

Prevalence Of Soil-transmitted helminths among school aged children in Yamaltu District, Gombe, Gombe State Nigeria.

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ABSTRACT

Background: Soil-transmitted helminths (STH) are a group of parasitic nematode worms that cause about 2 billion infections worldwide affecting mostly children and producing a wide range of symptoms. In 2001, WHO recommended biannual treatment of children with antihelminthics. However, in 2006 less than 24% of children were covered in all the regions with the least in Africa. The aim of the study was to determine the prevalence of STH among school aged children and to find out if the WHO set target of mass chemotherapy had been achieved in the study area.

Materials and Methods: A cross sectional study was conducted using a multi stage sampling technique to select 310 children between the ages of 5 to 14 years. Data was collected using a semi structured interviewer administered questionnaire. Stool samples collected from the respondents and analyzed by stool microscopy. Data was analyzed using Epi-info 3.5.1 version.

Results: The mean age of 310 respondents was 8.8±2.6 years, 54% were males. The prevalence of STH was 11.0%. In addition, 14.9% of participants aged 10-14 years had helminthic infection, while the rate of infection among females was 15% which was two times that of male respondents. Of the 34 respondents infected with STH, 53% was due to *Ascaris lumbricoides* alone. The WHO target of 75% was not achieved as less than 25% of children were treated before this study.

Conclusion: The prevalence of (STH) was high in the district and treatment with anti helminthics was low. Government at all levels should ensure routine treatment of children with anti-helminths medications to improve the current low coverage.

Key Words: Prevalence, Soil transmitted-helminths, Yamaltu, Nigeria.

INTRODUCTION

Soil-transmitted helminths (STH) are a group of parasitic nematode causing human infections through contact with parasite eggs or larvae that thrive in the warm and moist soils of tropical and subtropical countries. ¹ The greatest numbers of soil-transmitted helminths infection occur in the Americas, China, East Asia and Sub Saharan Africa (SSA). Eighty five per cent of the people infected with soil-transmitted helminths in the world are estimated to be in SSA. ²

Soil-transmitted helminths are infections of poor people, they thrive where malnutrition, inadequate sanitation and minimal care prevail and contribute to perpetuating poverty by worsening nutritional status, hampering life and school achievement and causing severe illness that affects everyday life. ³

The prevalence of soil-transmitted helminths all over the world varies from 2% in the United States of America, to 73% in Morocco and 100% in Madagascar. ^{4,5,6} Nigeria is one of the endemic countries for soil-transmitted helminths with prevalence across the country from rural community-based

studies, showing a range of prevalence of 10% in Ebonyi State to 64.8% in Ijebu-Ode town. ^{2,7} The prevalence of the disease is not uniform even in endemic countries since it depends on levels of personal hygiene and sanitation. Focal studies in some communities among pregnant women in Plateau and neighboring Bauchi States show a close prevalence of 55.3% and 44.8% respectively. ⁸ While another study conducted at Naraguta in Jos North LGA revealed a prevalence of 37.3%. ⁹ Prevalence of soil-transmitted helminths infections vary with age, children and adolescents are infected more often and are infested most heavily. This is most likely due to their adventurous tendencies to play in infected soil and to indulge in unhygienic practices. ⁹

Soil-transmitted helminths have been estimated to affect some 3.5 billion people globally and 450 million are thought to be ill as a result of such infections, majority being children. In some tropical areas, the prevalence reaches nearly 100 percent. ¹⁰ The major public health significance and economic impact of this group of pathogens is hard to quantify, although the World Health Organisation has estimated that more than 1 billion

people world-wide are infected with one or more of the major pathogenic species: *Trichuris trichura*, *Ascaris lumbricoides* and hookworms. It was estimated that 39 million disability adjusted life years (DALY) are attributable to these nematode species alone.^{11,12}

The WHO in 2006 reported that, 130 countries worldwide were considered to be endemic for soil-transmitted helminths.^{13, 14} Of these countries, only 22 (16.92%) reached the 75% target of chemotherapy for preschool aged children and 9 (6.92%) for school aged children. Of the 386 million preschool aged children and 878 million school aged children at risk of soil-transmitted helminths morbidity worldwide, only 82 million (21.36%) and 77 million (8.75%) respectively were reached with treatment. Soil-transmitted helminths deprive the poorest of the poor of health, contributing to economic instability and social marginalization. The poor people of under developed nations experience a cycle where under nutrition and repeated infections lead to excess morbidity that can continue from generation to generation. Soil-transmitted helminths rarely cause death but because of the size of the problem, the global number of related deaths is substantial.¹²

The wider community has recognized the importance of soil-transmitted helminths acknowledging that their disease burden is as great as those of tuberculosis (34.7 million DALY) or malaria (46.5 million DALY).¹⁴ The burden of disease caused by soil-transmitted helminths infections is enormous and widely distributed in tropical and sub-tropical areas.

In order to reduce the negative impact of soil-transmitted helminths on health, the World Health Organization (WHO) in 2001 set a target for all soil-transmitted helminths endemic countries to reduce the prevalence by regular treatment of seventy five per cent of school aged children (5 to 14) years by 2010.^{3,13} Soil-transmitted helminths can easily be treated with a single oral dose of either Albendazole, Mebendazole, Levamisole or Pyrantal at less than three United States of American cents per child.³ The chemo prophylactic control of soil-transmitted helminths in the African region where 85% of infections occur, were found to be rather low. The WHO recorded coverage of school aged children treated with antihelminthics as 9.8 per cent, 22.8%, 4.1%, 0.3%, 3.2% and 23.4% for Africa, Americas, Eastern Mediterranean, European, South East Asia and Western Pacific regions respectively. Nigeria recorded coverage of only 2.7 per cent as against the targeted 75%.⁶ We therefore determine the prevalence of soil-transmitted helminths among under five children and also determine if the 75% WHO target chemotherapy with antihelminthics was achieved in the study area.

MATERIALS AND METHODS

Study area

This study was carried out in Morom Community in Yamaltu Deba Local Government Area of Gombe State North Eastern Nigeria. The Local Government has eleven Political Wards and each has at least two Primary Health Centres. The Local Government has three Secondary Health Facilities, out of which two are General Hospitals namely Deba and Zambuk while the Cottage Hospital is located at Hinna. Morom Community has a Primary Health Centre where minor cases are managed, while serious cases are referred to Zambuk General Hospital located about 11 km away. Morom Community has an estimated population of 9000 people according to 2006 population data,¹⁵ most of them Tera speaking farmers who practice Islam and Christianity as their religion. The Community has a secondary and a Model Science Primary School established over forty years ago.

Study design

This study was a community based cross sectional study design where school children between the ages of 5-14 years in and out of school were studied. Study was carried out in November 2011

Sample Size

Sample size was determined using the formula below

$$n = Z\alpha^2 pq / d^2$$

Where

n= Minimum sample size

Z α = Standard Normal Deviate at 95% Confidence Interval=1.96

p=Prevalence of soil transmitted helminths among children previously conducted in Jos Nigeria given as 37%⁹=0.37

q= Complement of p=0.63

d= Precision given as 0.05

The minimum sample size from the above formula was 358. However, 394 children were studied after allowing 10% attrition rate

Subject selection

Inclusion criteria: Only children between the ages of 5-14 years living in Morom both in and out of school.

Exclusion criteria: Children on transit and/ or those who are not permanent residents of Morom Community.

Sampling technique

A multi stage sampling technique was used in selecting the required samples for this study. Yamaltu Deba Local

Government has 11 political wards, Difa-Lubo-Kinafa ward was selected using simple random sampling by balloting. The second stage was the selection of the community. A list of all the villages was obtained from the selected ward, and Morom community was selected at random using simple random sampling by balloting. Within Morom community, all households were numbered and after spinning a bottle at the city centre, we selected the first household where the bottle pointed and enquiries were made if there was any child between the ages of 5-14 years from each household a child was selected and where we have more than one child in a household only one was selected, this was done to select the study samples until the required sample was achieved.

Stool Analysis

Each subject was given a new specimen bottle to collect and deliver the stool samples within the early hours of the day (to get maximum egg concentration) after the correct procedure for stool sample collection was explained/demonstrated to respondents, mothers were instructed to assist the younger subjects to collect stool samples. All sample bottles were labelled with the number given to each child. Stool samples were collected and transported daily in a cold box by the research team and refrigerated at 4°C before analysis at the Specialist Hospital, Gombe by the laboratory scientists. The stool was examined for the presence of soil-transmitted helminths ova using two light microscopes (Olympus CX22RFS1 Model) by making a wet mount using normal saline placed on a clean glass slide and covered with a cover slip and examined using x10 and x40 objectives. Stool analysis was conducted daily on the average 100 samples per day. Twenty percent (20%) of the slides underwent peer review by the laboratory scientists to ensure they were truly positive or negative as reported. Albendazole has been recommended by WHO as the drug of choice in the treatment of soil-transmitted helminths because it has broad spectrum of activity, it is effective, safe and inexpensive.¹⁶ All children found to be positive with helminths were treated with Albendazole 400 mg.

Data Analysis

All data generated was processed and analyzed by the use of the EPI info 3.5.1 (2008) and SPSS statistical software. Socio-demographic data were presented as percentages, while quantitative data were described using means and standard deviations. Chi-square was used to determine any association between certain socio demographic variables in the children. A confidence interval of 95% was used in this study and a p-value of <0.05 was considered significant.

Ethical Consideration

Ethical clearance was obtained from the Gombe State Ministry of Health Ethical Committee before the study commenced. Written permission was sought and obtained from the Gombe State Commissioner of Health, Yamaltu Deba Local Government Chairman and the village heads of the study communities. Written informed consent was also sought for and obtained from the parents of each child (in the form of a signature or a thumb print). The essence and contents of the study was explained to each parent, as well as the benefits and side effects of the drugs to be administered before their children were enrolled into the study. All the children interviewed were revisited by the research team at the community and those who were found to have any of the helminths were treated with Albendazole tablets. Health education was also delivered to a group of children and their wards the district head palace.

RESULTS

Socio-demographic Characteristics of the respondents

A total of 394 children were recruited for this study. Of the 358 (91.0%) who submitted their stool samples, 310 (79.0%) samples were analyzed. The mean age of the respondents was 8.8±2.6 years

Table 1: Socio-demographic characteristics of the respondents

	Frequency (%) N=310
Age Group (Years)	
5-9	191 (61.0)
10-14	119 (39.0)
Sex	
Male	170 (54.5)
Female	140 (45.5)
Educational Status	
Non Formal	37 (11.9)
Primary/Secondary	273 (88.1)
Religion	
Christianity	73 (23.5)
Islam	237 (76.5)

More than half (61.0%) of the respondents were within the age group 5-9 year, more than half (54.5%) were males, majority (88.1%) attended primary and junior secondary schools. Less than one quarter were from Christian house holds (table 1) Of the 310 respondents, 34 (11.0%) had one of the three major soil-transmitted helminths (Figure 1). Of the 34 respondents who had parasites in stool, more than half (52.9%) harboured

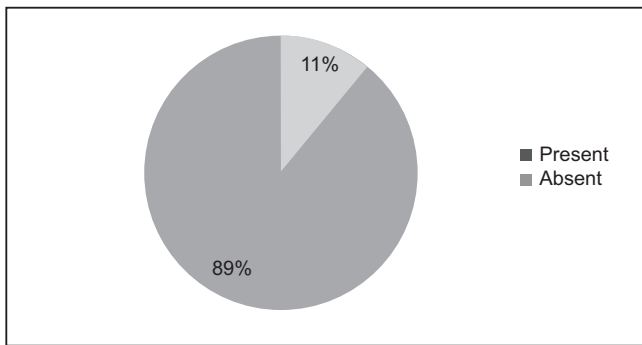


Figure 1: Prevalence of soil-transmitted helminths among respondents

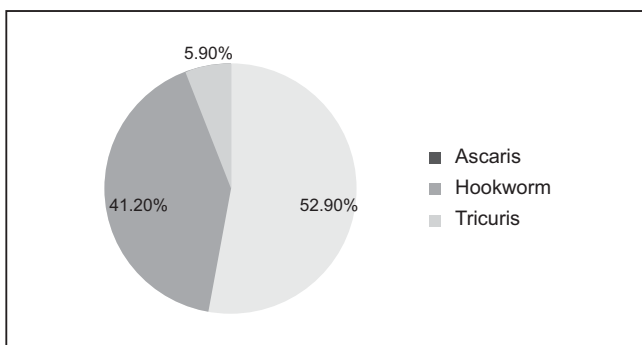


Figure 2: Distribution of soil-transmitted helminths among respondents by species

Table 2: Prevalence of soil-transmitted helminths by socio-demographic characteristics of respondents

Variable	Presence of Parasite in Stool		X ²	P-Value
	Present (%)	Absent (%)		
Age Group in Years				
5-9	17 (8.9)	174 (91.1)	2.170	0.141
10-14	17 (14.3)	102 (85.7)		
Sex				
Male	13 (7.6)	157 (92.4)	4.237	0.039*
Female	21 (15.0)	119 (85.0)		
Educational Status				
Non Formal	4 (10.8)	33 (89.2)	0.001	0.974
Primary/Secondary	30 (11.0)	243 (89.2)		
Religion				
Christianity	6 (8.2)	67 (91.8)	0.739	0.390
Islam	28 (11.8)	209 (88.2)		

Those within the age group 10-14 years had the highest prevalence of helminths (14.3%) compared with 5-9 years (8.9%), however it was not statistically significant. Prevalence of soil-transmitted helminths was almost twice as high among females group (15%) compared with their male counterparts (7.6%) and this is statistically significant (<0.05). Educational status and religious beliefs of the respondents did not play any significant role in the prevalence of soil-transmitted helminths among the respondents as shown in Table 2.

This study found that only 24.5% of respondents have ever been treated with any of the following Anti-helminthics i.e. Albendazole, Mebendazole or Levamosole prior to this study shown in Table 3

Table 3: Respondents who have been treated for soil-transmitted helminths prior to study

Ever been treated with any anti-helminths			
Community	Yes (%)	No (%)	Total
Morom	76 (24.5)	234 (75.5)	310 (100)

DISCUSSION

The prevalence of soil-transmitted helminths was found to be 11%, this is in agreement with some previous studies conducted among rural children of Malawi,² Ebonyi State⁸ and Egypt.¹⁷ However, it was lower than other studies conducted in Delta State,⁴ Morocco,⁶ and a rural community in Lagos¹⁷ and Madagascar.¹⁸ The lower prevalence obtained in this study could be attributed to timing and the geographical difference. The area is a savannah region and the study was conducted during the end of the raining season, November (when the soil is usually dry). It is a well established fact that wet and damp soil favours the eggs of helminths and rainy season enables them to thrive more than the dry season.^{17,19}

Three soil-transmitted helminths (*Ascaris*, *Trichuris* and Hookworm) were identified in this study and *Ascaris* had the highest prevalence.

This was in conformity with a number of previous studies.^{1,8,19,21,22,23} *Ascaris lumbricoides* ova are very resistant to harsh environmental conditions and are air borne, they may account for the ubiquitous nature of ova distribution and hence very high prevalence in all age groups.¹⁸ Hookworm infection was found to be the second most prevalent, then *Trichuris*, the least (<10%) in contrast to another study conducted in south eastern Nigeria in which *Trichuris* had the highest prevalence than

Hookworm among the three soil-transmitted helminths.¹⁸

The prevalence was higher in the age group 10-14 years compared to 5-9 years. This could be due to adventurous nature of the older group compared with the younger age group. There were more male respondents in this study but the prevalence was higher among female respondents. This could be due to inadequate sanitary condition in the community as pit latrine and open defecation was practiced, in addition there was inadequate water supply in schools and females were not allocated toilets based on recommendation of school health services. Moreover, females like their males counterpart also participates in farming activities thus sharing all the risks of contract helminthiasis with the males.

The prevalence of soil-transmitted helminths in this study was low compared to other studies conducted in different parts of the country and within the African region.^{17, 18} Despite some progress made in some African countries towards achieving the WHO target of treating between 75% to 100% of school aged children with antihelminthics by the year 2010, Nigeria was reported to have had a coverage of only 2.7% as against 100% recorded in Burkina Faso and 63% in Mali.¹³ Moreover, there was no evidence of such commitment from the community studied as only 24.5% of the selected school aged children have ever been treated with any of antihelminthics. This low coverage could be explained by absence of control programme for helminthiasis as well poor implementation of school health programme in Nigeria's primary schools despite the Policy since 2006^{3,24}

Conclusion

This study found 11.0% of children infected with soil transmitted helminths. Twenty per cent of infestation among children is considered significant requiring mass de-worming with antihelminthics as recommended by World Health Organization. The World Health Organization target coverage for de-worming school aged children has not been achieved within the study area as only 24.5% of respondents have ever been treated with any of the routinely administered antihelminthics. We therefore recommend that: The Gombe State ministry of Health in collaboration with the Ministry of Education, ensure that routine de-worming of all school children commences as well as speedy implementation of School Health Services across all primary and secondary

schools in the state.

LIMITATIONS OF THE STUDY

1. A single stool examination for detection of soil-transmitted helminths was conducted, which could have under estimated the prevalence, as optimal or recommended laboratory diagnosis of soil-transmitted helminths requires the use of concentration method. This was due to constraints of trained personnel.
2. It was planned to conduct stool sample testing within few hours of stool collection or stool samples be refrigerated immediately but due to logistic constraints and power shortage at the community, samples had to be transported to the Specialist Hospital in Gombe, leading to delay in analysis. This might have under estimated the prevalence's of helminths observed.

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