



PREVALENCE OF SOIL TRANSMITTED HELMINTHS INFECTIONS AMONG PRIMARY SCHOOL CHILDREN IN UMUOHAMA UKPOR IN ANAMBRA STATE, NIGERIA

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ABSTRACT

Soil transmitted helminthes infections are of public health importance globally. This is a Cross-Sectional descriptive study designed to investigate the Prevalence of Soil Transmitted Helminthes Infections among Primary School Children in Umuohama Community in Ukpok, Anambra State, Nigeria. A total of 90 subjects (39 males and 51 females) aged between 1 and 10 years were recruited randomly from four primary schools including Umuaraba community primary school, Ohineneke central school, Umuaraba central school, and Teach them young primary school for this study. Laboratory analysis was done using standard concentration methods. The result revealed that 23.3% of subjects were infected with soil-transmitted helminthes and the prevalence was higher in females (25.5%) than in males (20.5%). Prevalence was highest among subjects aged between 1 and 5 years (29.3%). The prevalence among the schools was highest in Umuaraba community primary school (28.6%) and lowest in Teach them young primary school (14.3%), with household having between 9-12 persons with highest infection rate (84.6%). Bush method had the highest rate of prevalence of 34.5%, followed by pit latrines with prevalence of 18.8% while water closet system had the lowest infection rate with prevalence of 15.9%. The total prevalence of soil transmitted helminthes was: *E. histolytica* (10.9%), *Ascaris lumbricoides* (9.7%) and hookworm (3.2%). Therefore, provision of modern day toilet system to schools along side with public awareness campaign on personal hygiene should be encouraged as this will facilitate the reduction of soil transmitted helminthes infection.

KEYWORDS: Soil transmitted helminthes, prevalence, primary school children, age, and toilet systems.

INTRODUCTION

Parasites are organisms belonging to one or two major taxonomic groups called Protozoa and Helminths (worms) (Smyth, 1972; Florde, 1994). Florde (1994) showed that parasitic diseases remain among the major causes of human misery and death in the world today. Parasitic diseases result from infection by Protozoa, Helminths (WHO, 1981; WHO, 1987) and some arthropods (Service, 1980; Kitron, 1998).

Soil-transmitted helminths (STHs) refer to the intestinal worms infecting humans that are transmitted through contaminated soil. Soil-transmitted helminths are major public health problems in several tropical and subtropical developing countries with poor socio-economic status. Soil-transmitted helminths are a group of parasitic

nematodes. There are three major nematode species of human concern because of their high prevalence and distribution worldwide, including the roundworm *Ascaris lumbricoides*, the whipworm *Trichuris trichiura* and two hookworms *Necator americanus* and *Ancylostoma duodenale* (Vercruyse *et al.*, 2011). According to World Health Organization, greater than one billion people are chronically infected with soil-transmitted helminths (Montresor *et al.*, 1998). Infections caused by soil-transmitted helminths (STHs) are of public health concern and are among the most important afflictions of humans who live in areas of poverty in the developing world and least developed countries (Crompton, 1999; Flisser, 2003).

Intestinal protozoan infections are of public health importance globally, particularly among children of school going age and the immunocompromised (Gelaw *et al.*, 2013; Obala *et al.*, 2013). Protozoan parasites contribute immensely to the burden of intestinal parasitic infections among children (Hotez and Kamath, 2009; Harhay *et al.*, 2010). Poor hygiene coupled with children voracious eating habits particularly puts them at greater risk of acquiring these infections (Schunk *et al.*, 2001; Carvalho-Costa *et al.*, 2007). Protozoan and Helminthic parasites (WHO, 1981; WHO, 1987) produce a variety of acute, chronic and debilitating intestinal infections, some of which culminate in death of the host (Monto *et al.*, 1991). It has been estimated that among the important protozoa causing diseases in man, currently *Entamoeba histolytica* that causes amoebiasis affects 10% of the world's population. The proportion is highest in the cities of the tropics and sub-tropics, but no country is free of amoebiasis (Mwenji, 2010). Intestinal infections continue to challenge clinicians and public health services on a global scale (Farthing *et al.*, 1992). Heavy infections with STHs may cause malnutrition and anaemia, thus adversely affecting the mental and physical development of children (Stephenson *et al.*, 2000; Hotez *et al.*, 2004). Therefore, this study investigated the prevalence of soil transmitted helminths infections among primary school children in Umuohama Ukpör in Anambra State, Nigeria.

MATERIALS AND METHODS

Research Design and Study area

A Cross-Sectional descriptive research design was used in this study to establish the prevalence of soil transmitted helminths and major intestinal protozoan infections among primary school children. The study was conducted in Umuohama, a community in Ukpör. Ukpör is a town in Nnewi, Anambra State. Ukpör has other communities such as Ebe and Nzagha. They are mainly farmers.

Study Population

The study population comprises of primary school children between the ages 1 to 10 years living in Umuohama community. Four primary schools including Umuaraba community primary school, Ohineneke central school, Umuaraba central school, and Teach them young primary school were randomly recruited for the study. In general, a total of 90 subjects comprising of 39 males and 51 females were recruited for the study.

Inclusion and exclusion criteria

All selected primary school children aged between 1 and 10 years who were living in the selected study area, whose parents/guardians were able to sign a written consent form and willing to participate in the study were included in the study. Primary school children younger than 1 year old or older than 10 years and who had a history of being clinically ill, used drugs for deworming within a period of one month before the study and the

parents/guardians refused to sign a written consent form were not included in the study.

Ethical Consideration

The ethical approval for this research was sort and obtained by the Faculty of Health Sciences and Technology ethics committee, Nnamdi Azikiwe University, Nnewi campus, Anambra State, Nigeria.

Sample Collection and Laboratory Analysis

The protocol was explained to the headmistress and teachers who were to aid the subjects in obtaining the sample. The age and sex of each participant were obtained from a questionnaire. Each participant was provided with a specimen bottle, labelled with name and identification number, for the collection of stool samples. The quantity of specimen collected was approximately 1 g. The collected specimens were then immediately taken to the Department of Microbiology Laboratory, Nnamdi Azikiwe University Teaching Hospital University, Nnewi for analysis, and stool samples not observed on the collection day were treated with 10% formol-saline solution and stored in a refrigerator for subsequent observation. The samples were analyzed using the formol-ether concentration technique of Christensen *et al.* (1984) while protozoan species was identified using standard identification tables (World Health Organization, 1997).

Data analysis

Statistical package for social science (SPSS) version 20 software was employed in the analysis of the result. Frequency tables were produced for each of the study variables.

RESULTS

The soil transmitted helminthes infection in relation to primary schools in Umuohama Ukpör showed that out of four schools examined which include Umuaraba community primary school, Ohineleke nursery and primary school, Umuaraba central primary school and Teach them young primary school, Pupils from Umuaraba central primary school and Umuaraba community primary school had the highest infection rate of *Ascaris lumbricoides* with 14.3% and 13.6% respectively compared to Ohineleke nursery and primary school and Teach them young primary school which had lower infection rate for *Ascaris lumbricoides* with 7.7% and 4.8% respectively. However, Teach them young primary school, Umuaraba community primary school and Ohineleke nursery and primary school had hookworm infection rate of 4.8%, 4.5% and 3.8% respectively while Umuaraba central primary school and Ohineleke nursery and primary school, Umuaraba had the highest infection rate of *Entamoeba histolytica* with 14.3% and 11.5% respectively than Umuaraba community primary school and Teach them young primary school that had lower infection rate of *Entamoeba histolytica* with 9.1% and 4.8% respectively (see table 1).

Table 1: Prevalence of Soil transmitted helminthes infections in relation to primary schools in Umuohama Ukpok Nnewi, Anambra State, Nigeria (%).

Parameters	Number Examined	Number infected	<i>lumbricoides</i>	Hookworm	<i>E. histolytica</i>
Umuaraba community primary school	22	6 (27.3)	3 (13.6)	1 (4.5)	2 (9.1)
Umuaraba central primary school	21	6 (28.6)	3 (14.3)	0 (0.0)	3 (14.3)
Ohineleke nursery and primary school	26	6 (23.1)	2 (7.7)	1 (3.8)	3 (11.5)
Teach them young primary school	21	3 (14.3)	1 (4.8)	1 (4.8)	1 (4.8)
Total	90	21 (23.3)	9 (10.1)	3 (3.3)	9 (9.9)

Based on sex relations, soil transmitted helminthes infection showed that out of 39 males and 51 females examined, 25.5% of females had higher number of infection than males with 20.5% infection rate. More so, 11.8% of females had *Ascaris lumbricoides*, 3.9% hookworm and 9.8% *Entamoeba histolytica* infection higher than the males with infection rates of 7.7%, 2.5%, and 10.2% for *Ascaris lumbricoides*, hookworm and *Entamoeba histolytica* respectively (see table 2). Again,

between ages related soil transmitted helminthes infection showed that children from 1-5 years had 12.2% of *Ascaris lumbricoides*, 4.8% of hookworm and 12.2% of *Entamoeba histolytica* infection rate higher than children between 6-8 years and 9-10 years respectively that had *Ascaris* infection 9.6%, 3.2% hookworm, 9.7% *Entamoeba histolytica* and 5.6% *Ascaris* infection, 0.0% hookworm, 5.6% *Entamoeba histolytica* respectively (see table 2).

Table 2: Sex and age relation of soil transmitted helminthes infections in Umuohama Ukpok Nnewi, Anambra State, Nigeria (%).

Parameter	Total number examined	Total with STH infection	<i>Ascaris lumbricoides</i>	Hookworm	<i>Entamoeba histolytica</i>
Male	39	8 (20.5)	3 (7.7)	1 (2.5)	4 (10.2)
Female	51	13 (25.5)	6 (11.8)	2 (3.9)	5 (9.8)
Total	90	21 (23)	9 (9.7)	3 (3.2)	9 (10.9)
Age					
1-5	41	12 (29.3)	5 (12.2)	2 (4.8)	5 (12.2)
6-8	31	7 (22.6)	3 (9.6)	1 (3.2)	3 (9.7)
9-10	18	2 (11.1)	1 (5.6)	0 (0.0)	1 (5.6)
Total	90	21 (21.0)	9 (9.1)	3 (2.7)	9 (9.2)

Furthermore, the highest prevalence of soil transmitted helminthes infections were observed in Umuaraba community primary school and Umuaraba central

primary school with a prevalence rate of 27.8% and 26.7% respectively (see table 3).

Table 3: Prevalence of Soil transmitted helminthes infections in relation to primary schools and their sex.

Parameters	Number Examined	Number Infected	<i>lumbricoides</i>	Hookworm	<i>E. histolytica</i>
Umuaraba community primary school	Male-10	2(20.0)	1(10.0)	0 (0.0)	1 (10.0)
	Female-12	4(33.3)	2(6.7)	1 (8.3)	1 (8.3)
	Total-22	6(26.7)	3 (8.6)	1 (4.2)	2 (9.2)
Umuaraba central primary school	Male-9	2 (22.2)	1 (11.1)	0 (0.0)	1 (11.1)
	Female-12	4 (33.3)	2 (16.7)	0 (0.0)	2 (16.7)
	Total-21	6 (27.8)	3 (13.9)	0 (0.0)	3 (13.9)
Ohineleke nursery and primary school	Male-13	3 (23.1)	1 (7.7)	1 (7.7)	1 (7.7)
	Female-13	3 (23.1)	1 (7.7)	0 (0.0)	2 (15.4)
	Total-26	6 (23.1)	2 (7.7)	1 (3.9)	3 (11.6)
Teach them young primary school	Male-7	1 (14.3)	0 (0.0)	0 (0.0)	1 (14.3)
	Female-14	2 (14.3)	1 (7.1)	1 (7.1)	0 (0.0)
	Total-21	3 (14.3)	1 (3.6)	1 (3.6)	1 (7.2)

The soil transmitted helminthes infection in relation to the type of toilet showed that children that defecate in the bush were highly infected with 34.5% of soil transmitted helminthes infection than children that uses water closet which had 15.9% of soil transmitted helminthes infection, and pit latrine with 18.8% of soil transmitted helminthes infection (see table 4).

Also, the soil transmitted helminthes infection in relation to the number of persons in a household showed that the family with 3-5 persons and 6-8 persons are less infected with 6.7% and 17.1% of soil transmitted infections respectively than those that are 9-12 persons in a household with higher soil transmitted helminthes of 84.6% infections (see table 4).

Table 4: Prevalence of Soil transmitted helminthes infections in relation to type of toilet system and number of persons in households (%).

Parameter	Number examined	Number infected
Bush method	29	10 (34.50)
Pit latrine	48	9 (18.8)
Water closet	13	2 (15.9)
Total	90	21 (22.9)
Number of persons in household		
3-5	30	3 (6.7)
6-8	47	8 (17.1)
9-12	13	11 (84.6)
Total	90	21 (36.1)

DISCUSSION

Soil-transmitted helminthes (STHs) infection represent major public health problem in a poor and developing countries and have constituted universal burden which does not only depend on regional ecological condition but also on local standard of social and economic development of the people. More than one dozen of different species of soil transmitted helminthes infect humans especially in the tropical and subtropical part of the developing world (Ukpai and Ugwu, 2003).

The present study showed that 23.3% of the subjects were infected with soil transmitted helminthes. This may result from indiscriminate disposal of human and animal feces and poor personal hygiene which contribute to high levels of soil transmitted helminthes infection (Koroma *et al.*, 1996). This is contrary to the finding of Mbuh *et al.* who reported a higher prevalence of 31.0% (Mbuh *et al.*, 2012). Also, Olaniran *et al.* had earlier reported a 40.7% prevalence of soil transmitted helminthes infection among school children in Osun State, Nigeria which is quite higher than our finding (Olaniran *et al.*, 2015). However, Dinesh *et al.* reported a much lower prevalence (3.8%) of soil-transmitted helminthes infection among pre-primary school children in Tanzania than that of the present study (Dinesh *et al.*, 2016). This

variations in the results may be attributable to the prevailing environment in which the studies were conducted.

In this study, it was observed that females had higher infection rate of soil transmitted helminthes with 25.5% than males with 20.5% of infection. The implication may be that females are more exposed to household activities such as fetching water or firewood, which makes them more prone to unhygienic activities than males (Alemu *et al.*, 2011). This is in consonance with the findings of some previous studies (Mbuh *et al.*, 2012; Olaniran *et al.*, 2015; Dinesh *et al.*, 2016).

The present study revealed that pupils from Umuaraba community primary school, Umuaraba central primary school and Ohineleke nursery and primary school are highly infected with 28.6%, 27.8% and 23.1% of soil transmitted helminthes infection respectively than the pupils from Teach them young primary school that had lower infection with 14.3% of soil transmitted helminthes. This implies that these schools that had higher infections of soil transmitted helminthes exposed their pupils to poor environmental conditions such as lack of good sanitation facilities, e.g. toilet which leads to pupils defecating in the school nearby bushes which increases their chances of soil transmitted helminthes infection (WHO, 2013).

It was also observed that a household with 3-5 persons and 6-9 persons had lower infection rate with 6.7% and 17.1% of soil transmitted helminthes than those that are 9-12 persons with higher infection rate of 84.6% of soil transmitted helminthes infection. The implication may be that those with higher population in a household may lack sanitation facilities and education which exposes them to soil transmitted helminthes infection (Asaolu and Ofoezie, 2003).

In this study, the soil transmitted helminthes infection were observed to be higher in pupils that uses bush method with 34.5% prevalence than pupils that uses pit latrines with 18.8% and water closet with 15.9% prevalence. This is because soil transmitted helminthes ova are mostly soil and grasses which infect pupils when they defecate in bushes or walk bare foot on the contaminated soil (WHO, 2011).

Furthermore, it was observed that *Ascaris lumbricoides* and *Entamoeba histolytica* are more prevalent with 9.7% and 10.9% respectively than hookworm with 3.2%. the implication may be because ascaris occurs in tropical countries like Nigeria where warm, wet climates provide environmental conditions that favour year-round transmission of infection. This contrasts to the dry areas where transmission is seasonal, occurring predominantly during the rainy months. The prevalence is also greatest in areas where suboptimal sanitation practices lead to increased contamination of soil and water (Heymann *et al.*, 2004). It was also seen in this study that pupils of age

1-5 and 6-8 years had higher prevalence of 29.3% and 23.6% than pupils aged 9-10 years with 11.1% infection rate. This may be as a result of the pupils playing with dirty soil and objects (WHO, 2011).

CONCLUSION

This study has revealed that soil transmitted helminthes infection is prevalent among primary school children in Umuohama Community in Ukpok, Anambra State, Nigeria and is associated with poor environmental conditions, unhygienic practices, and poverty.

RECOMMENDATION

Therefore, provision of modern day toilet system to schools along side with public awareness campaign on personal hygiene should be encouraged as this will facilitate the reduction of soil transmitted helminthes infection.

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