

Co-Infection of *Ascaris lumbricoides* and *Taenia* spp from selected primary schools children in Boripe Local Government of State of Osun, Nigeria

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Introduction

Helminths or parasitic worms are multicellular, bilaterally symmetrical, elongated, flat or round animals. They are parasites in humans, which belong to two phyla: Platyhelminthes and Nematoda. Serious health problems arise from these human intestinal parasites and it is highly prevalent in the tropics. The intestinal tract of humans had been the habitat of these helminths [1]. Diseases due to the parasites are among the most prevalent human infections affecting approximately one quarter of the world's population, mainly school children. This is due to their poor personal and environmental hygiene, poverty and poor health services among others [2,3]. Previous studies affirmed that scientists in their studies have shown associations between helminth infections and under nutrition, iron deficiency anaemia, stunted growth and poor performance in cognition tests [4,5]. Also, learning impairment is caused by worm infections hence, helminth control is one of the most cost effective strategies to improve health in developing countries [6].

Materials and Methods

The study was conducted in the Boripe Local Government Area of the State of Osun, with coordinates 7°52'0"N 4°39'30"E, south western Nigeria. Its headquarter is in the town of Iragbiji. The rainy season spans from March to November with an August break in between. Hence, majority of the inhabitants are farmers and traders while few individuals are civil servants.

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ABSTRACT

Objective: This research was geared towards surveying and knowing the influencing factors of intestinal nematodes infection in primary school pupils in Boripe local Government Area, State of Osun Nigeria.

Methods: Two hundred stool samples were collected from ten different schools. The samples were emulsified in formaldehyde-ether concentration and centrifuged. The resulting stool sediments were microscopically examined. Questionnaires were given to the pupils to capture their bio-data and health status in relation to the influencing factors of the infection.

Results: The percentage co-infection of the parasites were 29.2% and 24.3% of males and females respectively. Religion, pork meat consumption and personal hygiene among others, significantly influenced the incidence of the infection ($p < 0.05$). On the contrary, there was no significant association between the intestinal helminths infection and washing of fruits/vegetables or stream swimming. The preponderance of *Taenia* spp was high compared to *Ascaris lumbricoides*.

Conclusions: Investigation in this study generally revealed a low infestation of the intestinal helminth parasites. Nevertheless, there is need for regular sensitization of the public, especially mothers, on the need for good hygiene practices and proper cooking of every food - mainly meat. Also, there is need for periodic deworming of the pupils for better utilization of the food nutrients.

KEY WORDS:

Co-infection
Ascaris lumbricoides
Taenia spp
Primary schools

Two hundred (200) faecal samples were collected and examined from ten (10) schools in the Local Government area. Random sampling technique was used in the selection of schools for this study. The parents of the selected students were pre-informed through letters on the importance of the research. Questionnaires and clean labelled water proof sample collection bottles were given to pupils between the ages of 6 to 12 years. This was taken home after

being taught how to obtain the faecal sample without contamination. The preservation of the faecal samples was done with formalin the next day before they were taken to the laboratory for analysis.

Each faecal sample was examined macroscopically for adult worms, blood and mucus. The colour, odour and consistency (formed, semi formed and watery) were observed as well. Also, the microscopic examination of the faecal parasites was done using [7] of the formaldehyde-ether concentration method. The procedure involved emulsifying of one gram (1g) of the sample with an applicator stick in a test tube with 7 mL of formalin solution. This was properly mixed. Thereafter, 3 mL of ether was added, corked and vigorously mixed in an inverted position. The mixture in a test-tube was centrifuged at 4000 rpm for 3 minutes to form layers of suspension. The layers were formol ether, faecal debris, formol water and stool sediments. The first three layers were discarded and a drop from the fourth layer was placed on a clean grease-free glass slide. This was covered with a cover slip and examined microscopically using the x10 and x40 objective lens of the microscope.

Ethical approval was obtained from the headmasters and the Parents Teachers Association Executive Committee of each school. Thereafter, letters on the purpose of the study with consent forms were sent to the parents/caregiver of the selected children. The confidentiality of participants was ensured throughout the study.

Statistical analysis

The data collected from this study were analyzed using percentages and Chi square (χ^2). The analyses were done using the Statistical Package for Social Sciences (SPSS) Version 16.

Results

A total of two hundred (200) faecal samples were examined in this study with the total percentage of male and female pupils to be 44.5% and 55.5% respectively. The prevalence of the helminth parasites based on sex showed that the total numbers of those with co-infection were 53 individuals with females having the highest infection 27 (24.3%) table 1. In all the infections compared (*Ascaris lumbricoides*, *Taenia* spp and co-infection), females were the most infected while *Taenia* spp. infected more of the pupils with the total percentage of 44.5%.

Table 1. Prevalence of intestinal Helminth parasites based on sex

Sex	Intestinal Helminth parasites			Total
	<i>A. lumbricoides</i>	<i>Taenia</i> spp	Co-infection	
Male	23 (58.8%)	40 (44.9)	26 (29.2)	89 (100)
Female	35 (31.5)	49 (44.1)	27 (24.3)	111 (100)
Total	58 (29.0)	89 (44.5)	53 (26.5)	200 (100)

Table 2 presented high observations under co-infection in nausea/vomiting, reduced weight and stunted growth/malnutrition in both sexes. The highest and the least observed symptoms of the pupils were from multiple symptoms and tiredness under single infection and co-infection respectively. The female pupils were the most vulnerable with 62 individuals under single infection in multiple symptoms. In the symptoms, tiredness was least observed for both sexes. Males under co-infection presented the least count of pupils with 0. The ascending order of the first four observed symptoms in the female pupils were tiredness, nausea/vomiting, reduced weight and stunted growth/malnourished. The counted pupils for these were 4, 8, 16 and 18 respectively table 2.

Table 2. Observable/Inquired symptoms with the pupils

Symptoms	Infections/ Sex			
	Single Infection		Co-infection	
	Male	Female	Male	Female
Abdominal pain/Stomach ache	34	25	10	5
Nausea/Vomiting	13	8	20	18
Diarrhoea	21	30	2	9
Tiredness	2	4	0	7
Reduced weight	12	16	16	18
Stunted growth/Malnourished	25	18	10	14
Multiple symptoms	49	62	13	9

Some influencing factors of the intestinal parasites infection were considered and it was seen that majority of these factors were statistically significant to the infection. Table 3 gives significant values of the factors, it was seen that personal hygiene, pork meat consumption and religion had great effect in the invasion of the helminth parasites as observed with the pupils ($P < 0.05$).

Table 3. The influencing factor of the intestinal parasites infection

Factors	Respondent's counts	P.value (<0.05)
Sex		0.120
Male	89	
Female	111	
Parents Occupation		0.157
Trader	81	
Farmer	78	
Civil Servant	41	
Toileting mode		0.002
Bush	64	
Pit latering	88	
Water Closet	48	
Hand washing after		0.001
Yes	149	
No	51	
Washing of fruits/vege-		0.124
Yes	121	
No	79	
Stream Swimming		0.005
Yes	120	
No	80	
Eating outside		0.203
Yes	91	
No	109	
Clean environment		0.003
Yes	79	
No	121	
Personal hygiene		0.000
Yes	163	
No	37	
Pork meat consump-		0.000
Yes	164	
No	36	
Religion		0.000
Christain	144	
Muslim	35	
Traditional	21	
Constant Hunger		0.120
Yes	111	
No	89	
Pepperish Stomach		1.000
Yes	100	
No	100	

Also, hand washing after toileting, toileting mode, clean environment and stream swimming had significant effect in the infection ($p < 0.05$). On the contrary, sex, having constant hunger, washing of fruits/vegetables, parent's occupation, eating outside and pepperish stomachs statistically played no significant roles in the infection of the respondents.

Discussion.

The co-infection of the two Intestinal Helminth parasites studied was observed to be very low in occurrence. Though when observed separately, *Taenia* spp was mostly isolated. This negates the findings of [8,9] who reported that *A. lumbricoides* has the most prevalence in their study. This could perhaps be because more of the pupils consumed improperly cooked pork meat as this helminth is closely related to pigs. Also, poor standard of personal (washing of hand after toileting, proper washing and cooking of foods etc) and environmental (indiscriminate defaecation around homes and using of night soil as fertilizer etc) hygiene is another influencing element of the infection. Likewise, occurrence of the invasion is higher in female pupils. This is linked to certain unhealthy practices by the pupils such as sand-play. It was noted that, the observable/Inquired symptoms of co-infections of the Intestinal Helminth parasites had higher numbers of individuals with reduced weight, stunted growth/malnourished, multiple symptoms and nausea/vomiting. The reasons could possibly be traced to the fact that these parasites solely depend on the food nutrients of their hosts as opined by [10]. Hence, the availability of this good condition probably helped in increasing the numbers of symptoms observed in the pupils. Similarly, nausea/vomiting could have resulted from the migration of the larvae parasite especially *A. lumbricoides* which are restless wanderers. Loss of appetite is possible in the event of heavy infection of the parasites.

The important factors among others that aid the infestation of the parasites are toileting mode, hand washing after toileting, clean environment and personal hygiene. All these factors tend towards the hygiene and poor sanitation habits of the pupils involved in this study. Also, pork meat consumption and religious practice played a key influence in the infection. This could be traced to the improper cooking

of the pork meat before eating. Similarly, religious practices also contributed to the incidence as most affected were Christians because consumption of pork meat is not against their faith as it is with the Muslims. Stream swimming is seen to have aided the infection in the pupils and this might be a result of swimming in faecal contaminated rivers. On the contrary, sex and parent's occupation had no link with the infection in this study. This finding negates the claim of in their study which claimed that sex was a strong factor influencing the prevalence of intestinal nematodes [11].

Conflict of Interest

We declare that we have no conflict of interest.

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