Prevalence of Intestinal Parasites among School Children in a Rural Community of Anambra State, Nigeria

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Abstract. A study was conducted to determine the prevalence of intestinal parasites among school children in Awka-Etiti, Anambra state, Nigeria between July and October 2012. Five hundred faecal samples were examined using direct faecal smear and concentration technique. Factors that predispose children to parasitic infection were investigated using oral interview, direct observation of the environment and structured questionnaire. Three hundred and sixty children, (72%) were infected including 149(29.80%) males, and 211(42.20%) females. *Ascaris lumbricoides* was the most prevalent helminth parasite, 133(26.60%) and *Entamoeba histolytica*, 105(21.0%) the most prevalent protozoan parasite identified. Prevalence of infection was significantly higher in the age group 9 – 11 years than in other age groups ($P<0.05$). Ogwugwudiani community school was the most affected and the difference in the rate of infection the schools was significant ($P<0.05$). Children whose parents are farmers were significantly more infected (88.0%) than other children ($P<0.05$). There was no significant difference in the prevalence of infection between the sexes ($P>0.05$). The high prevalence of infection could be attributed to the poor sanitary status and poor personal hygiene of the children. Therefore, improvement in these factors through basic health education and de-worming at intervals is highly recommended.

Key words: parasite, *Entamoeba*, prevalence, *Ascaris*, helminth, infection.

INTRODUCTION

Intestinal parasitic infections are globally endemic and have been described as constituting the greatest single worldwide cause of illness and disease. Intestinal parasitic infections are associated with lack of sanitation, lack of access to safe water, poor nutrition, improper hygiene (Steketee, 2003). People of all ages are affected by parasitic infections but children are the most affected. Intestinal parasitic infections undermine the health status of children with more than one billion of the world's population including at least 400 million school children chronically affected (Harpham, 2002).

Through out history, human have been infected by parasite from single cell protozoa to large worms living in the gastrointestinal tract. The source of parasites has been faecal contaminated soil and vegetable. Ingestion of infective eggs from soil contaminated vegetables and water is the primary route of infection. Transmission also comes through municipal recycling of waste water into crop fields (Baird *et al*., 2002).

People became infected with *Taenia solium* and *Taenia saginata* by eating under cooked meat or drink unpasteurized milk. *Giardia lamblia* and *Entamoeba histolytica* are spread by fecal contamination of drinking water and foods as well as direct contact with infected dirty hand. *Ascaris lumbricoides* can be contacted and spread by eating infected faecal contaminated food, unwashed vegetables or raw fruits. Penetration of intact skin by infective stage is a means of transmission employed by Hookworm and *Strongyloides stercoralis*. Swimming in contaminated water can also result in infestation by parasite such as *Schistosoma* sp. (Nematian *et al*., 2004). Allergies, anaemia, constipation, diarrhea, fatigue are some of the symptoms associated with parasitic infections. Waste products from parasites can irritate the nervous system resulting in anxiety and restlessness (Pillai and Kain, 2003). People with intestinal parasitic infections are usually under nourished and weak, infected with virus, fungi or bacteria (Methorn, 2001).

Intestinal helminthes may impair the development of their human host through their impact on nutrition and may affect nutrition by inducing iron-deficiency anaemia (Ezeamama *et al*., 2005). They attach themselves to the lining of the small intestine causing intestinal bleeding and loss of nutrient (Guarner, 2009).

Certain drugs are used in the treatment of intestinal parasitic infections including Piperazine, Mebendazole, Pyrantel pamoate, Albendazole etc. Intestinal parasitic infections can be prevented through basic health education with particular references to sanitation, good personal hygiene, wearing of shoes, and proper washing of hands before eating. The present study describes the prevalence and risk factors associated with parasitic infections in a rural community of South-eastern Nigeria.

MATERIALS AND METHODS

Study Area

Awka-Etiti lies between longitude 6.9667^0E and latitude 6.0333^0N in Idemili South Local Government Area of Anambra State Nigeria. It is located within the agricultural belt of Anambra State with tropical climate and distinct wet and dry seasons.

It comprises seven villages namely, Umunocha, Ejighinadu, Nkolofia, Nnaba, Ogunzelu, Umudunu and Irowelle. The inhabitants are estimated to be 14,000 people (2006 census) majority of who are farmers, some traders, artisans, few civil servants. There are primary and secondary schools, churches, microfinance bank, electricity, market, health care centres and private Hospital. Refuse are disposed in the farmland usually close to residential houses. Disposal of fecal matter is mainly by pit latrine, water closet system and indiscriminate defecation on farmlands. Source of drinking water is mainly from underground tanks.

Four schools were randomly selected for the study: Community primary school, Father Paul Primary & Secondary School, Irowele, Ogwugwudiani Community School and St. Joseph secondary School. Data on age, sex, hygiene, parental occupation were obtained using structured questionnaire and oral interview. Fecal samples were collected in wide-mouthed clean specimen containers and transported to Divine Laboratory Nnewi for parasitological examination.

Within one hour of collection, the fecal samples were examined using wet preparation and concentration technique.

In Wet preparation method a small portion of the fecal matter, taken from different sides, with an applicator sticks, was emulsified in a drop of normal saline placed on a clean grease-free glass slide. This was covered with cover slip and examined under the microscope using X10 and X40 objective lens.

Parasites which could not be seen using wet preparation method due to light infection were concentrated using Formalin-Ether concentration technique. In a clean glass test tube about 3g of faeces was thoroughly mixed in distilled water. The content was strained through two layers of wire gauze into a centrifuge tube. This was centrifuged for 5mins. The supernatant was discarded and it was re-suspended in 7mls of 10% Formaldehyde to which 3ml of Ether was added and shook vigorously to mix. This was centrifuged for 5 minutes and the supernatant poured off. The sediment was put on a clean grease-free glass slide and examined under the microscope using X10 and X40 objective lens. The results were recorded and analyzed statistically using Chi-square test.

RESULTS

Of the 500 fecal samples examined, 360 were positive with overall prevalence of 72.0%. Ogwugwudiani Community School had the highest prevalence, 82.40% and St. Joseph Secondary School had the least prevalence of 77.60% as shown in Table 1. The difference in the rate of infection among the schools was significant ($P<0.05$).

The prevalence of intestinal parasites in relation to age is shown in Table 2. The highest prevalence 84.67% was observed among the children aged 9 – 11 years whereas children aged 18 – 20 years had the least prevalence, 63.33%.

Ascaris lumbricoides was the most common intestinal parasites with the prevalence of 26.60% whereas *Trichuris trichiura* was not common and had the lowest prevalence of 2.40%. Difference in the rate of infection among the age groups was statistically significant ($P<0.05$).

In table 3, children who drink mainly water from well were mostly infected, 93.75% with *Ascaris lumbricoides* (41.25%) and *Entamoeba histolytica* (18.75%) being the most common

parasites observed among them. Those who drink sachet water harboured the least number of parasites, 62.50%. Also, children who defecate in the bush harboured more parasites (80.59%), than those who defecate in pit-latrine (67.78%) and water closet system (66.67%). The difference in the infection rate was significant (P<0.05).

Table 4 shows sex related prevalence of intestinal parasites. The males were 149(78.42%) infected more than the females 211(68.06%). The difference in the rate of infection was not significance (P>0.05).

The prevalence of intestinal parasites in relation to the occupation of the children's parents is shown in table 5. Children whose parents are farmers were significantly more infected (88.0%) than children whose parents are business and civil servants (P<0.05).

Table 1: Prevalence of the intestinal parasites among the four schools in Awka-Etiti

Schools	Total No. Examined	Total No +ve	*Ascaris* No (%)	*E. histolytica (%)*	Hookworm (%)	*G. lamblia* (%)	*T. trichiura* (%)
Community primary school Umunocha	125	100 (80.00)	50 (40.00)	15 (12.00)	20 (16.00)	12 (9.60)	3 (2.40)
St. Joseph Secondary School Ejighinadu	125	97 (77.60)	32 (25.60)	39 (31.20)	10 (8.00)	16 (12.80)	0 (0.00)
Father Paul Primary & Secondary School, Irowele	125	60 (48.00)	19 (15.20)	16 (12.80)	12 (9.60)	9 (7.20)	4 (3.20)
Ogwugwudiani Community School Umudunu	125	103 (82.40)	32 (25.60)	35 (28.00)	19 (15.20)	12 (9.60)	5 (4.00)
Total	500	360 (72.00)	133 (26.60)	105 (21.00)	61 (12.20)	49 (9.80)	12 (2.40)

Number in parenthesis indicate percentage infection

Table 2: Age specific prevalence of intestinal parasite of school children in Awka-Etiti

Age group	Total No. Examined	Total No +ve	*Ascaris* No (%)	*E. histolytica (%)*	Hookworm (%)	*G. lamblia* (%)	*T. trichiura* (%)
6 – 8	80	60(75.00)	20(25.00)	23(28.75)	15(18.75)	0(0.00)	2(2.50)
9 – 11	150	127(84.67)	21(27.33)	36(24.00)	24(16.00)	26(17.13)	0(0.00)
12 – 14	100	65(65.00)	35(30.00)	14(14.00)	10(10.00)	11(11.000	0(0.00)
15 – 17	50	32(64.00)	30(30.00)	10(20.00)	0(0.00)	0(0.00)	7(14.00)

18 – 20	120	76(63.33)	27(22.50)	22(18.33)	12(10.00)	12(10.00)	3(2.50)
Total	500	360(72.00)	133(26.60)	105(21.00)	61(12.20)	49(9.80)	12(2.40)

Number in parenthesis indicate percentage infection

Table 3: Prevalence of intestinal parasite in relationship between hygiene/sanitation

Source of drinking water	Total No. Examined	Total No +ve	*Ascaris* No (%)	*E. histolytica (%)*	Hookworm (%)	*G. lamblia* (%)	*T. trichiura* (%)
Well water	80	75*93.75)	33(41.25)	15(18.75)	8(10.00)	15(18.75)	4(5.00)
Sachet water	200	125(62.50)	45(22.50)	30(15.00)	35(17.50)	10(5.00)	5(2.50)
Bore hole water	220	160(72.73)	55(25.00)	60(27.27)	18(8.18)	24(10.9)	3(1.36)
Total	500	360(72.00)	133(26.60)	105(21.00)	61(12.20)	49(9.80)	12(2.40)
Toilet system used							
Water system	60	40(66.67)	10(16.67)	15(25.00)	8(13.33)	5(8.33)	2(3.33)
Pit toilet	270	183(67.78)	52(18.26)	68(25.19)	23(8.52)	32(11.85)	8(2.96)
Bush pathway	170	137(80.59)	71(41.76)	22(12.94)	30(17.65)	12(7.06)	2(1.18)
Total	500	360(72.00)	133(26.60)	105(21.00)	61(12.20)	49(9.80)	12(2.40)

Number in parenthesis indicates percentage infection.

Table 4: prevalence of intestinal parasite in relation to sex

Sex	No. examined	Number infected (%)	Number uninfected (%)
Male	190	149(78.42)	41(21.58)
Female	310	211(68.06)	99(31.94)
Total	500	360(72.00)	140(28.00)

Number in parenthesis indicate percentage infection

Table 5: Prevalence of the intestinal parasite according to occupation of parents especially mothers

Occupation of parents especially mothers	Total No. Examined	Total No +ve	*Ascaris* No (%)	*E. histolytica (%)*	Hookworm (%)	*G. lamblia* (%)	*T. trichiura* (%)
Farmer	250	220(88.00)	78(31.20)	62(24.80)	49(19.60)	28(11.20)	3(1.20)
Business	150	100(66.67)	32(21.33)	13(20.67)	12(8.00)	15(10.000	4(2.67)
Civil servant	100	40(40.00)	23(23.00)	12(21.000	0(0.00)	6(6.00)	5(5.00)
Total	500	360(72.00)	133(26.60)	105(21.20)	61(12.20)	49(9.80)	12(2.40)

Number in parenthesis indicates percentage infection.

DISCUSSION

The result of this study revealed intestinal parasitic infections are a public health problem in Awka-Etiti and Eastern Nigeria. Parasitic infections are wide spread in rural areas of Eastern Nigeria where humid environment, traditional ways of life contaminated soils and water, and limited health services contribute to the transmission and persistence of fecal parasites. In this study, the overall prevalence, 72% is very high with *Ascaris lumbricoides*, 26.06% being the most common parasite and *Trichuris trichiura* 2.4% being the least common parasites. Our findings are in consistent with that of Damen *et al*., 2011 who reported an overall high prevalence of 80.90% with *Ascaris lumbricoides*, 19.1% being the most common parasites and *Trichuris trichiura* (3.5%) being the least common in similar rural North-eastern Nigeria.

High prevalence of intestinal parasites, 58.5%, although less than the 72% recorded in the present study, was also reported by Houmsou *et al*. (2010) in Makurdi, Benue State, North-central Nigeria.

Also consistent with the finds of the present study are the findings of Endris *et al*. (2010) who reported high prevalence of 72.9% in a rural area of Ethiopia, Legesse and Erko (2004) who reported a high prevalence of 83.8% in South-East lake of Langano Ethiopia. The prevalence of intestinal parasites reported in this study is greater than that reported by Aschalew *et al*. (2013) who reported 34.2% prevalence in North West Ethiopia. Damen *et al*, (2010) who reported prevalence of 30.2% in North central Nigeria, and Tadesse (2005) who reported a prevalence of 27.2% in Babile Town in Eastern Ethiopia. These variations in the prevalence may be due to differences in climatic conditions, environmental sanitation, economic and educational status of parents and study subjects as well as previous control efforts.

In our study, *Ascaris lumbricoides*, 26.60%, was the most common parasite. This confirms the study by Damen *et al* (2010); Orji *et al.,* (2012); Ifeadike *et al*., (2012) who reported Ascaris as the most common parasites. On the other hand, studies by Houmsou *et al*., (2010); Lindo *et al*., (2002) and Aschalew *et al*., 2013) who reported Hookworm as the most common parasites. This may be attributed inadequate drinking water and poor sanitation of the study area. In this study, males, 78.42% were infected more than the females 68.06%. This is in contrast to the report of Jang and Luo (2003) and Aschalew *et al*., (2013) where females were more infected, but is consistent with the findings of Houmsou *et al.* (2010); Ikon and Useh (1999). This may be attributed to the fact that males are more often engaged in predisposing activities such as football, barefoot, playing in stream or ponds.

Our findings indicate that the young age groups (6 – 14) were more infected than the older age group (15 – 20) years. This may be due to the fact that children in the age group 6 – 14 years play a lot outdoors with barefoot, forage in garbage dumps and eat discarded food remains in their immediate environment which may be fecal contaminated and eat indiscriminately with unwashed hands. They know very little about hygiene. On the other hand, in the age group of 15 – 20 years, the low prevalence observed could be as a result of awareness of hygiene and dangers of poor hygiene and as such avoid possible predisposing factors. This confirms studies by Houmsou *et al*., (2010); Luka *et al*., (2000); Lindo *et al*., (2002).

Our findings also revealed children who drink well water, defecate in bush, and whose parents are farmers were heavily infected. Also with the exception of Hookworm other parasites reported in this study can be acquired through fecal-oral route. This depicts the level of risk such as poverty, sanitation, illiteracy, ignorance, poor hygiene and lack of public health education in most rural setting and inadequate drinking water. These are major contributors to parasitic diseases in the developing world. Therefore, improvement in all these factors is important in the control of parasitic infection. The present study demonstrates the usefulness of fecal examination in developing countries especially in rural areas in monitoring the prevalence intestinal parasites and in assessing the effectiveness of public health interventions and other control measures.

CONCLUSION

The very high prevalence of parasitic infection in Awka-Etiti revealed in this study is a great public health concern and calls for government urgent intervention through mass deworming

and creation of public health awareness on the helminth diseases and their association with poor sanitary and hygiene status.

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