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COMPARATIVE STUDY ON THE PREVALENCE OF INTESTINAL PARASITES AMONG PRIMARY SCHOOL CHILDREN IN TUDUN-FULANI MODEL SCHOOL AND HASHA INTERNATIONAL SCHOOL MINNA, NIGER STATE

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ABSTRACT

Intestinal parasitic infections remain an important public health problem in Nigeria causing diarrhoea and other health conditions. The method involved in collecting and processing of stool samples in agreement with standard parasitological technique. Stool samples collected were analyzed using formal ether concentration techniques (FECT). Two hundred and forty (240) stool samples from pupils age 6-14 years were examined from two schools, located in Bosso local Government area. Overall prevalence rate of 178(74.2%) were observed for various intestinal parasitic infection which included *Ascaris lumbricoides* 83(34.6%), which has the highest prevalence, *Necator americanus* 49(20.4%), *Taenia saginata* 22(9.2%), *Entamoeba hystolytica* 11(4.6%), *Schizostoma mansoni* 7(2.9%) and *Fasciola gigantica* 6(2.5%) with the least occurrence. Rate of infection was high among children of 6-8 and 9-11years of age. Overall infection rate was high among female children having higher prevalence than the males. Statistically, the result of the research showed a significant difference ($P<0.05$) based on sex of the pupils while based on age, the results showed no significant difference ($P>0.05$). The prevalence rate of infection recorded in this study could become higher in years to come and consequently become more threatening due to boost in birth rate and other socio-economic factors. The results of this study showed that pupils in both schools carry heavy intestinal parasitic infection burden which suggest prevailing unhygienic environment.

Keywords: Gastrointestinal, Parasites, Children, Tudun-Fulani, Hasha and Unhygienic environment.

INTRODUCTION

Gastrointestinal parasites are parasites that inhabit the gastro-intestinal tract of human and other animals. They can live in the body but most of them prefer the intestinal wall. An intestinal parasite can sicken the host. The major groups of parasite include Helminths and protozoans. The protozoans are organism having one cell which consists of sporozoa, sarcodina, mastigophora and ciliophora. While the helminths consist of cestodes, trematodes and nematodes. Each of these parasites can affect the digestive tract, sometimes two or more causes infection (Luka *et al.*, 2000). Gastrointestinal tract parasites are a group of worms that use the body lumens of the gut as normal locations for their adult forms. These parasites include the roundworms, hookworms, and whipworms which cause high morbidity and mortality in both human and domestic animals (Ganga *et al.*, 2006).

Gastrointestinal tract parasitic infections are of enormous public health importance and as such have been rated among the most widespread infections globally. Parasitic diseases are frequent in developing countries and constitute a major public health challenge as a result of their high prevalence rate as well as their consequence on both nutritional and immune status of the population (Ikon and Useh, 1999). In Africa, infections with parasitic helminths are Known as one of the focal public health predicament because in the world 2,200 million inhabitants are prone to this infection, there existed 2,000million helminths infections with 15million Nigerians suffering from Ascariasis alone while there are quite a lot of people with Strongyloidiasis, Trichuriasis, Enterobiasis, Hookworm, and tapeworm infections (Adabara *et al.*,2012). Among the parasitic infection helminths infection is the most common in the northern part of Nigeria. Helminthiasis are common in regions where poverty, poor sanitary conditions prevail (Adabara *et al.*, 2012). Gastrointestinal parasites are well known as a major reason and origin of morbidity and mortality throughout the globe for the most part of the under developed countries (Odu *et al*., 2011a; Odu *et al*., 2013). Gastrointestinal parasites are also acknowledged as one of the most universal illness in human being particularly in tropical and sub-tropical countries (Awolaju and Morenikeji, 2009; Odu *et al*., 2011b; Odu *et al*., 2013). Intestinal parasitic infections remain a severe public health menace in countless developing countries particularly owing to faecal pollution of water and food (Jimenez-Gonzalez *et al*., 2009; Odu *et al*., 2011a; Odu *et al*., 2013).

Transmission of agents that cause diarrhoea are usually by the faecal oral route, which include the ingestion of faecal contaminated water or food, person to person contact and direct contact with infected faeces (Andu *et al.*, 2002). Epidemiological studies of diarrhoea have been reported from several African countries including South Africa (Househam *et al.*, 1988), Gabon (Presterl *et al.*, 2003), Egypt (Omudu, *et al.*, 2007). It ranks second only to respiratory diseases and is a major cause of morbidity among notifiable diseases in some part of the world (Coker *et al*., 2000).

These infections impact negatively on the physical fitness and cognitive performance of pupils (Luka *et al.*, 2000). Intestinal helminthic infection is one of the commonest causes of chronic infection in humans in developing countries indeed children of an endemic community can be expected to have intestinal parasitic infection soon after weaning and high risk of re-infection in the rest of his or her life (Luka *et al*., 2001). The impure drinking water, low socio-economic state, poor sanitation coupled with low literacy rates of parents particularly the mothers are the main causes. Parasitic worms of human can be found in air, food, and water, they causes constipation, stomach

bloating, and other health problems. Other symptoms include anaemia, asthma, diarrhoea digestive disorders, fatigue, low immune system, nervousness and skin rash (Agbolade *et al*., 2004). Worm infestation is one of the major causes of childhood malnutrition, anaemia, stunted physical and mental growth (Ikram *et al.*, 2009; Omalu *et al*., 2013).

Intestinal parasitic infections have always been important public health problem in the world especially in the tropical and subtropical countries where humid climate, environment and poor socio-economic condition contributes to the problem (Ganga *et al.*, 2006).

There can be over hundreds of different types of parasite living in human bodies; some are microscopic in size while others can be found everywhere in the environment. However a contemporary education policy has tremendously increased the time children have to spend in school, the school environment has therefore emerged as epidemiological foci in childhood parasitism (Amuta and Houmsou, 2009). Factors that have been identified responsible for continued persistence of intestinal parasites in children are poor sanitary conditions, unhygienic practices, poor housing and poverty (Edungbola and Obi, 1992; Nwoke, 2004; Amuta and Houmsou, 2009).

Ascaris lumbricoides, *Trichuris trichiuria* are among the GIT parasite found associated in multiple infection. Poor environmental hygiene and poor socio-economic conditions are among the factors that promote the survival and transmission of GIT parasites. Faecal contamination of food and water, and use of soil as fertilizers are the major routes of transmission of gastrointestinal parasite. They are transmitted from human via faecal-oral routes, during which ova and cysts were discharged in human faeces. Widespread contamination occurs and infective stages are usually swallowed by new hosts (Omalu *et al*., 2013).

The aim of this study is to determine the prevalence of gastro-intestinal parasite among primary school pupils in Tudun Fulani model primary school and Hasha international school Minna, Niger state.

MATERIALS AND METHODS

Study area

This study was carried out in Minna, capital of Niger state. The state was created third February, 1976 from formal north-western state, with 25 Local Government Areas, in which Minna comprises of two Local Governments Chanchaga and Bosso. Minna experiences two distinct seasons (Dry and Wet season). The annual rainfall varies from about 1600mm in the south to 1200mm in the north. The duration of rainy season ranges from 150-210mm from north to south. The maximum temperature usually below 30.6^0C is recorded between March and June, while the minimum is usually December and January. Most part of the state comes under influence of air mass which blows from the North. Generally, the fertile soil and hydrology of the capital (Minna) permit cultivation. This study was conducted among primary school children in Tudun Fulani Model School, Bosso (Public School) and Hasha International School, Bosso (Private school) all in Bosso Local Government Area of Niger state were stool samples were collected from children.

Sample collection

Permission was obtained and sought from the establishment in charge of the primary schools before the collection of samples. Stool samples were collected from pupils in selected primary school who were given well labelled sample bottle which is a plastic container with press seals well labelled with name, sex and age. Sample bottles were collected from the pupil and taken to laboratory for processing and analysis. In the laboratory, the faecal samples were examined for ova, cyst, or larva of gastro-intestinal tract parasite using the formol-ether concentration technique (Cheesbrough, 2005).

Parasitological examination

The parasitological examinations of stool samples of pupils were carried out using formal-ether technique. The stool samples collected were analyzed and examined for the presence of gastrointestinal parasites. Microscopic examination of the stool samples was done by direct saline preparation for ova and cysts (Cheesbrough, 2005). On a microscope slide, 2 g of stool specimen was emulsified and a drop of normal saline was added on to it and a cover slip was carefully placed on the suspensions. The slide was viewed microscopically to check the presence of parasites using x10 and x40 objective lenses,S respectively (Cheesbrough, 2009).

RESULTS

As shown on Table 1, an overall high prevalence rate of six gastro intestinal tract parasite (GIT) was recorded among primary school children; overall prevalence was 178 (74.2%). Out of 178 positive result recorded in the study area *Ascaris lumbricoides* had the highest prevalence rate in children 83(34.6%), followed closely by *Necator americanus* 49(20.4%), and *Taenia saginata* 22(9.2%), *Entamoeba histolytica which is* 11(4.6%), *Schizostoma mansoni* which is 7(2.9%) and *Fasciola gigantica* had the lowest prevalence rate 6(2.5%), Where Tudun-fulani primary school has the highest rate of parasitic infection 107(89.2%).

Table 2 shows the prevalence of gastrointestinal parasite among primary school children in Tudun-fulani model primary school and Hasha international school in relation to age. Out of 240 samples collected, 120 samples were examined for each school, between the ages of 6-8years, 9-11 and 12-14 yrs. The highest presence was recorded in the age group 9-11 years with prevalence rate of 85(85%) while the least was recorded among age 12-14 years 34(53.13%). There was no significant difference (P>0.05) between rate of infection in respect to ages.

The results presented in Table 3 showed the prevalence in relation to sex Gastro-intestinal parasite among school children of Tudun-fulani model school and Hasha international school in Bosso local government area. 240 samples collected and examined, where the total number of male examined for both schools was n=140, and that of female was n=100, where females had higher rate of infection with 94(94%) positive for the six intestinal parasite and high prevalence of *Ascaris lumbricoides* 43(43%). While that of male was 51.4% and prevalence of *Ascaris lumbricoides* 36(25.7%). It was discovered that the female had the highest number of occurrence of parasitic infection for both schools. There was significant difference (P<0.05) between rate of infection in respect to sex for both schools.

Table 1: Prevalence of gastrointestinal parasites in Tudun-Fulani Model and Hasha International Schools in Minna

Parasite isolated	Tudun Fulani Model school, n=120, No positive (%)	Hasha International School, n=120, No positive (%)	Total n=240 No positive (%)
Ascaris lumbricoides	49(40.8)	34(28.3)	83(34.6)
Necator americanus	28(23.3)	21(17.5)	49(20.4)
Taenia saginata	13(10.8)	9(7.5)	22(9.2)
Entamoeba hystolytica	7(5.8)	4(3.3)	11(4.6)
Schizostoma mansoni	5(4.2)	2(1.6)	7(2.9)
Fasciola gigantic	5(4.2)	1(0.8)	6(2.5)
Total	107 (89.2)	71 (59.2)	178 (74.2)

Table 2: Distribution of Gastrointestinal parasite based on age of pupils in Tudun-Fulani Model and Hasha International Schools in Minna

Parasite isolated	6-8 (n=76) No infection (%)	9-11 (n=100) No infection (%)	12-14(n=64) No infection (%)	Total (n=240) No positive (%)
Ascaris lumbricoides	25(32.9)	43(43.0)	15(23.4)	83(34.6)
Necator americanus	16(21.1)	25(25.0)	8(12.5)	49(20.4)
Taenia saginata	10(13.2)	7(7.0)	5(7.8)	22(9.2)
Entamoeba hystolytica	4(5.3)	3(3.0)	4(6.3)	11(4.6)
Schizostoma mansoni	2(2.6)	4(4.0)	1(1.6)	7(2.9)
Fasciola gigantic	2(2.6)	3(3.0)	1(1.6)	6(2.5)
Total	59(77.63)	85(85.00)	34(53.13)	178(74.2)

Table 3: Distribution of Gastro-intestinal parasite in relation to sex of pupils of Tudun-Fulani model and Hasha International Schools in Minna

Parasite isolated	Male n=140, no infection (%)	Female n=100, no infection (%)	Total% n=240
Ascaris lumbricoides	36(25.7)	43(43.0)	83(34.6)
Necator americanus	22(15.7)	26(26.0)	49(20.4)
Taenia saginata	7(5.0)	10(10.0)	22(9.2)
Entamoeba hystolytica	3(2.1)	6(6.0)	11(4.6)
Schizostoma mansoni	2(1.4)	5(5.0)	7(2.9)
Fasciola gigantic	2(1.4)	4(4.0)	6(2.5)
Total	72(51.4)	94(94.0)	178(74.2)

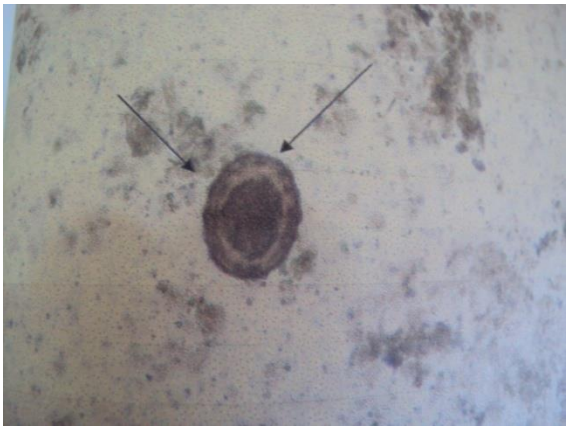

Fig. 1: Fertile Egg of *Ascaris lumbricoides*

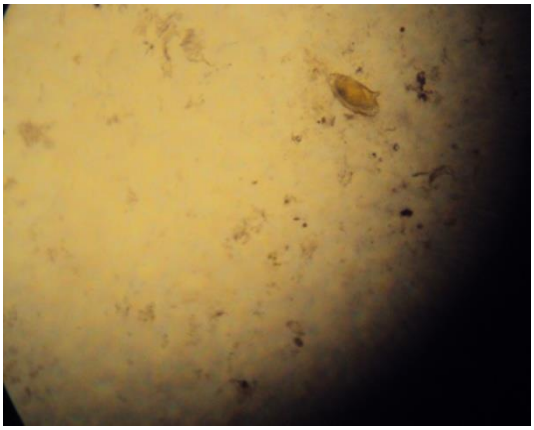

Fig. 2: Egg of *Schizostoma mansoni*

DISCUSSION

Gastrointestinal parasitic infections is endemic in the study area, an overall high prevalence rate of six gastro intestinal tract parasite (GIT) was recorded among primary school children, overall prevalence was 178 (74.2%). Out of 178 positive result recorded in the study area *Ascaris lumbricoides* had the highest prevalence rate in children 83 (34.6%), followed closely by *Necator americanus* 49 (20.4%), and *Taenia saginata* 22 (9.2%), *Entamoeba histolytica which is* 11 (4.6%), *Schizostoma mansoni* which is 7 (2.9%) and *Fasciola gigantica* had the lowest prevalence rate 6(2.5%), Where Tudun-fulani primary school has the highest rate of parasitic infection 107(89.2%). The result of this study is in contrast with the findings of Gimba *et al*. (2015) who reported a of 42.9% of intestinal parasites among in children in Gwagwalada, FCT-Abuja, Nigeria

Indifference to our results, a number of researchers in Nigeria and overseas had reported a lower prevalence rates earlier. Wariso and Ibe (2005) reported 46.0% prevalence

rate of intestinal parasite within some parts of Port Harcourt, Nigeria. Egwunyenga *et al.* (2001) reported 33.3% in Nigeria. Alison *et al*. (2004) reported 17.0% in Uganda. Mordi and Ngwodo (2007) reported a value of 0.7% in all the eighteen local government areas of Edo State, Nigeria. Okolie *et al*. (2008) recorded a high prevalence rate of 75% among patients with appendicitis in Oguta, Imo State, Nigeria. Chukwuma *et al*. (2009) in their study on the prevalence of parasitic geohelminth infection of primary school pupils in Ebenebe Town, Anambra State, reported a prevalence value of 53.6% in soil and 87.7% in stool. In another study conducted by Awolaju and Morenikeji (2009) a prevalence value of 48.4% and 50.80% was reported among primary and post-primary schools children Ilesa West, and among school children in Ilaje, Osun State, Nigeria respectively. Furthermore, Chukwuma *et al*. (2009) too reported a prevalence of geohelminth eggs/larvae in soil among primary schools. The schools are Umuji primary school, Umuogbuefi primary school and Obuno primary school with prevalence rate of 52.5%, 83.3% and 32.5% respectively. In a study among inhabitants of a rural community in Mexico, Jimenez-Gonzalez *et al*. (2009) recorded a prevalence value of 34.0%. In another study conducted by Odu *et al*. (2011a) an overall prevalence of 30.7% was reported among primary school children in rural and urban settings in Rivers State, Nigeria. Alli *et al*. (2011a) reported 49.4% in Ibadan, Oyo State, Nigeria. Odu *et al*. (2013) reported an overall prevalence of 15.7% among primary school children in Rivers State, Nigeria.

The study revealed a significantly higher prevalence 85 (85%) of gastrointestinal parasites in children 9 to 11 years old. High prevalence of gastrointestinal parasites observed in children 6 to 8 years old in this study was also in agreement with the findings of Ishiyama *et al.* (2001). This disagrees with Odu *et al*. (2013) who reported that prevalence of intestinal parasites were not age dependent. This might be due to habits as well as poor or lack of environmental sanitation especially where people eat or drink. Also, low body immune system especially as concerned children might be responsible for high infection rate reported in this study (Sorensen *et al*., 1996; Alli *et al*., 2011b). Gastrointestinal parasites detected in this study include *Entamoeba histolytica, Necator americanus, Taenia saginata, Fasciola hepatica* and *Ascaris lumbricoides*. These intestinal parasites have been reported in various parts of Nigeria (Ajero *et al*., 2008).

With regards to sex, females had higher rate of infection with 94 (94%) positive for the six intestinal parasite while that of male had 51.4%. It was discovered that the female had the highest number of occurrence of parasitic infection for both schools. There was significant difference (P<0.05) between rate of infection in respect to sex for both schools. This result disagree with the findings of Gimba *et al*. (2015) who reported that females showed a marginally higher prevalence (30.0%) compared with males (25.7%), there was no significant difference (P>0.05) between the enteric parasitosis and sex. Saathof *et al*. (2004) in KwaZulu-Natal/South Africa and Tohon *et al*. (2008) in Nigeria also reported that parasitic diseases were not gender reliant. It also disagree favourably with Awolaju and Morenikeji (2009) who recorded no significant difference in a study conducted among primary and post-primary schools pupils Ilesa West, Osun State, Nigeria and disagrees with Nkengazong *et al*. (2009) who also reported that the disparity in prevalence assessment of parasites sandwiched between the sexual category in Kotto Barombi and in Marumba II were insignificant statistically. Also, Mafiana (2008) and Agbolade *et al*. (2004) that helminthic infections were not sex dependent.

Ascaris lumbricoides was the most prevalent in the study areas with 83(34.6%). This was in agreement to most findings reported from Nepal in which *A. lumbricoides* topped the list of detected parasites from children with diarrhoea (Rai, *et al.*, 2002). The higher prevalence reported for *Ascaris lumbricoides* in this study agreed with previous report by Adeyeba and Akinlabi (2002), Agbolade *et al*. (2004); Alli *et al*. (2011a) and Odu *et al*. (2013). Okolie *et al*. (2008); Okonko *et al*. (2009); Alli *et al*. (2011a) and Odu *et al*. (2013) also reported *A. lumbricoides* to be most predominant in their studies. Infection by *Ascaris lumbricoides* is spread through eggs, which are swallowed as a result of ingestion of contaminated soil or contact between the mouth and the various objects carrying the infective eggs. Contamination of food or drink by dust or handling is another source of infection. Ascaris ova are also spread through the agents of flood and coprophagous animals, and can thus be transported to locations far from the defecation sites (Obiamiwe and Nmorsi, 1990; Mordi and Ngwodo, 2007). The well-protected eggs can withstand drying and can survive for very lengthy periods. Soil pollution is thus a major factor in the epidemiology of human *ascariasis* (Mordi and Ngwodo, 2007).

The prevalence of *Ascaris lumbricoides* 83(34.6%) reported in this study is in disparity to the prevalence reported by some researchers in other parts of Nigeria. A prevalence of 57.4% was reported by Odu *et al*. (2013) among school children. Egwunyenga *et al*. (2004) reported a prevalence of 55.0% in Eku, Delta State of Nigeria. Nwosu *et al*. (2004) reported a prevalence of 52.0% in school children in Abia and Imo States of Nigeria. Odikamnoro and Ikeh (2009) reported a prevalence of 51.5% among the Kpiri-kpiri community of Abakiliki of Ebonyi State, Nigeria. The 42.9% however, is high when compared with what has been previously reported in other areas. Mordi and Ngwodo (2007) reported a value of 30.0% in all the eighteen local government areas of Edo State, Nigeria.

Very high prevalence of Gastro-intestinal parasitic infections has been reported to occur in rural settings, Pre-urban and urban slums by Okon and Oku (2001). It is therefore not surprising to record the overall high prevalence of GIT parasite in this study area due to its pre-urban settings with slums. Subsequently the high prevalence of Gastro-intestinal parasite in this study forms an index for monitoring the community level of sanitation, economic status and nutritional standards.

CONCLUSION

The outcome of this work has shown that the prevalence of intestinal parasite is increasing in Minna especially among the primary school children of Bosso community. There is need for exhaustive study on the prevalence, epidemiology and transmission rate in Minna and Niger state.

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