



Prevalence of Geohelminths among Primary School Children in Edoh Community, Esit Eket Local Government Area, Akwa Ibom State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author MNW designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors EOO and UAH managed the analyses of the study. Author MNW managed the literature searches. All authors read and approved the final manuscript.

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ABSTRACT

Background: Geohelminths are responsible for some Neglected Tropical Diseases (NTDs) which have significant public health impacts in sub – Saharan Africa.

Aim: To evaluate the prevalence of geohelminths among primary school children.

Study Design: A cross – sectional randomized study.

Place and Duration of Study: The study was carried out in Salvation Army Primary School, Esit Eket Local Government Area, Akwa Ibom State, Nigeria. The study was conducted from June to December, 2018 (six months).

Materials and Methods: Stool samples were collected from each study participant, examined macroscopically (to detect the presence of blood, mucous, consistency and colour) and microscopically (to detect the presence of Geohelminths) using sedimentation concentration technique.

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Results: An overall Geohelminths prevalence of 58.0% was recorded in this study and only four species of Geohelminths were identified with varying prevalence; *Ascarislumbricoides* 35.7%, Hookworm 26.6%, *Trichuristrichiura* 4.2% and *Strongyloidesstercoralis* 2.8% ($P = .05$). Age groups 12–14 years and 3–5 years had the highest and least prevalence of 70.0% and 55.6% respectively while males and females had prevalence of 62.7% and 52.9% respectively.

Conclusion: Geohelminths still have significant public health effects in Nigeria; prompt interventions such as accurate diagnosis, mass chemotherapy, periodic health education and improved living conditions will effectively reduce the menace of geohelminths.

Keywords: Geohelminths; children; Edoh community; public health.

1. INTRODUCTION

Geohelminths are a group of soil – transmitted intestinal parasites (helminths) which are responsible for several diseases in humans [1]. Some common geohelminths are roundworm (*Ascaris lumbricoides*), hookworms (*Necator americanus* and *Ancylostoma duodenale*), whipworm (*Trichuris trichiura*) and threadworm (*Strongyloides stercoralis*); these parasites are among the Neglected Tropical Diseases (NTDs) identified by the World Health Organization [2]. These parasites are known as geohelminths because their eggs or immature stages undergo incubation in the soil for varying periods of time before they become infective to humans. Humans contract geohelminths infections by ingesting the infective stages of these parasites through contaminated and not properly washed or cooked foods (fruits, vegetables etc.), dirty hands with soil particles and penetration of exposed human skin in contact with contaminated soil [3]. Geohelminths are very common globally and infect mainly poor and social amenities – deprived people due to the prevalent inadequate sanitation, lack of access to quality healthcare, overcrowding and poor personal hygiene [2].

Globally, about 1.5 billion people (24% of the world's population) are infected with geohelminths; highest prevalence occurs in sub – Saharan Africa, the Americas, China and East Asia [2]. Geohelminths occur in all age groups but higher prevalence occur in children (preschool – age and school – age) especially those in rural areas of sub – Saharan Africa and these children are usually found playing with soil and other objects in the environment with no or minimum supervision [4,5].

According to global surveys, over 267 million preschool – age children and 568 million school – age children reside in areas where

geohelminths are intensively transmitted; these areas require adequate prompt treatment and interventions [2]. Despite global reduction in the prevalence of geohelminths in Asia and the Americas, the status of sub – Saharan Africa remains significantly unchanged [6]. Mild infections by geohelminths may be asymptomatic but severe infections can cause diarrhoea, abdominal pain, malnutrition, general malaise and weakness as well as impaired physical development and growth [2].

In the study area, there is little data on the prevalence of geohelminths in school-aged children which will guide in creating efficient school – based health programmes which are vital for sustainable control of geohelminths [3,7]. The present study was conducted to determine the prevalence of geohelminths among primary school children in Edoh Community, Esit Eket Local Government Area, Akwa Ibom State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Area and Population

The cross – sectional study was conducted in the Salvation Army Primary School, Oniok Edoh, Esit Eket Local Government Area (LGA), Akwa Ibom State, Nigeria. Esit Eket LGA is situated off the shores of the Atlantic Ocean, exhibits features of the Mangrove swamp and lies between latitude 4°37'51" (4.6309°) N to longitude 8°4'14" (8.0706) E with an elevation of 15 meters (49 feet). The area experiences dry and rainy seasons, has a total annual rainfall of about 3550mm with humidity of 86% and has an average temperature of 25°C as well as has many rivers and tributaries including the Widen ham creek and Qua Iboe river. The predominant occupation of the inhabitants are fishing and farming.

A total of 143 randomly selected children (irrespective of sex and age ranged from 3 – 14 years) from the Salvation Army Primary School participated in this study. Oral and written consents were obtained from the parents/guardians of the children and school management before the commencement of the study.

2.2 Data Collection

Clean, dry and leak – proof sample collection bottles were distributed to the randomly selected children, simple instructions on how to neatly put faecal samples into the collection bottles were given to the children and their parents/guardians; the bottles containing faecal samples were collected the next day, samples were immediately fixed with 10% formalin (to preserve parasite ova/eggs) after macroscopic examination and taken to the laboratory.

2.3 Data Analysis

All faecal samples were initially examined macroscopically and then microscopically [8]. Macroscopic analysis involved examining the faecal samples for colour, odour (offensive or inoffensive), consistency (formed, semi – formed

or watery), presence of blood, pus and mucous [8]. Microscopic examination of faecal sample was done using formol ether concentration (sedimentation) technique [8]. All data generated in this study were statistically analyzed using chi square test and a p value less than 0.05 was considered significant ($P = .05$).

3. RESULTS

An overall geohelminths prevalence of 58.0% (83 out of 143) was recorded (Table 1). In this study, only four species of geohelminths (*Ascaris lumbricoides*, Hookworm, *Strongyloides stercoralis* and *Trichuris trichiura*) were observed; *Ascaris lumbricoides* and *Strongyloides stercoralis* had the highest and least prevalence of 35.7% (51 out of 143) and 2.8% (4 out of 143) respectively ($P = .05$) (Table 2).

According to age, children in age groups 12 – 14 and 3 – 5 years had the highest and least prevalence of 70.0% (7 out of 10) and 55.6% (20 out of 36) respectively (Table 3). According to sex, males and females had prevalence values of 62.7% (47 out of 75) and 52.9% (36 out of 68) respectively (Table 4).

Table 1. Overall prevalence of geohelminths in study area

Study area	NE	NI (%)	NU (%)
Edohcommunity	143	83 (58.0)	60 (42.0)

NE = Number Examined; NI = Number Infected; NU = Number Uninfected

Table 2. Distribution of geohelminths

Study area	NE	<i>Ascaris</i> spp		Hookworm		<i>Strongyloides stercoralis</i>		<i>Trichuris trichiura</i>	
		NI (%)	NU (%)	NI (%)	NU (%)	NI (%)	NU (%)	NI (%)	NU (%)
Edohcommunity	143	51 (35.7)	92 (64.3)	38 (26.6)	105 (73.4)	4 (2.8)	139 (97.2)	6 (4.2)	137 (95.8)

Table 3. Age-related prevalence of geohelminths

Age (years)	NE	NI (%)	NU (%)
3 – 5	36	20 (55.6)	16 (44.4)
6 – 8	60	35 (58.3)	25 (41.7)
9 – 11	37	21 (56.8)	16 (43.2)
12 – 14	10	7 (70.0)	3 (30.0)
Total	143	83 (58.0)	60 (42.0)

Table 4. Sex-related prevalence of geohelminths

Sex	NE	NI (%)	NU (%)
Male	75	47 (62.7)	28 (37.3)
Female	68	36 (52.9)	32 (47.1)
Total	143	83 (58.0)	60 (42.0)

4. DISCUSSION

From this study, geohelminths are still prevalent with significant public health importance among school-aged children in Nigeria. Several studies in some parts of Nigeria have also buttressed this such as Osun State [9], Imo State [10], Cross River [11] and Edo State [12]. The high prevalence of geohelminths in this study could be attributed to environmental contamination with infected faeces, overcrowding of pupils, inadequate protective footwears, poor sanitary measures and low personal hygiene. The prevalence and distribution of geohelminths among study participants in this study was statistically significant with *Ascaris lumbricoides* having the highest prevalence, this observation agrees with some similar studies [11,13–15]. The higher prevalence of this parasite could be because the external surface of the eggs of *Ascaris lumbricoides* covered by a thick shell which gives it better protection and longevity in the environment than the eggs of other nematode parasites.

According to age-related geohelminths prevalence, study participants in all age groups had equal chances of contracting geohelminths infection. Pupils of 12 – 14 years had the highest parasite prevalence, this could be attributed to several factors such as higher exposure to environmental contaminants, more adventurous and presence of inadequate or worn-out protective footwears compared to pupils in age group 3 – 5years that had the least prevalence (whose members had better protective footwears, stayed mainly in class and were not subjected to regular field work unlike the older pupils).

Males had a higher prevalence of geohelminths in this study, this agrees with the higher prevalence among males observed in some similar studies [9–12,16,17]. Males are more exposed to environmental contaminants due to the nature of their playful activities (football, wrestling etc.).

5. CONCLUSION

Geohelminths infections are still of public health significance in Nigeria especially among school age pupils. Regular deworming (chemotherapy), provision of good protective footwears, frequent health education and improved sanitary measures (provision of pipe-borne water and good toilet facilities) will significantly curtail the menace of geohelminths in Nigeria especially in rural areas.

CONSENT AND ETHICAL APPROVAL

Ethical clearance and oral/written consents were obtained before the commencement of this study. Study participants were 143 (75 males and 68 females) randomly selected primary school children. Ethical clearance for this study was obtained from the Government of Akwa Ibom State Health Management Board.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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