ISOLATION AND PREVELENCE OF BACTERIA ASSOCIATED WITH DIARRHOEA IN CHILDREN VISITING HOSPITALS IN ANYIGBA

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Abstract

Bacteriological investigations of diarrhoeal diseases were carried out among 60 children between the ages of 0 – 60 months using stool samples from three different hospitals in Ayingba, Dekina Local Government Area of Kogi State. Out of the 60 children, 32 had diarrhoea associated with bacteria. The bacteria isolated were *Escherichia coli* (46.9%), *Salmonella* species (28.1%), *Shigella* species (21.9%), and *Staphylococcus aureus* (3.1%). Statistical association was observed between age and the presence of the bacteria isolates with the age group 13- 24 months having the highest occurrence of the bacterial isolates (21.7%) followed 37 – 48 months (11.7%) and the least occurrence in the age group 0 – 12 months (5.0%). It was found that *Escherichia coli* was the most frequently isolated bacteria. The study revealed the presence of diarrhea among infants in Anyigba.

Key words: Diarrhoeal diseases, Bacteria, Infants

INTRODUCTION

Diarrhea is the passage of unusually loose or watery stools, usually at least three times within 24 hour period. Prolonged diarrhea may lead to excessive loss of fluid, salt and nutrient in the faeces. The main cause of death from acute diarrhea is dehydration, which result from loss of fluid and electrolyte in stool. Another important cause of death is dysentery and under nutrition (Sinclair *et al.,* 2003). Diarrhea is an important cause of under nutrition because patients eat less during diarrhea and their ability to absorb nutrients is reduced. Moreover, nutrient requirement is increased as a result of infection (Sinclair *et al.,* 2003). Risk factors that predispose children to diarrhea include poor sanitation, poor social and economic status and malnutrition (Andu *et al.,* 2002).

Diarrhoeal diseases are major attendance at health facilities, a common cause of admission to many of the hospitals in the country, and a significant and often preventable cause of death. The clinical symptoms of diarrhea include the passage of frequent loose or watery stool without visible blood (Bahal *et al.,* 2001), vomiting may occur and fever may be present. The most important cause of acute watery diarrhea in young children in Nigeria include rotavirus, enterotoxigenic *Escherichia coli, Shigella*, *Campylobacter jejuni*, and *Cryptosporidia*, *Vibrio cholerae*, *Salmonella* and enteropathogenic *Escherichia coli* (Bahal *et al.,* 2001).

Another clinical symptom of diarrhea is dysentery, which refers to diarrhea with visible blood in faeces, the symptoms of which include anorexia, rapid weight loss and damage to the intestinal mucosa by invasive bacteria. The organisms implicated in this type of diarrhea include *Shigella*, *Campylobacter jejuni*, *Salmonella* and very rarely *Entamoeba histolytica* (Bahal *et al.,* 2001).

Transmission of agents that cause diarrhea are usually by the faecal oral route, which include the ingestion of faecal contaminated water or food, person to person contact and direct contact with infected faeces. Host factors that increase susceptibility to diarrhea include under nutrition, current or recent measles and immune deficiency or immunosupression (Andu *et al.,* 2002).

Diarrhea disease is part of the social problems in Nigeria and in other developing countries in the tropics. Diarrhea disease is a leading cause of morbidity and mortality among young children in low income countries.

The diarrhea specific mortality in children less than 5 years of age in Africa has been estimated at about 106 per 1000. Therefore, the prevalence is not fully understood and the isolating technique is rather too expensive (Olowe *et al.,* 2003).

Anyigba is located in the Eastern part of Kogi State with majority of its inhabitants depending on private boreholes and the Ogane-Aji River. This river is often contaminated with faecal materials. The level of hygiene of the people of this area and their social-economic status might likely predispose the inhabitants and especially infants to the risk of contracting diarrhea.

Therefore, the aim of the study is to assess the association of bacteria isolated from diarrhea in infants visiting hospitals in Anyigba and its public health implications.

MATERIALS AND METHODS

Sample Collection and Handling

A total of 60 fresh faecal samples were collected from 60 patients with acute diarrhoea in the three hospitals in Anyigba. The faecal samples were collected into a clean, sterile container

(Universal bottles and Swabs) in accordance with standard routine procedure (Perilla, 2003). Faecal specimens were stored at 4°C initially at the hospitals and then transported to Kogi State University Microbiology laboratory.

Enumeration and Identification of Bacteria

A loopful of each sample was separately streaked on prepared MacConkey agar plates under aseptic condition. The streaked plates were incubated for 18 – 24 hours at 37^0C. After incubation, the plates were observed for bacterial growth. Colonies that grew were further sub-cultured repeatedly to obtain pure isolates. The bacteria isolates were identified following the methods outlined by Fawole and Oso (1988).

RESULTS

Table 1 shows age distribution of diarrhoeal children in the three hospitals examined. Out of the 60 samples examined, 32 samples were positive for bacterial growth and the highest incidence occurred in the age group of 13 – 24 months (21.7%). The lowest occurrence was in age group of 0 – 12 months with 3 positive samples representing 5.0%. There was statistical association between age and bacterial diarrhea (X^2 = 16.926, p<0.05).

Table 2 shows the occurrence of bacteria associated with diarrhea in the study subjects with *Escherichia coli* having highest frequency of occurrence of 15 (25.0%) followed by *Salmonella* species with 9 (15.0%), *Shigella* species 7 (11.7%) and *Staphylococcus aureus* 1 (1.7%).

Table 1: Age distribution of diarrhoeal children in Anyigba

Age group (months)	No. of sample examined	Positive	Percentage (%)
0 -12	7	3	5.0
13- 24	15	13	21.7
25- 36	13	4	6.7
37-48	16	7	11.7
49-60	9	5	8.3
Total	**60**	**32**	**53.4**

$$X^2 = 16.926, P<0.05$$

Table 2: Distribution of Bacterial Organisms Isolated from diarrhoeal children in Anyigba

Bacteria of	Number of isolates	Percentages (%)	
		Per Total No. of Bacteria Isolated Analyzed	Per Total No. Samples
Escherichia coli	15	46.9	25.0
Salmonella species	9	28.1	15.0
Shigella species	7	21.9	11.7
Staphylococcus aureus	1	3.1	1.7
Total	**32**	**100**	**53.4**

DISCUSSION

The prevalence of bacteria associated with diarrhea in this study was 53.4%. This is similar to earlier works by Abdullahi *et al.* (2010) and Sule *et al.* (2011) who reported 40.67% and 44% prevalence. However, this is in contrast to a report of 83.1% from similar study in Abakaliki, South – Eastern Nigeria (Ogbu *et al.,* 2008). The finding in this present study is not consistent with the reports of 63.3%-71.83% in Tanzania but

consistent with the reports of 50-60% in other developing countries (Vargas *et al.,* 2004). The disparity in prevalence in Nigerian cities might be attributed to differences in infrastructural and socioeconomic indices.

The study showed that *Escherichia coli* appeared to be the predominant bacteria causing diarrhea followed by *Salmonella* species, *Shigella* species and *Staphylococcus aureus* in that order. The isolation of *Staphylococcus aureus* in one of the sixty samples analyzed indicates the possibility of Staphylococcal food poisoning. 46.6% of the sixty diarrhea cases investigated had no bacterial pathogen suggesting viral, protozoan or non pathogenic factors. Bacterial pathogens were isolated more in the age group 13 – 24 months (21.7%), followed by age group 37 – 48 months (11.7%) with the least from the age group 0 – 12 months (5.0%) which suggest an association between age and bacterial diarrhea.

The reason for high incidence of bacteria isolates in age group 13 – 24 months could be due to the fact that children within this age group on their own cannot differentiate between what to eat and what not to eat; they have not learnt the rudiment of adherence to aseptic or hygienic practice and can barely express themselves (Sule *et al.,* 2011). Those between the ages of 0 – 12 months are essentially under their mothers care, feeding mainly on breast milk thereby reducing their susceptibility to these pathogens. The predisposing factors that enhance spread and increase the risk of diarrhea in young children include failure to breast feeding exclusively for the first 4 – 6 months of life (Sule *et al.,* 2011). The risk of developing diarrhea is greater in non-breast fed infants than those exclusively breast fed. Breast feeding until at least one year of age or prolonged breast feeding reduces incidence and severity of diarrhea disease (Abdullahi *et*

al., 2010). The uses of infant feeding bottle which may be contaminated with bacteria, under nutrition, immunodeficiency or immune suppression, current or recurrent measles attack are among the risk factor.

Most diarrhea episodes occur during the first 2 years of life due to combined effects of declining levels of maternally acquired antibodies, the lack of active immunity in the infant, the introduction of food that may be contaminated with faecal bacteria and direct contact with human or animals faeces when the infant start to grow (Patwari *et al.,* 1993). Most enteric pathogens stimulate at least partial immunity against repeated infection or illness, which helps to explain the declining incidence of disease in older children and adults (Patwari, *et al.,* 1993).

The study also shows that more bacterial pathogens were isolated in female (31.7%) than in males (21.7%) which is in contrast to the work of Abdullahi *et al.* (2010) where they reported that male children were more infected (22.33%) than female children (18.33%).

CONCLUSION

This study shows that though there are a number of causative agents of diarrheal diseases, bacteria still remain one of the major causes with *Escherichia coli, Salmonella spp* and *Shigella spp* being the most important bacterial pathogens among infants in Anyigba, Dekina Local Government Area of Kogi State. This can be minimized by improving personal hygiene, quality of drinking water and treatment of infected cases as well as quick isolation and treatment of infected cases as well as encouragement of breast feeding for lactating mothers.

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