Research Article
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Survey on prevalence of intestinal parasites associated with some primary school aged children in Dutsinma Area, Katsina State, Nigeria

Abstract

The study was carried out in Dutsin-Ma Local Government area of Katsina State, Nigeria, from the period of February to July, 2015. The study was conducted to determine the prevalence of intestinal *helminths* parasites among school aged children in the study area. Faecal samples were collected from 252 children (pupils) in Na-Alhaji Primary School Dutsin-Ma and Darawa Primary School Darawa and examined for eggs/larvae of intestinal *helminths* using formal ether concentration technique. The overall prevalence in both Na-Alhaji and Darawa primary schools pupils between ages of >6–16years was 63.49% positive for parasites infections. Five different intestinal *helminths* were observed in the study area including *Ascaris lumbricoides* (21.42), *Trichuris trichiura* (4.76), hookworm (13.10), *Strongyloides stercoralis* (3.97) and *Schistosoma mansoni* (1.98). Infection rate was significantly higher ($p<0.005$) among male pupils 98 (67.12) then female counterparts with 60(56.60). Also, high prevalence was observed in pupils between 7–12years in the study areas. Health Education on proper hygiene habit and mass deworming campaign should be embarked upon immediately.

Keywords: prevalence, helminth parasites, egg, intensity, *ascaris lumbricoides*, children, primary schools

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Nasiru Manir, Ladan Muawiya Umar, Bawa Jibia Abduhadi
Nasiru Manir, Ladan Muawiya Umar, Bawa Jibia Abduhadi

Correspondence: Bawa Jibia Abdulhadi, Department of Biological Sciences, Federal University, Dutsin-Ma, Nigeria, Tel +2348037368094,
Email abawa@fudutsinma.edu.ng, bawa51@yahoo.com

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Introduction

Helminth infection is a major health problem of children from rural areas of developing countries and it is an important cause of morbidity in school age children especially primary school pupils (4 to 15years) who harbor the highest intensity of worm infestation.[1,2] Five species are responsible for widespread disease in humans and these include *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm (*Ancylostoma duodenale* and *Necator americanus*) and *Strongyloides stercoralis*.[3] Approximately 2billion people are infected with *helminth* worldwide, which are endemic in most tropical countries; however, this May be an underestimate of the true global distribution.[4,5]

Infection and transmission are propagated by poor hygienic habits such as indiscriminate disposal of human and animal faeces, which permits contact of faeces and its accompanying microbial load with soil or water. Generally, *helminth* infections are associated with poverty, lack of sanitation, impaired hygiene and overpopulation.[3] In Nigeria, a considerable amount of human and animal wastes are discharged into the soil daily leading to the contamination of the soil with *helminth* eggs and larvae.[6] The public health and socio-economic consequences of intestinal *Helminthes* are of considerable global concern particularly in the rural communities of developing countries where malnutrition and other factors complicate the impact of infection. Most parasitological surveys of common parasitic infections in Nigeria have been confined to the rural villages where poor sanitation and domestic hygiene as well as a general ignorance of the diseases, provide optimal environment for their transmission.[7] Intestinal parasite or soil transmitted Helminthes are the most common Neglected Tropical Diseases (NTD) worldwide which continues to cause significant morbidity in Nigeria and in less developed tropical and subtropical countries. In endemic countries, gastro-intestinal infections are most prevalent in rural communities, peri-urban settings and urban storm.[8] These infections are most prevalent in tropical and subtropical regions of the developing world where adequate water and sanitation facilities are lacking. Due to the public health effects of these intestinal Helminthes infections and also impair physical and mental growth of children, their educational achievement, and also hinder economic development. This study was carried out to determine the prevalence of gastrointestinal parasites among some primary school aged children in Dutsin-Ma Local Government Area, Katsina State, Nigeria.

Methodology

Study area

Dutsin-ma occupies a land mass of 527 square Kilometres. It is located on latitude (12˚27'6.012"E) and longitude (7˚29'52.98'N). The inhabitants are mostly Hausa, Fulani speaking people constitute a population of 169,671 according to census 2006; the area is characterized by mean temperature ranging between 35°C-39°C annually.[9] The vegetation is dominated by trees, shrubs and grasses. Majority of the indigenes are farmers, civil servants, fishermen and others are teachers and businessmen.

Study population

A total of two hundred and fifty two (252) children in each class of the schools were randomly selected for the study. Some of the children/pupils (males and females). Two(2) primary schools were randomly selected:

i. Na Alahaji primary school; selected within Dutsin-Ma Town
ii. Darawa Primary School Dabawa Area; chosen as the most populace primary school in the village.

iii. This was done because of the higher population of students in all the schools of the study area.

Ethical approval

Approval was obtained from the Local Government Educational Secretary (LGES) and consent from the District Education Officer. The Head Teachers of the schools and parents/guardians of the pupils were addressed with a lecture before sample collection. The children were also informed about the study. Hence, pupils that volunteer in giving the faecal samples were motivated with biscuit, sweet and chewing gum.

Faecal sample collection

A clean, labelled, wide-mouth sample plastics Bootle with cover, were giving out to selected pupils for the study. The pupils were taught on how to collect their early morning faecal samples, without contamination using the applicator stick attached to sample container. The bottles were collected from the pupils as the resumed for morning classes and with the aid of their teachers, the questionnaires were correctly filled. Faecal samples were immediately preserve with 2ml of 10% of formalin, and finally taken to Biology Laboratory of the Federal University Dutsin-Ma, for analysis. Samples were carried out in accordance with internationally best practices.[10,11] A total of 252 stools samples, comprising of 192 from males and 60 from females were randomly collected in the selected primary schools.

Faecal sample analysis

The faecal samples were examined for parasite using the formaldehyde-ether concentration techniques as described by.[12] An aliquot of 1g faeces was measured using wind balance machine, and then suspended in 10ml of 10% formaldehyde solution and mixed with a glass rod. The suspension was passed through a funnel to remove debris into a centrifuge tube, three ml of ether was added and suspension thoroughly mixed the tubes were centrifuge and spine (4000rpm) per three minutes, and four layers were formed at the end of the centrifugation, the first layer was ether with the fat dissolved in it, the second was the debris, and third was the formaldehyde solution, and fourth layer was the sediment of eggs and larvae. The centrifugation tubes were decanted, leaving the only sediment, the sediment was examined by sampling a drop with a pipette and depositing it in class slide and then emulsify and examined microscopically by using one drop of iodine and normal saline was added to the slide respectively, using x10 and x40 objectives lense of the microscope as described by.[12] The eggs and larvae were identified using Atlas of Medical Helminthology as well Medical Parasitology.[13,14]

Data analysis

Chi square (X^2) was used to test for association of prevalence with pupils across class of the study by gender and age group. The data obtained are shown in tables and interpreted in percentage and analysed with respect to age group, sex, and sources of drinking water and type of helminthes identified.

Results

Out of the 252 stool samples examined in both Na'Alahaji primary school Dutsin-Ma and Darawa primary school Dabawa area, a total of 160(63.5%) were recorded positive with at least one helminthes parasite (Table 1) (Figure 1).

Table 1 Prevalence of intestinal parasites type infection in school aged pupils

Type of helminth	No examined	No. positive (%)
Ascaris lumbricoid	252	54(21.42)
Trichuris trichiura	252	12(4.76)
Hookworm	252	33(13.10)
Strongyloides stercoralis	252	10(3.97)
Schistosoma mansoni	252	5(1.98)

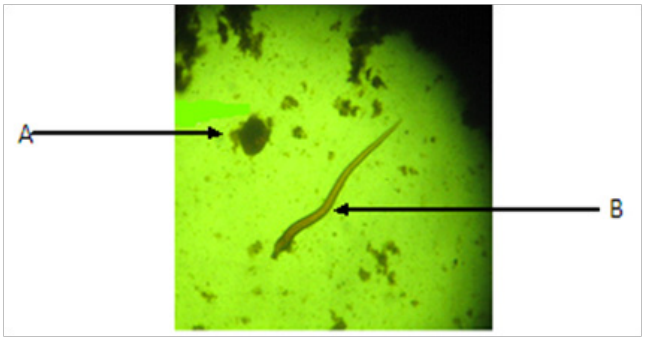

Figure 1 (A). Ova of *A. lumbricoides* and (B). Larvae of *Strongloides stercoralis*.

The results in (Table 2), indicated that the prevalence of the intestinal helminthes in Na'Alahaji primary school pupils had higher occurrence in both males 76(73.07) and females 51(57.95) then the males and females pupils in Darawa primary school pupils, and there was no significant associated with sex between urban and sub-urban prevalence (P>0.05). However, infection and parasite population was generally higher and more common in males than in female counterpart (Table 2).

Table 2 Prevalence of intestinal *helminthes* in school Age children by sex in the study areas

	Male		Female	
School	**No. examined**	**No. positive (%)**	**No. examined**	**No. positive (%)**
Na Alahaji	104	76(73.07)	88	51(57.95)
Darawa	42	22(52.38)	18	9(50.00)
Total	146	98(67.12)	106	60(56.60)

Males X^2=3.9; df=1; p=0.05 and Female X^2=0.3; df=1; p=0.05

The results in Table 3 revealed that the prevalence of the intestinal *helminth*s was statistically associated with age (P>0.05). The rate of infection decreased with age except for age >6years. The total infection among school aged according to age is shown in (Table 4). Infection was significantly (p<0.05) higher among children in the younger age group (7-12years) than older one (13-16years).

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Table 3 Prevalence of intestinal parasites infection in school Age pupils by Age group

	Na Alahaji primary school		Darawa primary school	
Age (Years)	**No. examined**	**No. positive (%)**	**No. examined**	**No. positive (%)**
>6	27	6(22.22)	15	8(53.33)
7-9	50	27(54.00)	15	10(66.67)
10-12	43	38(88.37)	11	7(63.64)
13-15	42	32(76.19)	14	5(35.71)
>16	30	24(80.00)	5	3(60.00)

Table 4 Total infections of intestinal parasites infection in school Age pupils by Age group in Na'Alahaji primary school, and Darawa primary school Dabawa village

Age (years)	No. examined	No. positive (%)
>6	42	14(33.33)
07-9	65	60(92.31)
10-12	54	50(92.59)
13-15	56	47(83.93)
>16	35	33(94.29)

The positive cases of individual parasites were *Ascaris limbricoides* 54(21.42%), *Trichuris trichura* 12(4.76%), hookworms 33(13.10%), *Strongyloides stercoralis* 10(3.97%), and *S. mansoni* 5(1.98%). However, *Ascaris limbricoides* was the most prevalent *helminth* with 36(18.75%) in Na Alahaji primary school and 18(30.0%) in Darawa primary school. *Schistosoma mansoni* had the least prevalence (1.67%) among Darawa primary school pupils but slightly higher among the Na Alahaji primary school pupils (2.03%) as shown in (Table 5). The results recorded in Table 6, deduce that Na Alhaji primary school in Dutsinma town had the highest prevalence 127(66.1) than Darawa primary school in Darawa village with 33(55.00).

Table 5 Comparison of the intestinal *helminthes* infection of the children in the 2 study areas

	Na Alahaji primary school		Darawa primary school	
Type of helminth	**No. examined**	**No. positive (%)**	**No. examined**	**No. positive (%)**
Ascaris lumbricoid	192	36(18.75)	60	18(30.0)
Trichuris trichiura	192	9(4.69)	60	3(5.0)
Hookworm	192	21(1.94)	60	12(20.0)
Strongyloides stercoralis	192	6(3.13)	60	4(6.67)
Schistosoma mansoni	192	4(2.03)	60	1(1.67)

Table 6 Prevalence of intestinal parasites infection in school aged pupils in the study areas

School	No. examined	No. positive (%)
Na Alhaji	192	127(66.1)
Darawa	60	33(55.00)
Total	252	160(63.49)

Discussion

The result of this study confirmed the fact that helminth parasites are still prevalent among school children in both town and rural areas of the study area. The number of children with the samples analyzed, indicated a high incidence and prevalence of helminthes. This study is in line with the findings of,[8,15] reported that many sub-urban communities of Nigeria constitute helminth infection, which lead to malnutrition and anaemia. The occurrence of intestinal parasites was still ranked high among the major health problem affecting children from rural communities due to their low economic status and social isolation.[16]

The findings of our study indicated that 55.0% and 66.1% of the children examined are infected with helminthiasis. The pathogenic effect was not determined, but the presence and parasitic load of these organisms might be attributed to poor hygiene. This could be explained by the reason that most of the pupils examined lack good health education with poor family background. This observation was similar to those previously recorded in Ibadan Oyo State Nigeria within which fall the same ecological zone as our present study area.[2] The prevalence reported in the study is partly due the fact that the study was conducted in sub-urban communities that account for high poverty rate, poor socioeconomic development that facilitate the transmission of helminth parasites.

The study also revealed and recorded high incidence with the most prevalent, which might be responsible as a result o river waters around and the type of contaminated and unhygienic food eaten by the pupils. It has been reported in the study that, parasitic helminthes encountered include; the *A. lumbricoides* (21.42%) followed by hookworm (13.10%), and *Schistosoma mansoni* with the least prevalence (1.98%). This report is consistent with work of[17–19] who are of the view that public health importance of soil-transmitted helminthic infection ranked highest in morbidity rate among school-aged children who often present heavy worm infection because of their vulnerability to nutritional deficiency. Based on this finding, it could be deduced that, high prevalence rate of intestinal helminth reported in this study could be classified and attributed to

high risk of getting more infection among the children examined. Similarly, the need for school based antihelminthic treatment in this area has not been practiced. Many studies have demonstrated the efficacy, acceptability and co-effectiveness of school based control of helminthes infection.[20,21] In this regard, it has been established by the fact that, mass antihelminthic treatment and educational awareness programs for good hygienic living among this populace has not been carried out as a tradition. Also,[22] reported mode of transmission of most helminthiasis (*A. Lumbricoides* and *Trichuris trichuira*) to be through oral-faecal routes. They added that the parasites also get transmitted through skin penetration or by the ingestion of uncooked or undercooked intermediate host containing infective forms of the parasite.

The research also reported that most of the primary pupils, irrespective of their gender due normally defecate in the nearby bush surrounding the school premises which might result in the development of helminth eggs being washed into the school compound by the rainfall and runoff water. This finding could further be explained by the fact that most of the school children go to the school barefooted which might altogether facilitate high prevalence of hookworm infections. This report correlates with the work of[23] who reported that parasitic helminthes infect people of all ages and sexes but more prevalent in children.

It was also observed and noted that majority of parents and guardians of these school children are either farmers or cattle rearers, which were in turn uninformed not educated about good hygienic behaviour and so their children are not under adult supervision for sanitation habit right from home. These findings correlate with the work of[22] reported helminthiasis infection in rural communities to pose greater health, social and economic problems which have far reaching effects on the economy of the country, especially by reducing the productive labour force. Similarly,[23] in their work reported urban areas with high prevalence of these parasites, because suitable conditions for their transmission have been provided due to low level of sanitation. There is no consistent pattern attributable to gender and age group with respect prevalence and intensity of *helminth* infection. The individual prevalence of intestinal *helminth* infection was highest among the age group 7-12years old (92.59%) and then other age groups. This is unexpected as the study was conducted among Primary school children who have been reported to be the high risk group as far as helminth transmission concerned.[24,25] While male were more infected with *A. lumbricoides*, female were found to be more infected with hookworm in this study.

The result revealed the prevalence of helminthes parasites to be neither on age nor sex dependent in the study, presumably due to equal exposure to risk factors as there were no restrictions on movement and contact from the pupils with intermediate and effective egg of the surrounding areas. The overall prevalence according to the gender among the pupils showed that males generally were more infected than females but the difference was not statistically significant. This observation confirms equal exposure to helminthes among the study population. The study has shown no significant differences between weight and height of the pupils that were infected and uninfected with helminthes infection. This might be due to the fact that the subjects in this study were asymptomatic and none of them were heavily infected. Helminthes parasites infection is recognized as the major contributor to malnutrition which could influence the weight and of infected subject.[26] Furthermore studies will be needed in this area to confirm the molecular characterization and pathogenic effect of these parasitic organisms in humans.

Conclusion

There was relatively high prevalent of intestinal parasite helminthes among primary school children in Dutsinma Local Government Area of Katsina State. The parasitic load and incidence of occurrence was higher and more vulnerable across the pupils' gender. Infection was significantly higher ($p<0.05$) as found among children in the younger age group (7-12years). In this regard, free medical test and treatment in this community are justifiable.

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Conflict of interest

The author declares no conflict of interest.

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