IN-VITRO SCREENING OF SOME SELECTED ANTIMICROBIAL AGENTS ON SOME UROPATHOGENIC BACTERIAL ISOLATES FROM AHMADU BELLO UNIVERSITY TEACHING HOSPITAL, ZARIA, NIGERIA

Supported by tetfund TERTIARY EDUCATION TRUST FUND

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Received: December 20, 2018 **Accepted:** April 21, 2019

Abstract: Some selected antimicrobial agents were screened and evaluate their susceptibility on some uropathgenic bacterial isolates from Ahmadu Bello University Teaching Hospital, Zaria, Nigeria. 300 patients participated in the study. Samples of urine were collected from male and female patients of different age groups with symptoms of Urinary Tract Infection (UTI). Five types of uropathogens were identified namely Escherichia coli (*E. coli*), *Proteus species*, *Pseudomonas species*, *Klebsiella* and *Staphylococcus aureus.* Urine samples of 181 females examined showed that 51 (28.2%) were infected and from 119 males, 31 (26.1%) were infected. *E. coli* had the highest occurrence seen in 42 (51%) of 82 (27.3%) infected cases. Out of this 42 samples with *E. coli*, 25 (59.5%) were from females. E. coli was highly sensitive to Nitrofurantoin (97.6%), and highly resistant to clotrimazole (76.1%). This study shows that the commonest microorganism causing UTI in this community is *E. coli* and drug of choice is Nitrofurantoin.

Keywords: Antimicrobial agents, culture, evacuate, microscopic, sensitivity, zone of inhibition

Introduction

Urinary tract infection is an infection anywhere in the urinary tract (Feld and Mattoo, 2016). Urinary tract infection (UTI) is the most common infection experienced by humans after respiratory and gastro-intestinal infections, and also the most common cause of both community-acquired and nosocomial infections for patients admitted to hospitals (*Najar et al.*, 2009). UTI can be asymptomatic or symptomatic characterized by a wide range of symptoms from mild irritation voiding to bacteremia, sepsis or even death (Ranjbar *et al.*, 2009). The lining of the bladder is relatively resistant to infection by most microorganisms as long as normal flow of liquid through the urinary tract is maintained (Richard, 2010).Urinary tract infection occurs more frequently in females than males due to the shortness and width of the female urethra (Inabo and Obinibi, 2006). The incidence of infection is a major cause for concern, as it affects females of all ages staring from the age of five (John, 2014), it was also found that most bacteria found in the urinary tract emanate from the intestine (Ozumba, 2009). Urinary tract infection involves bacterial invasion of any part of the urinary tract be it the kidney, ureter, bladder and the urethra (Scully, 2013).

Symptomatic urinary tract infection involving the bladder known as cystitis is characterized by pain when passing out urine, the frequency of urine passage and urgency coupled occasionally with the feeling that the bladder is not completely emptied (Nicolle, 2005). An antimicrobial is any product which even at very low concentration inhibits or kills certain micro-organisms. However, no antimicrobial agent is effective against all bacteria (Paul, 2013). The extensive use and misuse of antimicrobial drugs such as wrong prescription, dosing, dosage, self-medication as they are easily available over the counter, fake and substandard quality and poor hygienic environment have favored the increased emergence and survival of resistant strains of microorganisms which is now making it difficult to treat some infectious diseases. Antimicrobial sensitivity to bacteria depends to a large extent on the pattern of usage in a particular environment as it varies from one geographical environment to the other and over years (Saffar *et al.*, 2008; Gruneberg, 2011). Owing to the prevalence of gastrointestinal, respiratory and other infections in the tropics, the same antimicrobial agents are used for urinary tract infection.

This study therefore aimed at screening the susceptibility of some selected antimicrobial agents commonly used in the treatment of UTI in Ahmadu Bello University Teaching Hospital, Zaria Nigeria.

Materials and Methods

Three hundred samples of urine from Male and Female patients of different age groups excluding pregnant women attending Ahmadu Bello University Teaching hospital, Zaria, Kaduna State were collected in sterile universal bottles and studied. Samples that showed significant *bacteriuria* were studied and isolates were identified using bacteriological methods. Test for antibacterial sensitivity was done according to the National Committee for Clinical Laboratory standards by using the disc diffusion method. Interpretations as "sensitive" or "resistant" were performed on the basis of diameters of zones of inhibition of the growth of bacteria according to disc manufacturer's instruction. Sensitivity was shown by zone of inhibition equal, wider or not more than 3 mm smaller than those of control. Resistance was shown by no zone of inhibition or zone radius measuring only 2 mm or less. Themicro-organisms were tested for antimicrobial susceptibility against ten (10) antimicrobial agents. Gram positive and gram negative multi discs were used. The antimicrobial agents include Ampicillin, Gentamycin, Colistinsulphate, Streptomycin, Tetracycline, Clotrimazole, Cloxacillin, Nalidixic acid, Nitrofurantoin and Ofloxacin.

Results and Discussion

The results of the tests done are shown in Figs. 1 – 4. Out of the total number of 300 samples screened, 119 (39.6%) were from male and 181 (60.3%) were from female patients. Of this 181 female urine examined, 51 (28.2%) were infected while 130 (71.8%) were uninfected. Out of 119 male urine examined, 31 (26.1%) were infected while 88 (73.9%) were uninfected. A total of 82 (27.3%) urine samples from both male and female patients were infected whereas 218 (72.7%) were uninfected.

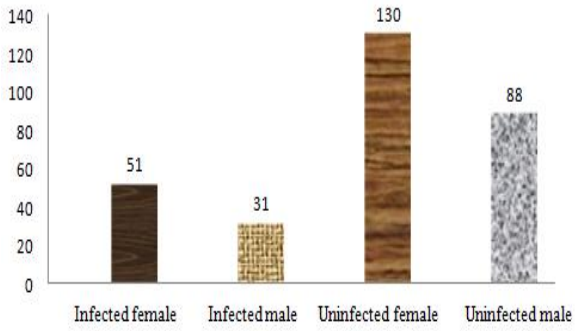

Fig. 1: The number of infected and uninfected patients

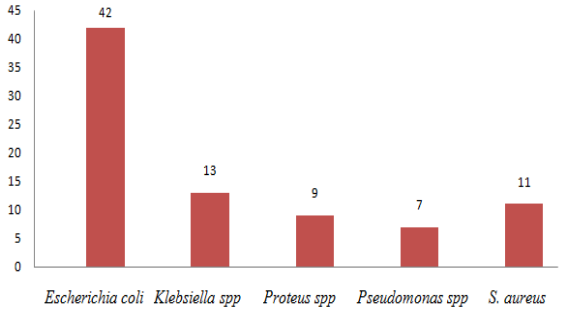

Fig. 2: The different urinary pathogens isolated and their percentages

Escherichia coli had the highest incidence, occurring in 42 (51.2%) out of 82 infected cases, followed by *Klebsiella spp*. occurring in 13 (15.9%) cases, and *Staphylococcus aureus* occurring in 11 (13.4%) cases (Fig. 2). The three pathogens accounted for (80.5%) of the infection. *Proteus spp*. and *Pseudomonas spp*. occurred in 9 (11.0%) and 7 (8.5%) cases, respectively.

Out of 42 (51.2%) *E. coli* isolated from the overall study, 25 (59.5%) were from females while 17 (40.5%) were from males (Fig. 3). *E. coli* accounting for 97.6%, Ofloxacin (85.7%), and Ciprofloxacin (80.9%) and Gentamycin (69%). On the other hand, (76.1%) of the isolates showed greater resistance to Clotrimazole (76.1%), Ampicillin (73.8%), and Tetracycline (66.6%) (Fig. 4).

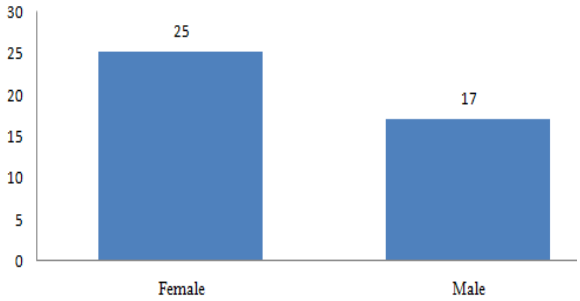

Fig. 3: The occurrence of *Escherichia coli* in the study population

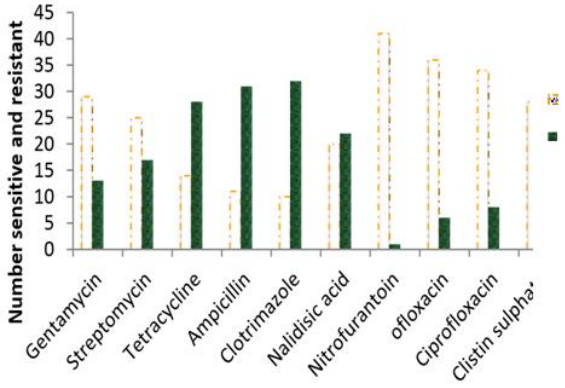

Fig. 4 The sensitivity of *E. coli* to the antimicrobial use in the hospital

The foregoing shows that more patients turned out to be uninfected. Although these symptoms could suggest infection of the urinary tract, bacteriuria is not their exclusive cause. Patients with classic symptoms of urinary tract infection may have a sterile urine, while asymptomatic patients may have infected urine (Najar *et al*., 2009). Investigators have found that only one-half of women with symptoms of acute lower UTI met the criterion of $\geq 10^5$ colony forming unit per milliliter (c.f.u./ml). Low-count bacteriuria might be an early phase of UTI. The majority of patients with bacterial counts between 10^2 and 10^4 c.f.u./ml has micro-organisms typical for UTI (*E. coli*, *Staphylococcus saprophyticus*, and enteric Gram-negative bacteria) (Avar-Boger *et al*., 2011; Kunin *et al*., 2012). Based on what was observed from the results obtained, women have higher percentage rate of infection than men. The urinary tract infection occurs more frequently in women than in men. These differences could be attributed to several factors such as the anatomical differences between the male and female urethra, improper cleaning of the perineum, the use of napkins, sanitary towels and tampons together with pregnancy and intercourse contribute to the higher occurrence of the infection in various categories of women (Hooton *et al*., 2012). In addition, the urine of females was found to have a more suitable pH and osmolarity for the growth of Escherichia coli, and other enteric pathogens.

Out of the five uropathogens (*Escherichia coli*, *Proteus species*, *Klebsiella species*, *Pseudomonas species* and *Staphylococcus aureus*) isolated during the period of the study, it was found that *E. coli* was the most common pathogens causing urinary tract infection and this corresponds with the work done by Ozumba *et al.* (2009). He reported E. coli as the commonest pathogen causing urinary tract infected accounting for 80.4% infection at first attack and 66.2% in second attack. It was also reported by Cheesbrough (2010) from the result of the study population, *E. coli* were isolated from 59.5% of infected females and 40.5% of infected males. *E. coli* was tested against 10 different antimicrobial drugs namely gentamycin, streptomycin, ampicillin, cotrimazole, nalidixic acid, nitrofurantoin, ofloxacin, ciprofloxacin and colistin sulphate. *Escherichia coli* was found to be 97.6% sensitive to nitrofurantoin, 85.7% to ofloxacin, and 80.9% to ciprofloxacin, 69% to Gentamycin and 73. 8% resistant to ampicillin, 66.6% to tetracycline and 76.1% to clotrimazole were detected. Sensitivity of *E. coli* to nitrofurantoin, ofloxacin and ciprofloxacin are largely due to uncommon use of these drugs as opposed to the rampant use of ampicillin, tetracycline and clotrimazole where they grew resistant. The antimicribial sensitivity and resistance correlates with what was reported by Ozumba *et al.* (2009) and Adeleke *et al.* (2005). The *E. coli* resistance to ampicillin, tetracycline and clotrimazole could be likely due to the widespread indiscriminate abuse of these agents in Zaria community,

being easily available from patent medicine stores, also dispensing these agents without doctor's prescription. The agents sensitivity obtainable in this community, Zaria could be different from that in developed countries (Gruneberg, 2011; Saffar *et al.*, 2008).

Conclusion

The foregoing showed that among the 10 antibiotics used for the sensitivity test in this study, nitrofurantoin, ciprofloxacin and of loxacin demonstrated better therapeutic activity against urinary tract infection caused by *Escherichia coli* in Zaria community and should be used cautiously used to avoid the risk of resistance.

Conflict of Interest

Authors declare that there is no conflict of interest related to this study.

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