Volume-3, Issue-11, November-2019: 31-39 P-ISSN: 2659-1561
International Journal of Recent Innovations in Academic Research E-ISSN: 2635-3040

Research Article

Catheters Associated With Urinary Tract Infections and Its Effects on Obstetric Patients in Eve Specialist Women Hospital Okigwe, Imo State Nigeria

Chikezie, J.A[1]., Ogwuegbu, H.O[2]., Ike, C.C[3]., Smith-Akor, D.M[4]. and Nwaugo, V.C[2].

[1]Department of Public Health, Faculty of Clinical Medicine & Health Sciences, Abia State University Uturu, Nigeria.
[2]Department of Microbiology, Abia State University, Uturu, Nigeria.
[3]Department of Biological Sciences (Microbiology Programme), College of Basic and Applied Sciences, Rhema University Nigeria, P.M.B. 7021 Aba, Abia State, Nigeria.
[4]Department of Microbiology, Federal Polytechnic Ukana, Akwa Ibom, Nigeria.
*Corresponding Author Email: askforhappyn@yahoo.com

Received: Nov 7, 2019 **Accepted:** Nov 14, 2019 **Published:** Nov 18, 2019

Abstract: Catheters Associated Urinary Tract Infections and its effects on Obstetric patients were carried out in Eve Specialist Women Hospital Okigwe, Imo State. Urine specimens were collected aseptically using standard microbiological laboratory techniques. The patients were examined for, urine analysis, urine culture and antibiotic susceptibility test. Out of 50 catheterized patients, 28(56.0%) patients were found with significant bacteriuria with *Escherichia coli* 8(28.6%) as the most common isolates followed by *Staphylococcus aureus* 5(17.0%), *Klebsiella pneumonia* 4(14.3%), *Pseudomonas aeruginosa* 4(14.3%), *Streptococcus faecalis* 4(14.3%) and *Proteus mirabilis* 3(10.7). The highest rate of 25.0% was found in the age group of 30-34 years while the lowest rate of 10.7% occurred in the age brackets of 15-19 and 40-44 years respectively. The indication of inserting indwelling urinary catheters shown that caesarian section patients In Eve Specialist Women Hospital Okigwe had the highest isolates of 12(42.8%), followed by pro-longed labor patients of 8(28.9%), Ectopic pregnancy 3(10.7%), Severe Preeclampsia 2(7.1%) and Anterpatum hemorrhage 3(10.7%). The longer usage of indwelling catheter the more venerable the patient becomes, especially from 8-10 days. In Antibiotic susceptibility test, it was shown that the most susceptible antibiotics for Gram negative isolates were Streptomycin (86.9%), followed by Ceftriazone (68.4%), Augumentine (57.9%), Gentamycin (57.9%), Taravid (57.9%), Pefloxacin (52.6%), Ceporax (52.6%) Ciprofloxacin (36.8%), Ampicilin (21.1%) and Septrin were the least susceptible antibiotics of (15.8%). The single most important risk factors for nosocomal bacteriuria and UTI are the presence of an indwelling urethral catheters. Therefore, decreasing the duration of catheterization, using clean intermittent catheterization, inserting catheters aseptically, and maintaining gravity drainage of urine are all useful in preventing indwelling catheter infections.
Keywords: Catheterization, Obstetric, Nosocomal.

Introduction

Urinary tract infections (UTIs) are a common problems in women at all stages of life. Pregnant women are more susceptible to UTI due to a number of factors including ureteral dilatation, increased bladder volume and decreased bladder tone, along with decreased ureteral tone which contributes to increased urinary stasis and ureterovesical reflux. Development of glycosuria seen in 70% of pregnant women encourages bacterial growth in

their urine [17]. Bacteriuria increases with age in both men and women but has a higher prevalence among the very young and very old. The prevalence of UTI is significantly higher for women than men [13] until men attain the age of 60. Women aged 15-29 have the highest distributions of symptomatic infection [7]. Microbial colonization of the urinary epithelial cells as well as tissue invasion and multiplication of uropathogens is termed as urinary tract infection (UTI). Usually bacteria are more prevalent and invasive. Different components of the microbial biofilms contribute to the character of antimicrobial resistance and the formation of biofilms on the indwelling catheters among patients has demonstrated the extent of competence and resistance against the antimicrobial agent [21]. Despite the fact, that the prevalence of bacteriuria among pregnant and non-pregnant is similar the occurrence of acute phylonephritis is higher among the pregnant women [20].

Up to 25% of hospitalized patients have urinary catheters inserted, out of which 10-27% develop UTIs. UTI accounts for approximately 40% of all nosocomial infections. The nosocomial urinary tract infections accounts to about 40% of the hospital acquired infections and are associated with elevated morbidity and mortality rates. Long term hospitalized patients with indwelling urinary catheters and patients undergoing urological treatment are prone to nosocomial infections. The pathogens accountable for the infection instigate from the individual's endogenous flora and the moist environment of the hospital aggravates the condition [18]. The prevalence of UTI among pregnant women during the second trimester accounted up to 50% and has defined UTI as a consequence of lack of adequate and appropriate treatment during pregnancy [12]. The predominant pathogen responsible for UTI is *E. coli* which constitutes up to 80-85% and is followed by *Staphylococcus saprophyticus* which accounts to 5-10%. The bacteria enter the bladder through urethra and the infection can also occur through blood and lymph. The microbial etiology of UTIs is deemed to be well established and frequent. Pathogens like *E. coli* and *S. saprophytics* are associated with population acquired acute uncomplicated infection whereas *Klebsiella*, *Enterococcus*, *Proteus Species*, *Enterobacter* are known to confer uncomplicated cystitis and phylonephritis [6]. Reducing the duration of catheter usage in the patients has a positive impact on the reduction of urinary tract infection. Catheter should be removed once it's no longer needed to reduce the rate of biofilm growth on the catheters [15, 2].

Study Area

The study was carried out in Eve Specialist Women Hospital Okigwe, Imo state Nigeria.

Ethical Clearance

The clearance to obtain specimens and work with the people in the hospital was given by the Head Medical Director in charge after submitting the clearance letter from the Abia State University, Uturu ethical clearance committee.

Subjects/ Data collection

This research was carried out as a hospitals based cross sectional study from the month of January-April 2019. Baseline demographic data includes gestation age, age, level of education, patient's identification number were collected from Medical Record Department. Detailed physical and clinical examinations of patients were carried out to evaluate their conditions. The patients were asked about any history of previous insertion of catheter device or UTI and indications for catheterization were recorded. Those with history of UTI and catheterization were excluded in the research. Pregnant women of 15 years and above on admission who inserted indwelling urinary catheters were used for this research. A total sampling of 40 patients on indwelling urinary catheters were sampled in the hospital:-Their

ages range from 15- 45 years with 6 class intervals and they were placed in age bracket of 5 intervals (eg, 15-19, 20-24. etc).

Sample collection: Midstream urine within 48 hours of removal of catheter or using standard sampling technique the catheter specimens were collected after clamping the catheter for 30 minutes in a universal container and transporting it immediately to the microbiology laboratory [4, 5].

Sample Processing: The urine samples were processed immediately after collection. The centrifuged urine specimens were examined under low dry power (10X) and high dry power (40X) of bright field microscope to find out the presence of pus cells, erythrocytes, casts, crystals and bacterial cells were recorded. The protein and sugar level were also recorded using urine strip test Combi 9 (Medi test). The specimens were cultured, using a standard wire loop of 4mm, on CLED, Mac Conkey and Blood agar. The seeded plates were incubated at 37˚C for 18-24 hours [4, 5].

Statistical Analysis
Chi-square Test of independence and three way ANOVA Analysis of Variance were employed to analyzed the data.

Results
The bacterial isolates of catheterized pregnant women in Eve Hospital Okigwe, out of 50 patients catheterized, 28(56.0%) patients were found with significant bacteriuria among 50 catheterized patients. *Escherichia coli* 8(28.6%), were the most common isolate followed by *Staphylococcus aureus* 5(17.0%), *Klebsiella pneumonia* 4(14.3%), *Pseudomonas aeruginosa* 4(14.3%), *Streptococcus faecalis* 4(14.3%) and *Proteus mirabilis* 3(10.7) (Figure 1). From Eve Hospital Okigwe 50 women examined, 28 patients were positive for significant bacteria, giving a prevalence of 56.0 % among the pregnant women. Figure 2: Shows the age distribution of bacterial isolates of CA-UTI from Eve Specialist Women Hospital Okigwe. The highest rate of 25.0% was found in the age group of 30-34 years while the lowest rate of 10.7% occurred in the age brackets of 15-19 and 40-44 years respectively.

In Eve Specialist Hospital Okigwe, the Social economic status related of catheterized patients were examined. Out of the 28 patients that were tested positive, famers had the highest isolates of 10(35.7%), Trader/Business 6(21.4%), Civil Servant 5(17.9%), Applicants/Unemployed 5(17.9%) and Students were the least with 2(7.1%) (Figure 3). The duration of catheterization related to significant Urinary Tract Infections shown in Figure 4. Out of 8 patients that had their indwelling urinary catheter for 2-4 days shown that 3(10.7%) had bacterial isolates, out of 16 patients that was catheterized for the duration of 5-7 days 9(32.2%) patients had bacterial isolates. It was also shown that out of 14 patients with indwelling urinary catheter for 8-10 day had 9(32.2%) and ≥ 10 days had bacterial isolates of (25.0%).

Etiology of inserting indwelling urinary catheters in pregnant women from the study area was shown in (Table 1). It was shown that patients that delivered through caesarian section had the highest isolates of 12(42.8%), followed by pro-longed labor patients of 8(28.9%), Ectopic pregnancy 3(10.7%), Severe Preeclampsia 2(7.1%) and Anterpatum hemorrhage 3(10.7%). The bacterial pathogen isolated from urine culture and their Gram Negative Antibiotic Susceptibility patterns was shown in (Table 2). The most susceptible antibiotics for Gram negative isolates were Streptomycin (86.9%), followed by Ceftriazone (68.4%),

Augumentine (57.9%), Gentamycin (57.9%), Taravid (57.9%), Pefloxacin (52.6%), Ceporax (52.6%) Ciprofloxacin (36.8%), Ampicilin (21.1%) and Septrin were the least susceptible antibiotics of (15.8%). Amongst the Gram positive isolates, the most susceptible antibiotics were Streptomycin (100.0%), followed by Erythromycin (66.7%), Ceporax (66.7%), Rifampicin (55.6%), Gentamycin (55.6%), Choramphenicol (44.4%) Levofloxacin (44.4%), Ciprofloxacin (44.4%), Ampiclox (22.2%), while Amoxil (22.2%), was the least (Table 3).

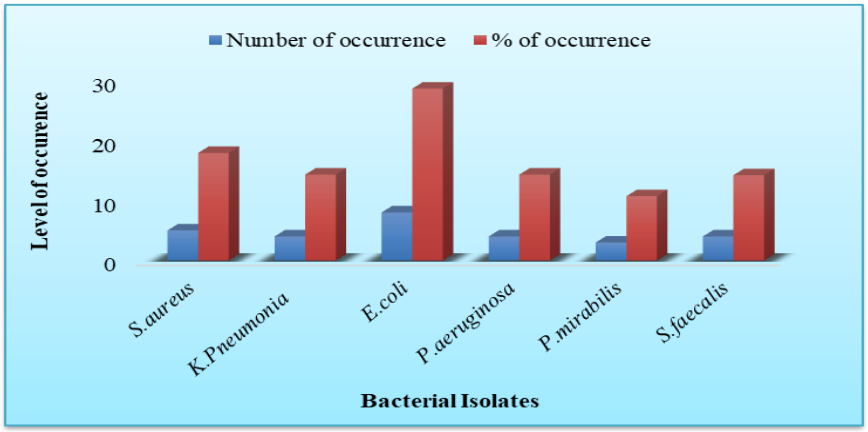

Figure 1. Bacterial Isolates of urine specimen from catheterized patients from Eve Specialist Women Hospital Okigwe

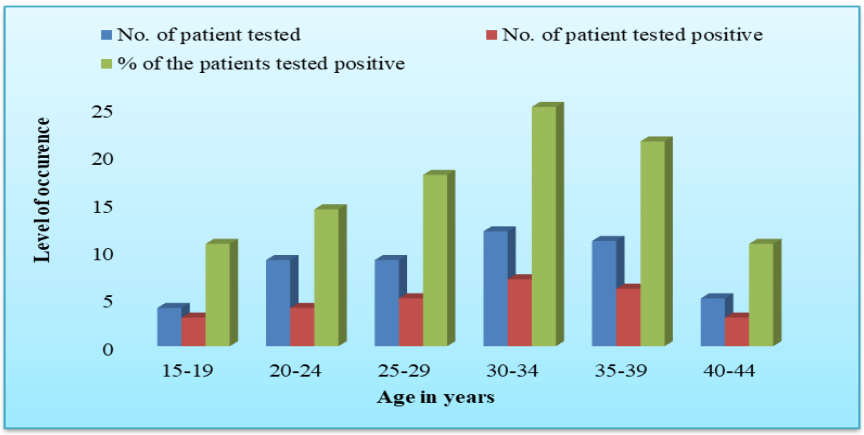

Figure 2. Age distribution of bacterial isolates of CA-UTI from Eve Specialist Women Hospital Okigwe

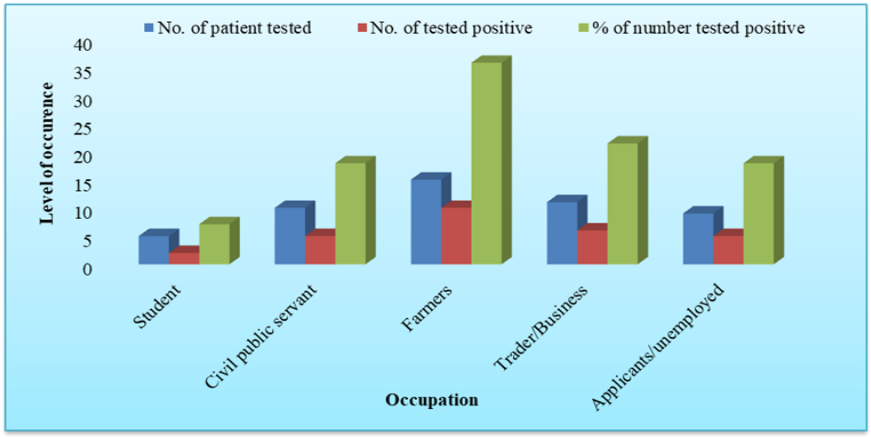

Figure 3. Social Economic status related of CA-UTI from Eve Specialist Women Hospital Okigwe

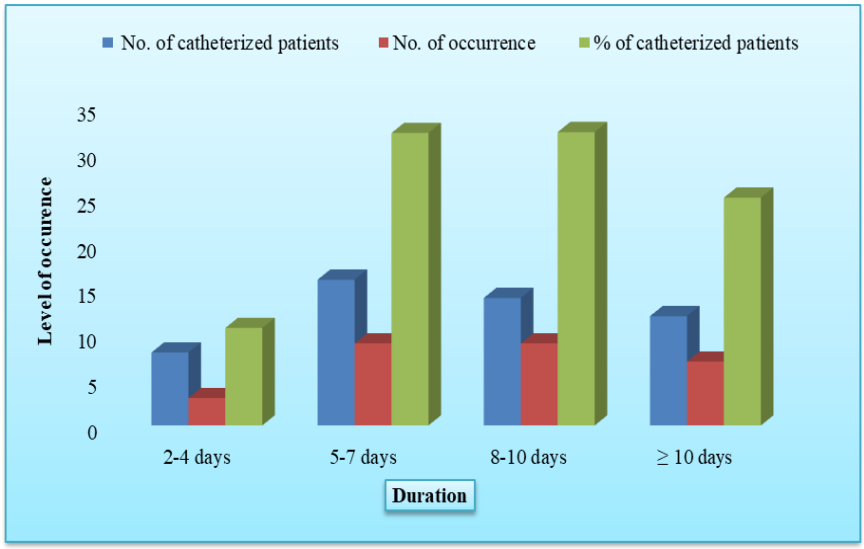

Figure 4. Relationship of Length of catheterization and development of significant bacteriuria among patients from Eve Specialist Women Hospital Okigwe

Table 1. Indications for the insertion of catheter among the patients from Eve Specialist Women Hospital Okigwe

Indication for the use of catheterization	No. of cases (%)	No. of positive cases (%)
Caesarian section	20(40.0%)	12(42.8%)
Severe/preeclampsia	5(10.0%)	2(7.1%)
Ectopic pregnancy	5(10.0%)	3(10.7%)
Pro-long labor	15(30.0%)	8(28.9%)
Anterpatum hemorrhage	5(10.0%)	3(10.7%)
Total	50(100.0%)	28(100.0%)

Table 2. Bacterial Pathogen Isolated in Urine Culture and their Antibiotic Sensitivity Susceptibility Patterns from Eve Specialist women Hospital Okigwe, Gram Negative organism

Organisms	*E. coli* (N=8)		*P. mirabilis* (N=3)		*K. pneumonia* (N=4)		*P. aeruginosa* (N=4)	
Antibiotics	**S%**	**R%**	**S%**	**R%**	**S%**	**R%**	**S%**	**R%**
Augumentine	4(50.0)	4(50.0)	2(66.7)	1(33.3)	2(50.0)	2(50.0)	3(75.0)	1(25.0)
Taravid	4(50.0)	4(50.0)	2(66.7)	1(33.3)	3(75.0)	1(25.0)	2(50.0)	2(50.0)
Ciprofloxacin	4(50.0)	4(50.0)	2(66.6)	1(33.3)	1(25.0)	3(75.0)	0(0.0)	1(100.0)
Gentamycin	5(62.2)	3(37.5)	3(100.0)	0(0.0)	2(50.0)	2(50.0)	1(25.0)	3(75.0)
Streptomycin	7(87.5)	1(12.5)	3(100.0)	0(0.0)	4(100.0)	0(0.0)	3(75.0)	1(25.0)
Ceporax	5(62.5)	3(37.5)	1(33.3)	2(66.7)	2(50.0)	2(50.0)	2(50.0)	2(50.0)
Ceftriazone	5(62.5)	3(27.5)	3(100.0)	0(0.0)	3(75.0)	1(25.0)	2(50.0)	2(50.0)
Septrin	2(25.0)	6(75.0)	0(0.0)	3(100.0)	1(25.0)	3(75.0)	0(0.0)	4(100.0)
Ampicilin	3(37.5)	5(62.5)	0(0.0)	3(100.0)	0(0.0)	4(100.0)	1(25.0)	3(75.0)
Pefloxacin	4(50.0)	4(50.0)	2(66.7)	1(33.3)	2(50.0)	2(50.0)	2(50.0)	2(50.0)

Table 3. Bacterial Pathogen Isolated in Urine Culture and their Antibiotic Sensitivity Susceptibility Patterns from Eve Specialist Women Hospital Okigwe, Gram Positive organisms

Organisms	***S. aureus* (N=5)**		***S. faecalis* (N=4)**	
Antibiotics	**S%**	**R%**	**S%**	**R%**
Amoxil	1(20.0)	4(80.0)	1 (25.0)	3(75.0)
Rifampicin	3(60.0)	2(40.0)	2(50.0)	2(50.0)
Ciprofloxacin	2(40.0)	3(60.0)	1(25.0)	3(75.0)
Gentamycin	2(40.0)	3(60.0)	3 (75.0)	1(25.0)
Streptomycin	5(100.0)	0(0.0)	4 (100.0)	0(0.0)
Ceporax	3(60.0)	2(40.0)	3 (75.0)	1(25.0)
Levofloxacin	2(40.0)	3(60.0)	2(50.0)	2(50.0)
Erythromycin	3(60.0)	2(40.0)	3(75.0)	1(25.0)
Ampicox	2(40.0)	3(60.0)	(0.0)	4(100.0)
Choramphicol	2(40.0)	3(60.0)	2(50.0)	2(50.0)

Discussion

Urinary tract infection (UTI) is the predominant type of bacterial infection among pregnant women [14]. The elasticity of the lower urinary tract is increased during pregnancy, partly because of the hormonal-induced reduction in smooth muscle tone. Bladder capacity increases during pregnancy, beginning in the third month due to the reduction in detrusor (bladder) muscle tone [8]. Catheterization to empty the bladder is currently regarded as the gold standard for measuring bladder volume [9]. However, it carries several risks, including infection, haematuria, urethral trauma and patient discomfort [11].

Bacterial prevalence of 28(56.0%) were found with significant bacteriuria among 50 catheterized patients. *Escherichia coli* 8(28.6%), were the most common isolate followed by *Staphylococcus aureus* 5(17.0%), *Klebsiella pneumonia* 4(14.3%), *Pseudomonas aeruginosa* 4(14.3%), *Streptococcus faecalis* 4(14.3%) and *Proteus mirabilis* 3(10.7). [11] also observed in their work that inappropriate use of indwelling urinary catheter in pregnant women carries several risks, including infection, haematuria, urethral trauma and patient discomfort.

In Eve Specialist Women Hospital Okigwe, it was shown that the highest rate of 25.0% was found in the age group of 30-34 years while the lowest rate of 10.7% occurred in the age brackets of 15-19 and 40-44 years respectively. The findings from this work agrees with the results of [10]; [16] whose their work showed the highest rate of 29.26% from 21-37 years and 28.9% from 25 – 29 years respectively. However, this work is disagrees with [11]; [3] who their results shows the prevalence rates of 75.0%, 39.0% and 40.0% from the age group of 15-23 years, 24-27 years and 33-above years, respectively.

The Social economic status related to catheterized pregnant women was observed that out of the 28 patients that were tested positive, famers had the highest isolates of 10(35.7%), Trader/Business 6(21.4%), Civil Servant 5(17.9%), Applicants/Unemployed 5(17.9%) and Students were the least with 2(7.1%). Similar findings was found in [19].

Etiology of inserting indwelling urinary catheters in pregnant women from the study area was found that patients that delivered through caesarian section had the highest isolates of 12(42.8%), followed by pro-longed labor patients of 8(28.9%), Ectopic pregnancy 3(10.7%),

Severe Preeclampsia 2(7.1%) and Anterpatum hemorrhage 3(10.7%). [10] also observed that caesarian section was the most common factor for inserting indwelling urinary catheter followed by eclampsia and severe pre-eclampsia. According to [1] the routine of an indwelling catheter for cesarean is not necessary and with the increasing incidence of this surgery, the benefits of avoiding catheterization are likely to be substantial.

Our study shows slight higher rate which may be due to physiological and biochemical changes that occurs during pregnancy. This may also be due to non-adherence to catheter insertion indications, introduction and maintenance techniques, discontinuation strategies, and indications for replacement of catheter [10]. Another major reason in our study includes prolonged usage of catheter especially when the patient did not complete their hospital bills which serves as a major risk factor for the development of CA-UTI.

Conclusion

The use of indwelling urinary catheter is a routine part of the majority of cesarean deliveries and other procedures performed in the hospital. Indications for using a catheter include providing relief when there is urinary retention, monitoring of the urine output for critically ailing persons, managing urine outflow during surgery, prolong labor, rupture of the uterus, before and after the cesarean sections, prior to and following hysterectomies, patients with genital injury.

The duration of catheterization is the most important risk factor for the development of bacteriuria. Reducing the duration of catheter usage in the patients has a positive impact on the reduction of urinary tract infection.

To achieve the “ABCDE” for preventing catheter-associated urinary tract infection is very important

1) Adherence to general infection control principles (eg, hand hygiene, surveillance and feedback, aseptic insertion, proper maintenance, education) is important.
2) Bladder ultrasound may avoid indwelling catheterization.
3) Condom catheters or other alternatives to an indwelling catheter such as intermittent catheterization should be considered in appropriate patients.
4) Do not use the indwelling catheter unless you must!
5) Early removal of the catheter using a reminder or nurse-initiated removal protocol appears.

Conflicts of interest

The authors declare no conflicts of interest.

References

1. Acharya, S., Uprety, D.K., Pokharael, H.P., Amatya, R. and Rai, R. 2012. Cesarean Section without urethral catheterization: A Randomized Control Trail. Kathmandu University Medical Journal, 2(38): 18-22.
2. Amat-Al, K.A., Athmar, H.A. and Abdelrahman, H.A. 2017. Caesarean section without using bladder catheterization is safe in uncomplicated patients. Journal of Gynecology and Obstetrics, 5(5): 56-59.
3. Ani, O.C. and Mgbechi, E.K. 2008. Prevalence of Urinary Tract infection (UTI) in sexually Active Women of Abakalili Ebonyi State, Nigeria. Animal Research International, 5(2): 876-879.

4. Cappuccino, J.G. and Sherman, N. 2014. Microbiology: A Laboratory Manual 10th Edition, USA, Pearson Education.

5. Chessbrough, M. 2006. Distinct Laboratory Practice in Tropical Countries part 2 page 106-110.

6. Demilie, T., Beyene, G., Melaku S. and Tsegaye, W. 2012. Urinalysis bacterial profile and antibiotic susceptibility pattern. Ethiopian Journal of Health Sciences, 22(2): 121-128.

7. Foxman, B. 2002. Epidemiology of urinary tract infections: incidence, morbidity, and economic costs. American Journal of Medicine, 113: 5S–13S.

8. Glavind, K. and Bjørk, J. 2003. Incidence and treatment of urinary retention postpartum. International Urogynecology Journal, 14(2): 119-121.

9. Gyampoh, B. 2004. Intrapartum ultrasound estimation of total bladder volume. BJOG: An International Journal of Obstetrics and Gynaecology, 111(2): 103–108.

10. Gupta, T., Mishra, P.P, Prakash, V., Agarwal, P., Prem, H.K. and Kumar, A. 2016. Spectrum of catheter associated infection in the obstetric patients in tertiary care Hospital. International Journal of Contemporary Medicine Research, 3(11): 77-83.

11. Kalsi, J., Arya, M., Wilson, P. and Mundy, A. 2003. Hospital-acquired urinary tract infection. International Journal of Clinical Practice, 57(5): 388-391.

12. Koffuor, G.A., Boye, A. and Siakwa, P.M. 2012. Asymptomatic Urinary Tract Infections in pregnanat women attending clinic in Cape Coast, Ghana. Journal of Medical Research, 1(6): 74-83.

13. Mahaseth, B.K., Srivastava, M., Das, C.R. and Rawat, D. 2016. Urinary Tract Infection and Antibiotic Susceptibility at Nepalgunj Medical College and Teaching Hospital Kohapur. Journal of Napagunj Medical Colleege, 2(14): 34-37.

14. Nowicki, B. 2002. Urinary tract infection in pregnant women: old dogmas and current concepts regarding pathogenesis. Current Infectious Disease Reports, 4(6): 529-535.

15. Ogwuegbu, H.O., Mbanaso, A.U., Opara-Nadi, N., Nwokorie, C.C. and Irogbeyi, L.A. 2019. The Prevalence of Bacterial Isolates from Prostatitis Patients Using Indwelling Urinary Catheters in Healing Cross Hospital Umuahia, Abia State, Nigeria. International Journal of Research and Innovation in Applied Science, 4(3): 2454-6194.

16. Onwuchekwa, E.C., Obiakor, E.I., Ogwuegbu, H.O. and Chikezie, J.A. (2019). The Bacterial Isolates from Obstetric Patients Using Indwelling Urinary Catheters in Okigwe General Hospital Imo State, Nigeria. International Journal of Research and Innovation in Applied Science, 4(10): 2454-6194.

17. Sharma, P.U. and Bidwai, U. 2013. Isolation and identification of bacterial causing Tract Infections in pregnant women in Vidarbha and their drug susceptibility patterns in them. International Journal and Applied Science, 2(4): 97-103.

18. Tambyah, P.A. 2009. The relationship between pyuria and infection in patients with indwelling urinary catheters: A prospective study of 761 patients. Journal of Medicine, 160: 673-674.

19. Taiwo, S.S. and Aderounmu A.O.A. 2006. Catheter Associated Urinary Tract Infection: Aetiologic Agents and Antimicrobial Susceptibility Pattern in Ladoke Akintola

University Teaching Hospital, Osogbo. Nigeria. African Journal of Biomedical Research, 9: 141-148.

20. Vasudevan, R. 2014a. Urinary tract infection. An overview of the infection and associated risk factors. Journal of Microbiology and Experimentation, 1(2): 10-15.

21. Vasudevan, R. 2014b. Biofilms: Microbial Cities of Scientific Significance. Journal of Microbiology and Experimentation, 1(3): 84-94.

Citation: Chikezie, J.A., Ogwuegbu, H.O., Ike, C.C., Smith-Akor, D.M. and Nwaugo, V.C. 2019. Catheters Associated With Urinary Tract Infections and Its Effects on Obstetric Patients in Eve Specialist Women Hospital Okigwe, Imo State Nigeria. International Journal of Recent Innovations in Academic Research, 3(11): 31-39.