located along Murtala Muhammad Way Jibia bypass Katsina, Katsina state.

Study Population
A study of pregnant women attending Federal Medical Centre Katsina was conducted from 19th September – 4th November 2017 with a total sample of 126.

Ethical Approval
Ethical approval was obtained from the research ethical committee of Federal Medical Centre Katsina (FMCNHREC. REG.N003/082012), also individual consent from each pregnant woman was assured of anonymity and confidentiality

Sample Collection
A total of 126 urine samples were collected in sterile universal bottles and transferred to microbiology laboratory of Federal Medical Centre Katsina. The patients were given a sterile, dry, wide-necked leak proof container and requested to provide early morning clean catch mid-stream urine. The urine sample was then immediately transferred to the laboratory for analysis. Questionnaires were used in order to obtain some demographic data's related to the patients

Sample Analysis
A method of Cheesbrough (2009) was adopted in carrying out the analysis of the urine sample. Urine specimens were collected and examined macroscopically for the appearance and microscopically for the presence of pus cells, casts as well as epithelial cells which signifies a urinary tract infection. Urine specimens were then inoculated on Blood Agar, Mac-Conkey Agar and Cystein Lactose Electrolyte Deficient (CLED) Agar and Manitol Salt Agar and incubated at 37°C for 24 hours under aerobic condition. After 24 hours of incubation, the culture plates were examined macroscopically and their appearance, size, color and morphology of the colonies and bacterial isolates were examined using standard biological procedures including Gram staining and biochemical tests.

Data Analysis
The data obtained were analyzed at 95% confidence interval using Graph Pad Prism statistical software version 5.02. A P-value of less or equal to 0.05 was considered statistically significant.

RESULTS
Table 1
Profile of Bacteria isolated from cases of significant bacteriuria *Staphylococcus aureus* has the highest percentage of occurrence.

Type of micro-organisms	Number	(%)
Staphylococcus aureus	10	40
Staphylococcus saprophyticus	8	32
Klebsiella species	4	16
Escherichia coli	1	4
Streptococcus species	2	8
Total	**25**	**100**

Table 2 shows the occurrence of asymptomatic bacteriuria in relation to age group. Age group 26-30 have the highest percentage of occurrence (7.94%) followed by age group 21-25 which had (5.56%) and the least was age group 36-40 which had (0.79%). Also when subjected to relative risk and odd ration analysis, they were found to be greater than 1.

Table 2: Occurrence of Asymptomatic Bacteriuria in relation to age group of pregnant women

Age-range	Total number examined	Number of positive result	(%)	Number of negative result	(%)
15-20	10	2	1.59	8	6.35
21-25	39	7	5.56	32	25.40
26-30	36	10	7.94	26	20.60
31-35	31	5	3.99	26	20.60
36-40	10	1	0.79	9	7.14
Total	**126**	**25**	**19.87**	**101**	**80.09**

Table 3 shows the occurrence of asymptomatic bacteriuria in relation to educational status. Those with secondary level of education had the highest percentage of occurrence (11.90%) and the least was those with primary level of education which had (1.59%). Also when subjected to relative risk and odd ration analysis, they were found to be greater than 1.

Table 3: Occurrence of Asymptomatic Bacteriuria in relation to educational status

Educational Status	Number examined	Number of positive result	(%)	Number of negative result	(%)
Primary	4	2	1.59	2	1.59
Secondary	64	15	11.90	49	38.89
Tertiary	53	8	6.35	45	35.71
None	5	0	0	5	3.97
Total	**126**	**25**	**19.84**	**101**	**80.16**

Table 4 shows the occurrence of asymptomatic bacteriuria in relation to settlement. The urban settlers have the highest percentage of occurrence (18.25%) and the least was semi- urban settlers which had (1.59%). Also when subjected to relative risk and odd ration analysis, they were found to be less than 1.

Table 4: Occurrence of Asymptomatic Bacteriuria in relation to settlement

Settlement	Number examined	Number of positive result	(%)	Number of negative result	(%)
Urban	119	23	18.25	96	76.19
Semi-urban	7	2	1.59	5	3.97
Rural	0	0	0	0	0
Total	**126**	**25**	**19. 84**	**101**	**80.16**

Table 5 shows the occurrence of asymptomatic bacteriuria in relation to tribe. Hausa tribe had the highest percentage of occurrence (14.29%) followed by Igbo tribe which had (3.17%) and the least was Yoruba tribe which had (0.79%). Also when subjected to relative risk and odd ration analysis, they were found to be less than 1.

Table 5: Occurrence of Asymptomatic Bacteriuria in relation to tribe of subjects

Tribe	Number examined	Number of positive result	(%)	Number of negative result	(%)
Hausa	90	18	14.29	72	57.14
Igbo	6	4	3.17	2	1.59
Yoruba	10	1	0.79	9	7.14
Others	20	2	1.59	18	14.29
Total	**126**	**25**	**19.84**	**101**	**80.16**

RR = 1 indicates equal rate of infection between the two groups
RR > 1indicates increased risk of infection for group in numerator
RR < 1indicates decreased risk of infection for group in numerator

DISCUSSION

The bacteria isolated from urine cultures were *Staphylococcus aureus*(40%), coagulase negative *Staphylococcus* (32%), *Klebsiella spp*(16%), *Streptococcus spp* (8%) and *Escherichia coli* (4%). *Staphylococcus aureus was the most common uropathogen isolated in this study* (40%) which agreed with the earlier studies conducted at Benin city (Akerele *et al.,*2001), Illorin (Ajayi *et al.*, 2012) and Ebonyi (Amadi *et al.,* 2007). More so *Escherichia coli* was found to be the least prevalent in our study with (4%) which is similar to a study conducted in Kano that indicated low prevalent of *Escherichia coli* among asymptomatic bacteriuria (Aminu and Aliyu, 2015). However it is contrary to the recent study conducted at Kenya (Adelaide *et al.*, 2017) and other previous study conducted at South Eastern part of Nigeria (Ibezim *et al.*, 2010) which showed *Eschericia coli* as their most prevalent organism.

The age group 26-30 had the highest prevalence of 7.94%, followed by 21-25 at 5.56%, 31-35 at 3.99%15-20 at 1.59% and 36-40 at 0.79% (Table 2). Age group 26-30 was more likely to develop asymptomatic bacteriuria than the other age groups due to increased risk of infection as shown by relative risk and odd ratio analysis.

Those with secondary level of education had the highest percentage of occurrence 11.90% followed by tertiary at 6.35%, primary 1.59% and none was recorded in those that didn't attend school (Table 3).The level of education acquired by the samples studied has great effect on the prevalence of Asymptomatic bacteriuria. Those with primary level of education have increased risk of infection than those with higher level of education as shown by odd ratio and relative risk analysis.

Those in the Urban had the highest prevalence of 18.25% followed by semi- urban at 1.59% none came from the rural region (Table 4). Although there was a low level of odd ratio and relative risk in both regions, there is also decreased rate of infection in urban areas due to the low level of relative risk. This may be because of the availability of healthy environment in the urban areas for prevention, as well as proximity to health centers, clinics and hospitals compared with the semi urban or rural areas.

Hausa tribe had the highest prevalence 14.29%, followed by Igbo 3.17%, others 1.59% and Yoruba 0.79% (Table 4.5). Low levels of Odd Ratio and Relative Risk in comparison between Hausa and Igbo has indicated that both the two tribes have equal chance of getting infected with Asymptomatic bacteriuria with risks of getting infected decreased in Hausa tribe. However, comparison between Hausa and Yoruba had shown that Hausa tribe has more chance of infected with Asymptomic bacteriuria and high risk than Yoruba tribe.

CONCLUSION

The prevalence of asymptomatic bacteriuria among pregnant women attending Federal Medical Center Katsina was high (19.8%) and *Staphylococcus aureus* was found to be the most prevalent organism.

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