PREVALENCE OF *HELMINTHIASIS* AMONG SCHOOL CHILDREN IN OBAN, AKAMKPA L.G.A, CROSS RIVER STATE, NIGERIA.

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Abstract

Soil-transmitted helminthic infection is a common public health challenge of primary school children in resource poor and developing countries like Nigeria. The prevalence of intestinal parasites among 200 school children in Oban was carried out between August and November 2021. The investigation was done at St. Michael's Primary School and Early Child Nursery School. The study adopted a cross-sectional, school based, descriptive study. The participants for the study were selected using a systematic sampling technique. Information collected included age, sex, source of drinking water. Results obtained showed that the overall infection rates were 86.72% (i.e., 111 out of 128pupils examined) in St. Michael's primary school, and 90.28% (1.e., 65 out of 72 children examined) in Early Child Nursery School. The children were infected with various parasites. The prevalence of parasites found were as follows: *Ascarislumbricoides* (57.03%), *Trichuristrichiura* (32.03%), Hookworm (54.31%) and *Strongyloidesstercoralis* (16.41 %) in St. Michael's Primary School, *Ascarislumbricoides* (63.90%), *Trichuristrichiura*(43.05%), Hookworm (51.38%) and *Strongyloidesstercoralis* (47.22%) in Early Child Nursery School. Mixed infection with *Ascarislumbricoides*, hookworm and *Trichuristrichiura* was observed in six children.It is presumed that poor standard of personal hygiene; insanitary environment and ignorance among other things contributed to the prevalence of these infections amongst children in the community. This calls for radical control measures aimed at the various intestinal parasites.There is need for health education and legislation if the spread of these infections and severe morbidity in infected individuals especially school children must be prevented.

Keywords: *Helminthiasis,* Akamkpa, School Children, Cross River State

INTRODUCTION

Soil transmitted helminth (STH) infections is considered as one of the most common and neglected infections at worldwide (Sumon *et al.,* 2021; Obeta *et al.,* 2019; Oguh *et al.,*2020). This disease is very common among humans living in areas of poverty in the developing world. About one billion individuals were reported to carry helminthic worms, in which most of them are living in low socio−economic settings, in sub−Saharan Africa (WHO, 2020). Globally, over one billion people are infected by at least one of the commonest species namely: *Ascarislumbricoides* (the roundworm), *Trichuristrichiura* (the whipworm) *Strongyloidesstercoralis*(threadworm) and the hookworms; *Ancylostomaduodenale* and *Necatoramericanus* (Agbolade *et al.,* 2007).

Substantive evidence suggests that the most vulnerable group are children (Alelign *et al*., 2015), where infections are acquired through playing with contaminated soil and pica habits (Alemu *et al*.,2019).

Despite global decline in the prevalence of *A*. *lumbricoides*, *T*. *trichiura* and the hookworms (*A*. *duodenale* and *N*. *americanus*) in the Americas and Asia, the situation in sub−Saharan Africa remains stagnant (Anunobi *et al*., 2019). Children harbour intestinal parasites with a little variation in species from one climatic region to another. In Oban for instance (a community recognized and documented to be Nigeria′s last great rain forest), most of the tropical parasites are found.(Sumo *et al*., 2021; FMH, 2015; Gimba & Dawan, 2015).

According to Brooker *et al.* (2008), epidemiological surveys have demonstrated that poor sanitary conditions such as defecation and fecal contamination of water bodies are the most important factors leading to intestinal worm infestation while the spread is due to personal hygiene (Van, 2009). Nigeria is endemic for helminth infections, in which *Ascariasis*, *Trichuriasis*, and Hookworm were incriminated as the major causes, with estimated cases of 55 million, 34million, and 38 million, respectively Hotez and Kamath, 2009).

The World Health Organization (WHO) estimates that over two billion people are infected with one or more Soil−Transmitted Helminths mainly *Ascarislumbricoides*, hookworm, and *Trichuris trichiura* (WHO, 2019). School−aged children have been shown to be the population at greatest risk of acquiring infections with roundworm, hookworm, and whipworm infections (Yu *et al*., 2017). The preponderance of helminthic infections in school−aged

children makes this subgroup a good target for *helminthiasis* (Oluwole *et al*., 2018).

WHO recommends that a baseline survey in school children be done to determine prevalence of worm infestation before instituting any worm control programme and treatment should be given according to the survey (WHO, 2019). Presently, there is no national school-based helminth control programme in Nigeria. It is on the above premise that the present investigation was aimed at determining the prevalence of such helminthiasis among School Children in Oban Community, Akamkpa, Cross River State, Nigeria.

MATERIALS AND METHODS

Study Area.

The study was conducted in Oban, Akamkpa L.G.A, Cross River State, Nigeria. Oban community lies between Longitude $8^{\circ}3^{0}$ and $84^{\circ}45$E and Latitude $5^{\circ}3^{0}$ and $5^{\circ}15$N. It is found in Akamkpa Local Government Area of Cross River State, Nigeria. It is about 60 Km from Calabar, the Capital City of Cross River State. It is bounded by Yakurrr, Obubra and Etung Local Government Areas in the North; South West by Biase and Calabar Local Government Councils; in the South East by Akpabuyo and the Republic of Cameroon, respectively.

Study Design. The study was a cross-sectional, school based, descriptive study. The participants for the study were selected using a systematic sampling technique. Information collected included age, sex, source of drinking water (stream, pipe-born or bore hole) and type of toilet facilities (Water Cystern, Pit, or on the ground or bush) and the general cleanliness of the environment. The study was performed between August and November 2021.

Study Population. The study population comprised Children from Primary One through Primary Six in all the three Schools. The ages of the Children were determined from the School records.

Ethical Approval. Approval to carry out the study was obtained from the Ethics Committee of the University of Calabar Teaching Hospital, Calabar, and Cross River State Universal Basic Education Board. Written informed consent was obtained from Parents/ Guardians of the subjects through the Parents-Teachers Association. Assent was also obtained from the Children.

Collection and Laboratory Analysis of Samples. Stool samples were examined using Stoll's Dilution Technique (Odinaka *et al*., 2015). A small sized, clean, dry, and leak proof plastic container with a wide mouth and pre-labelled with the subject's name and an identification number was issued to each recruited child. Students with the help of parents or guardians were instructed to bring to school stool specimens collected that morning. The stool samples were taken to the University of Calabar Parasitology Laboratory within 6hrs after the stool had been passed, to be analyzed for the presence of ova of soil-transmitted helminths. The pupils submitting stool samples were given pencils, erasers, or pens as incentives. All infected children were given a single dose of Mebendazole (500mg) at the expense of the researchers. Social classification of the children was based on the criteria set by WHO (2019).

Statistical Analysis. Statistical analysis of the data was performed using the Statistical Package for the Social Sciences (SPSS) for Windows (version 20.0).

RESULTS

A total of 200 school children were recruited for the study; of the 200 pupils screened for intestinal parasites, 176 (88.00) were found to be infected (Table 1) at St. Michael's Primary School, 111 out of 128 pupils examined were found to be infected with eggs of parasitic helminths. In Early Child Nursery School, 65 out of 72 pupils were infected with eggs of helminths and cysts of protozoa (Table 1).

Table 1. Prevalence of intestinal parasites among pre and Primary School Children in Oban, Akamkpa L.G.A.

School	No. Examined	No. Infected	% Infection
St. Michael's Primary School	128	111	86.72
Early Child Nursery School	72	65	90.28
Total	200	176	88.00

The prevalence of various intestinal parasites by sex is shown in Tables 2 to 5. For St. Michael Primary School, females had the highest prevalence rate of 89.29% and this was closely followed by males with 84.7206.

Table 2. Age-Prevalence rates of *Ascaris lumbricoides* among male and female pupils in St. Michael's Primary School, Oban.

Age Range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	29	24(82.75)	14	12(85.77)
6-8	20	10(50.00)	21	11(52.38)
9-11	18	7(44.44)	14	5(35.71)
12-14	5	0(0.00)	7	4(57.14)
Total	72	41(56.94)	56	32(57.14)

In the Early Child Nursery, males on the other hand recorded the highest prevalence rate of 91.11% while 88.88% of females had intestinal parasites.

Table 3 . Age-Prevalence rat es of Hookworm infection among M ale and Female Pupils in

St. Michael's Primary School, Oban.

Age Range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	29	12(41.4)	14	7(50.00)
6-8	20	13(65.00)	21	11(52.38)
9-11	18	6(33.33)	14	6(42.9)
12-14	5	1(20.00)	7	2(28.60)
Total	72	32(44.44)	56	26(46.43)

Table 4. Age-prevalence rates of *Trichuris trichiura* among male and female pupils in St. Michael's Primary School, Oban.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	29	10(34.48)	14	6(42.86)
6-8	20	5(25.00)	21	8(38.09)
9-11	18	6(33.33)	14	5(35.71)
12-14	5	0(0.00)	7	1(14.29)
Total	72	21(29.17)	56	20(35.71)

Table 5. Age-Prevalence rates of *Strongyloides stercoralis* among male and female pupils in

St. Michael's Primary School.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	29	1(3.45)	14	6(42.86)
6-8	20	5(25.00)	21	5(23.81)
9-11	18	3(16.67)	14	0(0.00)
12-14	5	0(0.00)	7	1(14.29)
Total	72	9(12.50)	56	12(21.43)

Among the various parasites recorded among pupils in St. Michael's Primary school, results show that *Fasciola* infection was highest in male between 9–11 years of age, followed by infection rates in females of similar age group. The values obtained was 22.22% and21.43% for males and females, respectively. *Strongyloides* infections in primary school was highest (42.86%) among females between3–5 years of age, while males of 6–8 years of age followed with infection rate of 25%.

Entamoeba histolytica was highest among male children of 3–5 years of age, with an infection rate of 17.24%; females, in general recorded the lowest incidence of intestinal parasite infections. *Schistosoma* infection rate in males was 20%. Other intestinal parasites such as *Giardia lamblia, Taenia* spp., *D. caninum,* were negligible in terms of their percentage infection rates.

In Early Child Nursery School, *Ascaris lumbricoides* infection recorded the highest incidence rate of 70.37% in females while infection rate was 60% in males. *Ascaris* infection among the various age groupswas highest amongst 3–5 years old, recording 80.0% and 90.91% rates of infection among males and females respectively (Table 3a). Hookworm infection was highest among males of 3–5 years of age, followed by females of 6–8 years of age. The infection rates were 66.670% and 63.64% respectively (Table 6).

Table 6. Age range and % infection of *Ascaris lumbricodes* among male and female pupils in Early Child Nursery School.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	15	12(80.00)	11	10(90.91)
6-8	16	11(68.75)	11	6(54.55)
9-11	11	3(27.27)	4	3(75.00)
12-14	3	1(33.33)	1	0(0.00)
Total	45	27(60.60)	27	19(70.37)

Table 7. Age range and % infection of Hookworm among male and female pupils in Early Child Nursery School.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	15	10(66.67)	11	6(54.55)
6-8	16	9(56.25)	11	7(63.64)
9-11	11	3(27.27)	4	2(75.00)
12-14	3	0(0.00)	1	0(0.00)
Total	45	22(48.89)	27	15(55.56)

Table 8. Age range and 9% infection of *Trichuris trichiura* among male and female pupils

in Early Child Nursery School.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	15	3(20.00)	11	8(72.73)
6-8	16	12(75.00)	11	2(18.18)
9-11	11	3(27.27)	4	1(25.00)
12-14	3	2(66.67)	1	0(0.00)
Total	45	20(44.44)	27	11(40.74)

Table 9 . Age range and % infection of *Strongyloides stercoralis* among male and female

pupils in Early Child Nursery School.

Age range (years)	Males		Females	
	No. Examined	No. Infected (%)	No. examined	No. Infected (%)
3-5	15	5(33.33)	11	6(54.55)
6-8	16	7(43.75)	11	11(100.00)
9-11	11	3(27.27)	4	0(0.00)
12-14	3	2(66.67)	1	0(0.00)
Total	45	17(37.78)	27	17(62.96)

For *Trichuris trishiura,* infection was highest (75.0%) in males of 6–8 years of age, followed by females (72.73%) of 3–5 years of age (Table 9). Infections with *Strongyloidos stercoralis* was 100% in female 9) children of 6–8 years of age. This was followed by an infection rate of 66.67% recorded in male of 12–14 years of age (table 3)

Fasciola infection was 27% in males of 9–11 years of age and 18.18% in females of 6–8 years of age. E. *histolytica* infection was 100% in females of 12–14 years of age: females of 3–5 years of age also recorded 100% infection rate for *Schistosoma mansoni.*

Overall result obtained shows that the highest rate of infection was recorded in female children with those in 3–5 age group mostly affected with various intestinal parasites.

Statistical analysis of results using independent t-test showed a high significant rate of *Ascaris* infections ($P<0.05$) among both primary and nursery school children in Oban. On the contrary, independent t-test showed that infections with *Trichuris trichiura, Fasciola, Strongyloides, E. histolytica* and *Schistosoma* was not significantly prevalent in the population sampled.

Discussion

It is important to constantly ascertain the prevalence of intestinal helminths among children owing to the ill effects posed by these parasites among the vulnerable groups (Olufunmilayo *et al.,* 2022). This study revealed a very high infection level already in this age group. The prevalence of the parasites especially *Ascaris lumbricoides* (63.90%) and Hookworm (54.31%) suggests that the children are highly susceptible to intestinal helminths, and this justifies the need to include them in deworming programs. This is similar to the findings of other studies (Obiukwu, *et al.,* 2008; Ukpai *et al*., 2013; Oguh *et al*., 2020) in other parts of Nigeria which also found helminthiasis to be common among primary school children. A similar pattern of infection is likely to occur in many other communities in the state and other parts of Nigeria.

The high prevalence rate of soil-transmitted helminths in the study population could be attributable to the risk factors associated with the study population, that is, non-availability of water supply and toilet facilities in schools. The

prevalence rate of *Ascaris lunmbricoides* in the present study is higher than the 3.5 % observed by Odinaka *et al*, (2015). Hookworm was one of the most common helminthic infections identified in this study and this may be ascribed to the rainy season when the study was conducted. The observation of increased hookworm transmission during the rainy season has been reported (Odinaka *et al*, 2015). The plausible reason for this increased hookworm transmission during the rainy season may be that the rains disperse faeces increasing chances of parasite contact with humans. *Trichuris trichiura* infection was observed similar to studies reported by Adefioye *et al.* (2011). *Trichuris trichiura* in this study generally has a low prevalence and this in line with the report of Osazuwa *et al*, (2011). Our study also showed that the prevalence of soil transmitted helminthiasis was higher in males than in female pupils. This could be because the majority of the study populations were children of farmers and males usually accompany their fathers to the farm. Male children are also known to be more adventurous. This is in agreement with the report of Obiukwu *et al.* (2008).

Pit latrines and nearby bushes were the commonly used sites of sewage disposal in the study population. This corroborates the report of Adefioye *et al.* (2011). The use of pit latrine and nearby bushes is an indication of the poor socioeconomic status of the study subjects. Additionally, students in the schools had no access to clean water supply and toilet facilities. Soil−transmitted helminths thrive and flourish in such habitats.

Conclusion

Prevalence of *Helminthiasis* among School Children in Oban, Akamkpa L.G.A, Cross River State, Nigeria was carried out in this study. The idea behind this study is to complement global efforts towards elimination of Helminthiasis infections as targeted by the WHO and the London declaration. This finding will therefore be a guide for instituting national and International MDA programs which classify communities into low risk (prevalence: 20% to < 50%) and high risk (prevalence ≥50%) and their respective treatment regimens. The findings in this study haverevealed a high prevalence of soil-transmitted helminthic infection amongst Primary School Children in Oban, Akamkpa L.G.A, Cross River State.

Recommendations

1. There is need for potable water supply and safe Sewage disposal systems in schools.

2. To reduce or stop the transmission of Helminthiasis, there is need to break the transmission cycle; however, this study showed that the current living standard coupled with poor hygiene practices among the study population is rather strengthening the cycle instead of breaking it.

3. There is also a need for routine regular deworming of all the students in the schools to reduce the burden of soil transmitted helminthiasis.

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