PREVALENCE OF SOIL-TRANSMITTED HELMINTHS INFECTIONS AMONG PUBLIC PRIMARY SCHOOL PUPILS IN EKPOMA, EDO STATE, NIGERIA

[1]Oguanya, F.C., *[1]Okogun, G.R.A., [1]Akhile A.O., [1]Eloka C.C.V., [2]Okoro C.J. [3]Okpe A.C.

Department of [1]Medical Laboratory Science, Ambrose Alli University, Ekpoma, Edo State, Nigeria. [2]Medical Microbiology, University of Nigeria Teaching Hospital, Ituku-Ozalla, Enugu-Nigeria. [3]Pharmacology/Therapeutic, College of medicine, UNEC.

***Corresponding Author: graokogun@yahoo.com**

ABSTRACT

This study was designed to determine the prevalence of soil-transmitted helminthes infections among primary school pupils in Ekpoma, Edo State Nigeria. Stool samples were collected from 200 apparently healthy children between November 2011 and April 2012. The samples were examined for parasitic infections using direct smear examination and formol ether concentration techniques. Results showed an overall prevalence of 24.50% soil-transmitted helminthes infections amongst the sampled population. The various soil-transmited helminths isolated were *Ascaris lumbricoides* (4%) Hookworm (15%), *Trichuris trichuria* (0.5%) and *strongyloides stercolalis* (1%) respectively. Also, 4.0% of the pupils were infected by more than one species of soil-transmitted helminths. The infection was higher among the males (28%), and pupils of age group 6-10 (27.30%). Hookworm infection had the highest prevalence compared to other isolates but the associated differences in age and sex among the infected children were statistically, not significant ($p > 0.05$). Therefore, the relative high prevalence and diversity of soil transmitted helminthes amongst children in Ekpoma, underlines the urgent need for intervening control measures in the area. Various control measures are suggested and our findings are further discussed.

Keywords: Helminthes, Infections, Primary school pupils, Public health.

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INTRODUCTION

Soil-transmitted helminthes (STHs), also known as intestinal helminths or geohelminths, are a group of parasitic nematode-worms that causes human infections. Transmission is through ingestion of an infective egg (faecal-oral) as in *Ascaris lumbricoides* and *Trichuris trichuria* or penetration of an infective larva through the skin of a susceptible host (active penetration) as in hookworm and *Strongyloides stercoralis*. They strive in warm and moist soil of the world tropical and sub tropical countries (Crompton, 1999; Chesbrough, 2006).

It is reported that more than a billion people are infected with at least one species by swallowing infective eggs or infective larva penetrating the skin (Crompton, 1999; Maugire, 2005; Cheesbrough, 2006). Various geohelminthes of particular worldwide importance includes the round worms (*Ascaris lumbricoides*), whipworms (*Trichuris trichuria*) hook worm (*Necator Americanus or Ancylostoma duodenale*). They are the most common STHs (Desilva et al., 2003) and are considered together because it is common for a single individual especially children living in rural areas without portable water supply, poor health facilities, no education and poor hygiene as it is in some poor nations of the world, to be chronically infected with all the three worms (Crompton, 2001).

Available data show also, that STHs infections are high in some parts of Nigeria (Uneke et al., 2007), other parts of Sub-sahara Africa, America, China and East Asia (Broker et al., 2006). Males have higher prevalence of STHs infections than females (Uneke et al., 2007) and age group 4-10 years has higher prevalence of STH infections than age group 10 years above (Adeyeba and Akinlabi, 2002; Uneke et al,. 2007).

In Nigeria, intestinal helminthes infections have continued to prevail because of low levels of living standard, poor environmental sanitation and ignorance of simple health promoting behaviours (Nwosu, 1981; Udonis, 1984). School age children

bear the greatest burden of these infections and such are faced with health burdens like malnutrition, stunted growth and intellectual retardation, as well as cognitive and educational deficits (Ukpai and Ugwu, 1999; Maguire, 2005; Chesbrough 2006).

However, despite their educational, economic and public health importance, STHs remain largely neglected by the medical/international community and this neglect stem from three features: 1) the people most affected are the worlds impoverished, particularly the poor; 2) the infection cause chronic ill-health and have insidious clinical presentation; and 3) the quantification of the effect of soil-transmitted helminthes infections on economic development and education is difficult (Wakelin, 2002).

The present study therefore examines the distribution of single and mixed infections of helminthes in some primary schools in Ekpoma; a semi urban University town located in the southern part of Nigeria.

MATERIALS AND METHODS

Study areas: This study was carried out in four different public primary schools in Ekpoma, Esan West Local Government Area of Edo State, Nigeria. Ekpoma is a semi urban university town located between latitude 60 40^{o} N 60 45^{o} N and longitude 60 05^{o} E 60 10^{o} E (Obabori et al, 2006) and has a population of about 61,870 people whose major occupations are farming and trading, and are in harmonious habitation with civil servants and students (World Garzetteer, 2007).

Sample size: A total of 200 stool samples were collected for this study from both male (n=100) and female (n=100) primary school pupils.

Ethical Approval: Before commencement of sample collection, the economic importance of STHs infection and the objective/significance of the study were explained. The study was conducted in compliance with the declaration on the right of the subject after approval by the head teachers of the schools visited, and the parents/guardians of the pupils.

Sample Collection: Specimen containers (wide-mouthed screw capped plain plastic containers) devoid of antiseptic/disinfectant and leak proof (Cheesbrough, 2006) were cleaned, dried and then distributed to the pupils for sample collection. The pupils were instructed on how and when to collect the sample before receiving the specimen containers. Each container was labeled with the pupil's name, age and sex.

The samples were received early and recorded appropriately and then transported immediately to the laboratory for examination. However, samples not examined early were preserved with 10% formol saline.

Samples Analysis: Samples analysis was done at the research/diagnostic laboratory of the College of Medicine, Ambrose Alli University, Ekpoma. Microscopic examination was performed using the saline wet preparation and formol ether concentration method after routine macroscopic examination for the presence of blood, pores or adult parasites as described by Ochei and Kolhatkar, (2004).

All the preparations were examined microscopically using the X10 objective to detect the parasites and X40 objective to confirm the presence of eggs

Data Analysis: The simple descriptive statistic and the Chi-squared test were performed to test the level of significance difference between age, sex and helminthes infections.

RESULTS

Out of the 200 children examined, 49 were infected by soil-transmitted helminthes giving an overall prevalence of 24.5%. Table 1 shows the prevalence of soil-transmitted helminths infections according to age, indicating that the age group 6-10yrs (33; 27.3%) has a higher prevalence rate than age group 11-15yrs (16; 20.3%). However, the differences in soil-transmitted helminthes between the age groups were statistically insignificant (X^2tab=1.642, p=0.20; p>0.05).

Table 2 shows the prevalence of soil-transmitted helminthes infection according to sex. It indicates that males (28%) had higher prevalence rate than the females (21%). However, the difference in this infection according to sex is statistically not significance. (x^2tab=1.642, p=0.20: p=>0.05).

Table 3 shows the age and sex related prevalence of various STHs infections encountered in the study. It shows also that males were more infected with Hookworm and other soil-transmitted helminthes than females. Similarly, age group 6 – 10years were more infected with Hookworm and other soil-transmitted helminthes. Specifically, Hookworm had the highest prevalence of 16.0% and 9.0% for age group 6 – 10years and males respectively.

Mixed infections of *Ascariasis lubricoides* and hookworm encountered in the study was 5 (2.50%), *Strongyloidiasis* and hookworm infection 1 (0.10%) and *Trichuriasis* and hookworm infection 2 (1.0%). A prevalence of 4.96% was established in age group 6 – 10years, while a prevalence of 2.53% was found for age group 11 – 15years with males 5.0% and females 3.0%. These mix infections are more in males than in females and in age group 6 – 10years than in 11 – 15years. However, the difference in age and sex related prevalence of various soil – transmitted helminths infections is statistically not significance. Age: (X^2tab=1.064, p=0.9; p >0.05), Sesx:(x^2tab=2.257, p=0.50; p>0.05).
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Table 1: Prevalence of soil transmitted helminthes infection according to age in the study

Age (years)	Number examined	Number infected	Prevalence (%)	X^2
6 – 10	121	33	27.3	
11 – 15	79	16	20.3	
Total	200	49	24.5	1.274

(X^2tab= 1.642, P = 0.20; P>0.05) df = 1

Table 2: Prevalence of soil-transmitted helminthes infection according to sex in the study

Sex	Number examined	Number infected	Prevalence (%)	X^2
Males	100	28	28	
Females	100	21	21	
Total	200	49	49	1.325

(X^2tab= 1.642, P = 0.20; P>0.05) df = 1

Table 3: Distribution of various soil – transmitted helminthes infections in the study

Parameter	Number examined	Total number infected	*Ascaris lumbricoides (%)*	*Hookworm (%)*	*Trichuris trichuria (%)*	*Strongyloides stercoralis (%)*	Mixed infection (%)
Age (years)							
6 – 10	121	33	5 (4.1)	20 (16.0)	1 (0.8)	1(0.8)	6 (4.96)
11 – 15	79	16	3 (3.79)	10 (12.0)	0 (0)	1(1.26)	2 (2.53)
Sex							
Males	100	28	3 (1.5)	18 (9.0)	1(1)	1(1)	5 (5)
Females	100	21	5 (5)	12 (12)	0 (0)	1(1)	3 (3)

(X^2tab=1.064, p=0.9; p >0.05), Sesx:(x^2tab=2.257, p=0.50; p>0.05) df = 4

DISCUSSION

The observed prevalence amongst the 6 – 10 age group is in line with the reports of Albonico *et al.*, (1998) and Naish *et al.,* (2004) who reported that the age group 6 – 10years are most responsible for contaminating the environment and also having high contact with soil activity than 11 – 15 years. However, the difference between the age groups was statistically not significant (x=1.274, p=0.259; p>0.05), which might be attributed to the fact that both falls within the primary school age children. Most infected with soil-transmitted helminths as reported by Crompton *et al.,* (1999) and Maguire (2005), as supported by Adeyeba and Akinlabi (2002), Ukpai and Ugwu (1999) and Naish *et al.,* (2004).

On the other hand, the observation that males were more infected than females is in line with the reports of Uneke *et al.,* (2007) and Adeyeba and Akinlabi, (2002) who reported 18.0% prevalence for males and 15.5% prevalence for females in South-Eastern Nigeria. However, the observed differences in males and females were statistically not significant (x^2tab=1, p=0.249; p>0.05).

The prevalence of Hookworm infections in relation to age and sex were more amongst age group 6 – 10years than in age group 11 – 15years. This is in line with the reports by Brooker and Micheal, (2000) that Hookworm is the most widely spread species of soil-transmitted helminths but contradicts the reports by Desilva *et al.,* (2003) and Piper, (2007) that *Ascariasis* has the highest world prevalence because of their highest egg output and lipid layer that protects the fertilized eggs. Hookworm infection was also higher in males than in females with the prevalence of 18% and 12% respectively. This is also in line with the reports of Uneke *at el.,* (2007) and Adeyeba and Akinlabi, (2002) that the prevalence for males and females in South-Eastern Nigeria were 18.0% and 18.0% resspectively.

Furthermore, *Trichuriasis* had 0.0% prevalence amongst age group 11 -15years. This contradicts the reports of Galvani, (2005) that *Trichuriasis* is most common amongst age group 5 – 15years. Also, the 0.0% prevalence amongst females might be attributed to the development of sense of personal hygiene than in males. Similarly, the observed prevalence for mix infections (*Ascariasis* and hookworm; *Strongyloidiasis* and hookworm infection; and *Trichuriasis* and hookworm), amongst age group 6 – 10years, are in line with the report of Raso *et al,* (2004) who stated that co-endemic infection of soil-transmitted helminths are common in areas of important determinant factors like poverty, poor sanitation, poor hygiene and lack of portable water.

However, the difference in both age groups and sexes were statistically not significance and in line with the report by Crompton, (2001) that it is possible for a single individual especially a child living in a rural area without water supply, no education, no care and a poor hygiene of less developed countries to be infected with more than one of these soil-transmitted helminths infections irrespective of the age or sex.

More so, the presence of these soil-transmitted helminthes among these primary schools children in this study are in accordance with the reports of Nwosu (1981), Udonsi, (1984), Desilva *et al.,* (2003) and Brooker *et al.,* (2006) that soil-transmitted helminths infections in primary school children are as a result of poor environmental sanitation, low levels of living standards and ignorance of simple health promoting behavior.

From the foregoing therefore, it is obvious that the prevalence of soil-transmitted helminthes amongst children in Ekpoma, irrespective of the age or sex, indicates that the call for an urgent intervention cannot be overemphasized.

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AUTHORS' CONTRIBUTIONS

Oguanya, F.C., performed this study under the supervision of Dr. Okogun, G.R.A., with assistance from Eloka C.C.V. Akhile A.O, performed the stool samples analysis. Okoro C.J. and Okpe A.C. provided technical and finicial support. All authors contributed to the development of this manuscript.