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Soil – Transmitted Helminthiasis: Prevalence and Rist Factors Among pupils in Primary Schools in Umuahia South Local Government Area, Abia State, Nigeria

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ABSTRACT

Soil Transmitted helminthes is a public health problem in the tropic. A study on helminthissis was carried out to determine its prevalence and associated risk factors among pupils in primary schools in Umuahia South Local Government Area. Abia State Nigeria, using formol – Ether concentration technique on the fecal samples from the different schools and structured questionnaire to determine the risk factors associated with the disease. A total of 450 fecal samples were collected with overall prevalence of 45.33%. The soil-transmitted helminthes recorded were hookworm, 90 (20%), *Ascaris lumbricoides*, 84 (18.67%) and *Trichuris trichuria* , 30 (6.67%). The difference was statistically significant ($P<0.05$). Prevalence was higher among the females 120 (48.78%) than in males 84 (41.18%) through not statistically significant ($P>0.05$). The prevalence was highest among pupils of age group 11 – 13 (60%), followed by age group 8 – 10 (54.72%) and the least was among 5 – 7 age group (30.77%). Amakama Central School Olokoro had the highest prevalence (68.90%) due to very poor hygiene, followed by Old Umuahia Primary School II (40.00%) while Adventist Care Nursery and Primary School had the least prevalence rate (10%). Hand wash pattern among the pupils showed a very low response, while 42.67% do not wash their hands after using the toilet, 24.89% also do not wash their hands before eating. The difference was statistically significant ($P<0.05$) Pupils that make use of public pit latrine had the highest prevalence (57.69%), followed by those that use private pit latrine (44.18%) compared with the pupils that use public water system (41.18%) and those that use private water system (28.25%). The high prevalence and types of soil-transmitted helminthes recorded among children in primary school suggest an urgent need for intervention. Education on proper hygiene habit especially at the primary school level is highly recommended with a coordinated multi-sectoral and multi-disciplinary strategy that integrates periodic de-worming, health education, provision of potable water supply and environmental sanitation for effective control and management.

KEYWORDS: Helminthiasis, risk factors, proper hygiene habit, sanitation, de-worming

INTRODUCTION

Soil-transmitted helminthes (STH) have long been recognized as a major public health problem and the prevalence vary from place to place in relation to the pattern of transmission of the disease and also have been classically considered a typical health problem of rural communities (Adeyeba and Akinlabi, 2002). Soil-transmitted helminth infections are among the most common infection worldwide and affect the poorest and most deprived communities. It is reported that more than a billion people are infected with at least one species by swallowing eggs present in human feces which in turn contaminate soil in areas of poor sanitation or infectious larva penetrating the skin (WHO 2003, Chesbrough 2006, Crompton 1999, Nwosu 1983). These helminthes include intestinal round worm (*Ascaris lumbricoides*) whip worm (Trichuris trichuria hookworm (*Ancyclostoma duodenale* and Necator *americanus*) (WHO 2014).

They are the most common soil-transmitted helminthes and are considered together because, it is common for a single individual especially children to be chronically infected with all the three worms (Crompton 2001, De Silva et al., 2003, Oguanya et al 2012). Soil-transmitted helminthic infections are high in some parts of Nigeria (Uneke et al., 2006) and other parts of Sub-Saharan Africa (Brooker et al 2006).

Males have higher prevalence than females (Uneke et.al., 2006) and the age group 4 – 10 years has higher prevalence than age group 10 years and above (Adeyeba and Akinlabi 2002, Uneke et al., 2006). Some climatic conditions are very important determinants in transmission of these infections such as adequate moisture and warm temperature which are essential for larval development in the soil (Brooker and Michael 2000, De Silva et al., 2003, Bethony et al., 2006). Other important determinants in the epidemiology of soil-transmitted helminthes are poverty, inadequate water supply, poor sanitation and personal hygiene especially shoe wearing and hand washing (De Silva et al., 2003). These conditions favour soil-transmitted helminth species and infections commonly occurs as co-infection with profound effect on the health of growing children such as chronic ill-health and insidious clinical presentations (Brooker and Michael 2003). Such children are malnourished, have stunted

growth, intellectually retarded, anaemic and with poor school attendance. Morbidity and rate of transmission are directly related to the number of worm harboured in the host. The intensity of infection is the main epidemiologic index used to determine infection (Anderson and May 1991). People with light soil-transmitted helminth infection usually have no symptoms. Heavy infections can cause a range of health problems which include abdominal pain, diarrhea, blood and protein loss, rectal prolapse and cognitive growth retardation (CDC 2013). Helminthic infection is a major cause of disease burden among inhabitants in developing countries (WHO 2003), especially in Sub-Saharan Africa. This high infection is evident of severe shortage in health care, education and chronic poverty (Crompton 1999). Children expose themselves to the infestation of parasite by playing on barefoot, poor personal hygiene and low level of standard of living. There is therefore need for this study as there is dearth of information about the infection in this study area and findings from this work will help to proffer both preventive and curative measure to enhance better living standard.

MATERIALS AND METHOD

Study Area

This study was conducted in Umuahia (Umuahia south) located at the longitude 5.032°N, 7.29°E and latitude 5.330°N, 7.4830°E in Abia State, Nigeria. Umuahia has a tropical climate with the dry season starting in October and ending in February. The total annual rainfall ranges from 1800 – 2100 mm and daily air temperature ranges from 21 – 32°C. The relative humidity is about 82 – 85% occurring during the raining season. Main occupations of the inhabitants are farming, trading and minor hand crafts.

Data Collection

Three different primary schools were used for the study namely Amakama Central School, Adventist Care Nursery and Primary School, Isi court and Old Umuahia Primary School II old Umuahia all in Umuahia South Local Government Area of Abia State.The selection was made due to their locations within the Local Government classified as urban and rural areas. Ethical clearance was sought from the Head teachers and the parents and guardians of the children prior to the study and they were properly enlightened on the purpose of the study and the need for voluntary participation as

confidentiality of participants was protected throughout the study.

A structured questionnaire was designed to collect data on age, sex, source of water supply, method of feaces disposal and other parameters considered in the study was distributed to each of the randomly selected pupils and responses collected during submission of specimen.

Collection and examination of specimen

Specimen containers (wide-mouthed screw capped plain plastic containers) devoid of antiseptic/disinfectant and leak proof were cleaned, dried and given to 450 pupils selected randomly for sample collection. Each container was labeled and pupils were allowed to take the container home and return same the next day (in the morning) to school with freshly passed stool. The samples were received early and recorded appropriately and then transported immediately to the laboratory for examination. The stools were examined in the laboratory by both sedimentation and flotation techniques using formol-ether concentration technique as described by Cheesbough (2006). With an applicator stick, about 2 g of the stool sample was emulsified in 4 ml of 10% formol-ether container in a tube. Additional 4 ml of diethyl ether was added, vigorously shaken and allowed to stand for two minutes. The mixture was then centrifuged at 1000 revolutions per minute after which the fecal debris was loosened and the tube inverted and decanted leaving the sediment at the bottom of the tube. This was then tapped to re-suspend and mix the sediment. A drop of the sediment was applied on the microscope slide covered with a cover slip and examined under a microscope with ×40 and 100 objective lens. Each slide with ova, larvae of parasite was recorded as positive.

Data Analysis

Data were presented and analyzed using percentages and chi-square (X^2) test was used to compare values and p value less than 0.05 was considered significant using SPSS package version 20.

RESULTS

Out of 450 children examined 204 were infected by soil-transmitted helminthes giving an overall prevalence of 45.33%. In table 1, gender –related prevalence of soil-transmitted helminthes indicated

that females 120 (48.78%) had higher prevalence than the males 84 (41.18%) but not significantly different (P>0.05). Helminths isolated from the study are Hookworm 90 (20%), *Ascaris lumbricoides* 84 (18.67%), *Trichuris trichuria* 30 (6.67%) (Table 2).

Table 1: Prevalence of soil-transmitted helminth infection according to gender

Gender	Number examined	Number infected	Percentage of infection (%)
Male	204	84	41.18
Female	246	120	48.78
Total	450	204	45.33

(χ^2 = 0.98419, Df = 1, P – value = 0.32117)

Table 2: Prevalence of parasites observed in the study area

Parasite	Number of parasite present	Percentage of infection %
Hookworm	90	20
Ascaris lumbricoides	84	18.67
Trichuris trichuria	30	6.67
Total	204	45.33

(χ^2 = 26.118, Df = 2, P-value = 0.00)

School related prevalence showed that, Amakama Central School has the highest prevalence rate (68.33%) followed by Old Umuahia Primary School (40%) and the least was among Adventist Care, Nursery and Primary School (10%) Table 3.

From the study age related prevalence showed that age group between 11 – 13 years had the highest (60%), followed by 8 – 10 years (42.11%) and the least was among age group 5 – 7 years (30.77%). (Table 4).

Table 3: Prevalence of soil-transmitted helminth infection with respect to location and gender

Source of sample	No. Examined	Hookworm		*Ascaris lumbricoides*		*Trichuris trichuria*		No. +ve	% +ve
		Male	Female	Male	Female	Male	Female		
Old Umuahia Primary II	180	18	18	9	15	0	12	72	40
Adventist Care Nursery and Primary School	90	0	0	3	6	0	0	9	10
Amakama Central School	180	24	30	21	3	9	9	123	68.33
Total	450	42	48	33	51	9	21	204	45.33

Table 4: Prevalence of soil-transmitted helminth infection according to age group

Age group (years)	Number examined	Number infected	Percentage of infection (%)
5 – 7	156	48	30.77
8 – 10	114	48	42.11
11 – 13	180	108	60.00
Total	450	204	45.33

(χ^2 = 11.104, Df = 2, P – value = 0.004)

The study indicated that 42.67% of the respondents do not wash their hands after using the toilet while 75.11% wash their hands before eating. (Table 5).

The prevalence in relation to method of fecal disposal revealed that those that use public pit latrine had the highest (57.69%), followed by private pit latrine (44.12%), the public water system (41.18%) and the private water system had the least (28.25%). This is statistically significant ($p<0.05$).

Table 5: Level of awareness in hand washing habit as prevention measure for helminth infection.

Variable	Response		X^2_{cal}	Df	P-value
	Yes (%)	**No (%)**			
After use of toilet	258 (57.33)	192 (42.67)	6.47	1	0.01
Before eating	338 (75.11)	112 (24.89)	77.85	1	0.00

Prevalence in relation to sources of water supply indicate that children that their source of water supply is from stream had the highest prevalence rate (64.13%) followed by well (60%) then borehole (30.08%) and the least was tap water (23.33%). This was statistically significant ($p<0.05$). (Table 6).

Table 6: Level of awareness on preventive measures and knowledge about risk factors associated with helminth infection.

Variable	Number examined	Number infected	Percentage of infection (%)
Response to method of fecael disposal			
Method of fecael disposal			
Private water system	80	27	28.25
Public water system	102	42	41.18
Private pit latrine	102	45	44.12
Public pit latrine	156	90	57.69
Total	450	204	45.33
(χ^2 = 5.2873, Df = 3, P- value = 0.1593)			
Source of water supply and prevalence of helminthic infection among the school children			
Source			
Tap water	30	8	23.33
Borehole	212	64	30.08
Well	20	12	60.00
Stream/River	188	121	64.13
Total	450	204	45.33
(χ^2 = 19.748, Df = 3, P – value = 0.00)			

DISCUSSION

The results of this study have revealed a high prevalence value (45.33%) of soil transmitted helminthes infection in children of school age in the study area. This figure is lower than 70.50% recorded by Oninla et al., (2007) and 48.8% by Ezeagwula et al., (2009) in Anambra State However, higher than, that reported by Okolo and John [2006] in Vom, Plateau State because they worked in urban area where the level of sanitation and hygiene is improved among the school children. The result further indicated that females were more infected (48.18%) than males (41.18%). This agrees with the work done by Agi and Awiwamdu (2008) in Niger Delta but disagrees with report of Adewole and Akingbolu (2009), Elom *et al*., (2012) in South East Nigeria and Bala and Yakubu (2010) in Jos Plateau State. They observed that males were more infected than females. This disparity in the results may be due to the level of sanitary conditions in the study area as well as the level of personal hygiene among the studied population. However, the higher prevalence found among the females in this study could be due to the fact that they are involved more in farming and other domestic activities such as sweeping and fetching of water from the stream and these they do barefooted hence being exposed to infection and to contaminated soil and the larvae of hookworm than the males.

There was a significant difference in the distribution of the infection among the different schools sampled. Pupils from Amakama Central School recorded the highest infection rate (68.33%) compared to children from Old Umuahia Primary School II (40%) and Adventist Care Nursery and Primary School (10%). This is due to the sanitary conditions of the school environment and the personal hygiene of the pupils because schools are located in rural and semi rural areas. This is in agreement with the study of Odebunmi *et al.,* (2007) that stated that children do engage in outdoor activities such as playing on moist soil that is contaminated and also helping out in farm work thereby making them to be at risk.

Age groups: 11 – 13 and 8 – 10 years recorded very high prevalence rates 60% and 42.11% respectively than the age group: 5 – 7 with lower prevalence (30.77%). However, children in these age groups engage in play activities in contaminated environment that could facilitate the transmission of these parasites and also are obviously careless about their personal hygiene because they are not old enough to understand the need for general cleanliness. Similar findings have

been reported by Ezeagwuna *et al*., (2009) that reported higher prevalence rates of 58.77% and 42.17% amongst children 11 – 13 and 8 – 10 years respectively. Also, Amaechi *et al*., (2013) reported 85.7% among 5 – 7 age group and 75% among the age of 8 – 10 years.

The predominant soil-transmitted helminth parasites found was Hookworm (20%) this agrees with the findings of Ezeagwuna *et al*., (2009), but however differs from other studies Wagbatsoma and Asien (2005) that reported that *Ascaris lumbricoides* had the highest infection rate. The high prevalence of Hookworm in this study was due to the fact that children in rural areas commonly play barefooted on contaminated soil.

Several risk factors associated with soil-transmitted helminth infections in rural areas include use of public pit latrine which had the highest (57.69%) followed by private pit latrine (44.12%), public water system (41.18%) and the least was among those that use private water system (28.25%). Hand washing habit of the pupils in these schools was very poor, only 57.33% wash their hands after using the toilet while 42.67 do not due to non availability of water in the schools and communities while 75.11% wash their hand before eating. The high prevalence rate of soil-transmitted helminth in this study population could be attributed to the risk factors associated with the non availability of water supply and good toilet facilities both in schools and at home. Furthermore, majority of the children belong to low socio-economic class. This agrees with the previous work by Adedoyin *et al*., (1990) and Allen *et al*., (2004), Haul *et al*., (2012), Ilechukwu *et al*., (2010), Wagbatsoma and Aimiuwu (2008), Salako (2001) that personal hygiene and poor socio-economic factors contributed to the high prevalence rate of the infection.

Soil-transmitted helminth among these primary school children in this study are in accordance with the reports of Nwosu (1981), Udousi (1984), De Silva *et al*., (2003) and Brooker *et al*., (2006). They made similar observation that soil-transmitted helminth infection in primary school children are as a result of poor environmental sanitation, ignorance of simple health promoting behaviour.

Findings from this study show that soil-transmitted helminth infection is highly prevalent among primary school children in the studied areas and possibly in the communities where these children reside.

RECOMMENDATIONS

1. Establishment of a health program for the control of
2. Helminthes in schools and communities.
3. Whereas deworming as prescribed by World Health Organization is a powerful and cost effective approach, it remains a short term strategy due to the possibility of re-infection. It is therefore recommended and that deworming be added to on-going public health programs such as integrated management of children illness, school health program, maternal and childhood health program, roll back malaria and vaccination program.
4. A lasting solution to the burden of soil-transmitted helminth infection required improvement in water supply sanitation and hygiene
5. Also, recommended is an improved health education and supervision, provision of improved toilet facilities in schools and at homes for the effective disposal of human wastes among the pupils and others in the communities to reduce transmission of soil-transmitted helminth infection.
6. There should be public health policy with multisectoral and multidisciplinary in approach where health care professionals, educationists and environmental health workers would use the platform of health care facilities in schools and public place to educate the pomilence and periodically deworm the children.

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