

Short Communication

Carrier rate of enteric bacteria associated with diarrhoea in children and pupils in Akure, Ondo State, Nigeria

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One hundred stool samples were collected from children and pupils in Akure, Ondo State, Nigeria. These were examined for the presence of enteric bacteria associated with diarrhea. Seventy of the samples were collected from apparently healthy pupils in some public primary schools in Akure, while thirty samples were collected from children in the Children's Ward of the Ondo State Specialist Hospital, Akure. All the samples were pre-enriched for *Salmonella* and *Shigella* in selenite-F broth and also streaked on MacConkey and Deoxychocolate citrate agar plates. The following bacterial were isolated; *Shigella dysenteriae*, *Salmonella enteritidis*, *Yersina enterocolitica*, *Klebsiella pneumoniae*, *Providencia* sp., *Pseudomonas aeruginosa*, *Escherichia coli*, *Proteus vulgaris*. *S. dysenteriae* was found to be most frequent in children aged six to twenty-four months and one to twelve years. The carrier rate of *S. dysenteriae* among males was very high compared to the females and there was high rate of bacteria isolates among the children of poor socio-economic status, poor sanitation and poorly breast-fed children.

Key words: Diarrhoea, deoxychocolate citrate, enteric, transmission.

INTRODUCTION

Diarrhoea is a disease commonly encountered both in urban and rural centers of Nigeria (Olajide and Edet, 1992). Risk factors that predispose children to diarrhoea include poor sanitation, poor social economic status and malnutrition (Njoku-Obi and Anozie, 1984). Diarrhoea remains public health problem all over the world and acute diarrhoea due to bacterial infections is one of the main causes of childhood morbidity and mortality, especially in developing countries (Katouli et al., 1990). Diarrhoea is a symptom of the response of the intestinal tract to a variety of primary diseases. It is usually less harmful to adult than to children due to the development of active immunity (Herald et al., 1993; WHO, 1992).

There are various types of clinical symptoms of diarrhoea including watery diarrhoea, dysentery, persistent diarrhoea and chronic diarrhoea (Herald et

al., 1993; WHO, 1992). Acute watery diarrhoea is the passage of frequent watery stools without visible blood and which may involve vomiting and fever. Dysentery is diarrhoea with visible blood in the faeces which causes rapid weight loss, anorexia and damage to the mucosa by the invasive bacteria (Peterson et al., 1998). Persistent diarrhoea is usually of a long duration at least 14 days in which episodes begin either as watery diarrhoea or as dysentery resulting in weight loss and dehydration (Bhardwaj et al., 1996). However, there is no single microbial cause for persistent diarrhoea (WHO, 1992).

This study was designed to determine the carrier rate of some enteric bacteria associated with acute diarrhoea cases in public primary school pupils and hospitalized children in Akure, Ondo State, Nigeria.

Table 1. Description of the physical appearance of stool samples collected from patients and school pupils in Akure, Ondo State, Nigeria.

Physical appearance	Number of samples from in patients	Number of samples from pupils of various schools	Total number of samples collected
Samples with mucus only	8 (27%)	6 (8.6%)	14
Sample with mixed mucus	12 (40%)	10 (14.3%)	22
Samples with visible blood	6 (20%)	4(5.7%)	10
Samples without mucus and blood	4 (13%)	50 (71.4%)	54
Total	30	70	100

Table 2. Distribution of isolation of enteric bacterial from stool samples from patient and school pupils in Akure, Ondo State, Nigeria.

Stool sample	Total number of samples collected	Number of samples with growth of bacterial	Number of samples without growth of bacterial	Number of samples with mixed culture	Number of sample with single culture
Pupils	70	40	15	30	35
Patients	30	15	Nil	10	5
Total	100	55	15	40	40

Table 3. Frequency of occurrence of bacterial isolates among the sexes of both in-patients and pupils sampled in Akure, Ondo State, Nigeria.

Organism	Male (%)	Female (%)
<i>Shigella dysenteriae</i>	30(75)	10(25)
<i>Salmonella enteritidis</i>	10(71.4)	4(28.6)
<i>Klebsiella pneumoniae</i>	5(62.5)	3(37.5)
<i>Yersinia enterocolitica</i>	5(62.5)	3(37.5)
<i>Providencia</i>	1(50)	1(50)
<i>Escherichia coli</i>	4(66.7)	1(33.3)
<i>Pseudomonas aeruginosa</i>	2(66.7)	1(33.3)

MATERIALS AND METHODS

A total of 100 stool samples were collected from children between the ages of 0 – 10 years. Thirty of the samples were collected from hospitalized children in the children's ward of State Hospital Akure with the age group ranging from less than 6 months to 5 years. Ten samples each were collected from seven public primary schools. The samples were collected in sterile specimen bottles having the names and ages of patients written on the sides of each bottles. Care was taken to select pupils who have not received treatment with antibiotics for four weeks prior to sample collection. All the samples were transferred immediately into the laboratory for analyses.

Selective and differential solid media as well as enrichment broth were used for the primary isolation of enteric organisms. These include MacConkey agar, deoxychocolate citrate agar (oxid) and selenite F (oxid), an enrichment broth. Biochemical tests such as methyl red, motility, kligler iron agar, indole, catalase, urease and oxidase were carried out on the bacterial isolates using conventional techniques of Buchaman and Gibbons (1974) and Cowan and Steel (1993).

RESULTS AND DISCUSSION

The description of the physical appearance of stool samples collected from both in patients of state hospital and pupils of various public primary schools in Akure, Nigeria was shown in Table 1. Out of the 100 stool samples analyzed, 10 of the samples contained visible blood, 22 contained visible blood mixed with mucus and 14 contained mucus while 54 samples were free of mucus and blood.

Table 2 shows the occurrence of enteric bacteria in the stool samples examined in which out of 100 samples, 55 showed bacteria growth after 24 h of incubation. Fifteen of these 55 samples were collected in patients and the other 40 from pupils. A total of 150 bacterial species were isolated. Out of these, 80 bacterial were isolated from deoxychocolate citrate agar (DCA) and 70 from MacConkey agar (MCA). The orga-

nisms were identified as *Salmonella enteritidis*, *Shigella dysenteriae*, *Proteus vulgaris*, *Yersinia enterocolitica*, *Providencia* species and *Pseudomonas aeruginosa*. Table 3 shows the frequency of occurrence of bacterial isolates among the sexes of both in-patients and pupils. It shows from the table that male children have the highest frequency of these bacteria than females.

Diarrhoea has been reported to occur among all age groups particularly in the developing countries and has been highly prevalent among children in the first two years of life (Patwari et al., 1993). However, acute diarrhoea due to bacteria infections is an important cause of morbidity and mortality in infants and young children in most developing countries including Nigeria (Njoku-Obi and Anozie, 1984).

The pupils (children) from primary schools investigated were all healthy as at the time of samples collection and bacteria isolated from their stool shown in Table 2 corresponds with report from other developing regions (Njoku-Obi and Anozie, 1984). Out of the 100 samples analyzed, only 15 did not show any bacteria growth on any of the media used.

Incidence of bacteria among pupils of primary school strongly suggests that individuals studied have either just acquired the organisms at an early stage of infections or suffered from previous infections due to organisms and hence are carriers of the organisms. The wide array of organisms agrees with previous work (Katouli et al., 1990) that simultaneous infection by some pathogens may lead to a synergistic effect on the severity of the disease.

Sixty percent of the stool samples contained blood and mucus (Table 1) suggesting dysentery, which may be caused by *Shigella dysenteriae*. Ulceration of large areas of the intestine caused the presence of fresh blood in the stools (WHO, 1992). The ability of the organisms to invade and destroy epithelial cells is responsible for the inflammatory and dysenteric diarrhoea they cause (WHO, 1992). The information

derived from the most hospitalized children sampled who tested positive were usually taken to the less educated nannies, private day-care centers which are not properly equipped with some facilities such as good toilets, clean water, environment free from flies and refuse. Others were taken care of at homes where the children can have direct contact with animal faeces, dust and wastes. Therefore, improving child care practices would reduce diarrhoea due to most frequent enteropathogens.

REFERENCES

- Bhardwaj A, Aggarwal V, Chakravarty A, Miltak SK (1996). Does rotavirus infection cause persistent diarrhoea in childhood. *Trop. Gastroenterol.* 17 (1): 18 –21.
- RE, Gibbons WE (1974). *Bergey's Manual of determinative bacteriology*. 8th Ed. Williams and Wilkins Company. Baltimore USA. pp.???
- Cowan ST, Steel KJ (1993). *Manual for the identification of Medical Bacteria*. 3rd Ed. Cambridge University Press Inc. (London). pp.???
- Herald B, Rahim H, Barelay D, Freive WB, Dirhen H (1993). Nutritional and environmental risk factors for diarrhoea diseases in Ecuadotian children. *Diarrhoea Dis. Res.* 11(3): 137 – 142.
- Katouli M, Jaaffari A, Farhouni A, Ketabi. GR (1990). Aetiological studies of diarrhoea diseases in infants and young children in Iran. *J. Trop. Med. Hyg.* 9(3): 22 – 27.
- Njoku-Obi, Anozie SO (1984). Outbreak of diarrhoea caused by enteropathogenic *E. coli* in a new born unit. *Nig. J. Microbiol.* 4(1): 15 – 19.
- Olajide B, Edet MPH (1992). Evaluation of the Health Education Services of the Oral dehydration therapy Unit in Unviersity College Hospital. *J. Nursing Sci. Dept.* 2(1): 170 – 174.
- Patwari AK, Manorama Deb, ridie Duidyaj (1993). Clinical and Laboratory Prediators of invasive diarrhoea in children less than five years old. *J. Diarrhoea Dis. Res.* 11 (4): 211 – 216.
- Peterson AM, Nelson SE, Meyer D, Ganer P, Lade Foged K (1998). Bacterial gastro-enteritis in hospitalized patients in Roskelde Countries. *Ugesterifit for Laeger*, 160 (4): 429 – 433.