Original Article

Parasitology

Prevalence of Helminth Parasite Eggs in Pupils and Playing Grounds of some Selected Primary Schools in Zaria, Nigeria

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ABSTRACT [ENGLISH/ANGLAIS]

One hundred soil samples were collected from the playing grounds of four primary schools in Zaria, Nigeria as well as 100 stool samples from randomly selected pupils in the 4 schools and examined for the presence of helminth eggs/larvae. Formol ether concentration technique was used for both soil and faecal samples. The result of this study showed that *Ascaris lumbricoides* was more prevalent in soil samples, while Hookworm was more prevalent in stool samples. Pupils in age group 13-15 had more helminth infection and females had a higher prevalence of the helminths. It was concluded that pupils of these schools may have played a role in the contamination of their school environment or vice versa.

Keywords: Ascaris lumbricoides, Hookworm, environment, hygiene

RÉSUMÉ [FRANÇAIS/FRENCH]

Une centaine d'échantillons de sol ont été prélevés dans les terrains de jeux de quatre écoles primaires de Zaria, au Nigeria, ainsi que 100 échantillons de selles provenant de hasard élèves sélectionnés dans les 4 écoles et examinés pour la présence d'œufs d'helminthes / larves. Formol technique de concentration éther a été utilisé pour les deux échantillons de sol et de matières fécales. Le résultat de cette étude a montré que Ascaris lumbricoides était plus fréquente dans les échantillons de sol, tandis que l'ankylostome était plus fréquente dans les échantillons de selles. Les élèves de 13-15 groupe d'âge avaient une infection plus helminthes et les femelles ont une prévalence plus élevée des helminthes. Il a été conclu que les élèves de ces écoles peuvent avoir joué un rôle dans la contamination de leur environnement scolaire ou vice versa.

Mots-clés: Ascaris lumbricoides, ankylostomes, de l'environnement, de l'hygiène

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INTRODUCTION

Intestinal helminths infections are among the most common infections occurring throughout the developing world [1]. Between 500 million and one billion people are estimated to be infected annually [2]. In many parts of the developing world, children are reported to have an intestinal helminth infection prevalence rate ranging between 50% and 80% [3]. For reasons not well understood, compared with any other age group, school-age children (including adolescent) and pre-school children tend to harbour the greatest numbers of intestinal worms and schistosomes and as a result experience growth stunting and diminished physical fitness as well as impaired memory and cognition [4].

In Nigeria, the occurrence of human intestinal helminthiasis is high [5,6,7,8], and intestinal helminths infections have continued to prevail because of low levels of living standards, poor environmental sanitation, and ignorance of simple health-promoting behaviours [5,9]. Stray dogs and cats roam freely in residential areas and public places in Zaria, hence the possibility of contamination of such places with their feaces. Previous studies [10, 11] have indicated that contact with soil in public places is a potential source of contamination with helminth ova.

Most helminth infections, if left untreated, results in multi-year chronic inflammatory disorders that cause both recurrent as well as delayed-onset pathology to the affected human host. In the light of this, there is need to survey the playing environment of school children for the presence of parasites so as to take preventive measures to avoid the impact of the disease on these children. The

present study was conducted to determine the prevalence of helminth eggs in pupils and playing grounds of some selected primary schools in Zaria, Nigeria.

MATERIALS AND METHODS

Sampling Area

Sampling for this study covered four primary schools in Zaria; 2 within Sabon Gari Local Government Area and the other 2 within Zaria Local Government Area. Samples were collected from the Ahmadu Bello University (ABU) staff primary school and a public primary school both in Sabon Gari local government area as well as from the ABU staff primary school and another public primary school, both in Kongo, Zaria Local Government Area.

Collection of Soil Sample/Analysis

Soil was scooped up to 2 cm depth and about 20 gram of it was placed into new polythene bags using a clean spoon from the playground, behind classrooms, and toilet areas from the selected primary schools in Samaru and Kongo. The samples were then taken to the laboratory for analysis. Five grams of each sample was placed in universal bottle containing (10 ml) formol saline and homogenized. The suspension was then strained through gauze folded twice and placed over a funnel to remove coarse sand particles. The filtrate was collected in a centrifuge tube (5 ml). Diethylether (1ml) was added to the filtrate, stoppered and mixed thorouly by shaking. It was then centrifuged at 2,300 revolutions per minute (rpm) for 3 minutes. The supernatant was decanted and the sediment mixed. This was then placed on a clean grease free slide and covered with a cover slip and examined microscopically using x10 and x40 objectives. The ova/larvae were identified using Atlas of Medical Helminthology and Protozoology [12] as well as Medical Parasitology [13].

Collection and Examination of Faecal Samples

A labeled wide-mouth plastic bottle was given to each of 100 pupils randomly selected in the selected primary schools. The pupils were asked to take the bottles home and return same the following morning with fresh stool samples. The samples were then transported to the laboratory for analysis. The stool samples were analyzed using formol ether concentration technique as follows;

One gram of the stool sample was emulsified in 4 mls of 10% formol saline contained in a universal bottle. Additional 4 mls of 10% formol saline was added and homogenized. The emulsified stool was sieved and collected in a centrifuge tube. 2 mls of diethyl ether was added. The tube was stoppered and mixed thoroughly for 1 minute. The stopper was loosed and the tube centrifuged at 1000g for 1 minute. After centrifugation, the faecal debrils was loosened and decanted along with the ether and formol saline leaving the sediment at the bottom. The sediment was mixed and placed on a clean grease free slide, covered with a coverslip and examined microscopically using x10 and x40 objectives. The ova/larvae were identified using Atlas of Medical Helminthology and Protozoology [12] as well as Medical Parasitology [13]

RESULTS

The prevalence of helminth eggs (32%) in soil samples collected from playing ground, behind classrooms and toilet areas of the four primary schools studied and their distribution is shown in table 1. Similarly, the prevalence of helminth eggs (29%) in stool samples collected from pupils in the four schools and their distributions are shown in table 2. The prevalence of helminth eggs in stool according to age group is shown in table 3; while table 4 shows the prevalence of helminth eggs in the various sexes of the school children sampled in the selected primary schools.

Table 1: This table shows prevalence of helminthes in soil samples from the selected primary schools in Zaria, Nigeria

School	No of samples examined	No (%) of samples +ve	Ascaris lumbricoides No (%)	Coccidia No (%)	Taenia No (%)	Toxocara No (%)	Strongyloides No (%)
ABU 1	25	11 (44)	5 (20)	2 (8)	1 (4)	1 (4)	2 (8)
PUB 1	25	6 (24)	1 (4)	2 (8)	0 (0)	2 (8)	1 (4)
ABU 2	25	8 (32)	4 (16)	1 (4)	1 (4)	0 (0)	2 (8)
PUB 2	25	7 (28)	3 (12)	1 (4)	1 (4)	1 (4)	1 (4)
Total	100	32 (32)	13 (13)	6 (6)	3 (3)	4 (4)	6 (6)

ABU 1: Ahmadu Bello University Staff school, Samaru; ABU 2: Ahmadu Bello University Staff school, Kongo; PUB 1: Public primary school, Samaru; PUB 2: Public primary school, Kongo

Table 2: This table shows prevalence of helminth eggs/larvae in stools of pupils examined from the selected primary schools in Zaria, Nigeria

School	No of Samples Examined	No(%) Of Samples +ve	Ascaris Lumbricoides No(%)	Faciola No(%)	Hookworm No(%)	Strongyloides No(%)	Toxocara No(%)
ABU 1	25	8(32)	2(8)	1(4)	3(12)	2(8)	0(0)
PUB 1	25	4(16)	1(4)	0(0)	1(4)	1(4)	1(4)
ABU 2	25	5(20)	1(4)	1(4)	2(8)	1(4)	1(4)
PUB 2	25	12(48)	3(12)	2(8)	5(20)	1(4)	0(0)
Total	100	29(29)	7(7)	4(4)	11(11)	5(5)	2(2)

ABU 1: Ahmadu Bello University Staff school, Samaru; ABU 2: Ahmadu Bello University Staff school, Kongo; PUB 1: Public primary school, Samaru; PUB 2: Public primary school, Kongo

Table 3: This table shows age distribution of helminth egg/larvae among children in the selected primary schools in Zaria, Nigeria

Age (Years)	No of Samples examined	Ascaris Lumbricoides No(%)	Faciola` No(%)	Hookworm No(%)	Srtrongyloides No(%)	Toxocara No(%)
10-12	46	2(4.3)	1(2.2)	4(8.7)	2(4.3)	0(0.0)
13-15	54	5(9.3)	3(5.6)	7(13.0)	3(5.6)	2(3.7)
Total	100	7(7.0)	4(4.0)	11(11.0)	5(5.0)	2(2.0)

Table 4: This table shows sex distribution of helminthes among children in the selected primary schools in Zaria, Nigeria

Sex	No of Samples examined	Ascaris Lumbricoides No(%)	Faciola No(%)	Hookworm No(%)	Strongyloides No(%)	Toxocara No(%)
Male	40	3(7.5)	1(2.5)	4(10.0)	2(5.0)	1(2.5)
Female	60	4(6.7)	3(5.0)	7(11.7)	3(5.0)	1(1.7)
Total	100	7(7.0)	4(4.0)	11(11.0)	5(5.0)	2(2.0)

DISCUSSION

Eggs of Ascaris, Strongyloides, Toxocara, Taenia, and coccidian cyst were found in soil samples collected from the schools studied. The presence of eggs in the soil may be suggestive of faecal pollution as adult stages of these worms reside in the intestine. This view is corroborated with the finding of eggs and larvae of similar parasites and others in the stool specimen collected from pupils in the affected schools. In some of the schools studied, adequate toilet facilities were lacking and the habit of children using toilets without washing their hands could make them serve as source of contamination of the soil with helminth eggs especially around the classrooms. The result obtained in this study is quite similar to those reported by Okon *et al* [14] and Nock *et al* [15] who had earlier done a similar work in Zaria and may indicate that these parasites are endemic in school pupils in Zaria.

The finding that Ascaris lumbricoides had the highest prevalence in soil is similar to what has been reported elsewhere [16, 17]. The high prevalence of hookworm and Ascaris in the stool of pupils could be due to the unhygienic habit of not washing hands by the pupils before eating after playing in school. The prevalence of Ascaris lumbricoides, Hookworm and Strongyloides was significantly increased as the age of the pupils increased and this agrees with the findings of Dada-Adegbola *et al* [18]. Females had a higher incidence of helminth eggs than males for all of the parasites seen with the exception of Fasciola. This finding does not agree with those of Ndamukong *et al* [16] who reported a higher incidence of helminth eggs in male pupils.

The discovery of helminth in apparently healthy pupils (this study) may be of public health concern as these seemly healthy individuals may continue to shed the parasite in stools thereby contaminating the environment and rain water could wash these parasites great distances to infect neighbouring communities. This study demonstrated the presence of helminth eggs in stools of primary school children as well as in their playing grounds in all of the selected schools examined supporting the fact that in developing countries including Nigeria, intestinal helminths have continued to prevail because of living standards, poor environmental sanitation and ignorance of health-promoting behaviours.

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CONFLICT OF INTEREST

No conflict of interests was declared by authors.