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Comparative Study on The Potency of Antibiotic Discs With Commercially Sold Antibiotics on Clinical Isolates From Urinary Tract

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ABSTRACT: A total of 250 urine samples were collected from patients attending Ahmadu Bello University Health Service Clinic (Sick bay), Salama Hospital and Major Ibrahim Abdullahi Memorial Hospital (Kaduna State Ministry of Health). The samples were screened for UTI and forty-three (43) were positive for *Klebsiella* and *Escherichia coli*. Of all the isolates, 24 were *K. species* and 19 were *Escherichia coli*. Their susceptibilities to Ampicillin, Ciprofloxacin and Gentamicin were examined using the antibiotics disc and the commercially sold antibiotics. The susceptibility of *K. species* to Ampicillin, Ciprofloxacin and Gentamicin for the antibiotics disc was 16.7%, 62.5% and 41.7% respectively. For the commercially sold antibiotics its susceptibility was 0%, 8.3% and 50.0% to Ampicillin, Ciprofloxacin and Gentamicin respectively. The susceptibility of *Escherichia coli* to Ampicillin, Ciprofloxacin and Gentamicin for the antibiotics disc was 31.6%, 52.6% and 57.9% respectively. For the commercially sold antibiotics its susceptibility was 0%, 36.8% and 31.6% to Ampicillin, Ciprofloxacin and Gentamicin respectively. Our results showed that antibiotics disc was more effective than the commercially sold antibiotics and that both organisms were resistant to Ampicillin but susceptible to Gentamicin and Ciprofloxacin.

Keywords: Potency, Antibiotics, Disc Isolates, Urinary tract

INTRODUCTION

The urinary system is structured in a way that helps ward off infection. The urethers and bladders normally prevent urine from basking up towards the kidneys, and the flow of urine in the bladder helps wash bacteria out of the body, in men, the prostate gland produces secretions that slow bacterial growth. In both sexes, immune defenses also prevent infections. Despite these safeguard mechanisms, though infection still occurs (Brenner *et al.,* 1991). Bacterial infections of the urinary tract are commonly seen in outpatients, hospitalized patients and apparently healthy populations (Olaitan, 2006).

A person who cannot void urine, is unconscious or is critically ill, often need a catheter that stays in place for a long time. Some people, especially the elderly or those with nervous system disorders who lose bladder control, may need a catheter for life. Bacteria on the catheter can infect the bladder, so hospital staff must take special care to keep the catheter sterile and remove it as soon as possible (Brenner *et al.,* 1991).

Uropathogenic strains of *Escherichia coli* are characterized by the expression of distinctive bacterial properties, products or structures referred to as virulence factors because they help the organism to overcome host defenses and colonize or invade the urinary tract. Virulence factor of recognized importance in the pathogenesis of urinary Tract Infection (UTI) is adhesions. Certain virulence factors favour specifically the development of pylonephritis, others favour cystitis and others favour asymptomatic bacteriuria (Johnson, 1991).

Escherichia and *Klebsiell* belong to the family Enterobacteriaceae. They are Gram negative, non-motile, straight rods and facultative anaerobes. These genera are very important pathogens of the urinary tract (Prescott *et al.*, 2007). Urinary Tract infection (UTI) caused by bacteria is perhaps the single most common bacterial infection of mankind. Numerous reports have suggested that UTI can occur in both male and female patients of any age with bacterial counts as low as 100 colony forming unit (cfu) per milliliters of urine (Theodore, 2007).

UTI is common in females. The highest incidence of Urinary Tract Infection (UTI) occurs in the child bearing age and this has been linked directly to sexual activity and aging (Inabo *et al.,* 2006). UTI may be asymptomatic in many cases, while it may be accompanied by dysuria, cystis and pyelonephritis in other patients (Aiyegoro *et al.,* 2007).

The resistant strains of *E. coli* and *K.* produce extended-spectrum beta-lactamases (ESBLs), these common bacteria, when they produce these enzymes are much harder to kill with antibiotics. The antibiotics resistance problem is likely to become wide spread and will affect the way infections will be treated in the future. If the trend continues, it may become difficult to select appropriate antibiotic therapy for urinary tract infection (*University of Texas Health Science Center at San Antonio,* 2008).

Treatment failures also lead to longer periods of infectivity which increase the number of infected people moving in the community and thus expose the general population to the risk of contracting a resistant strain of infection (WHO, 2009). Bacteria are particularly efficient at enhancing the effects of resistance not only because of their ability to multiply very rapidly but also because they can transfer their genes, which are passed on when bacteria replicate. In medical setting such resistant microbes will not be killed by an antimicrobial agent during a standard course of treatment. Resistant bacteria can also pass on their resistance genes to other related bacteria. Resistance to a particular drug can thus spread rapidly through a bacterial population (WHO, 2009). This study therefore aimed at determining the potency of both commercially sold antibiotics along side antibiotic discs on isolates from the urinary tract.

MATERIALS AND METHODS

Collection of Samples

Two hundred and fifty (250) urine samples were collected from three health facilities: Ninety (90) urine samples from Ahmadu Bello University Health Services (Sick bay), 80 from Salama Hospital and also 80 from Major Ibrahim Abdullahi Memorial Hospital (Kaduna State Ministry of Health). *E. coli* and *K. species* were isolated and characterized using standard laboratory procedures. The isolates were inoculated into peptone water and incubated at 37°C for 24hours.

Standardisation of Inoculum: The inoculum of the organism was prepared by inoculating colonies of the organism from a fresh culture into sterile distilled water. The turbidity was compared to 0.5 McFarland standards. prepared according to the method of Cheesebrough, (2004).

Antimicrobial Sensitivity Testing: The methods that were used for antimicrobial sensitivity testing were:

Disc Diffusion Method

Nutrient agar was prepared and 20mls was dispensed into a sterile petridish. It was allowed to solidify then the test organism was inoculated onto it. It was allowed to diffuse and the desired antibiotics disc was evenly distributed on the inoculated plate with the aid of a sterile forceps. It was incubated at 37°C for 24hours. Zone of inhibition was measured to the nearest mm.

Cup Plate Method

Nutrient agar was prepared and 20mls was dispensed into a sterile petridish. It was allowed to solidify. The test organism was inoculated onto it, and then allowed to diffuse. Holes of about 6mm were bored using a sterile cork borer. The agar plugs were removed using a sterile ampoule file. The antimicrobial agent was diluted to give the same concentration as the disc for each antibiotic. 0.1ml of the antimicrobial solution was placed in each hole. It was left at room temperature for 1 hour and then incubated at 37°C for 24hours. Zone of inhibition was measured and recorded to the nearest mm.

RESULT

A total of 250 urine samples were collected from patients attending Ahmadu Bello University Health Service Clinic (Sickbay), Salama Hospital and Major Ibrahim Abdullahi Memorial hospital. Out of the 250 samples 43(17.2%) were positive for bacterial infection, of the 43 bacterial isolates 19(7.60%) were *E. coli* and 24(9.60%) were *K. species* as shown in Table 1.

Table 2 shows the antibiotic susceptibility profiles of *E. coli*, 6(31.6%) of the *E. coli* isolates were susceptible to the antibiotic discs of ampicillin while 12(63.2%) were resistant, however, 19(100%) of the isolates were resistant to the commercially obtained antibiotic at the same concentration. Similarly 13(68.4%) of the *E. coli* isolates were resistant to gentamicin obtained from the vendors compared to 11(57.9%) that were susceptible to the antibiotic discs. Moderate susceptibility was observed with ciprofloxacin commercially obtained because 7(36.8%) of the isolates were susceptible and still 7(36.8%) of same *E. coli* were considered to be intermediate and only 5(26.3%) were resistant to ciprofloxacin. *K. species* isolates were totally resistant 24(100%) to the commercially available ampicillin, 10(41.7%) were also resistant to gentamicin and only 7(29.2%) were resistant to the ciprofloxacin commercially obtained. However, *K. spp* were fairly susceptible to ciprofloxacin and gentamicin laboratory discs but resistant to ampicillin 19(79.2%) as shown (Table 3).

Table 1: *Escherichia coli* and *Klebsiella* Species Isolated from Clinical Samples

ORGANISM	ABUHSC (SICKBAY) n=90	SALAMA HOSPITAL n=80	MIAMH HOSPITAL n=80	TOTAL n=250
E. coli	3(3.33%)	9(11.25%)	7(8.75%)	19(7.60%)
K. species	12(13.33%)	8(10.00%)	4(5.00%)	24(9.60%)
Total	15(16.66%)	17(21.25%)	11(13.75%)	43(17.20%)

Key: n- number of samples analysed
ABUHSC- Ahmadu Bello University Health Service Clinic
MIAMH- Major Ibrahim Abdullahi Memorial hospital

Table 2: Susceptibility of *Escherichia coli* to Antibiotics

Antibiotics(µg)	No of isolates	Susceptible (%)	Intermediate (%)	Resistant (%)
AMP(SD)	19	6(31.6)	1(5.2)	12(63.2)
AMP(C)	19	0(0)	0(0)	19(100)
CPX(SD)	19	10(52.6)	8(42.1)	1(5.3)
CPX(C)	19	7(36.8)	7(36.8)	5(26.3)
CN(SD)	19	11(57.9)	0(0)	8(42.1)
CN(C)	19	6(31.6)	0(0)	13(68.4)

Key: SD- sensitivity test discs C- Commercial antibiotics AMP- ampicillin (30µg)
CPX- ciprofloxacin (10µg) CN- gentamicin (10µg)

Table 3: Susceptibility of *Klebsiella Species* to Antibiotics

Antibiotics(µg)	No of isolates	Susceptible (%)	Intermediate (%)	Resistant (%)
AMP(SD)	24	4(16.7)	1(4.2)	19(79.2)
AMP(C)	24	0(0)	0(0)	24(100)
CPX(SD)	24	15(62.5)	7(29.2)	2(8.3)
CPX(C)	24	2(8.3)	15(62.5)	7(29.2)
CN(SD)	24	10(41.7)	2(8.3)	12(50.0)
CN(C)	24	12(50.0)	2(8.3)	10(41.7)

Key: SD- sensitivity test discs C- Commercial antibiotics AMP- ampicillin (30µg)
CPX- ciprofloxacin (10µg) CN- gentamicin (10µg)

DISCUSSION

K. species was the highest organism isolated from urine samples of patients attending Ahmadu Bello University Health Service Clinic (Sickbay), while *E. coli* was the highest organism isolated from urine samples of patients attending Salama Hospital and Major Ibrahim Abdullahi Memorial hospital (Kaduna State Ministry of Health). This work suggests that *K. species* and *E. coli* are the leading aetiological agent of UTI among these patients during the time of this study. This agrees with the work of Bashir *et al.*, (2008), Onifade *et al.*, (2005) Aiyegoro *et al.*, (2007) who isolated *E. coli* as the leading aetiological agent in their studies. The susceptibility profile of these isolates showed relatively higher level of sensitivity to Gentamicin and Ciprofloxacin which is in agreement with findings by Nwanze *et al.*, (2007). High resistance to Ampicillin was also observed corroborating the findings of Awoniyi *et al.*, (2009). This observation is attributed to earlier exposure of the isolates to the drug which may have enhanced resistant development (Ehinmidu, 2003). It could also be due to practices of self medication and indiscriminate use of this antibiotic and the acquiring of plasmid encoded resistant genes (Akinyemi *et al.*, 1997). The resistance of most of the isolates to the commercially sold antibiotics can also be attributed to the nature of storage of these drugs, prolong exposure to other environmental factors such as heat, moisture, sunlight as well as humidity.

The findings have no doubt highlighted the need for constant monitoring of susceptibility of specific pathogens in different populations to commonly used anti-microbial agents, so as to determine trends of antimicrobial susceptibilities; to formulate local antibiotics policies and to assist clinician in the rational choice of antibiotics therapy to prevent misuse or over use of the antibiotics.

REFERENCES

Aiyegoro, O.A., Igbinosa, O.O., Ogunmwonyi, I.N., Odjadlare, C.E., Igbinosa, O.E., Okoh, A.I (2007): Incidence of Urinary Tract Infections (UTI) among Children and Adolescents in Ile-Ife, Nigeria. *African Journal of Microbiology Research*. 13-19.

Akinyemi, K.O., Alabi, S.A., Taiwo, A. and Omonigbehin, E.A. (1997). Antimicrobial Susceptibility Pattern and Plasmid Profile of Pathogenic Bacteria Isolated form Subjects with Urinary Tract Infection in Lagos, Nigeria. *Nigeria Quarterly Journal Hospital Medicine*. **1:** 7-11.

Awoniyi, D.O., Udo, S.J. and Oguntibeju, O.O. (2009). An Epidemiological Survey of Neonatal Sepsis in a Hospital in Western Nigeria. *African Journal of Microbiology Research*. **3(6):** 385-389.

Brenner, B.M., Wiggins, R.C., Jacobson, H.R., Warnock, D.G., Elbadawi, A. and Glayhack, J.T. (1991). *Urinary Tract Infection in Adults.* National Kidney and Urologic Disease Information Clearinghouse.

Bashir M.F, Qazi J.I., Ahmad, N. and Riaz S. (2008). Diversity of Urinary tract Pathogens and Drug resistant Isolates of *Escherichia coli* in different gender groups of Pakistanis. *Tropical Journal of Pharmaceutical Research*. **7(3):** 1025-1031.

Cheesebrough, M. (2004): *District Laboratory Practice for Tropical Countries*. Macmillan Publishing Company, U.S.A. 67-68,137,141,180.

Ehinmidu, J.O (2003): Antibiotics Susceptibility Pattern of Urine Bacterial Isolates. *Tropical Journal of Pharmaceutical Research*. 2(2). 223-228.

Inabo, H.I. and Obanibi, H.B.T. (2006). Antimicrobial Susceptibility of Some Urinary Tract Clinical Isolates to commonly used antibiotics. *African Journal of Biotechnology*. **5(5):** 487-489.

Johnson, J.R. (1991). Virulence factors in Escherichia coli Urinary Tract Infection. *Clinical Microbiology Reviews*. **4(1):** 80-128.

University of Texas Health Science Center at San Antonio (2008, February 8). Drug-resistant E. Coli And Klebsiella Bacteria Found In Hospital Samples And Elsewhere In US.*ScienceDaily*. Retrieved December 12, 2011, from http://www.sciencedaily.com-/releases/2008/02/080208161610.htm

Nwanze P.I, Nwaro L.M, Oranusi S., Dimkpa U., Okwu M.U, Babatunde B.B, Anake T.A, Jatto W., Asagwara C. E(2007): Urinary Tract Infection in Okada Village: Prevalence

and Antimicrobial Susceptibility Pattern. *Scientific Research Essay.* **2(4).** 112-116.

Olaitan O. J. (2006): Asymptomatic Bacteriuria in Females Students Population of a Nigerian University. *The Internet Journal of Microbiology* **2** (2).

Onifade A.K, Omoya F.O, Adegunloye D.V (2005): Incidence and Control of Urinary Tract Infection among Pregnant Women attending Antenatal Clinics in Government Hospitals in Ondo State. *Journal of Food Agriculture and Environment*. **3(1)**: 37-38.

Prescott L., Harley J., and Klein, D. (2007): *Microbiology*. 7th Edition. Mc GrawHill Company, U.S.A. 558-559.

Theodore M. (2007): Prevalence and Antibiogram of Urinary Tract Infections among Prison Inmates in Nigeria. *The Internet Journal of Microbiology* **3**(2).

World Health Organisation (2009): Antimicrobial Resistance. Media Centre. *Programmes & Projects*