

## Prevalence of Soil Transmitted Helminth Infections in a Tertiary Institution in Western Nigeria

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**Abstract:** Studies carried out in different countries has shown that the social and economic situation of an individual is an important cause in the prevalence of intestinal parasites. A parasitological and questionnaire study was therefore carried out among the students of the Federal Polytechnic Ede a tertiary institution in Osun State, Nigeria. The questionnaire assessed the level of knowledge of the students about Soil Transmitted Helminths (STH) and the parasitological study assessed the prevalence of STH among this group of students. A total of 252 stool samples were examined using direct smear and concentration technique. *Ascaris lumbricoides* (12.7%) and Hookworm species (8%) were the only STHs recovered from the stool samples of the students. *Ascaris* infection was more common than hookworm in all the age groups studied and the prevalence of both infections decreases with age. The prevalence of both infections was higher in males than in females but there was no statistical significance difference between the prevalence of infection with age and sex ( $P < 0.05$ ). However, egg counts revealed that most of the students infected had light infections with both parasites. The result of the questionnaire revealed that most of the students were not aware of the mode of transmission and control of STHs. A statistically significant number of the students did not know the correct mode of transmission ( $P=0.0389$ ) and correct mode of treatment ( $P=0.0121$ ) of the intestinal parasites. In view of this result, it is expedient that health education on major parasitic diseases should not be limited to primary and secondary schools as it is usually done in this area but be extended to tertiary institutions so as to reduce the burden of the diseases. [New York Science Journal. 2010;3(1):1-5]. (ISSN: 1554-0200).

**Keywords:** STH, Prevalence, knowledge, Tertiary institution

### 1. Introduction

The World Health Organisation (WHO) estimated that more than one billion of the world's population is chronically infected with soil-transmitted helminths (STH) (WHO, 2000). The high prevalence of these infections is closely correlated with poverty, poor environmental hygiene and impoverished health services (Crompton and Nesheim, 2002). These infections occur in all regions of Africa and its public health importance has been demonstrated by a number of studies both in Nigeria (Adeyeba and Tijani, 2002; Idowu and Rowland, 2006) and elsewhere (Scolari et al., 2000; Clennon et al., 2004). It is endemic in both rural and urban population and it is posing a great threat to public health in developing countries (WHO, 2000). It has been shown to cause poor appetite, intestinal abnormalities, poor absorption or increased loss of nutrient, which may result in protein-energy malnutrition and anaemia (Tomkins, 1981; Stephenson et al., 2000). Global estimated prevalence of anaemia in hookworm infection and a cognitive improvement of deficit in hookworm, *Ascaris* and *Trichuris* infections indicate that for each parasite, 10-50 million persons

may be affected (Montresor et al., 1998). Chronic parasitism in a population will not only jeopardize their health, it will also render them susceptible to other diseases, weaken them and make them less effective thereby reducing their productivity and academic performance.

In Nigeria, numerous surveys have been carried out over the years in different parts of the country on the prevalence of intestinal parasites among many groups of people. Most of these reports blamed the prevalence and intensity of parasitism on low level of sanitation, domestic hygiene, abject poverty, and illiteracy because such studies are concentrated among children and rural inhabitants. To our knowledge there is paucity of information on the prevalence of STH among tertiary institution students who are literate and are expected to exhibit high level of hygiene. One of the reasons for such paucity of information is because tertiary institution students are expected to be aware of these infections and thereby preventing its occurrence among them. We therefore designed this study to determine the prevalence and knowledge of STHs infection among tertiary institution students in Ede, Nigeria.

## 2. Materials and Methods

### Study Area & Population

The study was conducted at the Federal Polytechnic, Ede, Osun State, Nigeria. Ede is about 20 kilometers West of Osogbo, the capital city of Osun State, Nigeria. The study population consisted of students in the lower diploma and higher diploma classes. The purpose of the study was explained to the students and only consenting students were recruited into the study. The survey was carried out among students in disciplines other than biology and related science subjects.

### Laboratory Method

Stool containers were distributed to each student and were asked to submit about 5g of fresh stool specimen. The students were instructed not to contaminate the specimen with urine or disinfectant during collection. The appearance of each stool sample was first carefully examined macroscopically for, constituency, blood, mucus and adult worms. The stool samples were then examined microscopically for parasites using direct smear saline method as recommended by the World Health Organization (WHO, 2003). Negative samples were later subjected to concentration method. Egg counts were recorded as number of eggs/g of stool (WHO, 2003). The chi-square test was used to compare and to check if there were significance differences in the data.

### Questionnaire and Statistical method:

Questionnaire was administered to obtain information such as age, sex, knowledge and perception of the students about parasitic infections. The questionnaire was prepared in a multiple-choice format and the students were instructed not to pick more than one option. Information on the knowledge of the parasites, transmission and control were obtained from the students. The data was analysed using Instat Grap-hpad software Incorporation San Digeo, USA for windows and significant difference between variables was tested using Fischer's exact test and chi square at 5% level of significance.

## 3. Results

A total of 252 subjects were screened in this study out of which 129 were males and 123 were females with a median age of 19.5. *Ascaris lumbricoides* and hookworm were the only parasites recovered from the stool sample of the students and the prevalence of parasitic infection was 52/252 (20.6%). Table 1 shows the age and sex distribution pattern of *A. lumbricoides* and hookworm infestation in the study population. The result showed that both infections were more prevalent among the age group 15-17 years with a gradual

decrease in prevalence rate as age increases. There was no statistical significance between the prevalence of both infection in relation to age and sex ( $P < 0.05$ ). *A. lumbricoides* had the highest prevalence of 12.7% while the prevalence of Hookworm was 8.0%. Both parasites were generally more prevalent among males (20.2%) compared with their female counterparts (10.6%) although the difference was not statistically significant (Table 2). Prevalence of concurrent infection of both *A. lumbricoides* and hookworm according to sex is also shown in Table 2. Twelve (4.8%) individuals have the occurrence of both infections together. Males had a higher incidence of concurrent infection (6.2%) compared with the female (3.3%) but the difference was not statistically significant. *Entamoeba histolytica* (a parasitic protozoan) was also observed in the study population with a prevalence of 3.19% (data not shown).

### Questionnaire Result

Out of 120 questionnaires administered to the students, 80 were retrieved. The responses of the students are shown in Table 3. Sixty one (76.3%) and 50 (62.5%) were aware that *Ascaris* and hookworm are parasitic infections respectively. On the contrary, while 52 (65%) knows the mode of transmission of *Ascaris* as being through faeco-oral route, only 17 (21.3%) were aware that hookworm is transmitted by penetration of the larvae through the skin. There was a statistically significant difference in the students' knowledge of the transmission of the parasites ( $P = 0.0389$ ) as shown in table 3. On the knowledge of the prevention, only 10 (12.5%) were aware that hookworm can be prevented by avoiding direct contact of the skin with the soil as compared with 40 (50.0%) that said it can be prevented by proper boiling of water. On the choice of treatment of the parasites, 61 (76.3%) were aware that chemotherapy is the mode of treatment of *Ascaris* while 35 (43.6%) says vaccination is the mode of treatment of hookworm. There is a statistically significant difference in their responses to knowledge on treatment of the parasites ( $P = 0.012$ ).

## 4. Discussion

The result of this study provides one of the first estimates on the prevalence and knowledge of intestinal helminths infections among tertiary institution students in Nigeria. In the past most studies had focused on pre-school, primary and secondary school children in the rural areas (Taiwo and Agbolade, 2000; Agbolade et al., 2007). This study showed that the occurrence of STH is not limited to children, illiterates and people in the rural areas only.

Table 1: Prevalence (%) of Ascaris and Hookworm infection by age and sex of 252 Federal polytechnic Ede Student

Age range (Yrs)	Sex	No. Examined	<i>A. lumbricoides</i>	Hookworm infection	OR	95% CI	P<0.05
15 – 17	Female	27	6 (22.2%)	2 (7.4%)	2.1000	0.3238-13.621	0.6608
	Male	33	10 (30.3%)	7 (21.2%)			
	Total	60	16 (26.7%)	9 (15%)			
18 – 20	Female	42	5 (12.0%)	3 (7.1%)	1.000	0.1320-7.574	1.3916
	Male	40	5 (12.5%)	3 (7.5%)			
	Total	82	10 (12.5%)	6(7.3%)			
21 – 23	Female	24	1 (4.2%)	0	3.000	0.08811-102.14	1.000
	Male	26	3 (11.5%)	3 (11.5%)			
	Total	50	4 (8.0%)	3 (6.0%)			
>23	Female	30	0	1 (3.3%)	0.2000	0.004528-8.833	1.000
	Male	30	2 (6.7%)	1 (3.3%)			
	Total	60	2 (3.3%)	2 (1.7%)			
	<b>Overall Total</b>	<b>252</b>	<b>32 (12.7%)</b>	<b>20 (8.0%)</b>			

The prevalence (20.6%) of STH (*A. lumbricoides* and hookworm) recorded in this study is an indication that STH infection is still of public health importance not only among primary and secondary school children in rural communities of Nigeria but also among tertiary institution students in urban areas. This calls for control, including treatment and provision of clean water and improved sanitation in tertiary institutions. There is need to conduct health education programs among these students because knowledge on the transmission and control of these infections is very low going by what was observed in this study.

Higher parasitic infections were observed among males compared to females in this study although the difference was not statistically significant. This pattern of parasitism with respect to gender of the students could best be attributed to higher hygiene level normally observed among the females of this age bracket compared to their male's counterpart. The males in this age group are involved in recreation and sporting activities that exposes their skin to contact with soil thereby exposing them to hookworm infection. The higher prevalence rate observed in males in this study reflects the greater opportunities of males to exposure. Males are generally more active and playful and are less careful and less discriminatory about what they eat which may make the spread of the infection easier and faster among the male students. This could also explain why the prevalence of double infections was higher in males (6.2%) than in females (3.3%).

The age related pattern of infection in this study showed that age group 15-17 years had the highest infection of *Ascaris* (26.7%) and Hookworm (13.3%). The reason could be attributed to factors such as buying of food from vendors who may have poor hygiene, consumption of inadequately cooked

vegetables, and careless use of streams and well water. The age group above 23 years had the least prevalence of 3.3% of intestinal helminth in the study population. These are more mature age group with a higher level of hygiene. This age group also records the least prevalence of infections with *Ascaris* (12.7%) and Hookworm (8.0%). In general sex and age related disparities on prevalence of helminth infection in these areas could be attributed to various factors which include age and sex differential usefulness and division of labour and unhygienic living conditions.

The results obtained from the questionnaire revealed inadequate knowledge of the mode of transmission and control of these infections among the students. While most of the students were aware that both diseases are parasitic infections, only 21.3% knows that hookworm is transmitted by penetration of the skin by the infective larvae while 67.5% said it is transmitted faeco-orally. 50% of the student did not know how to prevent hookworm infection and only 20% of the students knew how to correctly prevent *A. lumbricoides* infection. The inadequate knowledge of the students on the mode of transmission of these parasites means that most of the students will not be able to avoid exposure to these parasites.

The prevalence of double infection of *Ascaris* + hookworm was 12 (4.8%) in the population which is an indication that the environmental conditions in the area satisfied the condition for development and successful transmission of these parasites simultaneously (Ukoli, 1984). The overall indication of these observations is that parasitosis is still a problem in Nigeria. A well organized health education program on personal hygiene and community health coupled with mass treatment is desirable and recommended in our tertiary institution.

The results also highlighted that parasite control programs targeted at school children should be extended to tertiary institution. WHO guidelines for the evaluation of parasitic infection at the community level only recommend mass treatment for primary and secondary school children (Albonico et al., 1999). It is therefore recommended that health education on

major tropical disease should not be limited to rural areas or primary and post primary institution only as it is usually practiced. Tertiary institution students should be carried along as this result has shown that their knowledge of common parasitic diseases is not adequate

Table 2: Concurrent infection of *Ascaris* and Hookworm according to sex

Gender	No. Examined	Total infected (%)	No with double infection (%)	No. with Single infection (%)	OR	95% CI	P < 0.05
Male	129	34 (26.4)	8 (6.2)	26 (20.2)	1.000	0.2534 – 3.947	1.000
Female	123	18 (14.6)	4 (3.3)	13 (10.6)			
<b>Total</b>	<b>252</b>	<b>52 (21)</b>	<b>12 (4.8)</b>	<b>39 (15.5)</b>			

Table 3: Perception of *Ascaris* and Hookworm infections among Federal Polytechnic Ede Students.

Characteristics	ASCARIS N = 80	HOOKWORM N = 80	X <sup>2</sup> Value	P Value
<b>a. Causes</b>				
Parasitic	61(76.3%)	50 (62.5%)	7.459	0.0586
Viral	4 (5.0%)	15 (18.8%)		
Bacterial	5 (6.3%)	5 (6.3%)		
Sexually transmitted disease	10 (12.5%)	10 (12.5%)		
<b>b. Method of Transmission</b>				
Faeco-oral route	52 (65.0%)	54 (67.5%)	8.376	0.0389*
Through contaminated needle	7 (8.8%)	5 (6.3%)		
Through bite of insects	13 (16.3%)	4 (5.0%)		
Penetration of skin by parasite	8 (10%)	17 (21.3%)		
<b>c. Knowledge of Preventions</b>				
Safe disposal of human excreta	16 (20.0%)	18(22.5%)	0.8405	0.8398
Boiling of drinking water	39 (48.8%)	40 (50.0%)		
Proper washing of wares	11 (13.8%)	12 (15.0%)		
Preventing the body from direct contact with the soil	14 (17.5%)	10 (12.5%)		
<b>d. Choice of Treatment</b>				
Chemotherapy	61 (76.3%)	45 (56.3%)	6.289	0.0121*
Vaccination	19 (23.8%)	35 (43.6%)		

\*P value significant at <0.05

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6/10/2009