UJMR, Volume 2 Number 1June, 2017 *ISSN: 2616 - 0668*
https://doi.org/10.47430/ujmr.1721.005
Received: 3rd January, 2017 **Accepted:** 27th February, 2017

Common Intestinal Helminthes Associated With Nursery and Primary School Pupils in Dukku Town

***Attahiru Adamu[1] and Bashir Abdulkadir[2]**
1College of Nursing and Midwifery, Gombe State, Gombe Nigeria
2 Department of Microbiology Umaru Musa Yaradua University Katsina
*Corresponding Author:attahiruadamu0@gmail.com.

Abstract
Intestinal worm infection is one of the most common causes of illness affecting the performance of pupils due to the child's inability to come to school or due to pains inflicted by such infections. Stool samples were collected from 300 hundred school children (who consented in the study) aged 6-12. The stool samples were analysed for worm segments, helminths eggs and larvae using standard methods. Other information was collected using a structured questionnaire designed for this study. The results showed that *Ascaris lumbricoides* 27(57.4%) was the most predominant, followed by *Trichuris trichuria* [12(25.5%)] and hookworm [8(17.0%)] was the least prevalent. Location-specific prevalence showed a significant difference ($p<0.05$) in the acquisition of helminths. Most of the Children from the semi-urban area that are attending public schools (21.8%) had higher prevalence than their counterparts in the more urban area who are attending private schools (10.1%). Children who had pond (24.5%) and well (19.4%) as their sources of portable water had higher prevalence than their counterparts with bore-hole water (09.9%) and tap water (2.0%). Children who had pit (26.7%) as their type of toilet had higher prevalence than their counterparts with water closet (12.9%). Children whose parents were traders (20.9%) and farmers (18.0%) had a higher prevalence than their counterparts whose parents were civil servants (10.7%). The ages and sexes of subjects showed no significant difference ($p>0.05$) in the acquisition of helminths in the study. This study has shown that intestinal helminths are still prevalent among primary school-aged children; especially in the rural areas. Therefore, we would like to recommend routine examination of stool of all Primary school children and call on the relevant governmental agencies to consider Health Posts in Nursery/Primary Schools. However, further study is advocated.
Key words: Children, helminths, intestinal, worms and primary school.

INTRODUCTION

Parasitic diseases are common in the developing countries such as Nigeria and are of major health hazard because of their high proliferation and prevalent rate, and their effect on both nutritional and immune status of the population (Damen *et al,* 2011). Parasitic diseases of blood and gastrointestinal tract of human are rampant in the tropics because there are favourable climatic, environmental and sociocultural factors which permit transmission of these parasitic diseases (Obiamiwe and Nmorsi, 1990). These parasitic diseases, whether waterborne, vector-borne, soil transmitted or those that result from some poor sanitary or social habits provide some of the many public health problems in the tropics (Mordi and Ngwodo, 2007; Alli *et al*., 2011).

The most prevalent neglected tropical diseases (NTDs) are due to helminths, lymphatic filariasis, soil –transmitted helminthiasis (including Ascariasis, trichuriasis and Hookworm infections) schistosomiasis and food–borne trematode infections (Mordi and Ngwodo, 2007). Helminthes are worms classified as parasites. More than 72 species of protozoa and helminthes can lodge in humans; most are considered food and water-borne Zoonoses (Alli *et al.,* 2011).

The parasites frequently encountered include *Ascaris lumbricoides,Trichuris trichiura*, *Strongyloides stercoralis*, *Giardia lamblia*, *Enterobius vermicularis, Ancyclostoma duodenale, Necator americanus,* and some species of *Schistosoma* as well as *Entamoeba histolytica* (Alli *et al*., 2011).

Gastro-intestinal parasites are identified as a cause of morbidity and mortality throughout the world particularly in the under developed countries (Arora and Arora, 2010) and evidently from various research papers, the public media and paper presentations. They are one of the most common infections in humans especially in tropical and sub-tropical countries affecting school-aged children.

Intestinal parasitic diseases, according to World Rural Observations (WRO) remain a serious public health problem in many developing countries especially due to fecal contamination of water and food. Soil transmitted helminthes (STHs) infections are important factors contributing to malnutrition (Alli *et al.*, 2011). Soil transmitted helminthiasis (STHs) are *Ancylostoma duodenable*, *Necator americanus (hookworms)* and *Trichuris Trichuria* (Whipworm).

STHs infections are widespread globally. In some species and regions, people with multiple infections are more common than those with either an infection or a single infection. Estimates of these parasitic diseases thus become a matter of necessity for the surveillance of public health, proper health-care delivery and people's welfare (Mordi and Ngwodo, 2007).

Few studies have examined the impact of infection on younger children, partly because of burden of worms and, it has been assumed that disease is light at the early age and perhaps because of the practical difficulty in reaching the pre-school population (Alli *et al.*, 2011).

PSAC (pre – School Aged Children) comprise between 10% and 20% of the 3.5 billion people living in soil transmitted helminths(STHs) endemic areas and although these infections are not among the big killers, they endanger children's health in a subtle and debilitating way, chronic infections compromise healthy growth, cognitive development, physical fitness, and iron status and affect immune response of infected children (Arora and Arora, 2010).

Previous studies in Nigeria have been along these lines. Among such studies are those of Mordi and Ngwodo (2007). The study investigates the hygienic conditions of schools insome parts of the Nigeria andidentiies factors that are essential for the development of sustainable school health programme.

AIMS andOBJECTIVES OF THE STUDY

- To determine the prevalence rate of common intestinal helminthiasis among primary school children in Dukku town.
- To find out the whether parents' income status and habitat contributes to intestinal helminthiasis among primary school children in Dukku town.
- To find out whether sources of drinking water, type of toilet facilities of pupils contributes to intestinal helminthes infection in children
- To identify areas in which teachers, parents and healthcare providers can improve on health, education, diet, sanitary conditions so as to prevent helminthes infection in Primary school-aged children in the study area.

MATERIAL AND METHODS

Study Area

The study area covers 18 semi urban and rural nursery and primary schools in Dukku town of Gombe state. The schools include Dukku Central, Dukku West Science, Magaji Isa, Manga, Gona, Balu, Alani, Haruna Rashid, Family Support, FOMWAN, Fodiyya, Alheri ECWA, International Academy, Asassul Islam, Nana Khadijat, Markazul Islam,Ibnu Abbas and WEC Primary Schools all from Dukku town, Gombe state of Nigeria

Dukku Central, West Science, Magaji Isa, Manga, Gona, Balu, and Haruna Rashid are public Primary schools, while the others are private primary schools.

Study population

A total of three hundred primary school pupils (150males and 150 females- for proper sampling and justification of the figures) from private and public nursery and primary schools who consented in the study were recruited for this study. Their age ranges from 4 -12 years. One hundred and fifty-eight (158) of them were pupils in the public schools, and of more rural settings, whose parents are mostly low-income petty traders, casual workers, farmers and some are jobless.

One hundred and forty-two (142) of them were from the semi-urban area attending private schools; and from the homes of senior civil servants, Business men, and other well-to-do persons. All the children sampled were going about with their normal activities and were apparently in healthy conditions.

Sample Collection

A total of 300 stool samples were collected from children attending the above mentioned nursery and primary schools within Dukku town of Gombe State, North-eastern Nigeria. The samples were collected in well cleaned containers and transported to the laboratory forprocessing and further analysis.

Other information such as sex, age, occupation of parents/guardians and the type of toilet in use at homes, environmental conditions of where they reside were collected using a specifically designed questionnaire for this study.

A survey form was also used to collect information on the schools' sanitation condition specifically: type of water supply conditions/ availability, and the kind of toilet used.

The stool samples were then fixed immediately in 10% formalin before being taken tothe laboratory for further analysis.

Ethical approval

The informed consent of the patients used for this study was obtained from the Local Education Authority and Primary Healthcare Department of Dukku Local Government.

Macroscopic Examination of Stool Samples

This describes the characteristic appearance of the stool i.e. the physical appearance such as colour as brownish, yellowish, black or bloody; and its consistency as to know whether the stool is formed, semi-formed, unformed or watery, presence of blood/mucus, or pus. The sample analysed in this study appearedwithout mucous or blood, some are black and semi-formed, watery stool, and some appeared brown, formed or semi-formed.

Parasitological Analysis

Among the different parasitological techniques for stool analysis, formol – ether concentration technique as described by Cheesbrough (2011) was employed in this study. The procedure involved emulsifying about one gram (1g) of faeces with an applicator stick in a test tube containing 7ml of formalin solution it was well mixed, 3ml of ether was then added and mixed properly the tube was corked with cotton wool and shake vigorously in an inverted position and the stopper is removed with care. Each sample was made in the same way and the test tubes were balanced in the centrifuge (Model: MINOR 35 from MST Ltd) and centrifuged at 1500 r.p.m for 5minutes.The plug of debris was then removed from sides of the tube with an applicator stick. The first three layers were decanted down the sediment with a few drops allowed to drain back from the sides of the tube. A cotton swab was used to remove any debris adhering to the sides of the tube. The remaining sediments and the fluid that drained back were mixed properly by flicking the test tube.

Microscopic examination

After smear preparation was made using a drop of iodine solution on a slide and the sediment was added and properly emulsified on the left side of the slide, a smear was made using normal saline covered with a cover slip for microscopic examination. The 10x and 40x objective was used to examine the whole area under the cover slip for parasite ova, cyst and larvae (Arora and Arora, 2011).

Identification of Worm (Ova, Larvae and Adult)

Wet mounts of microscopic slides of stool specimens were viewed for intestinal helminths. Several criteria were employed in recognizing the worms: *Ascaris lumbricoides* eggs were recognized on the basis of being round, ova or elliptical with rough membrane (fertilized) or they were a bit elongated and also has rough membrane (unfertilized). *Trichuris trichiura* were recognized by their barrel – shaped egg with transparent, mucoid polar plug at either ends. The hookworm (*Necatoramericaricanus* and *Ancylostoma duodenale*) hassimilar egg structure. The eggs were oval or elliptical with the larvae coiled within, thus, showing a clear zone between the embryo and the eggs shell (Arora and Arora, 2011).

Enumeration of helminths eggs

The procedure for counting helminths eggs in stool sample involves making a wet preparation of the sediment on a clean slide and covering the drop with a cover slip. Starting at one corner of the cover slip, the preparation was systematically examined under a light microscope, using 40x lens moving it back and forth across and noting the number of eggfound (Cheesebrough, 2011).

RESULTS

Table 1 shows the frequency of occurrence ofHelminths detected in stool samples of nursery andprimary school children in a private and public schools within the study area. It showed that*Ascaris lumbricoides* 27(57.4%) was the most predominant, followed by *Trichuris trichuria*[12(25.5%)]. Hookworm [8(17.0%)] was the leastprevalent.

Table 1: Frequency of occurrence of Helminths detected in stool samples of subjects

Helminthes	Positive samples	(%)prevalence (Total for both schools)	No. in Public schools	(%)	No in Private schools	(%)
Ascaris lumbricoides	27	57.4	19	70.4	8	29.6
Trichuris trichuria	12	25.5	8	66.7	4	33.3
Hookworms	8	17.0	4	50.0	4	50.0
Total	**47**	**100.0**	**31**	**65.9**	**16**	**34.0**

From the Table 2 below, Children from the Public owned schools had higher prevalence rate of helminths (65.96%) than their counterparts in the Private schools with (34.04%) prevalence of helminths. There was a Significant difference ($p<0.05$) between the typeof the school the subjects belongs, and the acquisition of helminths.

Table 2: Prevalence of Helminths in relation to type of school ownership

Private school	Type of Helminthes found	No. found	%/ Helminth spp	Public school	Type of Helminthes found	No. found	%/Helminth spp*(P<0.05)*
Family Support	*A.lumbricoides*	1	12.5%	Dukku Central	*A.lumbricoides* *T. trichiura*	4 2	21.1% 25%
FOMWAN	*A.lumbricoides*	2	25%	Dukku west	*A.lumbricoides,* *T.trichiura*	5 2	26.3% 25%
Fodiyya	*A.lumbricoides,* *T. trichiura*	1 1	12.5% 25%	Magaji Isa	*A.lumbricoides*	2	10.5%
Alheri ECWA	*A.lumbricoides,* *T. trichiura*	1 2	12.5% 50%	Manga	A.lumbricoides Hookworm	3 1	15.8%
Int'l Academy	*A.lumbricoides*	1	12.5%	Alani	*T.trichiura*	2	25%
Asassul Islam	Hookworm	2	50%	Gona	A.lumbricoides Hookworm	2 1	10.5% 25%
Nana Khadijat	*T. trichiura*	1	25%	Balu	Hookworm *T. trichiura*	1 2	25% 25%
Markazul Islam	*A.lumbricoides* Hookworm	1 1	12.5% 25%	Haruna Rashid	A.lumbricoides Hookworm	3 1	15.8% 25%
Ibnu Abbas	*A.lumbricoides,*	1	12.5%				
WEC	Hookworm	1	25%				
Total 10	**3 Types of Genera**	**16**	**34.04%**	**8**	**3 Types of Genera**	**31**	**65.96%**

Table 3 shows the prevalence of helminths in relation to the demographic characteristics. There was a significant difference ($p<0.05$) between sources of water, type of toilet facilities used by the subjects and the acquisition of helminths. Children who had pond (21.3%), well (34.0.4%) and with bore-holes (36.2%) as their sources of water had higher prevalence rate than their counterparts as their source of water. In the same vein, children who had pit latrine (53.2%) as their type of toilet had higher prevalence than their counterparts with water closet (36.2%) as their type of toilet facility used at school and at home, those with no facility at all had 10.6%.

Ages of children between 5-7 years and 8-12 years showed significant difference as in both type of schools 5-7 year children had higher prevalence as can be seen in the table; 5-7 years in Private and public schools (63.8%), for 8-12 years in both type of schools showed 36.2%. Sexes of subjects showed no significant difference ($p>0.05$) in the acquisition of helminths.

Table 3: Prevalence of Intestinal Helminths in Relation to Demographic characteristics

Characteristic	Private school	Public school	No of helminth Private Public	% of helminth*(P<0.05)*
Age	5-7 years	5-7 years	11 19	63.8%
	8-12 years	8-12 years	5 12	36.2%
Source of portable water	Pond	Pond	1 8	21.3%
	Well	Well	2 11	34.04%
	Bore-hole	Bore-hole	3 11	36.2%
	Other sources	Other sources	2 2	8.5%
Type of toilet facility	Latrine	Latrine	4 17	53.2%
	Water- closet	Water closet	1 5	36.2%
	No facilty	No facilty	1 14	10.6%
Total				**100%**

From Table 4, it could be seen that males had a higher prevalence of intestinal helminths with significance (p>0.05). Males had 55.3%, while the females had 44.7%.

Table 4: Sex of Subjects in relation to acquisition of Intestinal Helminths

Gender	No. tested	%	No. positive	*%(P<0.05)*
Males	150	50.0%	26	55.3
Females	150	50.0%	21	44.7
Total	**300**	**100%**	**47**	**100**

From Table 5 below, it could be seen that number of subjects with civil servants and business men as their parents are the most tested but with a least prevalence (8.5% each) among them, Pupils from farmers' homes followed with a number tested as 66 with a prevalence of 19.1%, petty traders had 63 pupils tested who had 17% prevalence; casual labourers, and Parents with no job had 57 and 14 pupils tested respectively this gives 23.4% 8 and 23.4% prevalence rates respectively. It can be seen that pupils from the homes of casual labourers and jobless parents had higher prevalence, while civil servants and Business men had the lowest prevalence.

Table 5: Prevalence of Helminths in relation to the occupation of parents

Parents' occupation	No. of pupils tested	%	No positive	%
Civil servants	68	22.7%	4	8.5%
Farmers	66	22.0%	9	19.1%
Business men	32	10.7%	4	8.5%
Petty traders	63	21.0%	8	17.0%
Casual labourers	57	19.0%	11	23.4%
No job	14	4.6%	11	23.4%
Total	**300**	**100%**	**47**	**100%**

DISCUSSION

In this study, the most prevalent parasite was *Ascaris lumbricoides* 27(57.4%). This was followed by *Trichuris trichuria* [12(25.5%)]. Hookworm [8(17.0%)] was the least prevalent. These intestinal helminths have also been reported in various parts of Nigeria (Mordi and Ngwodo, 2007; Awolaju and Morenikeji, 2009;and Alli *et al*., 2011). The higher prevalence reported for *Ascaris lumbricoides* in this study agreed with some previous report by Adeyeba and Akinlabi (2002), Agbolade et al. (2004) and Alli *et al*. (2011) also reported *A. lumbricoides* to be most predominant in their studies.

The 57.4% prevalence value reported *Ascaris lumbricoides* in this study was however, high whencompared with what has been previously reported inother areas. Mordi and Ngwodo (2007) reported a value of 30.0% in all the eighteen local governmentareas of Edo State, Nigeria.

In this study *T. trichiura* had a prevalence rate of 25.5%. This is lower than the 39.4% reported in a previous study, and the 77.6% reported by Obiamiwe and Nmorsi (1990). The value reported for *T. trichiura* in this study is high when compared with the reports of both past and current studies in other parts of the country and in the world.

However, hookworm was relatively the least most common helminths reported in the study. The prevalence rate of hookworm in this study was 17.0%. This compared favourably with the 17.7% reported by Alli *et al*. (2011). This value is however low when compared with the value from other studies in various parts of the country both now and in the past. However, the 17.0% prevalence rate reported in thisstudy indicates high level of unhygienic practices among some group of children which enhanced transmission in the communities.

Furthermore, the overall prevalence of intestinal helminths in this study was 15.7%. Contrary to this findings, some workers in Nigeria and overseas had earlier on reported higher prevalence rates. Alli *et al*. (2011) reported 49.4% in Ibadan, Oyo State, Nigeria. Awolaju and Morenikeji (2009) reported a value of 48.4% among primary and post-primary schools children Ilesa West, Osun State and 50.80% among school children in Ilaje, Osun State. Mordi and Ngwodo (2007) reported a value of 0.7% in all the eighteen local government areas of Edo State, Nigeria.

Furthermore, this study showed significant difference ($p<0.05$) between sources of water, type of toilet facilities used by the subjects and the acquisition of helminths. Children who had pond and well as their sources of water had higher prevalence rate than their counterparts with boreholes as their source of water. In the samevein, children who had pit latrine as their type of toilet had higher prevalence rate than theircounterparts with water closet or (no toilet facility at all) as their type of toilet facility used at school and at home.

Studyin some parts of Nigeria (Obiamiwe and Nmorsi, 1990) has highlighted the hyper-endemicity of soil transmitted helminths, especially among children. Maternal women are at high risk of infection because of their close relationship with children. The differences in the percentages reported in these studies may be due to environmental factor, economic status, life style and occupation of the subjects, as seen in this project, which may truly expose them to infection and also personal habits like ingesting contaminated food and water, contaminated with infective larvae or ova of these parasites.

Moreover, the occurrence of helminths infection at high rates among children is indicative of faecal pollution of soil and domestic water supply around homes due to poor sanitation, ignorance of the mode of transmission of these worms and improper sewage disposal has been found to be a predisposing factor to infection. This present study showed that prevalence of helminths were also age dependent. This might be due to habits, self-awareness on hygiene as well as poor or lack of environmental sanitation especially where these children or their staff eat or drink. Also, low body immune system especially as concerned children might be responsible for high infection rate reported in this study, similarly reported previously by others(Alli *et al.*, 2011).

Sex-related prevalence of helminths in this study showed a significant difference ($p<0.05$) in the acquisition of helminths. Adeyeba and Akinlabi (2002) showed that infection rates for intestinal parasites were higher in males than females. This finding is in consonance with some previous study of Adeyeba and Akinlabi (2002) in Nigeria. It did not agree favourably with Awolaju and Morenikeji (2009) who reported no significant among primary and post-primary schools children Ilesa West, Osun State. It also disagrees with the finding of(Alli *et al*. 2011) who also reported that differences in prevalence values of parasites between the sexes which statistically not significant. Location-specific prevalence of helminths showed significant difference ($p<0.05$) between locations of the subjects and the acquisition of helminths.

More So, Children from the rural area had higher prevalence rate of helminths (21.8%) than their counterparts in the semi-urban area with 10.1% prevalence rate of helminths. According to the occupational status of the parents from these locations, there was significant difference ($p<0.05$) in the acquisition of helminths in this study. This is in agreement with the impact of mass de-worming as reported by Awolaju and Morenikeji (2009).Children whose parents were traders and farmers showed a higher prevalence rate than their counterparts whose parents were civil servants. Urban parents were very much enlightened. They are practicing good personal hygiene, they also de-worm their children some twice and other thrice yearly.

Conclusion

Intestinal helminths are still highly prevalent among school-aged children in Nigeria and a major cause of morbidity in this age group. This study has successfully achieved the objective for which it was set. The findings of this study have shown that three helminths (*Ascaris lumbricoides*, *Trichuris trichuria* and hookworm) were prevalent among nursery andPrimary school children in semi-urban and rural areas in Dukku, Gombe State, Nigeria. The data obtained from this study provides information on the various parasitic diseases associated with blood and gastro-intestines of school children in semi-urban and rural areas of Dukku, Dukku LGA Gombe State, Nigeria. As such therefore, we would like to conclude for the periodic investigation of stool among the primary pupils not only within the study area but beyond that and make a clarion call on the relevant organisations to pay attentions on such vulnerable children and include the case for future studies.

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