

Prevalence of Intestinal parasites Among Primary School Pupils in Jega and Maiyama Local Government Area Kebbi State, Nigeria.

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ABSTRACT

This study was carried out between August and November 2017 in order to determine the prevalence of intestinal parasites among ten selected public primary schools in Jega and Maiyam Local Government Area, Kebbi State, Nigeria. A total of 400 stool samples from children were examined for helminth ova and protozoan cysts by formal-ether concentration method. An overall prevalence of 45.25% was obtained. Entamoeba histolytica, Hookworm (Ancylostoma duodenale and Necator americanus), and Ascaris lumbricoides were the most frequently encountered parasites with 27.5%, 26.4% and 18.3% prevalence respectively, followed by Cryptosporidium spp., (6.5%). Others encountered included Strongyloides stercoralis (4.1%), Entamoeba coli (3.7%), Trichuris trichura (2.8%), Enterobius vermicularis and Giardia lamblia (2.4%) respectively, Hymenolepis nana (2.0%), Taenia saginata, Strongyloides stercoralis and Diphylobotrium latum (1.4% each), and Balantidium coli (0.4%). Logistic regression analysis indicates that, the infection was associated with: age of the pupils, 5-7 years (OR=1.53, P = 0.04, 95% Confidence Interval= 1.014-2.318) and 8-10 years (OR = 1.4, P = 0.1, CI= 0.90-2.12). Sex-specific prevalence is higher in males (49.5%) than females (41.0%). There was a positive association between sex and the prevalence of the infection (Odds Ratio=1.4, P = 0.09 and 95% CI=0.950-2.094). There was a statistically significant association between the prevalence of the infection and source of drinking water (OR=1.69, P = 0.01 and CI=1.124-2.537) for well water. It was concluded that unhygienic behavioral variables, certain environmental and socio-demographic factors predicted the presence of intestinal parasitism in the areas. Sustainable intervention should include basic health education, improvement in living standard, access to clean water and adequate sanitation.

Key words: Prevalence, Intestinal parasites, school children, Jega and Maiyama.

INTRODUCTION

Gastro-intestinal parasites are parasites which inhabit the gastro-intestinal tract of human and other animals. They include protozoan and helminthes parasites. The common intestinal protozoan parasites of human are *Entamoeba histolytica/dispar*,

Giardia lamblia/intestinalis, and *Cryptosporidium parvum*. Parasitic helminthes (worms) that infect humans belong to two phyla namely; phylum Platyhelminthes and phylum Nematoda. The medically important helminthes are nematodes (roundworms), cestodes (tape

worms) and trematode (flukes) (WHO, 2000). They are transmitted either the ingestion of the infective stage of the parasites often in contaminated hand, food and water or through skin penetration (Bunza and Abdullahi, 2013).

Intestinal helminthes are prevalent throughout the tropics, especially among poor communities. Records show increasing trends in helminthiasis, particularly in developing nations (WHO, 2002). According to the World Health Organization report, 250 million peoples were infected with *Ascaris lumbricoides*, 46 million with *Trichuris trichiura* and 151 million with hookworms (WHO, 1996).

Children between ages of 3 to 13 years are more susceptible to intestinal parasitic infection than those with the age of 14 and above. Thus, as age increases exposure to intestinal parasitic infection decreases possibly due to improved personal hygiene (Mohamed *et al.*, 2009).

The adverse effects of intestinal parasites include hepatomegaly, splenomegaly, abdominal pain, mechanical blockage of the lumen, chronic diarrhea, liver abscesses, intestinal ulcer, anemia, intestinal mal-absorption and death (Bunza and Abdullahi, 2013). Intestinal parasitic infections have detrimental effects on the survival of affected individual's appetite, growth, physical fitness, school attendance, and cognitive performance of school age children (Hadidjaja *et al.*, 1998).

The aim of this research is to determine the prevalence of human intestinal parasites among primary school pupils in Jega and Maiyama LGAs, Kebbi state.

MATERIALS AND METHODS

Study Area

This study was carried out in Jega and Maiyama local government areas of Kebbi state. The area is located at latitude 12.22° North and longitude 5° east (Sulaiman, 2008). The inhabitants are predominantly Hausa people by tribe. The major occupation of the people is farming and trading.

Study Population

The study population comprised of 400 primary school pupils. A total of 10 primary schools were randomly selected from Jega and Maiyama LGAs for this study and 40 pupils were selected from each of the ten primary schools selected in the study area.

Sample Size Determination

A total sample size of pupils was estimated using the standard formula as described by Sarmukaddam and Garad 2006;

$$N = \frac{Z^2pq}{D^2}$$

Where; N = sample size,

Z = standard normal distribution at 95% confidence interval=1.96,

P = prevalence rate, which is taken as 50% = 0.50.

q = 1-p = (1-0.50) = 0.50,

D = the allowable error, which is taken as 5% = 0.05. By substituting the values into the formula;

$$N = \frac{1.96^2 \times 0.50 \times 0.50}{0.05^2} = 384.16384.$$

Data collection

A structured questionnaire was administered to obtain information on demographic data and risk factors of acquiring gastrointestinal parasites. A total

of 400 fecal samples was collected from 400 pupils (200 in Jega LGA and 200 Maiyama LGA). Each pupil was given a sample collection bottle bearing serial number that was assigned to his/her name in the record book. The pupils were instructed on how to collect their early morning stool into the containers. The faecal samples collected was preserved in 10% formalin and transported to the Zoology Laboratory in the Department of biological sciences, Faculty of science and science education, Kebbi state University of science and technology Aliero for analysis.

Laboratory Analysis of Faecal Samples

Faecal analysis was achieved by using formol-ether concentration technique. The formol-ether concentration technique was done by placing 2g of the faeces into a test tube containing 10ml of distilled water. This was emulsified and the mixture was strain through a gauze-sieve into a centrifuge tube and centrifuged at approximately 2,500 r.p.m for 3minutes. The supernatant was decanted and 10% formol-saline was added to the tube containing sediments within 2.5mm of the top of the tube and then mixed with a glass rod. About 3ml of di-ethyl ether was added to the mixture in the tube, corked and then shaken vigorously. The mixture was centrifuged again for two minutes at 2,000 r.p.m. after which, the fatty debris at the interface of the liquids was loosened with a swab-stick, and the whole supernatant fluid together with the debris was poured away. A drop of Lugol's iodine solution was then added to the deposit at the bottom of the tube and shake. A drop of the content was pipette on a microscope glass slide and cover with a cover slip and examined under light microscope using the x10 objective lens (NCCL, 1997).

Identification of the parasites was done using the morphology of diagnostic stages of human intestinal parasites by Brook and Melvin (2001).

Data Analysis

The data collected for this study was analyzed using Graph Pad InStat software version 3.05. The prevalence was calculated and express in percentages. Odds ratio (OR) was used to determine the association between certain risk factors and prevalence of the infection. P-value of ≤ 0.05 is considered significant.

RESULTS

Out of 400 pupils screened in the study area, 181(45.25%) were found positive with different species of gastro-intestinal parasite. An overall prevalence of 45.25% was obtained in this study. With respect to location, the infection was significantly related to the community in question. Peak prevalence was recorded in Maiyama 92(46.0%) than Jega 89(44.5%) as shown in figure 1. Odds ratio value of 1.062 shows significant differences in prevalence of the infection between the two communities.

Thirteen species of human intestinal parasites were identified in the study area, of which *Entamoeba histolytica*, Hookworm (*Ancylostoma duodenales* and *Necator americanus*) and *Ascaris lumbricoides* were the common intestinal parasites species found in all the sampled schools with prevalence rate of 27.6%, 26.4% and 18.3% respectively.

Breakdown of result in relation to school showed that Gindi and Mungadi primary school had the highest prevalence of 21 (52.5%) each, followed by Dumbegu primary school 20(50.0%), Nasarawa and

Giwa Tazo 19(47.5%) each, M.B.D primary school 18(45.0%), Nizamiyya 17(42.5%), and UBE Maiyam 17(42.5%), Jega Model primary 16(40.0%), and Raudatus sunnah academy had the least prevalence with 13(30.0%) Table 1. However, these differences among the Schools was not significant at 95% confidence level ($P = 0.785$).

In this study, prevalence of intestinal parasites in relation to age of the pupils showed that 5 -7 age group had the highest prevalence of 73(52.14%), 8-10 age group had 61 pupils infected out of 120 with 50.83% prevalence and 11 - 13 years age group had the least with 47 pupils infected out of 140 and prevalence rate of 33.57% (Figure 2). Odds ratio value of 1.53 and 1.38 for 5-7years and 8-10years age group showed associations between the age group and the infection while odds ratio value of 0.48 for 11-13years shows negative association between the age group and the infection. There is statistically significant association between age group (5-7years) and the infection ($P= 0.04$).

The prevalence of intestinal parasites based on gender of the pupils is shown in

Table 4.3. Gender wise, prevalence was higher among males (49.5%) compared to their female counterpart (41.0%) but the effect was not statistically significant ($P= 0.088$) despite positive association between gender and prevalence rate ($OR = 1.41$).

Variation of prevalence with respect to source of water supply was observed in this study (Figure 3). Higher prevalence of 53.3% was obtained among pupils who indicated that they use wells. An odds ratio of 1.689 and P-value of 0.011 obtained for respondents that use wells showed statistically significant association between the water source and the disease. Of the 205 respondents that use borehole, 83(40.5%) positive cases were recorded and from 43 respondents for pipe-borne water 17(39.5%) had positive cases. Odds ratio value of 0.770 and 0.673 for pupil using pipe-borne water and bore hole water results did not show significant association between the prevalence of the infection and the source of water.

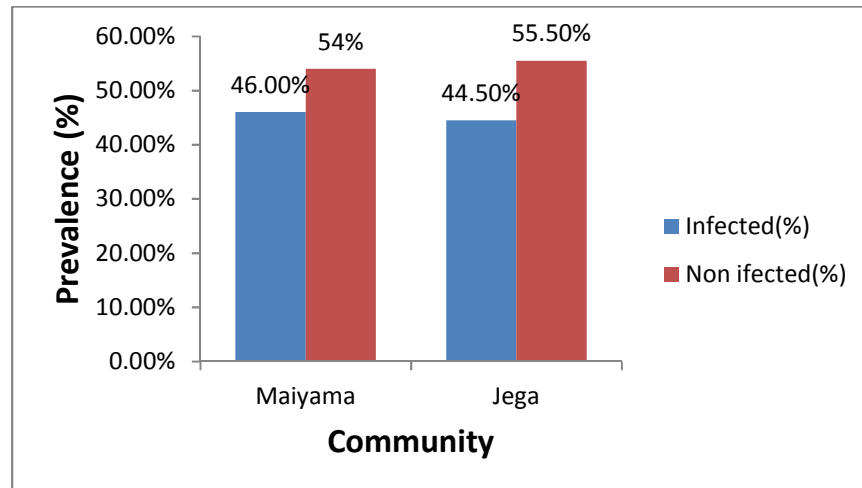


Figure 1: Prevalence of intestinal parasites in the two communities.

Table.1: Prevalence of intestinal Parasites in Ten primary Schools in Jega and Maiyama.

Schools	Number examined	No. infected (%)	Chi-square	Df	P-value
Dumbegu	40	20(50.0%)	5.540	9	0.785n.s
Gindi	40	21(52.5%)			
Giwa Tazo	40	19(47.5%)			
Jega Model	40	16(40.0%)			
Muh'd Bello	40	18(45.0%)			
Nasarawa	40	19(47.5%)			
Nizamiyyah	40	17(42.5%)			
Raudatus sunnah	40	13(32.5%)			
UBE Maiyama	40	17(42.5%)			
UBE Mungadi	40	21(52.5%)			
TOTAL	400	181(45.25%)			

n.s = not significant

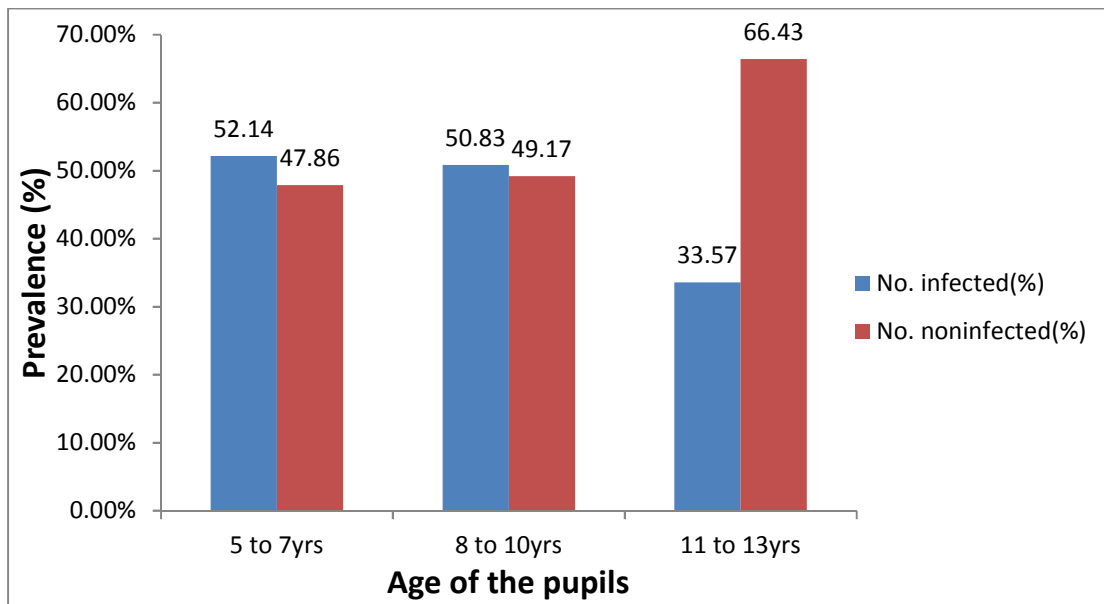


Figure 2: prevalence of intestinal parasites in relation to age of the pupils.

Table 2: Prevalence of intestinal parasites stratified by gender of the pupils.

Gender	Number Examined	Number positive (%)	Number negative (%)	Odds ratio	P-value	95% CI
Male	200	99(49.5%)	101(50.5%)	1.411	0.088ns	0.950-2.094
Female	200	82(41.0%)	118(59.0%)			
Total	400	181(45.25%)	219(54.75%)			

Ns – Not significant, CI – confidence interval.

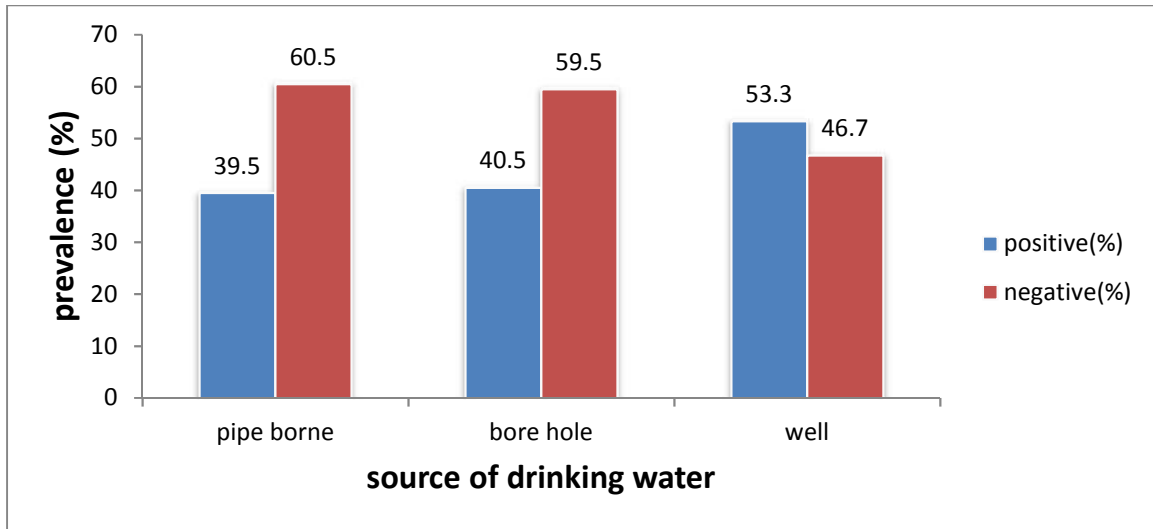


Figure 3: Prevalence of intestinal parasites in relation to source of drinking water.

DISCUSSION

Over the course of this study, a total of 400 fecal samples from 400 primary school pupils (200 males and 200 females) were collected and analyzed for the presence of eggs, cyst or larvae of intestinal parasites and an overall prevalence of 45.25% was obtained. The result of this finding was higher than that obtained by Frederick *et al.*, (2011) Benin city with 3.9% prevalence, Ahmed *et al.* (2003) with 30.8% in Katsina, Damen *et al.* (2010) with 30.2% in Doi village Plateau State. The high prevalence of intestinal parasites in schools in Jega and Maiyama Local Government Areas may be due to favourable climate for the survival of the parasites, improper management of organic refuse, inadequate supply of clean water, poor drainages and use of dumping site for defaecation.

Peak prevalence was recorded in Maiyama with a total of 92(46.0%) out of 200 than Jega with a total positive case of 89(44.5%) out of 200. Odds ratio value of 1.062 shows significant association between the two communities. This is attributable to the possible differences in community

practices relating to infection and level of environmental contamination (Danladi *et al.*, 2015). According to Zaidah *et al.*, disparity in distribution may be linked to population characteristics, geographic location, and detection methods. The distribution and prevalence of various species of intestinal parasites differ from region to region because of several environmental, social and geographical factors (Zahraa, 2010). Most infectious diseases are particularly prevalent in areas with warm climates in which man exerts himself least in developing sanitary protection and typically has a low threshold of resistance to invading organisms (Gendrel *et al.*, 2013).

Prevalence studies in relation to school showed that Gindi and Mungadi primary schools had the highest prevalence of 21 (52.5%) each. This outcome might be due to improper management of organic refuse and inadequate supply of clean water, poor drainages and use of dumping sites for defaecation might have contributed to this high prevalence. Raudatus sunnah academy had the least prevalence with 13(30.0%).

These differences among the Schools were however not significant ($P = 0.785$). This might be due to the same level of exposure to risk factors in the communities where the schools are located. It shows that the levels of hygiene in the schools might be the same.

Age-specific prevalence of intestinal parasites showed that 5 -7 years age group had the highest prevalence of 73(52.14%), 8-10 years age group had 61 pupils infected out of 120 with 50.83% prevalence and 11 - 13 years age group had the least with 47 pupils infected out of 140 and prevalence rate of 33.57%. Odds ratio value of 1.56 for 5-7years showed associations between the age group and the infection followed by pupils between the age group of 8 - 10 years. Those pupils in age group of 11 - 13 years had least prevalence. This may be due to their level of exposure to the risk factors. Younger children are more susceptible to intestinal parasitic infection than older children. They are known for maintaining poor personal hygiene as this plays a role in intestinal parasitic infections. This is because intestinal parasites could be transmitted through the contamination of the environment, especially the soil where the children usually play in the open fields and eat food without washing hands. Thus, as age increases exposure to intestinal parasitic infection decreases possibly due to improved personal hygiene (Mohamed *et al.*, 2009).

As the children grow there is better awareness in hand washing and other personal hygiene measures this reduce the risk of the children from getting infected. Similar observations were made by Danladi *et al.*, (2015) in Kebbi state, Kalu *et al.* (2013) in Mbaitoli in Imo State, Nigeria, Damen *et al.* (2010) in Doi village Plateau State,

Obiukwu *et al.*, (2008) in Mbaukwu in Anambra State.

The prevalence of the parasites in the 400 pupils was higher in males compared to the females. From a total of 200 male and 200 female pupils enrolled for the screening, 99 (49.5%) males and 82(41.0%) females were positive for one parasite or the other. There was statistically significant association between the sexes and prevalence rate. Gender-related prevalence shows that male pupils were more infected compared to the females, the reason may be due to the fact that males are more engaged in extracurricular activities such as recreational activities and games. The lower prevalence in females may be due to cultural practices, which require females to be indoors most of the time while males take part in many outdoor activities. Passi (2015), Kalu *et al.* (2013) and Uneke *et al.* (2006) made similar observations in Nigeria.

The result of this research shows an intimate association between patterns of infection and access to good water supply. Prevalence of intestinal parasitic infections according to water source showed that the prevalence was higher in the pupils who used wells as their source of drinking water and least in those that used either borehole or pipe-borne water as source of drinking water. This significant association between infection and use of wells as sources of drinking water may be because shallow wells may be prone to contaminations. Also, some wells in the towns are dug close to pit latrine, and poor sanitation around the well enhances transmission of intestinal parasites. Lower prevalence recorded among those pupils using pipe-borne and borehole water as their sources of drinking water shows that these sources are safe. However, during the

process of fetching water, the water containers or handle of the borehole engine and tap may be contaminated (Absar *et al.*, 2010). The association of sources of water to gastro-intestinal parasitic infection as observed in this study is comparable to that of Ahmed *et-al* (2003) in Katsina state.

CONCLUSION

The rates of the infections observed are of public health significance. The occurrence of intestinal parasites among primary school pupils can cause chronic infections which can negatively affect all aspect of children's health, nutrition, cognitive development, learning and educational access and achievement. The prevalence is directly related to the sanitary conditions and socioeconomic status. Thus, it is recommended that Good personal hygiene should be encouraged by both teachers and parents of children and mass deworming campaign should be carried out in schools especially those in rural areas. This will help and eventually reduce the cases of high prevalence of intestinal parasitic infections. More studies are needed in these areas to identify the risk factors associated with the prevalence of the parasites in the areas.

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