International Digital Organization for Scientific Research ISSN: 2579-079X
IDOSR JOURNAL OF SCIENCE AND TECHNOLOGY 3(1): 9-17, 2018.

Geohelminthiasis among children from Three Rural Primary Schools in Ebonyi State, Nigeria: Appraisal of Knowledge, Attitude and Practices

Elom Michael Okpara[1], Ezeruigbo Chinwe F. S[2]., Nworie Amos[1], Ugah Uchenna I[3*]., Igwe Chibueze[4] and Okeh Emmanuel N[4].

[1]Department of Medical Laboratory Science, Faculty of Health Science, Ebonyi State University, Abakaliki.
[2]Department of Nursing Science, Faculty of Health Science, Ebonyi State University Abakaliki.
[3]Department of Microbiology, Faculty of Science, Federal University Ndufu-Alike Ikwo.
[4]Medical Laboratory Services Department, Federal Teaching Hospital, Abakaliki.

ABSTRACT

Geohelminthiasis is a public health problem in regions of the world with poor sanitation, inadequate water supply, over-crowded and illiterate population. In children, it is considered to be a leading cause of sickness and absenteeism from school and can also result to serious negative health conditions, including delayed physical growth, cognitive impairment and nutritional deficiencies. A total of 255 children from three primary schools in Ishielu LGA, Ebonyi State, Nigeria, participated in the study from October 2014 to January 2015. Well-structured close-ended questionnaires were used to extract information concerning knowledge attitude and practices on soil transmitted helminthiasis from the children.Wide-mouthed screw–cap sterile containers were used for collecting stool specimens from the children. The stool specimens were analysed in the laboratory, using both wet mount preparation technique and formol-ether concentration technique. Data collected wereanalysed using Chi-squared tests and statistical significance was established at $p<0.05$. There was low knowledge of geohelminthiasis (2.75%), signs and symptoms (1.96%), routes of transmission (1.96%), and preventive measures (2.35%) and the pupils' attitudes were poor as most (an average of 56%) of them were exhibiting unwholesome health practices such as defecating on open fields, practice of geophagy, eating of raw and unwashed fruits and vegetables, and walking barefoot. One hundred and two (40.00%) of the children were infected. The prevalence of infection among males and females were 38.05% and 41.55% respectively and were statistically significant ($p<0.05$) in age group 15-17 years. Both genders were infected most by the hookworms and least by *Trichuristrichiura*with prevalence of 21.24% vs 29.58% and 0.88% vs 2.82% for hookworms and *T. trichiura*in both genders. School-by-school prevalence of geohelminthiasis indicated no significant difference ($p>0.05$) in infections. Adequate health education, provision of sufficient sanitation facilities, and provision and enforcement of compulsory deworming exercises are recommended for control and possible elimination of geohelminthiasis.

Keywords: Geohelminthiasis, Knowledge, Attitudes, Practices, Children, Ebonyi State.

INTRODUCTION

Soil-transmitted helminths otherwise collectively known as geohelminths are among the important groups of infectious agents that are of public health Bimportance. Worldwide, three members of the group–*Ascaris lumbricoides, Trichuristrichiura* and the hookworms (*Necatoramericanus* and *Ancylostomaduodenale* are more important and more prevalent [1],[2],[3].

Geohelminthiasis is more prevalent among people living in conditions of poor sanitation as obtained in resource constrained and neglected rural and urban areas of developing countries, including sub-Sahara Africa, East Asia, India and South America [2] Insufficient water supply and sanitation facilities, over-crowded living environments, poor health care systems or inaccessibility to the health care systems and low levels of education have been reported to be responsible for predisposing the poor more to infections and diseases, including the geohelminthiasis. [4].

Humans become infected with soil transmitted helminths by oral contamination with embryonatedeggs in the cases of round worms and whip worms and through skin penetration by the infective filariform (L_3) larvae, in the case of the hookworms. The availability of geohelminth -surviving suitable soil environmental conditions, including optimal temperature and humidity, and high level of soil contact activities such as playing while on barefoot on contaminated sand and soil and the practice of geophagy, render children more susceptible to infections by soil-transmitted helminths.

Recent global estimate by WHO, indicated that among the three more prevalent geohelminths, *A. lumbricoides*infected at least 807 million people; *T. trichiura,* at least 604 million people while the hookworms (*A. duodenum* and *N. americanus)* infected at least 576 million people [5]. A more recent report indicated that the global prevalence of infection with geohelminths was over 2 billion [6]. Another report from most recent publication stated that approximately 1.5 billion people have been reported to be globally infected withgeohelminths with over 270 million and 600 million pre-school-age and school age respectively living in highly endemic regions of the world [3].

Infections with geohelminths are considered to be leading causes of sickness and absenteeism from school and can lead to disability adjusted life years (DALYS) lost [7]. School-age children infected with soil-transmitted helminths have been reported to develop serious negative health conditions including delayed physical growth, cognitive and nutritional impairment [3],[7],[8].

Presently, no vaccines have been developed against soil-transmitted helminths but management and control approaches usingalbendazole or mebendazole have been in progress, though skeletally in some economically better societies of the endemic areas. The absence of vaccines and continually high prevalence reports of the infections have generated the need for embarking on the study.

MATERIALS AND METHODS

The Study Area: The three rural primary schools used in the study were randomly selected from three communities in Ishielu LGA of Ebonyi State, Nigeria. The

LGA has an area of 872 km^2, with a population of 152, 581 [9].

The vegetation composition of the areas is typically Guinea Savannah mosaic type [10]. Wet and dry seasons which respectively start from May to October and from November to April are the two principal prevailing seasons of the area. High temperature and high relative humidity are remarkable abiotic factors prevalent in the study area. The major occupation of the inhabitants of the study area is farming, which is mainly at the subsistence levels. Majority of the poor farmers engage in the use of animal faeces in the absence of the chemical fertilizers, for improving the soil nutrients for the growth of their crops. Low level of education is prevalent, with some people still attending primary schools at 18 years of age.

The Study Population and Schools: The target population of the study was school-age children between 6 years and 17 years old. Three schools were randomly selected for the study and they were:- Ezza Umuhuali Primary School (EUPS), Community Primary School, Amezu (CPSA) and Central School Umuhuali (CSU).

Ethical Considerations: The study was approved by the Primary Health Care Unit of the LGA of study. Permission from the headmasters of each of the studied schools was obtained, using a draft of letter of introduction by the principal investigator of the study. Consents of both children and their parents were sought and obtained before enrolment. All other ethical precepts in research involving human beings were strictly observed.

Questionnaire Design and Administration: Simple but well-structured close-ended questionnaires were used to extract information concerning knowledge, attitude and practices on soil-transmitted helminthiasis from the children. The questionnaires were distributed to the children who were older and in higher classes while information obtained from the younger ones was by asking questions and recording their answers on their questionnaires. The administered instruments were collected and collated and sent for analysis immediately after the exercise.

Specimen Collection Techniques and Laboratory Analysis: The children were educated on the correct method of collecting stool specimens. Thereafter, wide-mouthed screw-cap sterile containers were distributed to the pupils for collection of their stool at home.In the morning of the following day, the stool specimens were collected from the children and were labeled by indicating the age and sex of each child. The stool specimens were quickly transported to the Teaching and Research Laboratory of the Department of Medical Laboratory Science, Ebonyi State University, Abakaliki, for analysis.

The specimens were first examined macroscopically, after which microscopic analyses took place. Both wet preparation and formol-ether concentration techniques were carried out as outlined by Cheesbrough [11]. The recovered parasites were identified and immediately recorded in the data notebook.

Statistical Analysis: Differences in proportions were evaluated using Chi-squared tests. Statistical significance was established at 95% level of significance.

RESULTS

A total of 255 school children composed of 113 (44.31%) males and 142(55.69%) females between the age bracket of 9 years and 17 years were enrolled in the study. The questionnaire aspect of the study tested the children's knowledge,

attitude and practices as they concerngeohelminthiasis while the other aspect of the study was based on coprological laboratory analysis. Knowledge of geohelminthiasis, its signs and symptoms, routes of transmission and preventive measures was too low as 2.75%, 1.96%, 1.96%, and 2.35% respectively were recorded. The attitude and practices of the children concerning soil-transmitted helminthes were unhygienic and unwholesome. Only 2.75% of them deworm twice annually while 64.71%, 47.45%, 56.07% and 54.51% defecate on open fields, practice geophagy, eat raw unwashed fruits and vegetables and walk and/or work barefoot respectively on potentially- contaminated soil (Table 1).

Table1:Knowledge, attitude and practices of geohelminthiasisamong children in three rural primary schools from Ebonyi State

Determined Variables	Total Respondents	Positive Responses	Negative Responses
Knowledge of geohelminthiasis	255	7(2.75)	248(97.25)
Knowledge of signs and symptoms of geohelminthiasis	255	5(1.96)	250(98.04)
Knowledge of means and routes of transmission of geohelminthiasis	255	5(1.96)	250(98.04)
Knowledge of preventive measures of geohelminthiasis	255	6(2.35)	249(97.64)
Defecating on open fields or in bushes	255	165(64.71)	90(35.29)
Practice of geophagy	255	121(47.45)	134(52.55)
Eating of raw and unwashed vegetables and fruits from school gardens.	255	143(56.07)	112(43.92)
Walking barefoot to school and working barefoot on farms when helping their farmer parents.	255	139(54.51)	116(45.49)
Use of any anithelminthic drug at least two times yearly.	255	7(2.75)	248(97.25)

Key: Numbers in parenthesis indicate percentages.

Table 2 depicts age-and gender-related prevalence of geohelminthiasis among the subjects. Out of the 255 stool specimens from the subjects, 102(40.00%) were infected. Females, with infection prevalence of 41.55% were more infected than males, who had infection prevalence of 38.05%. The prevalence of infection across the genders was statistically significant ($p<0.05$) in age group of 15years-17years.

Table2:Age- and gender-related prevalence of geohelminthiasis among children from three rural primary schools in Ebonyi State, Nigeria

	Males			Females		
Age groups (years)	**Number examined**	**Number infected**	**Prevalence**	**Number examined**	**Number infected**	**Prevalence**
9-11	39	17	43.59	57	24	42.11
12-14	55	20	36.37	63	26	41.27
15-17	19	6	31.58	22	9	40.91
Total	**113**	**43**	**38.05**	**142**	**59**	**41.55**

The geohelminth group-specific prevalence among the studied children indicated that both genders were infected most by the hookworms and least by *T. trichiura,* with respective infection prevalence of 21.24% vs 29.58% and 0.88% vs 2.82% for hookworms and *T. trichiura*in both genders (Table 3).

Table 3: Geohelminth-group specific prevalence among children from three rural primary schools in Ebonyi State, Nigeria

	Males (N=113)		Females (N=142)	
Geohelminth group	**Number infected**	**Prevalence**	**Number infected**	**Prevalence**
Hookworm	24	21.24	42	29.58
Ascarislumbricoides	18	15.92	13	9.16
Trichuristrichiura	1	0.88	4	2.82
Total	**43**	**38.05**	**59**	**41.55**

School-by-school prevalence of the geohelminths is as presented in table 4. Across the schools, hookworms had the highest prevalence (25.88%) while *T. trichiura*had the least (1.96%). There was no significant difference ($p>0.05$) in infection prevalence across the schools.

Table 4: School-by-school prevalence of recovered geohelminths among children in Ebonyi State, Nigeria

	Hookworm			*A. Lumbricoides*		*T. trichiura*	
Schools	**Number Examined**	**Number infected**	**Prevalence**	**Number infected**	**Prevalence**	**Number infected**	**Prevalence**
EUPS	50	13	26.00	4	8.00	0	0.00
CPSA	102	27	26.47	13	12.75	1	0.98
CSU	103	26	25.24	14	13.60	4	3.88
Total	**255**	**66**	**25.88**	**31**	**12.16**	**5**	**1.96**

Key: EUPS---EzzaUmuhuali Primary School, CPSA---Community Primary School, Amuzu, CSU---Central School Umuhuali.

DISCUSSION

Knowledge of geohelminthiasis, their signs and symptoms, routes of transmission and preventive measures were low, as 2.75%, 1.96%, 1.96% and 2.35% respectively were recorded. Poor knowledge of means of transmission and preventive measures recorded in the study is similar though smaller that that reported by Midzi et al. [12]among grade three primary school children in Zimbabwe. The unhygienic, unwholesome and predisposing attitudes of the subjects in this study have been reported by earlier studies on geohelminthiasis. Nmor et al. [13] reported walking barefoot as a significant predictor for hookworm infection at regular and occasional levels in their study in Delta State, Nigeria. Ojurungbe et al. [14] also reported barefoot as a problem in their study. The practice of deworming at least twice yearly has been very poor in this study as only 2.75% of the children as at the time of the study dewormed twice per year, leaving 97.25% of them untreated. The scenario is similar to previous reports. Amaechi et al. [15]reported that 81.7% of their study subjects in Abia State, Nigeria did not deworm themselves at six month intervals as at the time of their study. Geophagy, a habit that is prevalent among some Nigerian women, especially, the pregnant ones and infants could render people very susceptible to soil-transmitted helminth infections, especially in the tropics and the sub-tropics, where indiscriminate faecal disposal and other poor sanitation practices are carried out. A significant number 121(47.45%) of the children in this study practisedgeophagy. The health of the remaining 134(52.55%) is in jeopardy, considering the waste disposal pattern, prevailing environmental factors in favour of maturation, development and subsequent transmission of geohelminths.

One hundred and two,(40.00%) of the 255 stool specimens examined were infected. Females were more infected (41.55%) than males (38.05%). The results of this study does not agree with Uneke et al. [16], who reported a lower prevalence of 16.9% in South Eastern Nigeria. However, the results of the present study are similar and in conformity with the findings of Ojurongbe et al., [14], [17].

Many previous studies have however, reported higher prevalence of geohelminthiasis among their study subjects [18], [19], [20].Ivoke[21]Nmor et al. [13],Nmorsi et al. [22] and Salawu and Ughele[23] all reported prevalence higher than that of this study. The reported different prevalence of infection with geohelminthes within and outside the country and even within the city of this study could be attributed to the seasonality of the study, the prevailing temperature and humidity, in cases of international studies, educational exposure of the inhabitants of the study area, occupation of the area of study, level of sanitation, economic status and infrastructural and health commodities and facilities at the disposal of the people of the study area. Some of the listed influential factors have been reported by earlier researchers, including Uneke et al. [16], as being characteristically important in shaping and propagating the transmission of geohelminthiasis with people of an endemic area. The finding that females were more infected than males is in contrast with reports of other studies [13], [15],[16], but conforms with reports of studies by (Odikamnoro et

al.,[19] and that of Salamu and Ughele, [23]. The prevalence of geohelminthiasis across the gender was only statistically significant ($p<0.05$) in age group 15 years-17years. This finding is in contrast to that of Ojurungbe et al. [14], who reported no significant difference between age and The findings of this study indicated that both genders were infected most by the hookworms and least by the *T. trichiura.* This is not in conformity with Uneke et al. [16] who reported *A. lumbricoides*as the geohelminth with the highest frequency of occurrence in infection. It also disagrees with Amaechi et al., [15]Salawu and Ughele, [23]. However, the recovery of the trio of *A.lumbricoides,* Hookworms, and *T. trichiura*conforms to previous reports of [13],[21], [23]. These reports re-affirm other research findings which reported the three geohelminths as the most common in occurrence.

School-by-school prevalence of infection indicated no significant difference ($p>0.05$) across the schools. That infections across the studied schools had no significant different values could be attributed to the fact that the schools are located around the same area and attended by pupils from families with similar socio-economic class; with educational attainments, beliefs and exposure of their parents being also similar.

infection and asserted that age brackets and genders in their study were equally exposed to infection as there were no age and sex restrictions on the movement of the people which may expose them to risks of infection with soil-transmitted helminths.

Despite the fact that the Federal Ministry of Health (FMOH) in Nigeria has introduced regular deworming exercises, using albendazole or mebendazole, geohelminthiasis is still high as to be considered a public health problem. Findings of this study and those of other researchers attest to that.Insufficient public health awareness, illiteracy, poverty, poor sanitation, neglect and inaccessibility to health and infrastructural facilities, emanating from politics of acrimony, are among the factors that maintain the transmission of the infection in some communities. Little wondergehelminthiasis are classified among neglected tropical diseases (NTD_s), asthey areendemic within disregarded and neglected population of people.

Adequate public health education, provision of sufficient sanitation facilities,and provision of effective and efficient well-monitored frequent deworming exercises with efficacious antihelminths is advocated for control and possible elimination of soil-transmitted helminth infections.

REFERENCES

1. World Health Organization (2005). Deworming for Health and Development.Reports on the Third Global Partners for Parasite Control, Geneva.

2. Hotez, P.J., Brindley, P.J., Bethony, J.M.,King, C.H., Pearce, E.J. and Jacobson, J. (2008). Helminth infections: the great neglected tropical diseases. *Journal of Clinical Investigations,* 118:1311-1321.

3.World Health Organization (2017). Soil-transmitted helminth infections. Fact Sheet, Geneva.

4.de Silva, N.R., Brooker, S., Hotez, P.J., Montressor, A., Engels, D. and Savioli, L. (2003).Soil-transmitted helminth infections: updating the global picture. *Trends in Parasitology,* 19:547-551.

5.World Health Organization (2011). Soil-transmitted helminthiasis: estimates of the number of children needing preventive chemotherapy and number

treated. *Weekly Epidemiology Record,* 25(86): 257-268.
6. World Health Organization (2012). Eiminatin Soil-transmitted helminthiases as a public health problem in children. Progress Report 2001-2010 and Strategic Plan 2011-2020. Geneva.
7. Curtale, F., Pezzoti, P., Saad, Y.S. and Aloi, A. (1998). An analysis of individual households and environmental risk factors for intestinal helminth infections among children in Qena Government, Upper Egypt.*Journal of Tropical Paedatrician,* 45:14-17.
8. Ostan, I., Kilimcioglu, A.A., Girginkar-dester, N., Ozyurt, B.C., Limoncu, M.E. and OK, U. Z. (2007). Health inquiries: lower socio-economic conditions and higher incidences of intestinal parasites. *BMCPublic Health,* 7:342.
9. National Population Commission (2006). The Population in Ebonyi State.
10.Ofomata, G.E.K. (1978). Nigeria in Maps.Eastern States.Ethiope Publishing House, Benin City, Nigeria.
11. Cheesbrough, M. (2010). *District Laboratory Practice in Tropical Countries.Part 1.*Cambridge University Press.
12.Midzi, N., Mptapuri-zinyowera, S., Mapingure, M.G., Paul, N.H., Sangweme, D., Hlerema, G., Mutsaka, M.J., Tongogara, F., Makware, G., Chadukura, V., Brouwer, K.C., Mutapi, F., Kumar, N. and Mduluza, T.(2011). Knowledge, attitudes, and practices of grade three primary school # children in relation to schistosomiasis, soil- transmitted helminthiasis, and Malaria in Zimbabwe.*BMC Infectious Diseases,* 11:169-173.
13.Nmor, J.C., Onojafe, J.O. and Omu, B.A. (2009). Anthropogenic indicators of soil-transmitted helminthiasis among children in Delta State, Southern Nigeria.*Iranian Journal of Public Health,* 38(3): 31-38.
14.Ojurongbe, O., Oyesiji, K.F., Ojo, J.A., Odewale, G., Adefioye, O.A., Olowe, A.O., Opaleye, O.O., Bolaji, O.S. and Ojurongbe, T.A. (2014). Soil-transmitted helminth infections among primary school children in Ile-Ife Southern, Nigeria: A cross sectional study. *International Research Journal of Medicine and Medical Sciences,* 2(1): 6-10.
15.Amaechi, E.C., Ohaeri, C.C. and Ukpai,O.M.(2013).Prevalence of helminthiasis among school children in some rural communities of Abia State, Nigeria. *Animal Research International,* 10(3): 1817-1825.
16.Uneke, C., Eze, K., Oyibo, P., Azu, N. and Ali, E. (2006). Soil-transmitted helminth infection in school children in South Eastern Nigeria: The public health implication. *The Internet Journal of Third World Medicine,* 4(1).
17.Njonjo, T., Okoyo, C., Andore, J., Simiyu, E., Lelo, A.E., Kabiru, E., Kihara, J. andJacobson, J. (2008). Helminth infections: the great neglected tropical diseases. *Journal of Clinical Investigations,* 118:1311-1321.
18.Handzel, T., Karanja, D.M., Addiss, D.G., Hightower, A.W., Rosen, D.H., Colley, D.G., andove, J., Slutsker, L. and Secor, W.E.(2003). Geographic distribution of schistosomiasis and soil-transmitted helminths in Western Kenya: implications for antihelminthic mass treatment. *American Journal of Tropical Medicine and Hygiene,* 69:318-323.
19.Odikamnoro, O.O. and Ike, I.M. (2004). Prevalence of common intestinal nematode infections among primary school children in Kpirikpiri Community of Abakaliki, Nigeria.*Nigerian Journal of Parasitology,* 24:71-79.
20. Adeyeba, O.A. and Akinlabi, A.M. (2006).Intestinal parasitic infections among school children in a rural community, Southwest Nigeria. *Nigerian Journal of Parasitology,* 23: 11-18.
21.Ivoke, N. (2007). A coprological survey

of geohelminth infections among school childrenin rural Ebonyi State, Nigeria.*Animal Research International,* 4(2): 653-661.
22.Nmorsi, O.P.G., Isaac, C., Aashikpelokhai, I.S. and Ukwandu, N.C.D. (2009).
Geohelminthiasis among Nigerian pre-school-age children.*International Journal of Medicine*
and Medical Sciences, 1(10): 407-411.
23. Salawu, S.A. and Ughele, V.A. (2015). Prevalence of soil-transmitted helminths among school-age children in Ife East Local Government Area, Osun State, Nigeria.*Futa Journal of Research in Sciences,* 11(1): 139-151.