DOI : 10.18843/rwjasc/v9i4/16
DOI URL : http://dx.doi.org/10.18843/rwjasc/v9i4/16

Prevalence and Associated Risk Factors of Gastro – Intestinal Parasites among Primary School Pupils in Ilorin East Local Government Area, Kwara State, Nigeria

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ABSTRACT

Intestinal parasitic infections is one of the most important diseases in the sub Saharan Africa especially among primary school children. Several factors have been associated with the high prevalence of intestinal parasitic infections in tropical and sub- tropical countries in Africa. To determine the prevalence and associated risk factors of gastro intestinal parasitic infections among Primary school pupils in Ilorin East Local Government Area of Kwara State, 416 stool samples were randomly collected from pupils of eight(8) primary schools that were earlier selected by random sampling technique. Stool samples collected were examined for intestinal parasites using direct wet mount and formal ether sedimentation techniques. Out of the 416 samples examined, 97 (23.32%) were found to harbour different species of parasites. Fourteen pupils representing 3.37% were found to harbour helminth parasites while 83(19.95%) were infected by protozoan parasites. The helminth and protozoan parasites recovered were: Taenia spp (2.16%), Hook worm (1.20%), Entamoeba histolytica (11.78%) and Entamoeba coli (8.17%). Prevalence was found not to have significant influence ($p < 0.05$) though the infection was higher in males (13.94%) than in female pupils (9.37%). Pupils within 10 - 13 year age group had the highest(%) prevalence of infection during the study. Although type of toilet facility used by pupils was not found to have any significant($p < 0.05$) influence on prevalence of intestinal parasitic infection among the pupils, sources of drinking water used by the pupils significantly ($p > 0.05$) influence the prevalence of intestinal parasitic infection in the study area. It was concluded that intestinal parasitic infection is a public health problem in the study area since primary school population serve as a reflection of the wider community.

Keywords: Gastro – Intestinal, Parasites infections, primary school children

INTRODUCTION:

Human societies have always been challenged by parasitic infections which are caused mainly by helminths and protozoan parasites. These parasites includes *Ascaris lumbricoides*, Hookworms, *Strongyloides stercoralis, Trichuris trichuira, Taenia* spp, *Enterobius vermicularis, Hymenolepis nana, Schistosoma mansoni, Onchocerca vulvulus, Dracunculus medinensis,Wuchereria bancrofti, Entamoeba histolytica, and Giardia lamblia,* among others (Kloos and Zein,1993; Vikram *et al*., 2008). Of these various human parasites, gastro intestinal parasites are the commonest, and are responsible for serious ill health, which sometimes leads to death (Cleaveland *et al*., 2001).

Globally, over two billion individuals are infected with intestinal parasites out of which majority children are leaving in resource-poor settings such as sub-Saharan Africa (WHO, 2002). Infections with intestinal parasites, particularly in children, have been associated with anemia, stunted growth, physical weakness and low educational performance (Stephenson *et al*., 2000).

Epidemiological studies carried out in different countries have shown that social and economic condition of individuals also serve as important determinants in intestinal parasitic infections (Phiri *et al*., 2000).

Control interventions of intestinal parasitic infections are based on the periodic administration of antihelmintics to persons at risk and supported by improvement in sanitation and health education (WHO, 2015) **.**

To achieve good public and child health,WHO recommends annual treatment in areas where prevalence of soil transmitted helminths is between 20% and 50% and, a bi-annual treatment in areas where prevalence is over 50% (WHO, 2017). These information are lacking in most Nigerian communities including Ilorin East Local Government Area of Kwara state.

MATERIALS AND METHODS:

The study Area:

Kwara state is located on latitude $8^0\,30'\,00''$ N and longitude $4^0\,32'\,59''$ E. It covers an area of about 32,500 sq. km. The state has River Niger as its natural boundary along its northern and eastern margins, and shares a common internal boundary with Niger state in the north, Kogi state in the east, Oyo, Ekiti and Osun states in the south and an international boundary with the Republic of Benin in the west (Ifabiyi and Omoyosoye, 2011).

Schools selected for the study:

Eight (8) schools drawn from four (4) zones (Akerebiata, Ojagboro, Ibagun and Sobi) were selected using a simple random sampling technique (Yates *et al.,* 2008). Briefly, pieces of papers were prepared and numbers assigned to schools which were randomly picked during the selection process.

Study Design :

A cross sectional study was used to determine the distribution of the parasites among pupils of the sampled schools. Stool samples were collected from pupils and processed by concentration method. Parasites cyst or ova were identified microscopically. The study population were male and female pupils of all ages attending primary schools in Ilorin East LGA of Kwara State.

Ethical Approval and Consent:

Permission for this study was obtained from Kwara State Universal Basic Education Board. Before the commencement of the study, the consent of the schools management, staff, parents and participating pupils were also obtained.

Collection of Stool Sample:

A total of 416 stool samples were collected from pupils of selected schools .Stool samples were collected from from 52 pupils from each of the selected schools. Each of the pupils was given a clean, dried and labelled specimen container for faecal sample. The procedure for introducing faecal material into the container was explained and demonstrated to the pupils before sample collection.

Administration of Questionnaire:

Structured questionnaires were administered to pupils before sample collection. This is to obtain information on pupils age, sex, hygiene practice, sources of drinking water and parent's socio - economic status. To enable tracking, each structure questionnaire was assigned an identification number which corresponds to the number on the sample bottle issued to the pupils.

Parasitological Analysis of Sampes:

The parasite cysts/eggs were counted under the microscope after the sedimentation process of the stool sample. Egg counting was carried out using a Mc Master technique in which sub- sample of the faeces prepared was transferred to the compartments of a Mc Master counting chamber and allowed to stand for 5 min. Parasites cysts on the other hand were counted under the microscope.

DATA ANALYSIS:

Data obtained from the study were presented using frequency distribution tables. Chi-square test of association was used to measure the association between factors (such as age, sex, parent education and hygiene practice of the pupils) and prevalence of parasitic infection among pupils. Probability level was set at 0.05.

RESULTS:

Distribution of Intestinal Parasites Among Pupils:
Table 4.1 shows the distribution of intestinal parasites recorded among pupils of the selected primary schools in Ilorin East LGA of Kwara state. *Taenia spp* (Cestoda) , *Hook worm* (Nematoda) and two species of protozoans (*Entamoeba histolytica* and *Entamoeba coli*) were recorded during the study. The prevalences of the parasites recorded were as follows: *T. saginata* (2.16%), *A. duodenale* (1.20%), *E. histolytica* (11.78%) and *E. coli* (8.17%).
The overall prevalence of both helminths and protozoans among the pupils sampled was 23.32% of which 3.37% of the infection were attributed to helminths while 19.95% to protozoan parasites. Significant difference was observed in the prevalence of helminths and protozoan infection among pupils in the study area ($p < 0.05$)

Prevalence of Intestinal Parasites by Locality:
The prevalence of intestinal parasites observed among pupils in the study area based on zone is presented in Table 4.2. Although protozoan infections were generally higher than helminth infections in all the four zones, both parasites were found to infect pupils more in schools located in Akerebiata zone than all the other zones. Howerver, prevalence by these parasites (protozoan and helminths) were not significantly different in Ojagboro, Ibagun and Sobi zones ($p > 0.05$)

Prevalence and Intensity of Gastro Intestinal Parasitic Infection in Relation to Gender and Age of pupils:
Among the 416 stool samples collected from the pupils during the study, 208 samples each where from male and female pupils respectively as shown in Table 4.3. Data analysis shows that gender of pupils did not have any significant influence on the overall prevalence of both protozoa and helminth infections in the study area ($p < 0.05$), although male recorded high prevalence (13.9%) than females (9.4%). However, both male and female pupils were found to be infected more with protozoan parasites than helminths.
The age - related prevalence of gastrointestinal parasites in Ilorin East LGA is presented in Table 4.4. Statistical analysis shows a significant association between intestinal parasitism and age of the pupils irrespect of sex. Over all, pupils aged between 10 - 13 years old were found to have significantly higher prevalence of 11.29% than pupils aged 6 -9 years and above 13 years of age ($p < 0.05$). Similarly, 10 -13 years age group were more infected with protozoans (10.09%) than 6 - 9 years age group and pupils whose age are above 13 years who recorded prevalence of 8.17% and 1.68% respectively.
The age related intensity of intestinal parasites among pupils shows that infection was low in all the age groups sampled (Table 4.5). None of the age groups was found to have moderate or higher parasite intensity according to the WHO classification of intensity for soil transmitted parasites.

Distribution of helminths species among pupils of different age groups:
The distribution of the different helminth parasite recorded among pupils of different age group in the study area is presented in Table 4.6. Pupils aged 6 - 9 years recorded the highest prevalence of *T. spp* (1.20%) than pupils aged 10- 13 years and > 13 years with prevalence of 0.48% each. However, slightly different pattern was observed with *A. duodenale* infection where the highest prevalence (0.72%) occurred in 10 - 13 years age group while other age groups recorded relatively lower prevalence of 0.24% each.

Distribution of different protozoan Parasites among pupils of different age group:
The prevalence of different protozoan parasites recorded among pupils of different age group during the period of the study is presented in Table 4.7. *Entamoeba histolytica* had an overall prevalence of 11.79% while *Entamoeba coli* recorded 8.17%. Infection by *E. histolytica* was found to be more common among pupils aged 10-13 year age group (8.89%) followed by 6-9 year age group (2.40%) and > 13 year age group had the least prevalence with 0.48%. However, 6-9 year age group recorded the highest prevalence of *E. coli* (5.77%) while 10-13 year and > 13 age groups recorded 1.20% each.

Prevalence of Gastro Intestinal Parasites in relation to pupil's parental education level:
The prevalence of intestinal parasite infection in relation to the pupil's parental education is presented in Table 4.8. Pupils whose parents had post primary school certificates recorded the highest prevalence (9.86%) compare to pupils whose parents had post secondary school certificate (8.65 %), primary school certificates(0.96%) or had no formal education(3.85%). Statistical analysis shows a significant difference ($p < 0.05$) between pupils from different parental education levels in relation to parasitism.

Prevalence of Parasitic infection in relation to the type of toilet facilities used by the pupils in the selected schools:
Table 4.9 shows the prevalence of intestinal parasitic infection in relation to toilet facility used by pupils. Prevalence of intestinal parasites was found to be highest (12.26%) among pupils who uses flush toilet facilities regularly than other types of toilet facilities. Next are pupils who uses pit toilet facilities with prevalence of 11.06%. However, pupils who use other toilet facilities such Bush and buckets recorded zero prevalence.

Prevalence of Parasitic infection according to the sources of drinking water used by the Pupils:
The prevalence of parasites infection was very high among pupils that uses well/stream as a lively sources of drinking water than those that used other source of water in the study area. The number of pupils infected that use well/stream as a sources of drinking water were 53 representing 12.7% followed by Tap/Borehole water (Table 4.10). Statistical analysis shows a significant difference in prevalence of parasitic infection among the different sources of drinking water used by the pupils in the study area ($p>0.05$).

DISCUSSION, CONCLUSION AND RECOMMENDATIONS:

The overall prevalence of intestinal parasitic infection(23.32%) recorded in the study area is relatively very low when compared to 41.9% recorded by Babatunde *et al*.,(2013) among primary school pupils in a rural community of Moro Local Government Area of Kwara State, 77.8% in rural communities in Ebonyi State (Owaka *et al.,* 2016), 54.13% among schooling children in Makurdi (Banke *et al*.,2006).
The low infection recorded in the present study however is similar to the prevalence of 16.9% reported by Chigozie *et al*. (2007) among children in South Eastern Nigeria and 15.75% among primary school children in Chikun and Kaduna South Local Government areas of Kaduna state, Nigeria (Thomas *et al*., 2014). The variation in prevalence obtained in the different environment could not be unconnected with difference in sanitary standard and personal hygiene that exist between the different study areas.
The relatively high prevalence of protozoans compared to helminths infection in all the four zones of Ilorin East could be associated with the tough cystic walls of most protozoans parasites. The cystic stage of protozoan parasites are known to be resistance to harsh weather conditions found in most northern state including Ilorin, Kwara state. In addition, these stages of protozoan parasites are resistant to most disinfectants. Turki *et al.* (2017) in a survey of parasites in Souther Iran also recorded relatively high prevalence of protozoans than helminths.
The observed relationship between prevalence of intestinal parasites and age groups of pupils during the present study agree with reports of several authors who showed that age have direct influence on the prevalence of parasitic infection among school age pupils Asaolu *et al.* (1992), Sakti *et al*. (1999), and Budy (1990) . The high prevalence among pupils aged 10- 13 years could be related to age- related habit of this age group. Pupils of the age 10-13 year engages in high level of contaminated soil activities such as foot balling and other sports that could expose them to infective stages of these parasites. Although Asaolu *et al.* (1992), Sakti *et al*. (1999), and Budy (1990) earlier reported that infection with intestinal parasites generally decreases with age. These authors attributed the decrease to increase awareness of public health and the danger of intestinal parasitic infection as such children grow older.
The prevalence of intestinal parasites observed in both male and female pupils in the study area shows that both genders are equally at risk of infection. This probably could be as a result of the fact that school pupils at the primary school age irrespective of gender plays in contaminated soil and maintain low level of personal hygiene despite differences in the communities where these schools are located. However, the relatively high prevalence in males observed in the present study is in agreement with the reports of Luka *et al*. (2000), Ukpai and Ugwu (2003) and Akogun and Badaki (1998) who reported high infection rates in male than female pupils. The authors attributed their findings to gender differences in recreational activities.
Parental educational background like most other host factors significantly influence the prevalence of intestinal parasitic infection in the present study. This is because the highest infection rate was recorded among pupils whose parents had post primary school qualification than those with lower educational qualification during the

period of the study. This may be as a result of social status of the elite in the community which engage themselves in eating raw fruits and vegetables in their daily meals.

The relative difference/ variation in prevalence of intestinal parasite with different toilet facilities is reflective of the socio-economic status of the pupils' parental background. Pupils who uses flush toilet system and latrine are probably from well to do background and have access to vegetables and fruits which when not properly cooked or washed could serve as a source of infection with intestinal parasites that are faeco- orally transmitted.

The high prevalence of intestinal parasites among pupils who uses stream and well water than those who used tap water is in agreement with studies of Wani and Ahmad (2009) who reported that children drinking water from well had higher prevalence of infection than those who had access to tap water for domestic purposes.

The overall prevalence of intestinal parasitic infection in the study area was relatively low compared to other reports in other part of Nigeria. The Prevalence (23.32%) of gastro intestinal parasites recorded among pupils in the study areas therefore warrants an annual control intervention in line with WHO (2017) recommendations

It is recommended that annual control intervention of soil transmitted parasites is recommended in Ilorin East LGA, awareness campaign by relevant Government agencies and NGOs should be embarked on to sensitize pupils and parents on the need for good personal and community hygiene and community leaders should monitor and ensured proper disposal of waste most especially around and within the schools and community premises among others

ACKNOWLEDGEMENT:

My greatest thanks and appreciation goes to the almighty God who made it possible for this work to be accomplished. My sincere appreciation goes to my supervisor, Head of Department as well as the entire staff of Biological Science Department of Nigerian Defence Academy Postgraduate School; I am indebted to them for their guidance and excellent supervision.

Finally, I acknowledge with much pleasure the kind cooperation, endurance, understanding and support of my family. May the almighty God reward you all abundantly.

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Table 4.1: Distribution of intestinal parasites among primary school pupils in Ilorin East LGA.

Parasites	n = 416	No of pupils infected	Percentage % of pupils Infected
Helminths			
	Taenia spp	9	2.16
	Hook worm	5	1.20
	Sub Total	**14**	**3.37**
Protozoa			
	Entamoeba histolytica	49	11.78
	Entmoeba coli	34	8.17
	Sub Total	**83**	**19.95**
	Grand Total	**97**	**23.32**

Table 4.2: Prevalence of intestinal parasites in pupils by localities in Ilorin East LGA.

Area (Zone)	No. of pupils Sampled	Parasite				Total	
		Protozoa		Helminth			
		No infected	% infected	No infected	% infected	No infected	% infected
Akerebiata	156	40	9.62	7	1.68	47	11.29
Ojagboro	104	15	3.61	4	0.96	19	4.57
Ibagun	104	14	3.36	1	0.24	15	3.61
Sobi	52	14	3.36	2	0.49	16	3.85
Total	**416**	**83**	**19.95**	**14**	**3.37**	**97**	**23.32**

X^2 = 11.94, df = 3, P = 7.815

Table 4.3: Prevalence of gastro intestinal parasites infection in relation to gender of the Pupils

Gender	No. of pupils examined	Parasite				Total	
		Protozoa		Helminth			
		No infected	% of pupils infected	No infected	% infected	No infected	% infected
Male	208	45	10.82	13	3.13	58	13.94
Female	208	38	9.13	1	0.24	39	9.38
Total	**416**	**83**	**19.95**	**14**	**3.37**	**97**	**23.32**

X^2 = 4.87, df = 1, P = 3.841

Table 4.4: Prevalence of Gastro intestinal parasites infection in relation to age of the Pupils

Age	No. of pupils examined	Parasite				Total	
		Protozoa		Helminth			
		No infected	% of pupils infected	No infected	% infected	No infected	% infected
6-9	210	34	8.17	6	1.44	40	9.63
10-13	157	42	10.09	5	1.20	47	11.29
> 13	49	7	1.68	3	0.72	10	2.40
Total	**416**	**83**	**19.95**	**14**	**3.37**	**97**	**23.32**

X^2 = 67.04, df = 2, P = 5.991

Table 4.5: Intensity of intestinal parasites infection by age group of pupils

Age (Year)	No. of pupils examined	Parasite						Total	
		Protozoa Intensity			Helminth Intensity				
		Low	Moderate	High	Low	Moderate	High	No infected	% infected
6-8	210	34	-	-	6	-	-	40	9.63
10-13	157	42	-	-	5	-	-	47	11.29
>13	49	7	-	-	3	-	-	10	2.40
Total	**416**	**83**	-	-	**14**	-	-	**97**	**23.32**

X^2 = 67.04, df = 2, P = 5.991

Table 4.6: Prevalence of helminths parasites among pupils of different age group

Age group (year)	No of pupils examined	No of pupils infected	% of pupils infected	Helminth parasites			
				Taenia spp No infected	%	*Hook worm* No infected	%
6-9	210	6	1.44	5	1.20	1	0.24
10-13	157	5	1.20	2	0.48	3	0.72
>13	49	3	0.72	2	0.48	1	0.24
Total	416	14	3.36	9	2.16	5	1.20

X^2 = 1.33, df = 2, P = 5.991

Table 4.7: Prevalence of protozoan parasites among pupils of different age group

Age group (year)	No of pupils examined	No of pupils infected	% of pupils infected	Prozoan Parasites			
				E. histolytica		*E. coli*	
				No infected	%	No infected	%
6-9	210	34	8.17	10	2.40	24	5.77
10-13	157	42	10.09	37	8.89	5	1.20
> 13	49	7	1.68	2	0.48	5	1.20
Total	**416**	**83**	**19.95**	**49**	**11.79**	**34**	**8.17**

X^2 = 7.39, df = 2, P = 5.991

Table 4.8: Prevalence of Gastro Intestinal Parasites in relation to pupil's parental education level

Parent Edu. Level	No of pupils examined	No of pupils infected	% of pupils infection
Post Sec Sch.	135	36	(8.65)
Post Pri. Sch	173	41	(9.86)
Pri. Sch	39	4	(0.96)
No Formal Edu.	69	16	(3.85)
Total	**416**	**97**	**(23.32)**

X^2 = 84.85,df = 3, P = 7.815

Table 4.9: Prevalence of Parasitic infection in relation to the type of toilet facilities used by pupils.

Toilet Facilities	No of pupils examined	No of pupils infected	% of pupils infected
Pit latrine	205	46	(11.06)
Flush toilet	211	51	(12.26)
Bush	0	0	0
Bucket	0	0	0
Others	0	0	0
Total	**416**	**97**	**(23.32)**

X^2 = 0.175, df = 1 , P = 3.841

Table 4.10: Prevalence of Parasitic infection according to the sources of drinking water used by Pupils

Sources of water	No of pupils examined	No of pupils infection	% of pupils infected
Tap/ bore hole	309	43	(10.34)
Well/stream	103	53	(12.74)
Sachet water	04	01	(0.24)
River	0	0	0
Total	**416**	**97**	**(23.32)**

Where = X^2 = 60.92, df = 2 , P = 5.991
