International Journal of Clinical Medicine Research
2017; 4(3): 26-29
http://www.aascit.org/journal/ijcmr
ISSN: 2375-3838

American Association for Science and Technology

Keywords
Bacteria,
UTI,
Pregnant,
Non-pregnant,
Women,
Antibiogram

Received: April 15, 2017
Accepted: May 3, 2017
Published: August 3, 2017

Bacteria Associated with Urinary Tract Infections in Pregnant and Non-pregnant Women and Their Anti-biogram

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Citation
Imarenezor Edobor Peter Kenneth, Iyamu Mercy Itohan, Brown Samuel Tamunoiyowuna Cockeye. Bacteria Associated with Urinary Tract Infections in Pregnant and Non-pregnant Women and Their Anti-biogram. *International Journal of Clinical Medicine Research*. Vol. 4, No. 3, 2017, pp. 26-29.

Abstract
This study was aimed at isolating bacteria associated with urinary tract infection (UTIs) in pregnant and non-pregnant women and their anti-biogram. Forty (40) samples were collected from both pregnant and non-pregnant women. The pregnant women samples were from antenatal clinic at General Hospital, Ewohimi, Edo State while the non-pregnant women were from apparently healthy students in Ewohimi. Identification of isolates was done with standard microbiological methods. Antibiotic susceptibility test was by disc diffusion method. Bacteria isolated from pregnant women were Escherichia coli 4(50%), Staphylococcus aureus 3(37.50%), and Enterobacter aerogenes 1(12.50%). Escherichia coli 3(50%), Klebsiella pneumoniae 2(33.33%) and Stahylococcus. saprophyticus 1(12.50%) were isolated from non-pregnant women. Antibiotic susceptibility testing of isolates showed Escherichia coli isolates was 100% sensitive to Ceftazidime, Gentamycin, Ofloxacin, and Augumentin, 57.14% sensitive to Nalidixic acid and Nitrofurantoin, and 71.43% sensitive to Ceftriaxone. It was 100% resistant to Tetracycline, Cotrimoxazole and Amoxicillin, 42.86% resistant to Nalidixic acid and Nitrofurantion and 28.57% resistant to Ceftriaxone. Staphylococcus aureus isolated from pregnant women was 100% sensitive to Ceftazidime, Gentamycin and Augumentin, 66.67% sensitive to Cloxacillin, and Chloramphenicol, 33.33% sensitive to Ofloxacin, Tetracycline, Cotrimoxazole, Amoxcillin, Streptomycin and Erythromycin. It was however, 100% resistant to Ceftriaxone. Klebsiella Pneumoniae isolated from non-pregnant women was 100% sensitive to Ceftriazone, Nalidixic Acid, Gentamycin, Augumentin, Tetracycline, and Ofloxacin, but 100% resistant to Cotrimoxazole and Amoxicillin. Enterobacter aerogenes and Stahylococcus saprophticus isolates from pregnant and non-pregnant women were 100% sensitive to Ceftazidime, Nalidixic acid, Gentamycin, Ofloxacin, Tetracycline, Ofloxacin, Cloxacillin, Streptomycin, Chloramphenicol and Augumentin, 100% resistant to Cotrimoxazole, Amoxicillin, Ceftazidime, Gentamycin, Cotrimoxazole and Erythromycin. Thus for all the bacterial isolates, Ceftazidime and Amoxicillin had the highest and lowest antimicrobial activities respectively. Results from this finding underscore the need for frequent urine examination for pregnant women and continuous maintenance of high standards of personal hygiene.

1. Introduction

The urinary tract is the body's drainage system for removing wastes and extra water. It includes two kidneys, two ureters, a bladder, and a urethra (1). The kidneys are a pair of bean-shaped organs, each about the size of a fist and located below the ribs, one on each side of the spine, towards the middle of the back. They filter waste products, water, and salts from the blood to form urine. The urine travels from the kidneys down into narrow tubes called the ureters (2). It is then stored in a balloon-like organ called a bladder, and emptied through the urethra, a tube at the bottom of the bladder. When the bladder empties, a muscle called the sphincter relaxes and urine flows out of the body, through the urethra. The opening of the urethra is at the end of the penis in males and in front of the vagina in females (3). The vagina of healthy women is colonized by Lactobacilli (beneficial microorganisms) that maintain a highly acidic environment (low pH) that is hostile to other bacteria. Lactobacilli produce hydrogen peroxide which helps eliminate bacteria and reduces the ability of *Escherichia coli* to adhere to vaginal cells. *E. coli* is a major bacteria culprit in urinary tract infections (1). Drinking plenty of fluids each day will also help flush bacteria out of the urinary tract (4). Emptying the bladder as soon as the urge to urinate occurs prevent UTI from occurring. Holding it can help any bacteria that may be present develop into a full – fledged urinary infection. Urinating before and after sexual intercourse also reduces the risk of getting infected. Sexually active women with recurrent UTI can prevent recurrences by not using spermicidal-containing contraceptives and taking a prophylactic antimicrobial agent around the time of intercourse Nicolle (1). Also, post-menopausal women with recurrent UTI can prevent recurrences by taking oral or vaginal estrogen which will shift the vaginal flora from uropathogens to Lactobacillus and will lower the pH and protect them from ascending infection (5).

2. Materials and Methods

A total of 40 samples of clean-catch midstream urine were collected randomly from both pregnant women (attending antenatal clinic at General Hospital, Ewohimi) and non-pregnant women who were apparently healthy non-pregnant female in Ewohimi. The research took a period of 10 days. The samples were collected into sterile universal containers and labeled appropriately, after which it was transported to the laboratory for microbiological analysis. For antibiotic susceptibility test, a small amount containing approximately 10 cfu/ml of peptone water culture containing the grown isolate was used to flood an already prepared Nutrient Agar. The excess was decanted and a multi-disc antibiotic was placed on the plate by means of sterile forceps. The plates were incubated at 37°C for 24 hours. This was observed for zones of inhibition and results were taken down accurately in millimeter. Zone size of less than 13mm was resistant to antibiotics while a zone size of 14mm and above indicated a sensitive antibiotic susceptibility testing

3. Results

A total of 40 samples were collected from both pregnant and non-pregnant women. The pregnant women were those attending antenatal clinic at General Hospital, Ewohimi, Edo State while the non-pregnant women were apparently healthy students from female hostel at Ambrose Alli University Ekpoma, Edo State. The result of this study showed the bacteria isolates and their respective percentage occurrence in Table 1. Table 2, shows an Identification characteristic of Bacterial Isolates and Table 3 shows Antibiogram of Bacterial Isolates.

Table 1. *Bacterial isolates from urine of pregnant women and non-pregnant women.*

Subjects	No of Samples	Positive culture	Percentage
Pregnant women	25	8	57.14
Non-pregnant women	15	6	42.86

Table 2. *Identification characteristics of Bacterial Isolates.*

Isolates	Identification criteria										
	Gram staining	Motility	Catalase	Coagulase	Citrate	Indole	Oxidase	Urease	Glucose	Lactose	Sucrose
Escherichia coli	-	+	N	N	-	+	N	N	+	+	+
Staphylococcus aureus	+	-	+	+	N	N	N	N	-	-	-
S. saprophyticus	+	-	+	-	N	N	N	N	-	-	-
Klebsiella pneumoniae	-	-	N	N	+	-	-	+	+	+	+
Enterobacter aerogenes	-	+	N	N	+	-	-	-	+	+	+

KEY
- = negative, + = positive, N = not tested

Table 3. *Antibiogram of Bacterial Isolates.*

Antimicrobial agent conc.	*Antibiotic effect on bacteria*									
	E. coli		***S. aureus***		***K. Pneumoniae***		***E. aerogenes***		***S. saprophyticus***	
	R (%)	**S (%)**	**R (%)**	**S (%)**	**R (%)**	**S (%)**	**R (%)**	**S (%)**	**R (%)**	**S (%)**
Ceftazidime (30µg)	-	7(100)	-	3(100)	-	2 (100)	-	1(100%)	1(100)	-
Ceftriaxone (5µg)	2(28.57)	5(71.43)	3(100)	-	-	2(100)	-	-	-	-
Nalidixic acid (30µg)	3(42.86)	4(57.14)	NA	NA	-	2(100)	-	1(100)	NA	NA
Gentamycin (10µg)	-	7(100)	-	3(100)	-	2(100)	-	1(100)	1(100)	-
Ofloxacin (5µg)	-	7(100)	2(66.67)	1(33.33)	-	2(100)	-	1(100)	-	1(100)
Nitrofurantoin (200µg)	3(42.86)	4(57.14)	NA	NA	-	2(100)	-	-	NA	NA
Tetracycline (10µg)	7(100)	-	2(66.67)	1(33.33)	-	2(100)	-	1(100)	1(100)	-
Augumentin (30µg)	-	7(100)	-	3(100)	-	2(100)	-	1(100)	-	1(100)
Cotrimoxazole (30µg)	7(100)	-	2(66.67)	1(33.33)	2(100)	-	2(100)	-	1(100)	-
Amoxicillin (30µg)	7(100)	-	2(66.67)	1(33.33)	2(100)	-	2(100)	-	NA	NA
Cloxacillin (5µg)	-	-	1(33.33)	2(66.67)	-	-	-	-	-	1(100)
Streptomycin (30µg)	-	-	2(66.67)	1(33.33)	-	-	-	-	-	1(100)
Chloramphenicol (10µg)	-	-	1(33.33)	2(66.67)	-	-	-	-	-	1(100)
Erythromycin (5µg)	-	-	2(66.67)	1(33.33)	-	-	-	-	1(100)	-

KEY: R = Resistant (zone diameter of 0-13mm), S= Sensitive (between 14mm and above)
NA= Not applicable

4. Discussion

The result of this research showed that 14 out of 40 samples collected and screened for UTI yielded positive bacteria cultures. This has again proven UTI to be a common infection in women (1). *E. coli* remains the highest etiological agent of UTI in both pregnant and non-pregnant women although the line of difference in this research is thin. The high occurrence of *E. coli* is in agreement with the report of (6) in which the organism had the highest incidence of 41.3%. The reason for the high prevalence of *E. coli* may be attributed to the shortness of the urethra and its proximity to the anus (1). The percentage occurrence of *E. coli* as reported by (1) was 80% but this report shows *E. coli* to have a 50% occurrence. (7) in his work reported *S. aureus* as the highest occurring organism followed by *E. coli*. His report however disagrees with this work. The irregularity of bacteria causing UTIs may however be as a result of improper collection and processing of samples, environmental factor, as well as hygienic factor. The isolates from pregnant women were more than those from non-pregnant women. This may be as a result of the low or reduced immunity of pregnant women against infections leading to the colonization and infection of the urinary tract by these pathogenic bacteria. The coagulase-positive *Staphylococcus* isolated from pregnant women may be attributed to the pH and osmolality of the urine which favours the growth of *S. aureus*. *Stahylococcus saprophyticus* which was reported by (1) as the second most common cause of UTI following *E. coli* in young non-pregnant sexually active females had a very low incidence in this research, thus it disagrees with his work. The low incidence may not be due to the fact that these females are not sexually active; it may have been that certain preventive measures were taken before, during, and after sexual intercourse. *E. aerogenes* and *K. pneumoniae* isolated from both pregnant and non-pregnant women respectively may be attributed to poor sanitary conditions. The presence of *K. pneumoniae* in the urine of non-pregnant women disagrees with the report of (8) and (9) that *K. pneumoniae* are the second urinary pathogen. It is however believed that pregnancy increases the chances of UTI in pregnant women due to several factors. This research however did not give a significantly reasonable yield of urinary pathogens from the urine culture. The reason may be because the urine samples collected for this research purpose were those other than early morning samples from the pregnant women group. Hence, collection of early morning mid-stream urine for future researchers is important as also agreed by (10). Antibiotic susceptibility of *E. coli* showed that it was 100% sensitive to Ceftazidime, Gentamycin, and Ofloxacin. It was resistant to Tetracycline, Cotrimoxazole, and Amoxicillin. *S. aureus* showed 100% sensitivity to Ceftazidime, Gentamycin, Augumentin, 66.67% sensitivity to Cloxacillin, and Chloramphenicol, 33.33% sensitivity to Ofloxacin, Tetracycline, Cotrimoxazole, Amoxicillin, Streptomycin, and Erythromycin. It was however 66.67% resistant to Ofloxacin, Tetracycline, Cotrimoxazole, Amoxicillin, and Streptomycin. *K. Pneumoniae* was 100% sensitive to all antibiotics used with the exception of Cotrimoxazole, Amoxicillin, Cloxacillin, Streptomycin, Chloramphenicol and Erythromycin. *E. aerogenes* was 100% sensitive to Cotrimoxazole, Amoxicillin with the exception of other antibiotics. *S. saprophyticus* was 100% sensitive to Ofloxacin, Augumentin, Cloxacillin, Streptomycin and Chloramphenicol. It was however resistant to the other antibiotics tested.

5. Conclusion

In conclusion, this research, it is obvious that *E. coli* of the family *Enterobacteriaceae* is the most common causes of UTIs. It has also shown that bacteria associated with UTIs in pregnant and non-pregnant women are similar in species. Differences in some cases may be due to some factors e.g. environmental factors. The occurrence of *E. coli* in the urine calls for improvement in personal hygiene since the organism is a fecal organism common to the intestinal tract. The use of

pit latrines and lack of maintenance of common toilet facilities should be discouraged as these could facilitate colonization of the urinary tract by uropathogens. Enlightenment programs informing the general public on the importance of good personal hygiene and the implications if neglected should be encouraged. This will not only reduce the risk of UTIs but other infections as well. Likewise, there should be continuous education for pregnant women on the need to maintain a high level of personal hygiene during pregnancy as they are at high risk for the infection. They should also be educated on the importance of routine medical checkup during the period of pregnancy. Lastly, clinics should have data of most of the prominent organisms' common during pregnancy and their antibiogram to help in quick intervention in cases of UTI. These drugs MUST be safe for both mother and fetus and as well effective.

Acknowledgement

We thank the Director and staff of Somos Laboratory, Ekpoma, Edo State, Nigeria for the use of their Laboratory Equipments for various Analysis.

References

[1] Nicolle, L. E. (2008). Uncomplicated urinary tract infection in adults including uncomplicated pyelonephritis. *Urology Clinic North America*. 35 (1): 1-12; v.

[2] Lin, K., and Fajardo. (2008). Screening for asymptomatic bacteriuria in adults, evidence for the U.S preventive services task force reaffirmation recommendation statement. *Annals of Internal Medicine*. 149 (1): 20-24.

[3] Azzarone, G., Liewehr, S., and O'Connor, K. (2007). Cystitis Pediatrics in Review. 28 (12): 474-476.

[4] Karl, K. (2008). Science is golden, P. 175, ISBN 978-0-7322-85364.

[5] Rosenthal, K. S., Murray, P. R., and Kobayashi, G. S. (2009). The big picture Medical Microbiology, 6th Edition chapter 34, Pg 342, Mc Graw-Hill.

[6] Ezechi, D. C., Dare, F. O and Fasubaa O. (1998). Sensitivity pattern of microbial infection of the urinary tract in pregnant women. *Society of Gynecology and Obstetrics of Nigeria*. 5: 62.

[7] Lane, D. R., and Takhar, S. S. (2011). Diagnosis and management of Urinary tract infections and Pyelonephritis. *Emergency Medicine Clinics of North America*. 29 (3): 539-552.

[8] Colgan, R., Nicolle, L. E., McGlone, A., and Hooton, T. M. (2006). Asymptomatic Bacteriuria in Adults. *American family physician.* 74 (6): 985-990.

[9] Colgan, R., Williams, M., and Johnson, J. R. (2011). Diagnosis and treatment of acute pyelonephritis in women. *American family physician.* 84 (5): 519-526.

[10] Johnson, J. R., and Stamm, W. E. (1989). Urinary tract infection in women; diagnosis and treatment. *Annals of Internal Medicine*. 111: 906-917.