Indexed, Abstracted and Cited: Index Copernicus International (Poland), ISRA Journal Impact Factor, International Impact Factor Services (IIFS), Directory of Research Journals Indexing (DRJI), International Institute of Organized Research and Scientific Indexing Services, Cosmos Science Foundation (South-East Asia), International Innovative Journal Impact Factor, Einstein Institute for Scientific Information {EISI}, Directory of Open Access Scholarly Resources, Science Indexing Library (UAE), Swedish Scientific Publication (Sweden), citefactor.org journals indexing, Directory Indexing of International

World Journal of Biology and Medical Sciences

Published by Society for Advancement of Science®

ISSN 2349-0063 (Online/Electronic)

Volume 5, Issue-4, 22-31, October to December, 2018

Journal Impact Factor: 4.197

WJBMS 05/04/1010/2018

www.sasjournals.com

A Double Blind Peer Reviewed Journal / Refereed Journal wjbmedsc@gmail.com/wjbms.lko@gmail.com

REVIEW ARTICLE

Received: 28/07/2018 Revised: 18/09/2018 Accepted: 20/09/2018

Prevalence of Soil Transmitted Helminth Infection among Primary School Pupils in Anyigba, Kogi State Nigeria

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ABSTRACT

A cross sectional study was used in the survey of the prevalence and intensity of Soil Transmitted Helminths infections and malnutrition in relations to STHs infections in Anyigba, which involved 5 schools that were randomly selected and a total of 283 school children between age-group 6-17 provided stool specimen and anthropometric measurements also gotten from them. Flotation techniques were used to analyze stool specimen while WHO Anthroplus was used to analyze anthropometric measurements using z-scores of height-for-age and BMI-for-age z-scores. SPSS version 20 software was used to analyze data. The general prevalence of STH was found to be 1.4% (4/283), all 4 children had light intensity prevalence. The prevalence of stunting was 13.1% with 1.1% severely stunted. Prevalence of stunting was more in the 10-13 age-group than in the 14-17 and 6-9 age-groups with prevalence of 10.3%, 2.1% and 0.7% respectively (P = 0.019). The overall prevalence of thinness was 8.83% with 0.71% severe thinness. Highest prevalence of thinness was in the rural area with prevalence of 6.0% and the township area with 2.8%. The prevalence and intensity of STH as revealed in this study is generally low. Although malnutrition pose threat in Anyigba. Public and school enlightenment on health education and good hygiene and behavioral practices should be intensified, while a more detailed research on the prevalence of malnutrition is extremely recommended as well.

Keywords: Soil Transmitted Helminths, Anthropometric Measurements and BMI.

INTRODUCTION

Soil-transmitted helminths (STHs) infections (also known as geohelminthiasis) are among the most prevalent of chronic human infections worldwide. STHs are a group of parasitic helminths causing infection in humans through contact with parasite eggs or larvae that thrive in the warm and moist soil of the world's tropical and subtropical countries. As adult worms, these helminths live for years in the human gastrointestinal tract (Bethony *et al.,* 2006). Of particular public health importance are roundworms (*Ascaris lumbricoides*), whipworms (*Trichuris trichiura*) and hookworms (*Necator americanus* and *Ancylosto maduodenale*). These worms are most prevalent in tropical and subtropical regions of the developing world where adequate water and sanitation are lacking, with recent estimates suggesting that *A. lumbicoides* infected 807 – 1,121 million people, *T. trichiura* 604 – 795 million and hookworms 576 – 740 million people in 2011 (WHO, 2011). The high prevalence of STH in tropical countries including Nigeria is closely linked with poverty, poor environmental hygiene, improper disposal of waste, inadequate water supply, gross environmental pollution and constant pollution of the air and water bodies (Ukpai and Ugwu, 2003, Mba and Amadi, 2001, Kalu *et al*; 2013).

The three major soil transmitted helminths (STH) *Ascaris lumbricoides* (round worm), *Trichuristrichiura* (whipworm) and *Necator americanus*/*Ancylosto maduodenale* (the hookworms) are amongst the most wide spread parasites worldwide (Vercrusysse *et al*; 2011). Children are the group with the highest prevalence and infection intensities and are also very vulnerable to the effects of worm infection including nutritional deficiencies which aggravate malnutrition and impaired physical and mental development contributing significantly to school absenteeism (WHO, 2010, Saathoff *et al*., 2004).

Periodic treatment of the endemic population with a broad spectrum anthelminthic drug has been advocated as a cheap and cost effective means of reducing the worm burden and its related morbidity (Andrade *et al*; 2001).

There have been several reports from various parts of Nigeria on STH, including those which are recognized as important health problems especially among growing school age children (Egwunyenga and Ataikiru, 2005; Asaolu *et al.,* 2002). In recognition of the global health importance of STHs infections, World Health Organization (WHO) recommends a baseline survey in school age children to determine the prevalence and intensity of infections which will be useful in the diagnosis, planning and implementation of effective control programmes (Bethony *et al*., 2006).

Study Objectives

To determine the prevalence of STH infections among primary school children in Anyigba
To determine the intensity of STH infection among primary school children in Anyigba
Malnutrition in relative to the prevalence of STH infection
To provide a guide if possible for mass chemotherapy intervention of the government

MATERIALS AND METHODS

Materials Used

Zinc sulphate (floatation medium), universal bottles, beakers, measuring cylinder, spatula, glass rod, sieve, test tubes, test tube stand, weighing balance, microscope, nose mask, disposable gloves, distilled water, water, washing liquid, 10% Formalin, glass slides, cover slips, masking tape, and cotton wool.

Description of the Study Area

Anyigba, the study area is located on latitude $7^0$15'N and $7^0$29'N and longitude z7011'E and 7032'E and with an average altitude of 420 meters above sea level with mean annual temperature of 25^0C and rainfall 1600mm. it is situated on sedimentary formation of the Anambra basin and dominated by laterite soil type with patches of hydromorphic and rich loamy soils (Ifatimihin and Ufuah, 2006).

Study Design

A cross-sectional descriptive study was undertaken to establish the prevalence and intensity of soil-transmitted helminths infections and malnutrition among primary school children in Anyigba.

Study Population

The study population is the primary school children in Anyigba that were present or available during the period of study.

Sampling Procedure

Consent letters were given to twelve primary schools of which five gave their consents; this includes three LGEA Schools and two private schools. The total number of primary school pupils gotten from these schools (those who participated in the study) was three hundred and forty two (342), out of which two hundred and eighty three (283) pupils provided stool specimen.

Criteria for Inclusion

All selected primary school children are those living in the study area throughout the study duration and whose parents gave their consent by signing the consent form and those willing to participate in the study are included.

Collection of Stool Specimen

The explanation of the research and its merits was given to the selected schools (Teachers and school children), few days before collection of the stool specimen. Then each of the selected school pupils was provided with a labeled universal bottle, an applicator stick, plain paper and a consent form. The universal bottle had a code number, the code number of the bottle and the name of the child who took that particular bottle was recorded in a note book to prevent accidental exchange of specimen among pupils. The pupils were then instructed that as soon as they got home, they should give the consent form to their parents or guardians for them to read and then disagree or agree to allow them participate in the study. The pupil were instructed that if they are allowed to participate and are also willing to participate, should on the next day morning defecate on the piece of paper that was provided to prevent contamination from the environment of the toilet, and then using the applicator stick they should pick up a portion of the stool on the piece of paper and put it into the clean universal bottle which was given them and cover it, then come with it to school. The pupils were called serially on delivery by their names using the list of names which corresponds with their code numbers; this is to prevent accidental exchange of bottles among the pupils.

Diagnostic Technique

The technique employed was the simple floatation technique as describe by Monica Cheesbrough, (2005) to obtain the parasites ova in the diagnosis of infection from the stool specimens.

Intensity of Infection

Egg counts were recorded for each species identified and converted into EPG (number of eggs per gram of faeces) for the analysis of intensity of infection. To calculate EPG egg count were multiplied by 20 (conversion factor). An infection status (light/moderate/heavy infection) created for the three common soil- transmitted helminths infections, the standard procedure used by WHO (Montresor *et al*., 2002) (table 1), was employed to determine the intensity of infection.

Data Analysis

Data collected from the study were analyzed by running descriptive statistics and cross tabulations by using percentages. Chi square (x^2) was used to assess the relationships between the independent variables and dependent variables at statistical significance $p < 0.05$. This was done using SPSS version 20.

Independent Variable

Sex, Age and intensity of STH infection

Dependent Variables

Height-for-age z scores and BMI-for-age z scores

RESULTS

Demographics Attributes of the Participants of the Study

In all the total number of schools that participated in the study is five (5) schools which include; LGEA CMML school one, LGEA CMML school two, LGEA Oji-Ofu, Living Stone and Salvation Nursery and primary school. Classes used for the sampling was from primary two to primary six. A total of 342 school children whose parents/guardians and themselves agreed to the consent form participated in the study. However only 283 children provided stool specimen, with a total of one hundred and twenty five (125) females (44%) and one hundred and fifty (158) eight males (56%). Age range of the children was between age 6-17 years, most of the participants fell between the 10-13 age range with 73.5% (208) followed by the age range 6-9 with 19.8% (56), while 14-17 age range with 6.7% (19) had the lowest number of participants. Among the classes, primary two and primary three had the lowest rate of 4.9% and 7.4% participants, primary five had the highest rate with 43.5% while primary four and six had 24.8% and 19.4 respectively. The rural area had a total of 149 (52.6%) while the township had a total of 134 (47.4%) of the participants (Table 3).

Prevalence of Helminths Parasite in Stool Microscopy among Primary School children

The general prevalence of soil transmitted helminths infection in the five school sampled was found to be 1.4%. Two hundred and eighty three (283) school children brought stool specimen out of which only four were found infected with soil-transmitted helminthes. The STH recovered were Hookworm and *Ascaris lumbricoides.* Out of the four infected children, two had infection of hookworm and the other two had infection of *Ascaris lumbricoides,* there was no case of co-infection. The infected school children are all from one school which belongs to the rural area (Table 4).

Intensity of Helminths Parasites among the School Children

The intensity of infection of the positive school children was characterized according to the world health organization grouping system of STH infection intensities (Montresor *et al*., 1998).

All four children (1.4%) had light intensity infection for both *Ascaris lumbricoides* and hookworm. Of the four children, two had light intensity infection of *A. lumbricoides* (120 epg and 80 epg) while the other two children had light intensity infection for hookworm (150epg and 60epg). No case of co-infection was observed.

Table 1. Demographic Attributes of the Participants of the Study.

Variable	Sex		Total
	Female N (%)	Male N (%)	N (%)
Age group (years)			
6-9	32(11.3)	24(8.5)	56(19.8)
10-13	85(30)	123(43.5)	208(73.5)
14-17	8(2.8)	11(3.9)	19(6.7)
Total	**125(44)**	**158(56)**	**283(100)**
Class			
Primary two	8 (2.8)	6(2.1)	14(4.9)
Primary three	13(4.6)	8(2.8)	21(7.4)
Primary four	31(10.9)	39(13.9)	70(24.8)
Primary five	49(17.3)	74(26.2)	123(43.5)
Primary six	24(8.5)	31(11)	55(19.4)
Total	**125(44)**	**158(56)**	**283(100)**
Residence area			
Rural	62(21.9)	87(30.7)	149(52.6)
Township	63(22.3)	71(25.1)	134(47.4)
Total	**125(44)**	**158(56)**	**283**

Table 1. Prevalence of Helminths Parasite in Stool Microscopy among Primary School Children.

School	N	*A. lumbricoides*		*T.trichiura*		Hookworm		Overall prevalence	
		No Infected	% prevalence	No infected	% prevalence	No infected	% prevalence	N infected	% prevalence
LGEA one	35	__	0	__	0	__	0	__	0
LGEA two	57	__	0	__	0	__	0	__	0
LGEA oji-ofu	110	2	0.7	__	0	2	0.7	4	1.4
Living stone	39	__	0	__	0	__	0	__	0
Salvation	42	__	0	__	0	__	0	__	0
Total	283	2	0.7	__	0	2	0.7	4	1.4

N= number examined.

DISCUSSION

In general, soil transmitted helminths infection abounds in developing countries with school children bearing the heaviest burden of the associated morbidity. Many studies have been conducted on the prevalence of soil-transmitted helminths infection all over the world including West Africa and Nigeria in particular.

This study reveals a prevalence of 1.4% of soil-transmitted helminths infection found among the primary school children. This result is comparable with the low prevalence of 0.9% obtained among primary school children in Same district (David, 2012), however in contradiction, it was considerable lower than the prevalence obtained in a number of previous studies carried out including the studies of Adeyaba and Tijani (2002), Ukpai and Ugwu (2003),

CONCLUSION

The prevalence and intensity of soil-transmitted helminths infection as revealed by this study is totally low. The low prevalence of soil-transmitted helminths infections could partially be accounted for by the time in which this research was conducted, also people are becoming more aware of the importance of deworming, especially in deworming of children, and it is a known fact that anthelminthic drugs are not cost effective and can be afforded easily.

Although this study revealed a high prevalence of malnutrition in which 13.1% and 8.83% had stunting and thinness respectively among the primary school children sampled. The high prevalence of malnutrition showed no correlation with soil-transmitted helminths infection since only a handful of positive cases were observed, thus reveals that there are some other possible factors of malnutrition in Anyigba, presumably poverty, inadequate knowledge of nutrition and other environmental factors. Improvement of the nutritional status of today's children should be of top priority, since the quality of the future human resources rests on today's children (Som*et al*., 2007).

Recommendations

Good hygiene practices and behavioral activities both in school and at home should be encouraged.

Public and school enlightenment on health education "deworming" should be intensified.

A comparative study of STH transmission between the raining and dry season should be carried out in order to ascertain if the prevalence of soil-transmitted helminths in both seasons are generally low or otherwise.

There are multi-factorial causes of malnutrition, which could not be identified in this research. Studies therefore on the possibly cause of the high prevalence of malnutrition in Anyigba is extremely recommended.

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