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Gastrointestinal Helminth Infections among Primary School Children in Ugbowo Metropolis Benin City.

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Abstract
Helminthic infections are among the most common and neglected infections worldwide. The prevalence of common helminthes in primary school children in Ugbowo metropolis, Benin City, Edo State, Nigeria was studied. Faecal samples were collected from 312 pupils aged 5 to 13 years. This comprised of at least 40 pupils from each of the 6 elementary grades. The freshly voided stool specimen was examined macroscopically with the naked eyes for appearance, color, and the presence of blood. This was followed by microscopic examination of samples through wet preparations and concentration techniques. The predominant parasite Ascaris lumbricoides, was found in 40 samples (12.8%). The highest prevalence of intestinal helminth infection was observed in ages 11 to 13 years to be 21(20.59%) while the least prevalence was observed in ages 5 to 7 years to be 6 (14.29%). Males had the highest prevalence of helminth infections 25 (16.23%), including some mixed infections, and compared to the females which recorded 19 (12.03%) prevalence rate. Investigation of intestinal parasitic infections should not be limited to children alone but also extend to their parents and other communities within the local government area for effective planning geared towards the control of these parasites. Therefore, while treating children infected by intestinal parasites, it is advisable to use broad spectrum or multi agent drug combinations because of multiple parasitism susceptibility in children.
Keywords: Gastrointestinal, helminth, infections, primary school children, Ugbowo metropolis

Introduction
Helminthic infections are among the most common and neglected infections worldwide[1]. They are among the most prevalent afflictions of humans living in areas of poverty in the developing world. Two billion individuals were reported to be parasitized with helminthic worms, majority of them living in resource-poor settings, 80% of these live in sub-Saharan Africa [2,3]. However, recent reports by World Health Organization puts the figure at 880 million infected children who are in need of treatment. The African medical research foundation in 2007 indicated that the young children particularly affected by intestinal helminths are from poor background, citing failure to use latrines as a major reason for the increase in the spread of parasitic helminthic worms [4]. Epidemiological surveys have revealed that poor sanitary conditions such as defecation and faecal contamination of water bodies are the most important factors leading to intestinal worm infestation while the spread is due to personal hygiene [5,6]. In Ethiopia, helminthic infections are the second most predominant causes of outpatient morbidity and this according to Kumie and Ali[7] is because Ethiopia has one of the lowest qualities of drinking water and sewage coverage in the world. Children of pre-school and school age (0 – 15years) are the groups at risk of getting infected[8,9,10]. The effects of helminthic infection in children are adverse and alarming. Intestinal parasitic worms have detrimental effects on the survival, growth, general fitness and performance of school children according to reports by De Silva[11] and WHO[12]. These infections are known to trigger immune responses in man, creating problems for the body's ability to fight diseases, thus making affected individuals more prone to co-infection as was note by Watkin and Pollitt[13]. Reports by Borkow and Bentwich[14]. indicated that helminthiasis is contributing to the unrelenting prevalence of AIDS and tuberculosis in many developing countries, particularly in Africa. Stunting of growth, iron deficiency, anaemia, rectal prolapsed and dysentery are features of intestinal helminths[15]. The burden of disease caused by helminthic parasitic worms globally is estimated to be 22.1 million disability adjusted life years lost to hookworm, 10.5 million to Ascaris *lumbricoides*, 6.4 million to *Trichuris trichiura* [16,17]. Human intestinal Helminthiasis has been studied in Nigeria by various workers over the years. Some isolated helminths common in the region include *Ascaris lumbricoides*, the whipworm *Trichuris trichuira*, the hookworm *Ancylostoma duodenale*, *Necator americanus* and *Strongyloides stercoralis*[18,19]. Periodic deworming of school children has also been instituted to curtail the problems caused by these worm infestations over the years and such programmes have been shown to improve growth and micronutrient status[10,20]. Availability of basic social and health amenities remains a major problem in Nigeria as in most third world countries; therefore the problem of worm infestation has persisted[20] suggesting a less than four monthly treatment interventions but expressed the need to look for drug resistant strains.

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The aim of this study is to determine the prevalence of common helminths in primary school children in Ugbowo metropolis, Benin City, Edo State, Nigeria.

Materials and Method

Study area

This study was carried out between August and November 2014 in BDPA Primary School, Ugbowo, Ovia North East Local government Area of Edo State. It is a government owned primary school.

A total of 312 pupils aged 5 to 13 years were selected for parasitological investigation. This comprised of at least 40 pupils from each of the 6 elementary grades.

Ethical consideration

Prior to commencement of the study the permission was sought from the School authorities. The authorities and pupils were educated on the significance of the study to dispel any misconceptions and their consent was also sought by giving out consent letters. Those that returned the letters signed by their parents/guardians were recruited for the study. Identities of the students were kept secret in order for them not to be stigmatized.

Collection of stool Specimens

The selected children were each given a clean, dry, well labeled universal bottle for collection of their faecal samples. The procedure of introducing faecal materials into the container was explained and demonstrated to the pupils with the assistance of their class teachers. Samples collected were taken to the Microbiology Laboratory of the Department of Medical Laboratory Sciences, University of Benin, for further analysis.

Specimen analysis

The freshly voided stool specimen was examined macroscopically with the naked eyes for appearance, color, and the presence of blood or mucus. This was followed by microscopic examination of samples through wet preparations and concentration techniques. The procedure followed the methods of 21.Cheesbrough, (1999).

Normal saline method (Wet preparation method)

With the aid of a dropper, a drop of physiological saline was placed on a clean slide, using an applicator stick, a small quantity (1mg) of the stool was mixed with the normal saline until a homogeneous mixture was obtained. This was covered with a cover slip and examined microscopically with the use of 10X and 40X objectives.

Formol ether concentration technique

Briefly, about 1 gram of faeces was suspended in 4 ml of 10% formol saline and mixed thoroughly. The mixture was sieved and to the filtrate, 4ml of diethyl ether was added and agitated. The mixture was then centrifuged at 3,000 rpm for one minute. The faecal debris was detached using an applicator and the supernatant discarded. From the deposit, saline and iodine mounts was examined microscopically using 10X and 40X objectives for identification of parasite ova, cysts etc. The recovered parasites were identified using Atlas by Cheesbrough[21].

Data analysis

The data obtained was analyzed using Chi square (x^2) to compare the proportions of data. The software INSTAT (Graph Pad Software Inc., La Jolla, CA, USA) was used in all statistical analyses. Differences were considered statistically significant when $P<0.05$.

Results

Table 1 shows the overall prevalence of helminth infections among school children attending BDPA Primary School in Ugbowo. The total number of stool samples examined was 312. There were 44 positive results with a percentage prevalence of 14.1%.

Table 2 shows that the predominant parasite infection was with *Ascaris lumbricoides*. *A. lumbricoides* found in 40 samples (12.8%), *Trichiuris trichiura* was found in 3 samples (1.0%) and Hookworm was found in only one sample (0.3%).

Table 3. shows the age related prevalence of each helminth among sampled pupils of BDPA Primary School. Of the 42 pupils who were between 5 and 7 years, 5(11.91%) had *A. lumbricoides*, 1(2.38%) had *T. trichiura* and none had hookworm infection. Of the 168 pupils who were between 8 and 10 years, 15(8.93%) had *A. lumbricoides*, 1(0.60%) had *T. trichiura* and 1(0.60%) hookworm infection. Of the 102 pupils who were between 11 and 13 years, 20(19.61%) had *A. lumbricoides*, 1(0.98%) had *T. trichiura* and none had hookworm infection. There was no significant association between age and type of helminth infections.

Table 4. shows sex related prevalence of helminth infections among sampled pupils of BDPA Primary School. Of the 154 males sampled 25(16.23%) had helminth infections and 19(12.03%) pupils of the 158 females sampled had helminth infections. There was no significant association between sex and rate of helminth infection.

Table 5 shows multiple infections by intestinal parasites among the different age groups and sexes of pupils. Only 2 males had multiple infections and they were one each in the 8-10 and 11-13 age groups respectively.

Figure 1 shows the overall prevalence of helminth infections in the pupils of BDPA Primary School while Figure 2 shows the age related prevalence of the 3 species of helminths isolated.

Table 1: Overall prevalence of helminth infections in pupils of BDPA Primary School

Number tested	**Number of Positive Samples**	**Number of Negative Samples**	**Percentage Prevalence**
312	44	263	14.1

Table 2: Prevalence of the different species of helminths among sampled pupils of BDPA Primary School

Parasites species	**Number of Occurrence n = 312**	**% of occurrence**
Ascaris lumbricoides	40	(12.8)
Hookworm	1	(0.3)
Trichiuris trichiura	3	(1.0)
Total	44	(14.1)

Table 3: Age related prevalence of the different species of helminth among sampled pupils of BDPA Primary School

Age Range	Number Tested	*Ascaris lumbricoides*	*Trichiuris trichiura*	Hookworm	Total	P-value
5-7	42	5(11.91%)	1(2.38%)	0(0.00%)	6(14.29%)	
8-10	168	15(8.93%)	1(0.60%)	1(0.60%)	17(10.12%)	
11-13	102	20(19.61%)	1(0.98%)	0(0.00%)	21(20.59%)	P=0.6113
Total	312	40	3	1	44	

Table 4: Sex Related Prevalence of Helminth infections among sampled pupils of BDPA Primary School

Sex	**Number tested**	**Number (%) Infected**	**P- Value**
Male	154	25(16.23)	P=0.2856
Female	158	19(12.03)	
Total	312	44	

Table 5: Multiple Infections by Intestinal Parasites among the Different Age Groups and Sexes of Pupils

Sex	**Number Infected**	***Ascaris lumbricoides* + *Trichiuris trichiura***	***Ascaris lumbricoides* + Hookworm**
Male **n** =154	2	1	1
Female **n** = 158	0	0	0
Age Range			
5-7 (**n** = 42)	0	0	0
8-10 (**n** =168)	1	1	0
11-13**(n** = 102)	1	0	1

Discussion

The results of the present study revealed the presence of helminths in the stool samples examined. Ova of the following species of parasites were observed, *Ascaris lumbricoides*, Hookworm and *Trichiuris trichiura*. This is in consonance with several studies carried out in Benin City, Edo State [22] and Southern Nigeria[23,24].

The overall infection rate of 14.1% recorded in this study is low when compared with previous findings in other parts of the country. For instance Adefioye[25] recorded 52.0% in south western Nigeria, while Asemota[26] recorded 55.2% and 35.98% in South-Eastern and South-Southern Nigeria respectively. This apparent difference in prevalence could be attributed to a number of factors including time and season of conduction of the surveys, environmental and other geographical factors. In addition there is a general improvement in the sanitary conditions and provision of modern infrastructures for basic healthy living between the period when the antecedent studies were carried out and the present day.

When the prevalence of intestinal parasitic infections was considered based on the age group of pupils, it was observed to be common in all the age groups, although the differences in prevalence among the various age

groups was not statistically significant. The rate of infection increased with advancement in age to a maximum level of 20% among age group 11-13. This buttresses findings of Ezeagwuna[27] who observed the highest prevalence of infection in the older age group. But disagrees with Widjana and Sutisna[28] who reported that worm burden of recovered parasites decreased as children got older. This seeming inverse relationship between the ages of children and prevalence of intestinal parasites might be a reflection of exposure pattern associated with children of younger ages who normally get more assistance by their parents with regards to the inculcation of good personal hygienic practice, while on the other hand the older children are left on their own.

It was observed that gender is not a significant risk factor for prevalence of intestinal helminth infections in this study. It agreed with the work of Wani[29]. The present study recorded a higher infection rate among the male children compared to their female counterparts (Table 4). This agrees with the findings of 30.Etim[30], that male pupils are fond of playing in dirty or filthy environment in addition to their geophagous habit.

Ekundayo[31] in an investigation that spanned over 30 years showed that *Ascaris lumbricoides, Trichiuris trichiura* and *Ancyclostoma duodenale* species were the most common intestinal helminthes isolated among pre-school and school age children in Nigeria. In the present study multiple infections by helminth parasites were low and was recorded only among the male pupils aged between 8 and 13 years (Table 5). This was corroborated by the findings of Nwaneri[32] in Benin City. The prevalence of hookworm among the male children in this study could be attributed to the fact that these children play barefooted on play grounds where the hookworm larvae penetrate into the skin. The predominance of *Ascaris lumbricoides* over other parasite species particularly hookworm showed a slight deviation from other reports in Nigeria where hookworm infection was more predominant [33,34]. Therefore, while treating children infected by intestinal parasites, it is advisable to use broad spectrum or multi agent drug combinations because of multiple parasitism susceptibility in children.

Conclusion

This study has demonstrated the existence of some helminth intestinal parasites among school children sampled making it clear that school children are predisposed to infection by intestinal parasites. This is worrisome to public health since intestinal parasitic infections are linked to socio-economic loss and its deleterious effects on the educational performance of school children.

Consequently comprehensive investigation of intestinal parasitic infection should not be limited to the children alone but also extend to their parents and other communities within the local government area for effective planning geared towards the control of these parasites, in order to reduce the morbidity resulting from these infections

Recommendations

1. With the observed prevalence of intestinal parasitic infections among school children in this setting of Benin City; the use of chemotherapeutic methods in checking infection among this group should be embarked upon periodically by authorities in charge of schools. It has earlier been reported by Ogbe[23] that school based control programmes on intestinal parasitosis is normally well accepted in Nigeria and should be encouraged by all stakeholders.
2. Government owned schools should not only provide good toilet facilities for use by pupils but they should also be provided with regular water supply and hand washing facilities such as running water, soap and a basin in order to keep the toilets in good condition. In the same manner, local government's education authority should take up their responsibility of regularly inspecting schools within their locality to ensure they have good sanitation facilities such as good latrines, water and soap.
3. Health education programmes should be organized in all school system most especially in the primary schools; this can be made more effective through printed handbills, posters, media advertisement to enlighten children on the importance of hand washing with soap, hygienic habits and general sanitation. In particular, pupils should be reminded that cleanness promotes good health and adequate hygiene behaviour is crucial in preventing diseases. Improving infrastructure without improving behaviour may result to ineffective disease control.

Legislation and its enforcement against indiscriminate disposal of garbage, human and animal excrement around school compounds could also contribute to good environmental sanitation. In addition school compounds should be fenced to discourage trespass by animals and humans.

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