

Prevalence of Soil Transmitted Helminthes among School Children in Central Local Government Area Ile-Ife Osun State. Nigeria

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Abstract: The investigation on the prevalence of soil helminthes infection among school children of central local government area ile-ife, Osun State was carried out using some parasitological analysis. 182 faecal samples were used in the study, out of which 86(47.7%) were males and 96(55.2%). The overall prevalence of parasitic infection is 40.7%, having total number of infected samples to be 74.0. Age 6-10 years had the highest prevalence of parasitic infection with the male having 19(10.4) while the female had 14(7.7). The female had the highest parasitic prevalence of 39(21.4) compared with the male 35(19.2). Bush+Pit 30(40.5) had the highest infection rate of prevalence of 16.5% followed by Bush alone, 28.(37.8) with prevalence of 15.4%, Pit 8.0(10.8) with prevalence of 4.4% and the least, Flush 2.0(2.7) with prevalence of 1.1% with p-value 0.0001. 41(55.4) with prevalence of 22.5% that always put on foot wears were infected while 33(44.6%) with prevalence of 18.1% of those that sometimes put on foot wear were infected, p-value 0.0001. *Ascaris lumbriciodes* had the highest parasitic infection of 39.0% while Hookworm and *Trichuris trichura* had 9.3% and 1.1% respectively. Generally, the female had the highest prevalence of 20.3% of *Ascaris lumbriciodes* while Male had the highest prevalence of 4.9% Hookworm infection. *Entamoeba histolytica* with 17.6% was also implicated. Provision of modern day toilet system to most of the schools will discourage defecation in the open fields and environment. Public enlightenment programme through media on personal hygiene will have a long way to go in the reduction of parasitic infections.

Keywords: PREVALENCE, SOIL TRANSMITTED HELMINTHES, SCHOOL CHILDREN.

1. INTRODUCTION

Parasitic worms are referred to as helminths because they live and feed on living hosts. Helminths receive both nourishment and protection by disrupting the host's ability to absorb nutrients resulting in weakness and disease of the host. The parasitic helminths can be divided into four groups which include: monogeneans, cestodes (tapeworms), nematodes (roundworms), and trematodes (flukes). Helminths share numerous characteristics that contribute to their parasitic quality including the presence of attachment organs. These attachment organs include suckers or bothridia, rostellum with hooks, oral and ventral suckers, lips, teeth, filariform extremities, and dentary plates. These attachment organs allow the helminths to reside within humans and other animals (Ana *et al.*, 2006)

Soil-transmitted helminths refer to the intestinal worms infecting humans that are transmitted through contaminated soil ("helminth" means parasitic worm): *Ascaris lumbricoides* (sometimes called just "*Ascaris*"), whipworm (*Trichuris trichiura*), and hookworm (*Anclostoma duodenale* and *Necator americanus*). A large part of the world's population is

infected with one or more of these soil-transmitted helminths: approximately 807-1,121 million with *Ascaris*, approximately 604-795 million with whipworm, approximately 576-740 million with hookworm. Soil-transmitted helminth infection is found mainly in areas with warm and moist climates where sanitation and hygiene are poor, including in temperate zones during warmer months. These STHs are considered Neglected Tropical Diseases (NTDs) because they inflict tremendous disability and suffering yet can be controlled or eliminated.

Soil-transmitted helminths live in the intestine and their eggs are passed in the feces of infected persons. If an infected person defecates outside (near bushes, in a garden, or field) or if the feces of an infected person are used as fertilizer, eggs are deposited on soil. *Ascaris* and hookworm eggs become infective as they mature in soil. People are infected with *Ascaris* and whipworm when eggs are ingested. This can happen when hands or fingers that have contaminated dirt on them are put in the mouth or by consuming vegetables and fruits that have not been carefully cooked, washed or peeled. Hookworm eggs are not infective. They hatch in soil, releasing larvae (immature worms) that mature into a form that can penetrate the skin of humans. Hookworm infection is transmitted primarily by walking barefoot on contaminated soil. One kind of hookworm (*Anclostoma duodenale*) can also be transmitted through the ingestion of larvae. People with light soil-transmitted helminth infections usually have no symptoms. Heavy infections can cause a range of health problems, including abdominal pain, diarrhea, blood and protein loss, rectal prolapse, and physical and cognitive growth retardation. (.CDC, 2013).

The role of intestinal parasites in causing morbidity and mortality as well as in the pathogenesis of other infectious diseases differs from region to region because of several environments, social and geographical factors. Hence, investigation of various parasitic infections is a prerequisite not only for formulation of appropriate control strategies but also to predict risk for communities under consideration. Although, several studies have been conducted on the incidence and prevalence of parasites of the intestinal lumen in Nigeria, there are still several localities for which epidemiological information is not available. However, all aetiological agents cannot be easily diagnosed in Africa on routine bases because of limited diagnostic facilities and trained personnel. It shows that laboratory diagnostic evaluations are required to determine the spread in each population so that it can provide guidelines for therapy for treatable aetiological agents and necessary data for planning and evaluation of patients care (Oguntibeju, 2006). Therefore the objective of this study is to:

- Determination of the prevalence of soil transmitted helminthiasis on the study area. .
- To determine the prevalence of soil transmitted helminthes infection in subjects according to their age and sexes.
- To determine the attitudinal effect of the population in transmission of the parasites.

There is no conflict of interest regarding the publication of this paper.

2. MATERIALS AND METHODS

Study area:

Pupils from different schools within Ife Central Local Government Area of Osun State Nigeria were used for the study between May and August 2013. The climate of the area is typically tropical with a characteristic dry season of about 6 months (October- March) and a wet season of about 6 months (April- September). (Akinbuwa and Adeniyi, 1996). The mean annual rainfall ranges between 1000 and 1250mm (Oguntoyinbo, 1982), the mean annual relative humidity ranges from 75% to 100% (Ayoade, 1982), and the mean annual temperature is about 30°C (Ndifon and Ukoli, 1989). The vegetation of the area is tropical rain forest characterized by large and tall trees. The inhabitants of the area are mixture of people from different ethnic groups in Nigeria. However, the majority are the Yoruba speaking people of the south-west. The 2 major sources of water supply in the local government are tap water and shallow well water. Toilet facilities include water closets and pit latrines.

3. SAMPLE COLLECTION

The head of the schools used were first contacted before the commencement of the study, this is to obtain necessary permission, assist in mobilizing and encouraging their subject to participate in the study. The children that consented were given questionnaire which obtained information such as sex, source of drinking water, Toilet facilities and hygienic practices. A pre-labeled sample bottle was given to each subject. The pre-labeled sample bottle had corresponding number

with each participant's questionnaire. They were instructed to collect small sample of their early morning stool inside the bottles and should avoid contamination with urine and soil. These samples were preserved (by adding 10% formal saline solution) immediately after collection.

4. EXAMINATION OF THE FAECAL SAMPLES

Macroscopic examination:

Submitted stool samples were initially examined for their appearance, consistency as well as the presence of mucus and / or blood.

Direct method:

A drop of normal saline and iodine solution was added to each side of the clean grease free slide (with the aid of applicator stick) in the saline and iodine solution on the glass slide. Both were homogenized separately and covered with cover slips, each was examined using x40 objective lens with the condenser iris sufficiently closed to give a good contrast. The glass slide was labeled and numbered to avoid treating them wrongly.

Concentrated method:

Formalin-ether sedimentation:

A small piece (1gram) of stool sample was thoroughly mixed in 10ml of water and strained through two layers of gauze in a funnel; the filtrate was centrifuged at 2000rpm for 2 minute. The supernatant was discarded and the sediment was suspended in 7ml of formalin saline and was allowed to stand for 10 minute or longer for fixation, to this was added 3ml of ether and the tube was stoppered and shaken vigorously to mix. Then the stopper was removed and the tube was centrifuged at 2000 rpm for 2 minutes and allowed to rest in a stand. Four layers became visible, the top layers consist of ether, second was a plug of debris, third was a clear layer of formalin saline and the fourth was sediment. The plug of debris was detached from the side of the tube with the aid of glass rod and the liquid was poured off leaving a small amount of formalin saline for suspension of the sediment which was poured on a clean glass slide, covered with cover slip and examined under the microscope. (Ramnik, 1999).

5. RESULTS

Total of 182 faecal samples were used in the study, out of which 86(47.3%) were males and 96(52.7%) were females. The overall prevalence of parasitic infection in the study is 40.7% (20.88±16.99), having total number of infected samples to be 74.0.(table1).

Age 6-10 years had the highest prevalence of parasitic infection with the male having 10.2% (19.63±16.17) while the female had 7.7% (22.57±12.84). The female had the highest total parasitic prevalence of 21.4% (20.74±15.39) compared with the male 19.2% (21.03±16.84) (Table 3).

The distribution according to the toilet facilities shows that Bush+Pit 30(40.5) had the highest infection rate of prevalence of 16.5% (24.97±19.41) followed by Bush alone, 28 (37.8) with prevalence of 15.4 % (19.43±15.86), Pit 8.0(10.8) with prevalence of 4.4% (17.88±16.89) and the least, Flush 2.0(2.7) with prevalence of 1.1%(21.00±2.83). there is an association between the toilet facilities and the rate of infection with p-value 0.0001.(Table 1).

Out of 126 subjects that always put on foot wears 41(55.4) with prevalence of 22.5% (19.12±15.76) were infected while those that sometimes put on foot wears 33(44.6) with prevalence of 18.1% (32.00±21.19) were infected. The relationship between the foot wear and the infection is significant with p-value 0.0001.(Table 2).

The female had the highest prevalence of 20.3% of *Ascaris lumbricoides* while Male had the highest prevalence of 4.9% Hookworm infection.. The highest prevalence parasitic infection rate as seen in(table 4) is with *Ascaris lumbricoides* having the total prevalence of 39.0% while Hookworm and *Trichuris trichura* had 9.3% and 1.1% respectively. (Table 4).

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Table 1: Distribution of Parasitic Infections in relation to Toilets facilities and Foot wears

Toilet Facilities	Examined Samples(%)	Infected Samples (%)	Prevalence(%)	Mean±SD	Variance
Pit	28.0(178)	8.0(10.8)	0.044(4.4)	17.88 ± 16.89	285.268
Flush	26.0 (18.5)	2.0(2.7)	0.011(1.1)	21.00 ±2.828	8.000
Bush	50.0 (24.1)	28.0 (37.8)	0.154(15.4)	19.43 ± 15.86	251.661
Pit + Flush	24.0 (16.3)	3.0(4.1)	0.016(1.6)	11.67 ± 6.11	37.333
Pit + Bush	48.0(20.0)	30.0(40.5)	0.165(16.5)	24.97 ± 19.41	376.654
Flush + Bush	6.0(3.3)	3.0(4.1)	0.016(1.6)	10.67 ±6.11	37.333
Total	182 (100)	74(100)	0.407(40.7)	20.88 ± 16.99	288.656

P – Value = 0.0001: F = 9.426

Table 2: Distribution of parasitic infections in relation to footwear

Foot Wear	Examined Samples(%)	Infected Samples(%)	Prevalence (%)	Mean +SD	Variance
Always	126 (69.2)	41 (55.4)	0.225 (22.5)	19.12 ± 15.76	248.410
Sometimes	56 (30.8)	33(44.6)	0.181 (18.1)	32.00 ± 21.19	449.062
Total	182	94(100)	0.407 (40.7)	24.86 ± 19.35	374.502

P – Value = 0.001: F = 16.980

Table 3: Age distribution of parasitic infections amongst pupils in the Local Government Area

Age group (Years)	Number Examined		Prevalence of infections		Mean ± Std Deviation	
	Male	Female	Male N (%)	Female N(%)	Male	Female
0 – 5	10.0	18.0	4 (2.2)	8(4.4)	13.75 ± 13.15	24.25 ± 11.99
6 – 10	36.0	32.0	19(10.2)	14(7.7)	19.63 ± 16.17	12.19 ± 12.84
11 – 15	40.0	46.0	12(6.6)	17(9.3.)	25.67± 23.99	17.59 ± 16.72
Total	86.0	96.0	35(19.2)	39(21.4)	21.03±16.84	11.16± 14.61

Table 4: Overall Prevalence of soil helminthes infection in relation to age and sex in the Local government area

Parasite (Eggs)	Age groups (years)			Total	Male	Female	Total
	0-5	6-10	11-15				
<i>Ascaris lumbricoides</i>	0.066 (6.6)	0.187 (18.7)	0.137 (13.7)	0.390 (39.0)	0.187 (18.7)	0.203 (20.3)	0.390 (39.0)
Hookworm	0.000 (0.00)	0.033 (3.3)	0.060 (6.0)	0.093 (9.3)	0.049 (4.9)	0.044 (4.4)	0.093 (9.3)
<i>Trichuris trichura</i>	0.000 (0.00)	0.000 (0.00)	0.011 (1.1)	0.011 (1.1)	0.011 (1.1)	0.000 (0.0)	0.011 (1.1)

6. DISCUSSION

A total of 182 samples comprising of 86 males and 96 females were examined. The study showed infection rate in Ife Central local Government to be 74.0 with the total prevalence of 40.7% which is of a significant value. This is in agreement with the study done by Oguntibeju in 2006 who documented the prevalence of intestinal parasites to be 50-90% in Africa.

According to the study, the three implicated soil transmitted helminthes were *Ascaris lumbricoides*, Hookworm and *Trichuris trichura* which is in accordance with the work of Bethony *et al.*, (2006) where they were able to implicate three main soil-transmitted helminthes infections, ascariasis, trichuriasis, and hookworm which are common clinical disorders in man.

The highest parasitic prevalence which occur in female which may be attributed to habits, and activities that enhance self contamination either from food, water and soil according to Anosike and Nwosu 1996. It is also in line with Ana *et al.*, 2006 which stated that among 320 children studied (48% girls, aged 7–14 years, mean 9.76±1.4) an overall STH prevalence of 72.5% was found. Children >10 years of age were generally more infected than 7–10 year-olds ($p = 0.015$). Prevalence was 30%, 67% and 16% for *Ascaris*, *Trichuris* and hookworms, respectively.

The most prevalent parasites in the study is *Ascaris lumbricoides* (Table 4). This is could be due to favourable environmental condition and poor hand washing practice among the children studied. Also most of these of these children are used to the habit of eating fruits unwashed especially while returning from school.

There is an association between the toilet facilities, foot wear and the rate of parasitic infection (table1). This may be attributed to faecal contamination of the environment and water supply, not covering of food and water to prevent contamination from flies which act as carrier. This is in consonance with the work done by Abubaarka and Smith (2007) and Frederique *et al* (2012) reported STH in children as a result of none wearing of footwear, fecal contaminated environment and aggravation by poor nutritional status..

This research established the fact that intestinal parasitic infection is still prevalent in Ife Central local Government, therefore, consideration should be given to devastating effect it can cause among the populace. Due to this, Proper personal hygiene and high level of sanitation should be embarked upon as the infection may be acquired through contaminated unwashed finger after defaecation or other soil contaminating activities. Defaecating in bushes and house surroundings should be discouraged and regular deworming should be promoted. Provision of modern day toilet system to most of the schools will discourage defecation in the open fields and environment. Likewise house owners should be compelled to provide toilet facilities in their houses. The sanitation officers need to extend their duties in this capacity to enforce provision of modern toilet facilities in each house. Also active public enlightenment programme through media on personal hygiene should be intensified as this will have a long way to go in the reduction of parasitic infections.

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