Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.3, No.7, 2013

Studies on the Intestinal Helminths Infestation among Primary School Children in Gwagwada, Kaduna, North Western Nigeria

Timothy Auta[1*], Ezekiel Kogi [2] and Oricha, Kokori Audu[3]
1. Department of Biological Sciences, Federal university, Dutsin-Ma, Katsina State,Nigeria
2. Department of Biological Sciences, Ahmadu Bello University, Zaria, Nigeria
3. Department of Biology, federal college of Education, Okene, Nigeria
*E-mail of the corresponding author: autatimz@gmail.com

Abstract
A study on prevalence of intestinal helminthes among primary school children was carried out in Gwagwada, Kaduna, North-western Nigeria. Out of the 283 school children examined for infection, 190 (67.1%) were found to be positive. The prevalence of intestinal helminthes found were Ascaris lumbricoides (30.7%), Taenia spp (23.0%), Schistosoma mansoni (11.7%), Hookworm (6.4%), Trichuris trichiura (4.9%), Enterobius vermicularis (4.6%), Strongyloides stercoralis (4.2) and Hymenolepis nana (3.9%). There was no significant association between helminthes infection and sex (p>0.05). There was no significant association between prevalence and the habits of washing hands after using the toilet and the washing of fruits and vegetables before eating ((95% C.I. < 1.0). S. mansoni infection had significant association the use of streams as source of drinking water (95% C.I. > 1.0). Ascaris lumbricoides has very high prevalence among primary school children. Sex has no association with infection of helminthes.
Keywords - Intestinal helminthes, school children, prevalence, Gwagwada Nigeria)

1. Introduction

Intestinal parasites are highly prevalent causing serious health problem in the tropics. School children carry the heaviest burden of morbidity due to intestinal helminths and schistosomiasis infections. The public health significance of schistosomes and geohelminths continue because of their high prevalence and their effects on humans, particularly those living in the tropical and subtropical areas (Lekun, 2001). Diseases due to the parasites are among the most prevalent human infections affecting approximately one quarter of the world's population, mainly school children due to their poor sanitary conditions and their voracious eating habits (WHO, 1987 and Bundy et al., 1991). Numerous helminthes inhabit the intestinal tract of human and those of great health importance include nematodes (roundworms) such as A. lumbricoides, T. trichchiura, hookworms (Ancylostoma duodenale and Necator americanus) and S.stercoialis, trematodes (flukes) such as schistosomes, Clonorchis sinensis, Opisthorchis viverrini and Fasciola spp. (F. hepatica and F. gigantica) and cestodes (tapeworms) such as Taenia solium, T. saginata, Diphyllobothrium latum, H. nana and E. vernicularis. The most common intestinal helminthes of humans throughout Nigeria are A. lumbricoides, T. trichiura, hookworm, S. stercoralis and Schistosoma mansoni (Odening, 1976). Others that have been reported but not very common include Taenia spp, H. nana, Dicrocoelium traspes and E. vermicularis (WHO, 1994).

Intestinal helminthes have been a major problem in rural settlements in Nigeria. This is as a result of their poor socio-economic status and lack of basic amenities such as pipe borne water and other sanitary facilities (Okon and Oku, 2001). It may also be due to their illiteracy and careless behaviours. In Nigeria, a lot of work has been carried out over the years in different parts of the country on the prevalence of intestinal helminthes and its associated diseases among many groups of people. Ahmed, et al., (2003) reported that 30.8% of students in Katsina were infected with at least one intestinal helminthes. Also, prevalence of intestinal helminthes in some patients in Zaria has been reported to be 1.67% for Strongyloids stercoralis only and 62.7% of other helminthes (Abdullahi and Abdulazeez, 2000). However, little is known about the infection status of intestinal helminthes among school children in Gwagwada and surrounding villages. This study aimed to survey the prevalence of intestinal helminthes among school children in public primary schools of the Local Government Education Authority (LGEA) in Gwagwada Educational district.

1.2 Materials and Methods

1.2.1 Study Area

The study was carried out in Gwagwada Educational District in Chikun Local Government Area of Kaduna State, Nigeria between January to September, 2006. Gwagwada is about 19Km off Kaduna – Abuja expressway. Ten schools were selected in the educational district. The schools selected are; LGEAs in Gwagwada, Dutse, Bakin Liza, Bakin Kasuwa, Bashishi, Gazamari, Gwazunu, Kajari I, Kajari II and Lukuru. 15% of the children, both male and female in each school and class were randomly selected for the study. Children below school age (< 6years) were encountered in the study. This is because there were no nursery schools in this area, and parents of these younger children send them to school along side with their older ones failing which they constitute a distraction to their farming activities.

1.2.2 Faecal sample collection

Labelled wide-mouthed sample bottles were given out to the selected pupils for the study and were instructed on how to obtain their faecal sample without contamination. The bottles were collected the following morning and the faecal samples were immediately preserved with formalin and taken to the laboratory for analysis.

1.2.3 Questionnaires

A questionnaire was administered to each of the selected pupils (through oral interview) to obtain information from them on the following: Class, age, sex, whether hands are washed after using toilet, whether fruits and vegetables are washed before eating, source of drinking water, water contact activities and possession of pets at home.

1.2.4 Laboratory Examination of Faecal Samples

The faecal samples were examined for parasites using the formaldehyde-ether concentration technique as described by Cheesbrough (1992). 1g of faeces was suspended in 10ml of 10% formaldehyde solution and mixed with a glass rod. The suspension was passed through a funnel covered with a gauze pad, to remove debris into a centrifuge tube. 3ml of ether was added and the suspension thoroughly mixed. The tubes were centrifuged for 3 minutes at 4000 rpm. Four layers were formed at the end of the centrifugation. The first layer was the ether with fats dissolved in it, the second was the debris, the third was the formaldehyde solution and the fourth was the sediment of eggs and/or larvae.

The centrifuge tubes were decanted, leaving only the sediment. The sediment was examined by sampling a drop with a pipette and depositing it on a glass slide. The slide was covered with a slide cover slip and examined microscopically using X10 and X40 objectives of the microscope; each parasite was identified using Medical Laboratory Manual for tropical countries (Second edition) by Cheesbrough (1992) as a guide.

1.2.5 Statistical analysis

The data obtained in the study are presented in tables, interpreted in percentages and analysed with respect to age, sex, class, sanitation habits, types of toilet system used, source of drinking water, contact with water bodies and possession of domestic pets. T-test was used to determine the significance of the differences in prevalence among schools by sex. Odds ratio was used to test for association between prevalence and the variables contained in the questionnaire. Correlation and regression was used to correlate prevalence of infection with class of study and age.

1.3 Results

A total of 283 school children were recruited for the study of which 190 (67.1%) were positive for at least one of the intestinal parasites encountered. The prevalence of intestinal helminthes found were *Ascaris lumbricoides* (30.7%), *Taenia sp* (23.0%), *Schistosoma mansoni* (11.7%), Hookworm (6.4%), *Trichuris trichiura* (4.9%), *Enterobius vermicularis* (4.6%), *Strongyloides stercoralis* (4.2%) and *Hymenolepis nana* (3.9%). The prevalence of the heliminths by sex revealed higher prevalence among males (67.7%) than females (66.4%) (Table1). There was however no significant difference in infection between males and females ($p > 0.05$: $t = 0.73$, 2.10). The prevalence of intestinal helminthes by class of study showed highest prevalence (71.4%) in class 1 while class 4 recorded the lowest prevalence (59.5%). There was a weak negative correlation between class of study and the prevalence ($r=-0.07$) indicating that prevalence should decrease with increase in class of study. The observed trend was so up to class 4 after which the prevalence rose sharply in classes 5 and 6 (Table 2).

In relation to the age of the school children, the highest prevalence of 75.0% was observed in the age group 13-15 years while the lowest prevalence of 44.4% was found in the age group > 16 years (Table 3). There was a stronger negative correlation between the prevalence and age ($r = -0.50$). In relation to the source of drinking water (Table 4), only one child drank tap water and was negative for helminth infection. Prevalence was associated with children who drank well and stream water (OR=1.03 and 1.06 respectively). These associations were however not significant (lower limits of 95% CI <1.0).

The prevalence of intestinal helminthes in relation to contact with water bodies showed that all the school children examined were equally exposed to intestinal helminth whether they had contact with water bodies or not as each category had a prevalence of 67% and OR of 1.0 (Table 5) indicating that there was no association between contact with water bodies and the prevalence. But in the prevalence of *Schistosoma mansoni* infection there was significant association in children that had contact with water bodies (OR = 6.07 and lower limit of 95% CI > 1.0) as shown in Table 6. When considered with the sanitary habit of washing of hands after using the toilet, the prevalence was in consistence with the frequency of hand washing. The highest prevalence of 69.7% was observed in children who always washed their hands. The prevalence decreased thereafter with the decrease in frequency of hand washing (Table 7). Also, the OR analysis showed no association between hand washing frequencies and prevalence as OR values were less than 1.0 in all categories. The prevalence of intestinal helminthes in relation to the habit of washing of fruits and vegetables before eating was in consistence with the frequency of washing. The prevalence increased with the frequency of washing (Table 8). The strength of associations and prevalence increased with increase in frequency of washing. Whereas there was no association with prevalence in children who never washed (OR=0.94). There was association in children who washed occasionally and always (OR=1.01and 1.04 respectively) but the associations were not significant (95%CI values< 1.0). Possession of pets in homes was associated (OR=1.06) with the prevalence of intestinal helminthes infection though not significantly. Those children who had faith at home had the higher prevalence (69.6%) than those who did not have (63.4%) as shown in Table 9.

1.4 Discussion

Generally, there was very high prevalence rates of infection, similar to what was reported by Lekun (2001) of a study in Ethiopia among school children and that of Sebastián and Santi (2000) among Naporuna schoolchildren in the Low-Napo region, north-eastern Ecuador. Ariyo, *et al.,* (2007) reported 77% prevalence of intestinal geohelminthiasis among school children in riverine communities of Nigeria. The high prevalence rate (67.1%) of intestinal helminth infections among primary school children as obtained could be attributed to carelessness and unhygienic habits practiced by these children both at home and in school. Lack of sanitation facilities in these schools might have also contributed to the high prevalence. In all the selected schools, there were no toilet facilities. Hence, the children practice open field defaecation when in school. Consequently, there is likely going to be contamination of the school environment with geohelminths ova. Because Children spend most hours in school, the school environment partly affects their health and well-being.

It was observed that majority of the parents of these school children are either farmers or nomadic cattle rearers, and also uninformed about good hygienic behaviour and so, children are not under adult supervision of their sanitation habits even at home.

Though there was no significant association of infection with sex, males show higher level of exposure to infection, which is corresponded with the reports of Alemu, *et al*, (2011), Leykun, (2001), Sehgal, *et al,* (2010) and Nmor, *et al., 2009.* This is probably because males are more involved in activities such as farming, fishing, and swimming. The insignificant association with sex could be attributed to the fact that there are other major factors than sex that play a role in the infection. This was contrary to the report of Adeyeba and Akinlabi (2002) that showed association of infection with sex. Though Anosike *et al* (2006) reported higher infection rate of 39.3% in females than males (34.5%) among residents of Naraguta rural community in Central Nigeria, it was also not statistically significant.

The very weak negative correlation (-0.07) between infection and the class of study may be because of the inconsistency in the trend of infection across class line. Also, children in the same class have no consistent characteristics. Most of the children in higher classes do not practice what they might have learned in health education. Moreover, there is no age uniformity in the classes. These perhaps explain why there was no particular trend in the distribution of the helminthes along class line. This result was consistent with the report of Sehgal, *et al,* (2010) of school children in Indira colony, Chandigarh, India and Alemayehu (2009) among school children in Abosa around Lake Zway, Southern Ethiopia.

The strong negative correlation between infection and age may be because as the age increases, the children are tend to exhibit more hygienic behaviour in their day to day activities. Major behavioural factors play a role in disease transmission (Habbari, *et al*., 1999). This differed from the report of Lekun (2001). The insignificant association of infection with the habit of washing fruits and vegetables is because most of the fruits and vegetables are handled by food vendors who are not informed on hygiene. They leave these food items exposed to dust particles and flies. These dust and flies can contaminate the food items with helminthes eggs.

Contrary to the report of Luka *et al.* (2000) that showed no significant association between infection and source of drinking water, this study revealed association of infection with source of drinking water. This may be because contaminated soil particles are washed into open wells and streams. When water is drawn from these wells and streams and used by household without boiling or treatment, the household get infected by ingestion of the helminth eggs. The insignificance of association between infection and contact with water bodies may be that the high prevalence was largely due to geohelminthes infection. Contrary to Adanyi, *et al,* 2011, the results of this study revealed prevalence of Helminths not to be significantly associated (P>0.05) with the pupils that did not wash their hands after defecating.

The association with possession of pets at home can be as a result of the fact that pets can harbour these parasites in them, therefore serving as reservoir host. Pets like dogs that are allowed to roam the streets can get their mouths and body contaminated with eggs. When these pets put their mouths in food item at home or when the pets are played with and the same hands used to touch food without washing properly, one can get infected.

1.5 Conclusion

Ascaris lumbricoides has very high prevalence among primary school children. Sex has no association with infection of helminthes. Infection rate decreased as the age of children increases. Infection of intestinal helminthes is also determined by the source of drinking water and possession of pets. The severity of the infection with intestinal helminthes may be more than what this study revealed. Hence, there is need for further

study to be carried out throughout the Local Government Area, especially among the primary schools in the rural areas.
Sanitation facilities should be provided by governments and non-governmental organizations (NGOs) to all schools. Behavioural change is also needed for proper use of these facilities. Mass deworming campaign should be carried out in schools, especially those in the rural areas. This will help to prevent and eventually reduce the cases of high prevalence of intestinal helminthes infection.

Acknowledgement
We sincerely appreciate the support and cooperation of the pupils and teachers of the schools used for the study. In addition, the technical support received from Mr. Amos of Kaduna State Ministry of Health. The authors declare that there is no conflict of interests.

References

Abdullahi .I.O and Adullhazeez, A. J (2000). Prevalence of intestinal Parasites in some human patients in Zaria. *The Nigerian Journal of Parasitology* 21:125-130.
Adanyi C. S, Audu P. A, Luka S. A. and Adanyi D. N (2011). The influence of types of toilets used and personal hygiene on the prevalence of helminthosis among primary school children in Zaria, Kaduna State. *Archives of Applied Science Research*, 3 (3):257-260
Adeyeba, O. (1986). Intestinal helminthiasis and haemoparasitism in an area endemic of Drancuculiasis in Oyo State, Nigeria. *International journal of Zoonosis*. 13:6-10.
Adeyaba, O.A. and Akinlabi, A. M. (2002). Intestinal Parasitic infection among school children in rural Community, South west Nigeria. *The Journal of Parasistology*.23:11-18.
Ahmed, A., Oniye, S.J. and Nock, I.H. (2003). Intestinal Parasitosis in relation to growth and Academic Performance in Kastina State, Nigeria. *Journal of Tropical Biosciences*, 3:42-47.
Alemayehu, G. S. (2008). Prevalence and Risk Factors of Soil Transmitted Helminthes among School Children in Abosa around Lake Zway, Southern Ethiopia. *A Thesis Submitted To The School Of Graduate Studies of Addis Abeba University Department Of Microbiology, Immunology and Parasitology, Medical Faculty*.
Alemu, A., Atnafu, A., Addis, Z., Shiferaw, Y., Teklu, T., Mathewos, B., Birhan, W., Gebretsadik, S. and Gelaw, B. (2011). Soil transmitted helminths and *Schistosoma mansoni* Infections among School Children in Zarima town, Northwest Ethiopia. *BMC Infectious Diseases*, 11:189
Anosike, J.C, Adeiyongo, C.M., Abanobi, O.C., Amajuoyi, O.U., Dada, E.O., Oku, E.E., Keke, I.R., Uwaezuoke, J.C., Obiukwu, CE; Nwosu, DC; Ogbusu, F.I. and Zaccheaus, V.O. (2006). Studies on theIntestinal Worm (Helminthiasis) Infestation in a Central Nigerian Rural Community. *J. Appl. Sci. Environ. Mgt.* Vol. 10 (2) 61 - 66
Ariyo, F., Fagbenro-Beyioku, A.F., Faweya, T., Monye, P., Oyewole, F., Oyibo, W.A., Okoro, C., Olufunlayo, T.F., Sanyaolu, A., Soremekun, B. and Ukpong, M. (2007). Helminthic reduction with albendazole among school children in riverine communities of Nigeria. *Journal of Rural and Tropical Public Health 6: 6-10*
Bundy,D.(1986). Epidemiology aspect of *Trichuris* and Trichuriasis in Caribean Communities. *Transaction of the Royal Society of Tropical Medicine and Hygiene.* 80:706-709.
Cheesbrough,M. (1992). Medical Laboratory Manual for Tropical Countries (second edition) Cambridge University Press. P. 203
Habbari, K., Tifnouti, A., Bitton, G. and Mandil, A. (1999). Helminth Infection Associated with the use of raw water for Agricultural Purposesin Beni Mellol, Morocco. *Eastern Mediteranean Health Journal* 5(5):912-921 http://www.fdagov/ohrms/dickets/198fr/98fr/97n0451a.pdf
Leykun, J. (2001). Soil-Transmitted Helminth Infections and *Schistosomiasis mansoni* in School Children from Chilga District, Northwest Ethiopia. *Ethiopian Journal of Health Science*. 11(2): 79 - 87
Luka, S. A., Ajogi, I. And Umoh, J.U. (2000). Helminthosis among primary school children in Lere Local Government area, Kaduna state, Nigeria, *The Nigerian Journal of Parasitology*. 21: 109-116.
Nmor , J.C., Onojafe, J.O. and Omu, B.A. (2009). Anthropogenic Indices of Soil-Transmitted Helminthiasis among Children in Delta State, Southern Nigeria. *Iranian Journal of Public Health, Vol. 38, No.3, 2009, pp.31-38*
Odenning, G. (1976). Conception of terminology of host in Parasitology. *Advances in Parasitology.* 14: 1-93.
Odotan, S.O. (1974). The health of Nigerian children of school age (6-15 years), parasitic and infective condition, the special senses, physical abnormalities. *Annals of Tropical Medicine and parasitology*. 68:145-156.
Okon, O. and Oku, E. (2001). Prevalence of intestinal parasites among school children in two contrasting communities in Cross River state, Nigeria. *The Nigerian Journal of Parasitology,* 22: 117
Sebastián, M.S. and Santi, S. (2001). Control of intestinal helminths in schoolchildren in Low-Napo, Ecuador: impact of a two-year chemotherapy program. *Revista da Sociedade Brasileira de Medicina Tropical*. 33(1):69-

73.
Sehgal R., Reddya, G. V., Jaco J., Verweijb, Atluri, V. and Rao, S. (2010). Prevalence of Intestinal Parasitic Infections among School Children and Pregnant Women in a Low Socio-Economic Area, Chandigarh, North India. *Reviews in Infection.* RIF 1(2):100-103
WHO (1987). Public Health Significance of Intestinal Parasites Infections. *Bulletin of World Health Organisation,* 65(5): 573-585.
WHO (1994). Children in the tropics intestinal parasitoses. *Technical Report Series.* No. 210 WHO, Paris, 1994. p14-20.

Table 1: Prevalence of intestinal Helminthes by sex only

Sex	No. Examined	No. Positive	% Positive (%190)
Male	167	113	67.7 (59.5)
Female	116	77	66.4 (40.5)
Total	**283**	**190**	**67.1**

Table 2: Prevalence of intestinal helminthes according to class

Class (Primary)	Number Examined	Number Positive	Percentage (%) Positive
1	63	45	71.4
2	47	31	66.0
3	40	26	65.0
4	42	25	59.5
5	36	24	66.7
6	55	39	70.9
Total	**283**	**190**	**67.1**

r = - 0.07

Table 3: Prevalence of intestinal helminthes according to age.

Age	Number Examined	Number Positive	Percentage (%) Positive
<6yrs	112	79	70.5
7-9yrs	63	38	60.3
10-12yrs	67	45	67.2
13-15yrs	32	24	75.0
>16yrs	9	4	44.0
Total	**283**	**190**	**67.1**

Table 4: Prevalence of intestinal helminthes according to the source of drinking water.

Source of Drinking Water	Number Examined	Number Positive	Percentage (%) Positive	Odd Ratio (OR)	95% Confidence Interval
Tap	1	0	0		
Well	238	160	67.2	1.03	0.49-2.12
Stream	44	30	68.2	1.06	0.51-2.23
Total	**283**	**190**	**67.1**		

Table 5: Prevalence of intestinal helminthes as related to contact with water bodies

Contact with Water bodies	Number Examined	Number Positive	Percentage (%) Positive	Odd Ratio (OR)	95% Confidence Interval
Yes	110	74	67.3	1.00	0.67-1.48
No	173	116	67.1		
Total	**283**	**190**	**67.1**		

Table 6: Prevalence of *Schistosoma mansoni* according to contact with water bodies

Frequency	Number Examined	Number Positive	Percentage (%) Positive	Odd Ratio (OR)	95% Confidence Interval
Yes	110	25	22.7	6.07	2.47-15.34
No	173	8	4.6		
Total	**283**	**190**	**67.1**		

Table 7: Prevalence of intestinal helminthes with the frequency in the habit of washing hands after using toilet

Frequency	Number Examined	Number Positive	Percentage (%) Positive	Odd Ratio (OR)	95% Confidence Interval
Always	123	85	69.1	0.94	0.56-1.60
Occassionally	138	92	66.7	0.96	0.57-1.62
Never	22	13	59.1	0.69	0.26-1.82
Total	**283**	**190**	**67.1**		

Table 8: Prevalence of intestinal helminthes according to the habit of washing fruits and vegetables before eating

Frequency	N.E	N.P	% P	OR	95% C.I
Always	62	42	67.7	1.04	0.55-1.98
Occasionally	177	119	67.2	1.01	0.59-1.74
Never	44	29	15.9	0.94	0.45-1.95
Total	**283**	**190**	**67.1**		

Table 9: Prevalence of intestinal helminthes according to the possession of Pets at home

Possession of Pets	Number Examined	Number Positive	Percentage (%) Positive	Odd Ratio (OR)	95% Confidence Interval
Yes	177	119	69.6	1.06	0.88-1.57
No	112	71	63.4		
Total	**283**	**190**	**67.1**		

OR>1 Indicates association
OR<1 indicates no association
95% C.I Including 1 indicates no significance
95% C.I excluding 1 indicates significance