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Research Article

INTESTINAL WORM INFESTATION AMONG SCHOOL CHILDREN IN DABOASE IN THE WASSA EAST DISTRICT OF THE WESTERN REGION OF GHANA

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ABSTRACT

The infestation of intestinal worms is rampant among school children in Daboase in the Western Region of Ghana. WHO revealed that worms infestations is one of the major problems in school children. The main route of infection is the faeco-oral. A population of one hundred and twenty school children was equally and randomly selected from four schools in Daboase. One hundred and twenty structured questionnaires were also administer and retrieved. One hundred and twenty faecal samples from the selected school children were examined for the presence of intestinal worms. It was examined that, Giardia constituted twenty-nine percent, Cryptosporidii constituted forty-five percent, Isospora constituted sixteen percent, and Dientamoeba constituted ten percent. Both sexes have equal chance of being infested. Majority of the parents of the pupils have no formal education whilst others have had one form of education up to graduate education. Sixty-three percent indicated that they have toilet facilities in their homes and about thirty-eight percent indicated that they do not have toilet facilities in their homes and so practice open defecation. Sixty percent washed their hands before eating whilst forty percent indicated that they do not wash their hands before eating. Nearly fifty-three percent of them used dewormer whiles forty-seven percent of them did not use dewormer. The usage of dewormer among the pupils significantly associated ($p<0.05$) with infestation level. Urgent actions are needed to; at least, reduce intestinal parasitic infections through concerted approaches involving politicians (decision makers), health extension workers, school teachers, the mass media, community and religious leaders. Regular inspection should be conducted on school children for personal hygienic practices and shoe wearing habits.

Keywords: Children, Daboase, Intestinal, Parasite, Worms.

INTRODUCTION

Intestinal Parasites Infection (IPIs) are globally endemic and have been described as constituting the greatest single worldwide causes of illness and diseases (Curtale *et al*., 1998). The infection is acquired through the faecal-oral route by consumption of food, water or drinks contaminated with cysts of the parasite. Licking or sucking of faecally contaminated hands have been documented to introduce the infection to humans (Bhandari*et al*., 2015).There are more than a dozen different species of soil-transmitted helminthes that infect humans, mainly found in the tropical and subtropical parts of the developing world. The World Health Organization (WHO) estimates that almost 2 billion people are infected with one or more of these soil transmitted helminths, accounting for 40% of the global morbidity from infectious diseases (Gabrielli*et al*., 2011). Recent report indicates that about 1221–1472

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million cases of ascariasis, 750–1050 million cases of trichuriasis, and 740–1300 million cases of hookworm infestation are reported annually, globally (Brooker*et al*., 2004).*Acari slumbricoides* causes ascariasis which is widespread due to a variety of medical and surgical complications. It has been estimated that 1.5 billion cases of infection globally and 65,000 deaths occur due to *A. lumbricoides* (Brooker *et al*., 2004). Hookworm is one of the most common chronic infections with an estimated 1.3 billion cases globally and directly accountable for 65,000 deaths annually. Clinical manifestations of hookworm disease are the consequences of chronic intestinal blood loss and iron-deficiencyanaemia(Siddiqui*et al*., 2002). *Trichuris trichiura*, which is like *A. lumbricoide* and hookworm, affects the physical and mental development in children. About 1.1 billion cases of infection and 70,000 deaths occur due to *T. trichiura* annually(Siddiqui *et al*., 2002). There could be single or multiple infestation of these parasites. Children of school age and immune-deficient individuals are particularly vulnerable to these parasitic helminths infestation, with heavy infections associated with cognitive impairment, iron-deficiencyanaemia, growth retardation, malabsorption and malnourishment (Bhandari *et al*., 2015). These parasites also cause different levels of tissue damage and ill-health to human and they are major health threat to the development of children throughout the world, especially in developing countries (Curtale *et al*., 1998). It is estimated that approximately one-third of the almost three billion people that live in developing regions of sub-Saharan Africa, Asia and the Americas are infected with one or more helminthes (Siddiqui *et al*., 2002). The most common helminthiasis are those caused by infection with intestinal helminths; Ascariasis, Trichuriasis and hookworm, followed by Schistosomiasis and Lymphatic filariasis(Siddiqui *et al*., 2002). This practically illustrates that the inhabitants of thousands of rural, impoverished villages throughout the tropics and subtropics are often chronically infected with several different species of parasitic worm (Curtale *et al*., 1998).

Although these helminthiasis affect people of all age categories, studies have shown that the burden of disease is usually higher among the school-going children (Curtale *et al*., 1998). This paper reports the prevalence of intestinal worm infestations among school children in Daboase in the Wassa East District of the Western Region of Ghana. Specifically this study was aimed at: Determining demographic characteristics of the school children. Identifying personal hygiene practices of the school children, determining proportion of school children infested with intestinal parasites.

MATERIALS AND METHODS

Description of Study Area

The study was conducted at Daboase in the Wassa East District of the Western Region of Ghana. The population of the district, according to the 2010 Population and Housing Census, is 129,628 representing 5.6 percent of the region's total population (Ghana Statistical Service, 2012). Males constitute 46.2 percent and females represent 53.8 percent. More than half (65.5%) of the district's population live in the urban areas, and has a sex ratio of 85 males to a hundred females. About two-fifth (41.6%) of the population of the municipality is youthful (0-26 years) depicting a broad base population pyramid which tapers off with a small number of elderly persons (3.7%). The total age dependency ratio for the municipality is 74.8, and males have a higher dependency ratio of 82.8 compared to females who has a dependency ratio of 68.4.The district has the following facilities: kindergarten (46), primary (93), JHS (74), SHS (8), a police headquarter, and a secondary school. The district has the following; two hospitals, health centre, seven rural clinics, seven maternity homes, seven private clinics and three Community Health Planning Services (CHPS).

Population

The study population consisted of all school children aged 5 to 16 years. Eligibility for participants in this study included being accessible to the researchers during the time of data collection.

Inclusion Criteria

This study included pupils attending primary schools within the Daboase township aged 5 to 16 and whose parents or guardians agreed to give informed written consent through the request of the Head teachers.

Exclusion Criteria

The pupils who were not allowed by their parents or guardians to participate in the study or who fall sick during data collection period were excluded in the study.

Sample and Sampling Technique

Sample size of 120 pupils was selected from 4 schools in Daboase Township to participate in this study; A simple random sampling technique was used to select the study population. This was achieved by selecting pupils from age 5 to 16. Pupils were allowed to randomly pick cards inscribed 'Yes' or 'No'.

Data Collection Instrument and Procedure: Questionnaire Administration

A structured questionnaire was adopted as data collection instrument for this study. The questionnaire was made of two sections namely background characteristics and sanitation practices among the pupils. Selection of pupils from each school was done in collaboration with the Head teachers and classroom teachers.

Sample Collection and Analysis

Stool sample (faecal matter) was collected from 30 pupils from each of the schools for laboratory analysis in separate

well labeled tubes. Specimens were analyzed at the Daboase Health Centre for the presence or otherwise of intestinal worms.

Data Analysis and Interpretation

The data by the questionnaires was coded and analyzed using descriptive statistics of Statistical Product and Service Solutions (SPSS) software (version 20.0). The data recorded from the specimen's was analyzed by means, frequencies, percentages and Chi Square tests using SPSS.

Table 1. School and number of number of pupils to be selected.

School	Number of pupils to be selected
D/A Primary	30
Saint Martins	30
SIPL	30
Daboase Secondary Technical School	30
Total	120

Ethical Consideration

In the study, careful consideration was given to ethical issues. In the questionnaire design, care was taken to make sure that questions are simple and straight forward and that questions that will stair up the emotions of the respondents was avoided. Additionally, to obtain permission to carry out the study, verbal and written consents were sought from the respondents and their parents before administering questionnaires to them. Reason for the research was explained to the respondents.

RESULTS AND DISCUSSION

From Table 1, the total number of students selected for the study was 120. That is 30 students from each of the five selected schools. Table 2 presents the ages of the pupils which ranged from 5-16 years with a mean of 10.2 years. Majority (42.5%) of the pupils have ages ranging from 6-9 years while the least (3.3%) were of the age range above 15years. Results of parents' highest educational levels and occupations are presented in Figures 1 and 2. Majority of the parents of the pupils have no formal education whilst the remaining has had some form of education up to the graduate level. Similarly, most of the parents were farmers.Intestinal parasitic infections (IPIs)are still among the major health problems of the world. The World Health Organization estimates that there are 800-1000 million cases of ascariasis, 700- 900 million hookworm, 500 million trichuriasis, 200 million giardiasis and 500 million amoebiasis(UNICEF., 1993). Intestinal parasites live and infest the gastro-intestinal tract of humans and other animals and transmit diseases to their hosts. From the study, about 64% of the school children were positive for intestinal parasites. This comparatively high rate could be attributed to poor sanitation and unhygienic practices at school and at home since the transmission is mainly by faeco-oral route (Yaro*et al*., 2018). The insignificant differences in infection according to sex observed in this study shows that both sexes have the same chance of being infested, in as much as both boys and girls walk barefooted to school. Secondly most of the boys and girls go barefooted during games and this is an excellent way through which they could be infected when the skin comes into contact with the eggs of the intestinal worms. The high prevalence of intestinal parasitic worms recorded among children between age groups 5 to 9, could be as a result of their low immunity, social and sanitary habits since they spend most of their time outdoors. They play a lot with and on sand with no care and also eat most of the time with unwashed hands (Mirisho*et al*., 2017).

Table 2. Demographic characteristics of pupils.

Item	Frequency	Percent (%)
Sex		
Male	52.0	43.3
Female	68.0	56.7
Total	120.0	100.0
Age (years)		
Less than 6	9	7.5
6-9	51	42.5
10-12	27	22.5
13-15	29	24.2
Above 15	4	3.3
Total	120	100.0

Source. Field survey, October, 2018.

Mean/ Variance age= 10.2 and 10.1 years, Minimum/Maximum age = 5 and 16 yrs, Source: Field survey, October, 2018.

The main routes of entry of intestinal parasites into the human body are ingestion, skin penetration, inhalation and auto-infection (Abossie & Sied, 2014). With regards to availability of toilet facilities at homes of pupils, 62.5% of them indicated to have toilet facilities in their homes, 35% responded no whilst 2.5% mentioned that they do not remember having any in their homes (Table 3)**.** Among the pupils, 60.8% reported that they wash their hands after using washroom, 30% said they do not wash their hands whilst the remaining 9.2% said they do not remember (Table 3). In relation to frequency of hand washing, 31.7% said they wash their hands always after using the washroom, 36.7% reported that they rarely after using the washroom, 27.5% gave no answer and 4.1% said they never washed their hands after using the washroom(Table 3).

Table 3. Availability and practices after usage of latrine at home.

Items	Frequency	Percent (%)
Availability of latrine at home		
Yes	75	62.5
No	42	35.0
Do not Remember	3	2.5
Hand washing after usage of latrine		
Yes	73	60.8
No	36	30.0
++Do not Remember	11	9.2
Frequency of washing hands after latrine		
Always	38	31.7
Rarely	44	36.7
Never	5	4.15
Respondent does not answer	33	27.45

Source: Field survey, October, 2018.

Table 4, gives the results of pupils' food eating practices at school, Most of the pupils (60%) indicated to wash their hands before eating at school, about 36% said that they do not wash their hands before eating at school whilst 4% of them said they do not remember. In relation to frequency of hand washing at school, 40% said they wash their hands always before eating, 45.8% reported that they rarely wash their hands and 14.2% gave no answer (Table 4). With regards to eating of fruits at school among the pupils, 68.3% of them indicated yes to eating fruit at school, 29.2% responded no whilst 2.5% indicated that they do not remember eating fruit at school (Table 4a).Fruit washing before eating is vital to avoid swallowing of parasites on the fruit. Hence pupils were asked whether they wash their fruits before eating, 53.3% of them said yes whilst 46.7% indicated either no or do not remember (Table 4a). In relation to frequency of fruit washing at school, 37.5% said to wash always, 36.5% reported rarely, 5.8% said never and 20% gave no answer (Table 4a). Table 4 further shows the hygienic practices of pupils at home. 79.2 % said to eat fruits at home whilst 20.8% either said no or do not remember. With regards to frequency of eating fruit at home, 70% said to eat always, 20% reported rarely, 1.7% said never and 8.3% gave no answer. In relation to frequency of washing fruits at home, 75.8% said to wash always, 9.2% reported rarely, less than 1% said never and 14% gave no answer (Table 4b). Sixty four (64 out of 120) representing 53.3% of the pupils reported to have used dewormer, 35% of them said no whilst the 11.7% indicated either do not know or remember (Table 5). Among the pupils who reported to have used dewormer, 39.1% said to have used it about 2 weeks during the time of data collection followed by 21.8% who said to have used it more than 4 months ago, 18.8% used it between 2 and 4 weeks, 7.8% each said they used it less than 1 week or between 1 and 2 weeks, and 4.7% said between 2 and 4 months (Table 5).

Table 4a. Hygienic practices of pupils at school.

Items	Frequency	Percent (%)
Wash hands before eating at school		
Yes	72	60.0
No	43	35.8
Do not Remember	5	4.2
Frequency of washing hands at school		
Always	48	40.0

Rarely	55	45.8
Respondent does not answer	17	14.2
Eat fruits at school		
Yes	82	68.3
No	35	29.2
Do not Remember	3	2.5
Wash fruits at school before eating		
Yes	64	53.3
No	42	35.0
Do not Remember	14	11.7
Frequency of washing fruits at schools		
Always	45	37.5
Rarely	44	36.7
Never	7	5.8
Respondent does not answer	24	20.0

Table 4b. Hygienic practices of pupils at home.

Items	Frequency	Percent (%)
Eat fruits at home		
Yes	95	79.2
No	20	16.7
Do not Remember	5	4.1
Total	120	100.0
Frequency of eating fruits at home		
Always	84	70.0
Rarely	24	20.0
Never	2	1.7
Respondent does not answer	10	8.3
Total	120	100.0
Frequency of washing fruits at home		
Always	91	75.8
Rarely	11	9.2
Never	1	0.8
Respondent does not answer	17	14.2
Total	120	100.0

Source: Field survey, October, 2018.

Table 5. Usage of dewormer and last time used.

Items	Frequency	Percent (%)
Use dewormer before		
Yes	64	53.3
No	42	35.0
Do not know	9	7.5
Do not Remember	5	4.2
Total	120	100.0
Last time used dewormer		
Less than 1 week	5	7.8
About 2 weeks	25	39.1
Between 2 and 4 weeks	12	18.8
Between 1 and 2 months	5	7.8

Between 2 and 4 months	3	4.7
More than 4 months	14	21.8
Total	64	100.0

Source: Field survey, October, 2018

Figure 1 gives the results on the proportion of pupils infested with intestinal parasites. Majority being 64% of the pupils were infested with intestinal parasites whilst 36% had negative result for the test. Among the intestinal parasites identified among the pupils were *Cryptosporidii*, *Giadia*, *Isospora* and *Dientenmobia* with 45%, 29%, 16% and 10% respectively (Figure 2). The overall highest rate of infection with *Giardia lambia* wasencountered in St. Martins and SIPL Primary Schools both of which were located in slum areas. Giardiasis infection has a worldwide distribution and the prevalence was highest in areas with poor sanitation especially the crowded populations who were unable to maintain adequate personal hygiene.Amoebiasisis treatable with metronidazole while Giardiasis is treated with both metronidazole and albendazole.

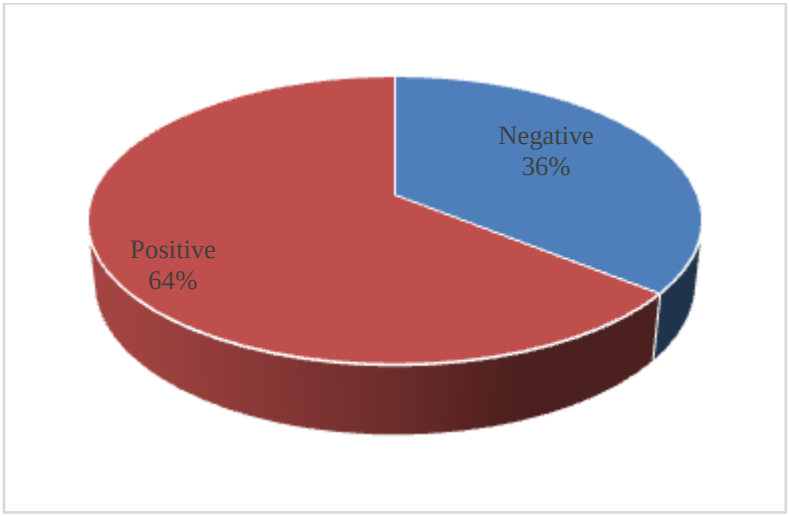

Figure 1.Proportion of pupils infested with intestinal parasite (Source: Field survey, October, 2018).

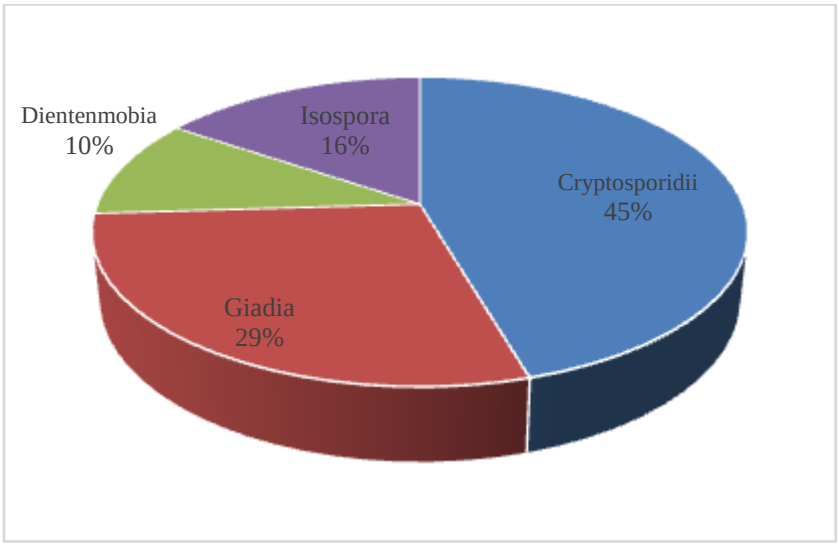

Figure 2. Intestinal parasites identified among the pupils(Source: Field survey, October, 2018).

Worm infections generally infect people who live in poverty with lack of adequate safe and clean water and poor sanitary conditions. Socioeconomic status and socio-cultural factors of people are significantly responsible for worm infection. Worm infestations are responsible for various morbidities in children (Curtale *et al*., 1998).Sex of the pupils had no significant association (*p>0.05*) with infestation level with a Pearson Chi-square value of 0.83, however, greater proportion of the females (56.6%) compared with males (43.3%) were infested with intestinal parasites (Table 6). Age of the pupils did not influence intestinal parasites infestation (Table 6). However, from the Table 6, it could be deduced that most of pupils less than 16 years, infestation level were more pronounced.

Educational level of parents significantly associated (*p<0.05*) with infestation levels among the pupils (Table 6). Greater proportions of school children whose parents had no formal education were highly infested with intestinal parasites compared with those parents who have had one form of education. Table 7 shows the results of association of hygienic practices with infestation among the pupils. There was no significant association (*p>0.05*) between walking on bare foot and infestation level. However, 65.8% of the pupils (50 out 76) who reported to walk on bare foot tested positive to intestinal parasites. The usage of dewormer among the pupils significantly associated (*p<0.05*) with infestation level. Majority of the pupils (50 out of 62 representing 80.6%) who reported to have used dewormer had negative result in intestinal parasites test compared with those pupils who indicated no and do not know had 76.2% and 56.3% positive to intestinal parasites test (Table 7).

Table 6. Demographic characteristics of pupils associated with intestinal worm's infestation.

Items	Gender	Result of worms			Pearson Chi-square test	
		Negative (n=43)	Positive (n=77)	Total	χ^2	p-value
Sex	Male	21	31	52	0.83	0.24
	Female	22	46	68		
Age(years)	Less than 6	3	6	9	3.00	0.51
	6-9	22	29	51		
	10-12	7	20	27		
	13-15	9	20	29		
	Above 15	2	2	4		
Educational level of father	No formal education	1	37	38	1.77	0.01*
	Primary and JSS	9	10	19		
	Secondary education	12	7	19		
	College/University	10	16	26		
	Graduate education	11	7	18		
Educational level of father	No formal education	2	49	51	3.93	0.03*
	Primary and JSS	12	11	23		
	Secondary education	14	11	25		
	College/University	14	6	20		
	Graduate education	1	0	1		

***** means significant associate at p=0.05.

Table 7. Hygienic practices of pupils associated with intestinal worms infestation.

Items		Result of worms			Pearson Chi-square test	
		Negative (n=43)	Positive (n=77)	Total	χ^2	*p-value*
Sometimes walk bare foot	Yes	26	50	76	3.02	0.89
	No	10	22	32		
	Do not remember	7	5	12		
Used dewormer before	Yes	50	12	62	15.8	0.03*
	No	10	32	42		
	Do not know	7	9	16		

***** means significant associate at p=0.05.

The infection rate of intestinal parasites was higher in children whose parents had no formal education. A study conducted by Wani *et al*., (2010)showed that maternal education was a significant risk factor for the prevalence of infection which implies that prevalence of infection decreases as the level of maternal education increases. Apparently, this factor extensively contributes to controlling risk factors for intestinal parasitic infections. Maternal education has been found to be the most important risk factor for parasitism in other studies as well (Abossie & Sied, 2014). In addition, the current study found out that the study participants were aware that it was beneficial to own and utilize toilet facilities in their homes. Nevertheless, some of the respondents reported not to own and utilize toilet facilities. These children therefore practice open defecation where convenient. This practice allows helminths eggs from the faeces of infected children to contaminate the environment including water sources hence leading to the spread of the parasitic worms.

The significant difference ($P < 0.05$) between the prevalence of intestinal worms among the children who had used dewormer and those who have not used dewormer before showed that it is advisable for parents and guardians to de-worm their wards in the space of three months interval as specified by some researchers. The study further revelled that some of the school children they do not practice hand washing before meal or after defecation or even wash fruits before eating. This finding suggests that there could be contamination of fruits and other foods with faecal matter in the area and this could be among the primary causes of the high incidence of infestation among them.A recent cluster randomized control trial study showed that hand washing with soap significantly reduces intestinal parasite infection in children (Mirisho *et al*., 2017).

CONCLUSION

The present study showed that school children in Daboase Township were heavily infested with intestinal worms. This indicates that intestinal worms continue to be major public health problems in low income communities. The most important risk factors for these infections were found to be age, inconsistency of wearing shoes, poor hand washing habit before eating, open field defecation, and eating unwashed fruits. Urgent actions are needed to; at least, reduce intestinal parasitic infections through concerted approaches involving politicians (decision makers), health extension workers, school teachers, the mass media, community and religious leaders. All these bodies should design practical action plans for effective prevention and control of intestinal worms in the study area in general and to create awareness among school children and their parents in particular. It is further recommended that, regular inspection be conducted on school children for personal hygienic practices and shoe wearing habits.

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