

## AETIOLOGIC AGENTS OF DIARRHOEA IN CHILDREN UNDER FIVE YEARS OF AGE IN OSOGBO, OSUN STATE.

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A survey of the aetiological agents of diarrhoea in children under 5 years of age was carried out in Osogbo, Osun State. A total of 135 patients visiting the outpatient and children emergency units of LAUTECH Teaching Hospital were examined. Strains of *Shigella* isolated were tested for antibiotic sensitivity. Consideration of the distribution showed that *Escherichia coli* was more prevalent in children aged between 3 to 5 years (57%) and was the most encountered of the organisms isolated (present in 77.8% of all samples) while *Shigella spp* was found in 16.3% of samples, *Vibrio cholerae* 0.7% and other coliforms 5.2%. Statistical analysis showed that *E. coli* was significantly associated with diarrhoea in the patients aged 3-5 years ( $P < 0.05$ ). *Shigella spp* was shown to show some resistance to tetracycline and high sensitivity to ofloxacin.

### INTRODUCTION

Diarrhoea is a leading cause of morbidity and mortality among children in developing countries (1). It has been found to be associated with bacteria, viruses and protozoa. However the pathogens most commonly associated with children diarrhoea were found to include *E. coli*, *Vibrio spp*, *Salmonella*, *Shigella spp*, and parasitic agent, *Giardia lamblia* (3). Rotavirus has been implicated in recent study, being more pronounced during the dry season (4). Some factors such as poor food hygiene, water and sanitation combine to facilitate the spread of enteropathogens and epidemics in such areas (5). *E. coli* has been implicated as the prevalent aetiological agent of Infantile

diarrhoea in Nigeria; exhibiting numerous strains(6). The epidemiological significance of each *E. coli* strain in childhood diarrhoea varies with geographical area (7). Although extensive investigation of diarrhoea in Nigeria have not been reported, the diarrhoea-specific mortality in children less than 5 years of age in Africa has been estimated at about 10.6 per 1000. Although oral rehydration has been shown to reduce early child mortality (8), it is a general belief that malnutrition may increase the duration or severity of diarrhoea in young children, while diarrhoea may lead to symptoms of malnutrition in them (8). This study investigates the aetiological agents of childhood diarrhoea in Osogbo

and their susceptibility to some antibacterial drug.

## **MATERIALS AND METHODS**

### **Study area/ sample source**

The study was carried out at the children and emergency and out patient departments of the Teaching Hospital, LAUTECH CHS Osogbo. Stool samples were collected from patients presenting with diarrhoea into sterile sample bottle. One hundred and five stool samples were collected over a period 10 months (from middle of July 2001 to April 2002) and analyzed.

### **Microbial Analysis**

The samples were examined for signs of diarrhoea (9). Tenfold serial dilution was carried out on those samples found consistent with the description for diarrhoea using sterile normal saline as diluent. 1.0ml of appropriate dilutions were inoculated onto Thiosulfate-Citrate-Bile Salt-Sucrose agar medium, Salmonella-Shigella agar medium and MacConkey agar, according to described method (6). Rectal swab specimens were directly inoculated onto each agar plate by routine techniques. The colonies that grew on each medium were examined and the organisms characterized. The *Shigella* strains isolated were tested for susceptibility to some antibiotics (ampicillin,

tetracycline, cefdinir, ofloxacin and erythromycin.) and the minimum inhibitory concentration (MIC) of each drug was determined by plate dilution technique.

## **RESULTS**

All the samples were positively identified as diarrheal stool. Bacteriological analysis showed that of a total of 135 isolates recovered from the stool samples; 77 were strains of *Escherichia coli*, others are *Shigella* 22, *Vibrio cholerae* 1, and other coliforms 7 (Table 1). A consideration of the age distribution shows that *E. coli* was more prevalent in children aged between 3 to 5 years (57%) and was the most encountered of the organisms isolated. A strain of *Vibrio cholerae* was also observed in a sample from children within the ages of 3-5yrs. Seasonal variations in incidence of bacterial diarrhoea is shown on Table 2. It was found to be prevalent during wet season ( $P>0.05$ ). A total of 93 (68.9%) isolates were recovered during the wet season compared to 42 (31.1%) recovered in the dry season. The frequency of isolation of *E. coli* was also higher in the wet season than dry season (52.6% and 25.2% respectively).

Table 3 shows the susceptibility pattern of the 22 strains of *Shigella spp* examined. All the shigella isolates were

resistant to tetracycline and erythromycin but were susceptible to ofloxacin. Two peaks of MICs were found for ampicillin 3.1 and

100 mg/ml or greater. Almost all the MICs of cefdinir were distributed in a narrow range, from 0.1 to 0.4 mg/ml.

**Table 1: Incidence and age distribution of enteropathogens isolated**

Pathogen	Yr	Yr	Yr	(Total n = 135)
	< 1yr	1-2%	3-5%	
<i>E.coli</i>	16(11.9%)	12(8.9)%	77(57%)	
<i>Shigella</i>	2(1.5) %	12(8.9)%	8(59%)	
<i>Other coliforms</i>	2(1.5) %	3(2.2) %	2(1.5) %	
<i>Vibro cholerae</i>	-(-)	(-)	1(0.7%)	
	<b>20</b>	<b>27</b>	<b>88</b>	<b>135</b>

**Table 2: Incidence and Seasonal Variation of Enteropathogens Isolated From Patients presenting at Hospital in Osogbo**

Organism	Nos of Isolates.		
	Dry	Rainy	Total%
<i>Shigella</i>	6(4.4)%	16(11.9)%	22(16.3)%
<i>E.coli</i>	34(25.2)%	71(52.6)%	105(77.8)%
<i>Other coliforms</i>	2(1.5)%	5(3.7)%	7(5.2)%
<i>Vibro cholerae</i>	0(-)	1(0.7)%	1(0.7)%

**Table 3: Drug susceptibility pattern of shigella spp isolated from patients Presenting at hospital in Osogbo.**

Minimum Inhibitory Concentration (MIC) mg/ml	ABPC	AT	EM	CFDN	OFLX
	< 0.025	0	0	0	0
0.05	0	0	0	0	8
0.1	0	0	0	1	11
0.4	0	0	0	12	2
0.8	0	0	0	9	1
1.6	1	1	0	0	0
3.1	5	0	0	0	0
6.3	3	0	2	0	0
12.5	1	0	1	0	0
25	0	0	3	0	0
50	0	6	6	0	0
> 100	12	13	10	0	0

**ABPC: Ampicilin,**

**AT: Tetracyclin**

**CFDN: Cefdinir**

**EM: Erythromycin**

**OFLX: Ofloxacin**

## DISCUSSION

Diarrhoeal diseases are part of the main social problems in Osogbo, as in other developing countries in tropics (1,11). Clarification of the enteropathogens involved in diarrhoeal diseases in the country is an essential step toward the implementation of effective primary health care activities against the diseases. This study provides information on the prevalence of enteropathogens in a distinctive area, Osogbo, Osun State. Although it may not give a complete picture of the genuine spectrum of diarrhoeal diseases in the community, the survey is still significant as it is, based on information available to us, the first intensive survey of the etiological agents of diarrhoeal disease in Osogbo.

*Escherichia coli* and *Shigella spp* were identified in this study as the major causes of diarrhoeal diseases in Osogbo. They are bacteria that have been consistently identified as aetiological agent of diarrhoea. Statistical analysis showed that *E. coli* was significantly associated with diarrhoea in patients aged 3-5 years ( $P < 0.05$ ). It was found to be more prevalent than the other enteropathogens, which is consistent with the result of other researchers (11, 12). While the isolation of *Shigella spp* is also

similar to results obtained by other workers, the frequency of isolation of *Shigella spp* (16.3%) in this area was higher than those reported in other tropical countries (1, 9). This could be indicative of the important role *Shigella spp* plays in the outbreak of diarrhoea in children aged less than 5 years. The seasonal variation in incidence of the pathogen is similar to results obtained elsewhere (13, 14).

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