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Cryptosporidium and Other Intestinal Protozoan Parasites in Rural Communities of Moro Local Government Area,Kwara State, Nigeria

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The prevalence of intestinal protozoan parasites was assessed in March to June 2012 among school children in four rural primary schools of Moro Local Government area of Kwara State, Nigeria. Wet preparation in fresh normal saline, Dobell's iodine preparation and formol ether concentration methods were used to prepare the stool samples for examination. Another drop of the formol ether concentration sediment on centre of the slide was stained with modified Ziehl Neelson method for oocysts of Cryptosporidium. Overall prevalence of intestinal protozoan parasite detected in the four rural primary and Cryptosporidium spp. We also found that most of the pupils infected with Entamoeba histolytica/dispar have diarrhoeic stool usually without complain by the pupils. Factors that enhance the distribution of these protooan parasites and how to improve community health and personal hygiene were discussed.

Keywords: Cryptosporidium, Entamoeba histolytica/dispar, protozoan parasites, personal hygiene, Kwara State.

INTRODUCTION

On a global scale, intestinal diarrheal diseases are second only to cardiovascular diseases as a cause of death [1]. They are the leading cause of childhood death,especially in some populous developing countries; they are responsible for more years of potential life loss than other causes combined [2]. It is estimated that 4,600,000to 6,000,000 children die each year (>12,600/day) in Asia,Africa and Latin American [3,4]. Diarrhoea diseases are leading cause of childhood morbidity and mortality in developing countries and an important cause of malnutrition in some older children of school age [5].Diarrhoea ranked among the largest numbers of reported notifiable disease in Nigeria [6]. The aetiological agents of diarrhoea in endemic areas include a wide variety of bacteria, viruses and parasites. Protozoan parasitic agents responsible for diarrhoea and other gastroenteritis condition include Entamoeba histolytica, Giardia lamblia and Cryptosporidium species. Others such as Isospora,Microsporidium, Balantidium coli, Chilomastix mesnili,Endolimax nana and Cyclocpora are often of less frequently investigated.

Cryptosporidium species is a primary pathogen causing acute diarrhoea, with nonspecific signs, such as dehydration fever, anorexia, weakness and progressive loss of conditions may be accompanied. Although this diarrhoea is usually self-limiting in immunocompetent humans,however, it can be life-threatening in children with protein energy malnutrition [7,8]. It can be the cause of frequent absenteeism in school and overall poor performance. The literature implicates this protozoan parasite is in three main epidemiological scenarios-

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namely: Sporadic, often water-related, outbreaks of self-life-threatening illness in immunocompromised patients,malnutition in younger children of school age in developing countries[9].

Entamoeba histolytica causes low abdominal pain and acute attacks of dysentery with blood and mucous in faeces. Several intestinal amoebiasis produce an overwhelming amoebic colitis which can be fatal, and may disseminate into liver and other organs. This parasite is endemic in many parts of tropical and subtropical African and its distribution is associated with inadequate sanitation and poor personal hygiene. It has been estimated that about 10% of those with intestinal amoebiasis may develop amoebic liver disease, and that annually probably 40,000-110,000 people die from invasive amoebiasis worldwide [10]. Giardia lamblia has a worldwide distribution but particularly common in the tropics and subtropics especially in areas where water supplies and the environment become faecally contaminated. This parasite causes abdominal pain,severe diarrhoea, vomiting, weight loss and malabsorption with lactose intolerance [11].

Previous studies on childhood protozoan parasitic pathogens associated with diarrhoea have been reported in several papers of paediatric, non-paediatric and other Journals, these were either hospital based reports or urban area reports and did not include factors that may influence their distribution in rural areas. The aims of this study were to determine the prevalence and types of intestinal protozoan parasites in rural population and to examine factors that may influence their distribution among primary school age pupils.

MATERIALS AND METHODS

Study Sites

Study sites were four rural primary schools in Moro Local Government area of Kwara State of Nigeria. The communities were Malete, Elemere, Ore-olumoh and Animaje. For thisstudy diarrhoea was defined as passing loose or watery stool within the immediate 24 hours period [7]. Consent to carry out this work was rigorous and it started from village heads, which had to pass instruction to clan head or their representative, then the family members. Consent was also obtained from the school head teachers and local health authority. Some parents whose parent did not consent were excluded from the study.

Sample Collection

All pupils that consent to the study were enrolled by collection of their bio-data and information on diarrhoea status. No history of receiving anti-helminthics and anti-protozoan drugs for the past three months by pupils in the schools. Pupils were given a sterile universal bottle,to collect their stool samples in nearby toilet. Those who were unable to collect their samples immediately were asked to bring the stool passed first in the morning to school the second day. These were collected on the second day while pupils were in morning assembly.

Sample Examination

Macroscopic examination was done on each sample as soon as they reached the laboratory usually less than two hours after collection fro the pupils. This was used to assess the diarrhoeic condition of the pupils. Particular attention was paid to watery, presence of mucus and blood in stool.

Microscopic preparation was done first in normal saline.A drop of fresh physiologic saline was placed on one end of a slide and a drop of Dobell's iodine was placed on the other.Using a wire loop, about 2 mg of formed or loose formed specimen was mixed in each solution until a smooth thin preparation was made, and a coverslip was applied to the slide. Material from the interior of the faecal sample, as well as the surface, was included. Watery The preparations were examined first with 10X objectives for trophozoites and cysts. These were confirmed with 40X objectives. Cysts of protozoan parasites were better identified in Dobell's preparation. Several microscope fields were examined with a 40X objectives before reporting a specimen as no parasites found [12,13].

Ridley modified formol ether concentration technique [14] was used to improve on the recovery of the cysts and oocysts of protozoan parasites from the samples that were missed in wet preparation. The sediments were examined by placing one drop each on left side and another on right"side of the slide. A drop of Dobell's iodine was added to the left preparation for the identification of cysts of Giardia lamblia and Entamoeba histolytica/dispar. Both preparations were covered with coverslips and examined. Another drop of sediment was placed at centre of second slide, allowed to air dried and stained using modified Ziehl-Neelsen method, which was used for detection of Cryptosporidium species [14].

RESULTS

Pupils of four primary schools in rural communities of Moro Local Government area of Kwara State were enrolled for the study. The vilages were Malete, Elemere,Ore-Olumoh and Animaje with pupils population size of 156 (males 81, female 75); 115(males 47,females 68);76(males 38, females 38) and 67 (males 31, females 36)parasites detected in the stool specimens of the pupils,

Table 1. Distribution of Intestinal protozoan parasites among pupils.

	Villages			
	Malete	Elemere	Ore-Olumoh	Animaje
Parasites	n(%)	n(%)	n(%)	n(%)
Eh	41(26.9)	37(32.2)	17(22.7)	16(23.7)
Gl	13(8.3)	10(8.7)	11(14.7)	8(11.7)
Cry	34(21.8)	24(20.9)	23(30.7)	25(38.8)

Key:Eh: Entamoeba histolytica/dispar, Gl: Giardia lamblia; Cry: Cryptosporidlum specles; n:number, %: Percentage,

they were trophozoites/cysts of Entamoeba histolytica,flagellate form/cyst of Giardia lamblia and oocysts of Cryptosporidium species. Overall prevalence of intestinal protozoan parasite detected in the four rural primary schools was 59.9%. The prevalence of Entamoeba histolytica/dispar is higher among the pupils in the two villages of Elemere and Malete with prevalence of 32.2%,and 26.9% respectively, while Cryptosporidium species was second. Cryptosporidium species was higher in Ore-Olumoh and Animaje with 30.7% and 38.8% respectively as shown in Table 1. Giardia lamblia had the lowest prevalence in among the pupils of the four villages. The prevalence of these parasites among the pupils whose ages range from 5 years to 15 years (from primary one to six) along with their sexes is shown in Table 2.

Sources of domestic water supply in these villages include; bore holes usually built by government or her agencies, well and stream/river. Sources of water supply to pupils' homes were obtained through questionnaire.The distribution of protozoan parasites and water sources is presented in Table 3. Most of the villages understudy relied on bore holes for water use than well and stream,for example 129 out of 156 (82.7%) of pupils use bore holes in Malete. However, 41.8% pupils in Elemere use stream/river as their water source. The prevalence of Entamoeba histoltytica/dispar infection was significantly higher among stream/river (41.1%) users than those that use bore holes (19.4%) in children of Malete, while there was no significant difference of this infection among pupils of other villages. Similarly there was higher significant difference of Giardia lamblia infection among pupils of Malete that used stream/river (23.5%) than pupils of same village that use bore hole (9.3%) (Table 3).

Stool specimens of the pupils were examined for consistency such as watery or fluid, semi-formed and hard formed. None of the stool samples were found to contain blood or mucous. Protozoan parasitic distribution among various consistencies of stool is shown in Table 4.Most of protozoan infections were found in watery stool.However, there were other watery stool samples whose aetiologic agents were not found to be intestinal protozoan parasite (Table 4).

DISCUSSION

Intestinal protozoan parasitic infections cause a public health problem in Nigeria, especially in rural areas where there is inadequate water supply, poor personal hygiene and nutritional deficiencies. The result of the present study showed the occurrence of three intestinal protozoan parasites among the school children in the four rural communities studied. The prevalence of Entamoeba histolytica/dispar was highest in Elemere (32.2%),followed by 26.7%,23.7% and 22.7% in Malete (26.7%),Animaje (23.7%) and Ore-Olumoh (22.7%) while the distribution of Cryptosporidium species and Giardia lamblia varied in each of the four communities as shown in Table 1. Other intestinal protozoans such as Balantidium coli, Chilomastix mesnili, Endolimax nana and lodamoeba butschlii were not found in the present study; though they were previously reported in Island of Bioko (Equatorial Guinea)[15].

The high prevalence of Entamoeba histolytica/dispar infection among these children may cause the possibility of this disease developing into extra-intestinal pathology and leading to amoebic liver abscess (ALA) and mortality [16]. Previous studies have indicated that approximately only 10% of E. histolytica infected individuals showed clinical symptoms with intestinal symptom [17].Cryptosporidium has a prevalence of 21.8%, 20.9%,30.7% and 38.8% in Malete, Elemere, Ore-Olumoh and Animaje respectively. This was similar to prevalence of 35.3% previously obtained on cryptosporidiosis in llorin, a 25 kilometer town (Capital of Kwara State) away from these communities [18]. The high prevalence of infection in the children may be attributed to the economic, social and personal hygiene of the pupils, members of families and the community [19]. A number of pupils have co-infections with two or three protozoan parasites detected from their specimens; this was similar to report of Jarallah [20] in Iraq.

Previous studies have demonstrated that the carriage of the persistent diarrheal pathogen of Cryptosporidium species, Giardia lamblia and Entamoeba histolytica/dispar is associated with poor growth, poor school attendance even in the absence of diarrhoea

Table 2. Prevalence of intestinal protozoan parasitic infection in four villages according to age and sex groups.

Villages									
Age Sex	Malete	Elemere	Ore-Olumoh	Animaje					
(Years)		No of In	fection(	%)		No of In	fection (	)	
	N	Eh	GI	Cry	n	Eh	GI	Cry	ı
Male	33	3	1	6	17	3	0	5	1
5-9		(9.1)	(3.0)	(18.2)		(17.6)	(0.0)	(29.4)	
Female									
	32	12	1	8	17	6	1	3	3
		(37.5)	(3.1)	(25.0)		(35.3)	(5.9)	(17.6)	
Both	65	15	2	14	34	9	1	8	
		(23.1)	(3.1)	(21.5)		(26.5)	(1.9)	(23.5)	4
Male	47	10	6	10	29	11	3	4	1
		(21.3)	(12.8)	(21.3)		(37.9)	(10.3)	(13.8)	
4八 10-14 Female									
	41	14	4	9	42	12	4	8	1
Both		(34.1)	(9.8)	(22.0)		(28.6)	(9.5)	(19.0)	

23	8	12	27	6	4	7	2	31	1	9	1	4	14	4	2	4		0	0	0		0	0	0
			Both			3			1			10					1				3			
2.4)	(11.3)	(16.9)		(22.2)	(14.8)	(66.7)		(33.3)		(29.0)	(33.3)	(12.9)	(40)	(20)	(40)		(0.0)	(0.0)	(0.0)		(0.0)	(0.0)	(0.0)
1	1	0	1	0	0	0		0		0		0	0										
00)	(100)	(0.0)		(0.0)	(0.0)	(0.0)		(0.0)		(0.0)		(0.0)	(0.0)										
3	1	4	0	0	0	0		3		0		0	0										
3.3)	(11.1)	(44.4)		(0.0)	(0.0)	(0.0)		(0.0)		(0.0)		(0.0)	(0.0)										

Key:Eh:Entamoeba histolytica/dispar, GI: Giardia lamblia; Cry: Cryptosporidium species; n: Numbers examined.

[21,22]. Other findings suggested that overall global impact of childhood diarrhoea illnesses [23]. The distribution of the intestinal protozoan parasite among age groups 5-9, 10-14 and 15-20 years does not show any significant difference,and the sex distribution is relatively higher in both sexes as indicated in Table 2. This report was similar to the work of Jarallah [20] in a rural village of Iraq.

Another important factor that contributed to prevalence of these protozoan parasites is the availability of water for drinking and domestic uses.Water contamination is very common in rural communities because of non-availability of

association of Entamoeba histolytica/dlspar, Glardla lamblia and Cryptosporidium with watery diarrhoeic stool.We recommend adequately treated water supply to rural communities or provision of bole holes rather than use of well and stream/river, provision of sanitary disposal of human waste and improve health education and personal hygiene. All pupils found infected in these community schools were adequately treated, while each class of the schools was given health education talk on the intestinal parasites,how they were acquired and how re-infection can be prevented.

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