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Antibiotic Susceptibility Profile of Enteric Bacteria from Hospital Stool Samples in Jos

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Abstract

Two hundred and fifty stool samples collected from patients attending ECWA Evangel Hospital Jos were investigated for enteric bacteria. The susceptibility profiles of the isolates were determined using the agar disc diffusion method. Organisms isolated were *Escherichia coli, Salmonella* and *Shigella* species. The susceptibility result revealed that all the organisms were susceptiblie to ciprofloxacin, spafloxacin, pefloxacin and ofloxacin. All isolates were resistant to amoxicillin, chloramphenicol, streptomycin, augmentin and sulphamethoxazole-trimethoprim. The result suggests the use of fluoroguinolones (ciprofloxacin, ofloxacin, spafloxacin, pefloxacin) as the drug of choice for the treatment of enteric infections in this environment.

Keywords: Antibiotic Susceptibility, *Escherichia coli, Shagella* and *Salmonella*

1.0 Introduction

Enteric infections are major causes of morbidity and mortality in the developing world resulting in over a quarter of all childhood deaths. Globally, *Shigella* and *Salmonella* remain the major contributors to acute enteric infections (Momtaz *et al.,* 2000). World wide, emergence of antibiotic resistance in all kinds of bacteria is a major public health issue (Miller *et al.,* 2002). Reduced susceptibility of enteric pathogens and emerging of resistant strains to some antibiotics such as ampicilin, cotrimoxazole, chloramphenicol and tetracycline (Momtaz *et al.,*2000). Tzonyo *et al.,* (2007) also reported reduced susceptibility to ciprofloxacin in *Salmonella paratyphi*. The work of Egah *et al.* (2003) also revealed that most strains of *Shigella* isolated from stool were resistant to ampicilin, chloramphenicol, cotrimoxacilin nalidixic acid and tetracycline. For the fact that antibiotic susceptibility patterns of enteric pathogens have been changing and also that not much information exist on the antibiotic susceptibility pattern of enteric bacteria in Jos, routine monitoring of the antibiotic resistance will provide data for antibiotic therapy and resistance control. This work was conducted to isolate and determine the antimicrobial susceptibility patterns of enteric bacterial isolates from stool.

2.0 Materials and Methods

2.1 Sample Collection

Two hundred and fifty stool samples were collected from patients recommended for stool culture at the ECWA Evangel Hospital Jos and processed for enteric bacteria. Stool samples were streaked onto MacConkey and *Salmonella-Shigella* agars and were incubated at 35 – 37^{0}C for primary isolation. Inoculation into Selenite-F enrichment broth and subculturing on *Salmonella-Shigella* agar were performed to improve the recovery of *Salmonella*. Suspect colonies were identified as *Escherichia coli, Salmonella* and *Shigella* special on the basis of morphology. Gram stain, motility, as well as indole and carbohydrate fermentation tests.

2.2 Antibiotic Susceptibility Testing

Antibiograms for *Escherichia coli, Salmonella* and *Shigella* isolates were determined by the disc diffusion technique according to the National Committee on Clinical Laboratory Standards (NCCLS) guidelines (Edwards and Betts, 2000). The following antibiotic discs were used: (Chloramphenicol (30µg), Spafloxacin (10µg), Ciprofloxacin (10µg), Amoxicillin (30µg), Gentamicin (10µg) Pefloxacin (30µg), Ofloxacin (10µg), Streptomycin (30µg), Augmentin (30µg) and Sulphamethoxazole-trimethoprim (30µg).

3.0 Results

Out of the two hundred and fifty stool samples collected during this study, *Escherichia coli* was isolated in all (100%) while *Salmonella* and *Shigella species* had percentage occurrences of 9.6% (24 isolated) and 5.6% (14 isolates) respectively. The

percentage susceptibilities and resistances of the isolates to the antibiotics tested are presented in Table 1, while the comparative resistances of the isolates to the antibiotics are presented in Figure 1. All the isolates were susceptibly to ciprofloxacin, spafloxacin, pefloxacin, and ofloxacin. There was variation in resistances to amoxicilin, Chloramphenicol, Streptomycin, Augmentin and Sulphamethoxazol-trimethoprim. However, the isolates were more resistant to amoxicilin, augmentin, chloramphenicol, sulphamethoxazole-trimethoprim.

Table 1: Antibiotic Susceptibility Rates of *E. coli Shagella* and *Salmonella* isolates

Antibiotics	Percentage Susceptibility			Percentage Resistance		
	E. coli	*Salmonella*	*Shigella*	*E. coli*	*Salmonella*	*Shigella*
SXT	54.8	29.2	21.4	45.2	70.8	78.6
CH	11.6	12.5	35.7	88.4	87.5	64.3
CPX	100	100	100	0	0	0
AM	28.8	45.8	28.6	71.2	54.2	71.4
CN	90.4	95.8	100	9.6	4.2	0
AU	14.4	16.7	42.9	85.6	83.3	57.1
PEF	100	100	100	0	0	0
OFX	100	100	100	0	0	0
S	94.8	20.8	57.1	5.2	79.2	42.9
SP	100	100	100	0	0	0

Key

SXT	-	Sulphamethoxazole-trimethopim
CPX	-	Ciprofloxacin
PEF	-	Pefloxacin
OFX	-	Ofloxacin
CH	-	Chloramphenicol
AU	-	Augmentin
CN	-	Gentamicin
SP	-	Spafloxacin
AM	-	Amoxacillin
S	-	Streptomycin

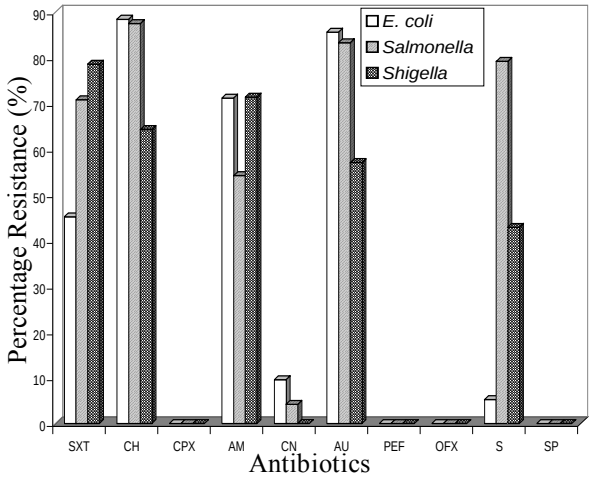

Figure 1: Comparative Resistance of *E. coli, Salmonella* and *Shigella* isolates to the Antibiotics

4.0 Discussion

This study indicates that *E.coli, Salmonella* and *Shigella* are the most commonly isolated enteric bacteria from stool. The occurrence of these pathogens shows that infections such as typhoid, gastroenteritis etc. are likely to be common. Poor hygienic and sanitary conditions may be implicative in the possible spread of these pathogens. *Escherichia coli* was isolated in all the stool samples probably because they are normal human commensals.

All the isolates (*Salmonella, Shigella* and *E. coli*) were susceptible to the fluroquinolones (ciprofloxacin, pefloxacin, spafloxacin and ofloxacin). This agrees with the report of David *et al.,* (2006), that fluroguinolones have become the drug of choice for the empirical treatment of acute diarrhoea in adults, because they are active against most of the common treatable enteric organisms, have excellent tissue and intracellular penetration, achieve high faecal concentration, suitable for oral administration and have a favourable safety profile in adults.

The varying resistances of isolates to chloramphenicol, amoxacilin, sulphamethoxazole-trimethoprim, gentamicin, augmentin and streptomycin (non-fluoroquinolones) maybe attributed to emergence of new strains probably due to indiscriminate use of antibiotics, poor hygiene and infection control which are highly prevalent in Nigeria and other developing countries. The work of Egah *et al.,* (2003) also revealed that *Shigella* isolates were resistant to non-fluoroquinolones (Chloramphenicol, ampicillin, co-trimoxazole, nalidixic acid and tetracycline).

In conclusion, the high susceptibility of the isolates to ciprofloxacin spafloxacin, pefloxacin and ofloxacin, implies that they could be used as drugs of choice in the treatment of infections due to enteric bacteria in this environment.

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