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Epidemiological Survey of the Most Prevalent Bacteria Responsible for Infantile Diarrhoea in Southwest, Nigeria

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The bacteria most frequently isolated from cases of infantile diarrhoea was investigated in Southwestern part of Nigeria from January 2005 to March 2007. Out of the 800 stool samples collected from cases in the 6 states that made up the region, 392 (49.0%) showed bacterial growth. Out of these, 88.5% was positive for *Escherichia coli*. The other organisms isolated are *Shigella* species (3.8%), *Klebsiella* species (2.8%), *Staphylococcus aureus* (2.6%), *Proteus* species (1.8%) and *Salmonella* species (0.5%). From this investigation therefore, *Escherichia coli* is the most prevalent cause of infantile diarrhoea of bacteria origin in this part of the world.

Key words: Infantile diarrhoea, *Escherichia coli.*

Infantile diarrhoea, which is an illness characterized by an increase in frequency and fluidity of stools is prevalent in most developing countries and occurs more often in infants during or shortly after weaning (Kosek *et al*., 2003).

Besides poor standards of personal and household hygiene, lack of potable water, consumption of contaminated and inadequately prepared foods, indiscrimate dumping of feaces on open fields are the other factors which enhance both the susceptibility to and the severity of infantile diarrhoea (Waldermann, 1998; Prescott *et al*., 2005).

According to Black (2004), as many as two million children die annually from this infection. The microorganisms frequently responsible for infantile diarrhoea are *Escherichia coli, Salmonella* species, *Shigella* species, *Staphylococcus aureus*, *Clostridium difficile*, *Enterobacter* species, *Campylobacter jejuni*, *Vibrio cholerae*, *Yersinia enterocolifica*, *Aeromonas* species, *Rotavirus* and *Entamoeba histolytica* (Evan, 2002; Prescott *et al*., 2005).

Since information is virtually non-available on the type of bacteria that is the most prevalent cause of this infection in this part of the world, this survey was carried out to know which of these common bacteria is the most prevalent cause of this infection in Southwest, Nigeria.

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Table 1. Characterization of the different Bacterial Isolates

Isolate No.	Gram's Reaction	Motility	Catalase	Coagulase	Indole	Methyl Red	Voges Proskauer	Citrate	Lactase (acid)	Glucose (acid)	Urease	Mannitol	DNase	Organisms
1.	-	+	N/A	N/A	+	+	-	-	+	+	-	+	N/A	*Escherichia coli,*
2.	-	-	N/A	N/A	+/-	+	-	-	-	-	-	+	N/A	*Shigella* sp
3.	-	-	N/A	N/A	+	+/-	+/-	+/-	+/-	+/-	+/-	+	N/A	*Klebsiella* sp
4.	-	+	N/A	N/A	-	+	-	+	-	+	-	+	N/A	*Salmonella* sp
5.	-	+	N/A	N/A	-	+	-	+/-	-	+	+	-	N/A	*Proteus* sp
6.	+	-	+	+	N/A	N/A	N/A	N/A	+	+	N/A	N/A	+	*Staphylococcus aureus*
+	Positive	-	Negative	+/-	Some strains positive, some negative				N/A	Not applicable				

MATERIAL AND METHODS

A total of 800 stool samples were collected using sterile wide-mouthed container with screw-capped lid from children below 5 years in the paediatric wards of some hospitals and Primary Health Care centres in Southwestern part of Nigeria. The investigation was carried out for 15 months in the different study locations.

A loopful of the different stool samples collected was inoculated (a stool sample per plate) onto selective media such as Desoxycholate Citrate Agar (DCA) for the isolation of *Salmonella* and *Shigella* species, Eosin Methylene Blue agar for *Escherichia coli*, and MacConkey for the isolation of *Proteus* species, *Klebsiella* species and *Staphylococcus aureus*. The agar plates were incubated at 37°C for 24 hours. The isolates were subjected to Gram's reaction and various biochemical tests such as sugar fermentation, indole, citrate etc and the results were interpreted according to Cheesbrough (1994).

RESULTS

In this study, where the epidemiological investigation of different bacteria causing infantile diarrhoea was carried out, six different types of bacteria were isolated and identified. These are *Escherichia coli, Shigella* species, *Klebsiella* species, *Salmonella* species, *Staphylococcus aureus* and *Proteus* species. The result of the characterization of these organisms is shown in Table 1.

Out of the 800 stool samples that were examined, only 392 (49.0%) showed bacterial growth, 374 (88.5%) of these were positive for *Escherichia coli,* 15(3.8%) for *Shigella* species, 11(2.8%) for *Klebsiella* species, 10 (2.6%) for *Staphylococcus aureus,* 7(1.8%) for *Proteus* species while 2 (0.5%) for *Salmonella* species (Table 2). Table 3 shows the distribution of the different bacteria isolated among the different states in South west, Nigeria.

DISCUSSION

Up till today, diarrhoea is still a problem worldwide especially in developing countries (Tuong and Scott, 1999; Black, 2004).

Table 2. Frequency of occurrence of the different types of bacteria isolated from cases of infantile diarrhoea in South west, Nigeria.

Type of Bacteria	No of Positive	% of occurrence
Escherichia coli	347	88.50
Shigella sp	15	3.83
Klebsiella sp	11	2.81
Staphylococcus aureus	2	0.51
Proteus sp	7	1.80
Salmonella sp	10	2.55
Total	392	100.0

Table 3. Distribution of the different Bacteria Isolated among the different States in Southwest, Nigeria

State	*Proteus* sp	*Staphylococcus aureus*	*Salmonella* sp	*Klebsiella* sp	*Shigella* sp	*Escherichia coli*	Total
Ondo	2(0.5)	2(0.5)	2(0.5)	1(0.3)	2(0.5)	72(18.4)	81(20.7)
Lagos	0(0.0)	2(0.5)	0(0.0)	5(1.3)	5(1.3)	80(20.4)	92(23.5)
Oyo	0(0.0)	2(0.5)	0(0.0)	0(0.0)	2(0.5)	45(11.5)	49(12.5)
Ekiti	3(0.8)	2(0.5)	0(0.0)	0(0.0)	0(0.0)	30(7.7)	35(8.9)
Ogun	0(0.0)	0(0.0)	0(0.0)	0(0.0)	3(0.8)	25(6.4)	28(7.1)
Osun	2(0.5)	2(0.5)	0(0.0)	5(1.3)	3(0.8)	95(24.2)	107(27.3)
Total	7(1.8)	10(2.6)	2(0.5)	11(2.8)	15(3.8)	347(88.5)	392 (100)

From the result of this investigation, *E. coli was* found to be the most frequently encountered bacteria responsible for infantile diarrheic cases in southwest, Nigeria. This result is in agreement with a similar study carried out by Hulian *et al.* (1991) where a 2 year aetiological survey of acute diarrhoea in children aged 0-35 months in five countries; China, India, Mexico, Myanmar and Pakistan showed that out of a total 3640 cases in all the centers, the most frequently encounter bacteria was Enterotoxigenic *Escherichia coli* (16%).

In the six states where the investigation was carried out in this study, Osun state recorded the highest incidence of *Escherichia coli* 95 (24.2%) while Lagos, Ondo, Oyo, Ekiti and Ogun states recorded 80 (20.4%), 72 (18.4%), 45 (11.5%), 30 (7.7%) and 25 (6.4%) respectively. The least encountered bacteria in this study was *Salmonella* species in all the states except Ondo. In this epidemiological investigation therefore, *Escherichia coli* is the most prevalent cause of infantile diarrhoea of bacteria origin in Southwest, Nigeria.

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