Prevalence of Geohelminths among Primary School Pupils in Unwana and Akpoha Communities of Afikpo, Ebonyi State, Nigeria

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Abstract: The study assessed the prevalence and risk factors affecting the transmission of soil transmitted helminthiasis among school age children in Unwana and Akpoha commuties of Afikpo North Local Government Area of Ebonyi State. The study involved stool examination for infective stages of soil transmitted helminth using zinc sulphate flotation technique. *Ascaris lumbricoide, Trichura trichuris* and *Ancylostoma duodenale* were observed. The overall prevalence rate was 71.6%. The sex related distribution of these helminthes showed the males were more infected 502 (50.2%) than the females 498 (49.8%). However, there was no statistical significant difference with respect to sex ($p > 0.05\%$). The study further showed that 12 years old had the highest prevalence of 195 (39.0%) while ages 8 and 13 had the least occurrence 139 (17.8%). This difference is a gain not statistically significantly at $p=0.05$ Geohelminths distribution in relation to class showed that primary four (4) had the highest prevalence of 352 (70.4%) whereas primary five (5) recorded the least prevalence 297 (59.4%). The study concluded that risk factors obtained from the questionnaire such as unhealthy personal and poor environmental sanitation were the major factors that enhanced helminthiasis and its mode of transmission. It is therefore imperative that education to parents and mass anti-helminthic drugs administration programs be enlisted to these areas to help reduce the rate of infection among primary school children.

Keywords: Akpoha, Prevalence, Soil transmitted helminthiasis, Unwana, Zinc sulphate flotation.

INTRODUCTION

Intestinal parasitic infections are highly prevalent in developing countries, contributing to high coincidence of malnutrition and morbidity. Soil transmitted helminthes (STH) still remain a notable health problem in resource limited countries due to difficulties in the implementation of control measures. For instance, information is still lacking on national data on prevalence, burden and risk zone (RZs) for STH infection. School aged children are very much at risk of contracting soil transmitted helminths due to exposure to unhygienic practices and lack of environmental sanitations especially in rural areas. Geohelminth infection is a major health problem particularly in rural areas of developing countries like Sub-saharan Africa, India and other Southeast Asian countries. It is an important cause of morbidity in school age children who harbor the highest intensity of worm infestation. Some of the significant morbidity attributed to intestinal helminthiasis is malnutrition, growth retardation, anaemia, Vitamin A deficiency and impaired intellectual performance.

MATERIALS AND METHODS

Study area

This study was conducted in Unwana and Akpoha communities in Afikpo North Local government, Ebonyi state, then transported to microbiology laboratory of Alex-Ekwueme federal university Ndufu-Alike (AE-FUNAI) which is located in Ikwo Ebonyi state.

Collection of samples

Following informed consent a total of 500 stool samples were collected from the pupils, they were randomly given a sterile universal container that was labeled appropriately with the details and a plastic spatula and a clean A4 paper to defecate and then using plastic spatula we collected a little amount of the stool inside the universal container and cap properly. The samples were then transported to the Microbiology laboratory of Alex-Ekwueme Federal University Ndufu-Alike for analysis. Those that were unable to be analyzed immediately were preserved with 10% formalin.

The study population

The population for this study comprised of primary school children aged between 8-13 years that fall in between the class range of primary 4-6. The population was randomly chosen between male and female gender.

Stool analysis/ parasitological examination

Faecal samples were examine for the presence of heliminth eggs or ova of *A. lumbricoides, T. trichiura* and *Ancyclostoma duodenale* using modified Zinc sulphate solution, whole sediments formed after centrifugation was transferred onto a glass slide and examined microscopically using x10 objective lens for the presence of helminth eggs and ova. They were identified based on their morphology

Procedure for Zinc Sulfate Concentration Technique

According to Cheesbrough, (2006) procedure for floatation technique was used: Ten (10ml) of lukewarm water was added in a test tube, few loopful of fecal matter was transferred to the tube. The suspension was strained through gauze to remove coarse fecal matter. The filtrate was spunned in a centrifuge at 2500 rpm for a minute. The supernatant was discarded and distilled water was added to the sediment, the tube was shaken well and centrifuged again. The process was repeated 2-3 times till the supernatant clear and then the supernatant was poured off. About 3-4 ml of 33% zinc sulfate with specific gravity of 1.8 was added to the tube and it was shaken well. More zinc sulfate was removed using a loop of 5mm in diameter and transferred to a glass slide and a cover slip was placed over the drop and examined under the microscope.

RESULTS

Distribution of Geohelminths infection in Unwana community among male and female pupils

The different distribution of Geohelminth of both single infections and mixed infections among the male and female population in Unwana where an *Ascaris* and *Ancyctostona* infection has the highest distribution in both populations than *Trichoris trichuria* that has the lowest distribution (Figure 1).

Distribution of Geohelminths infection in Akpoha community among male and female pupils

The different distribution of Geohelminth of both single infections and mixed infections among the male and female population in Akpoha where an *Ascaris* and *Ancyctostona* infection has the highest distribution in both populations and can be seen more in female population than male population. *Trichoris trichuria* that has the lowest distribution (Figure 2).

Frequency of distribution of Geohelminths in Unwana based on class interval

The frequency of distribution among the class intervals of primary 4, 5 and 6 studied indicated that primary 6 has the highest frequency and primary 5, the least frequency (Figure 3).

Frequency of distribution of Geohelminths in Akpoha based on class interval

The frequency of distribution among the class intervals of primary 4, 5 and 6 studied indicated that primary 4 has the highest frequency and primary 5, the least frequency (Figure 4).

Age distribution of Geohelminths infection among male and female population in Unwana and Akpoha

The age group of 8 to 13 used for the study shows that age 12 had the highest occurrence and the least age with occurrence were age 13 and 8 both in Unwana and Akpoha communities (Tables 5 and 6).

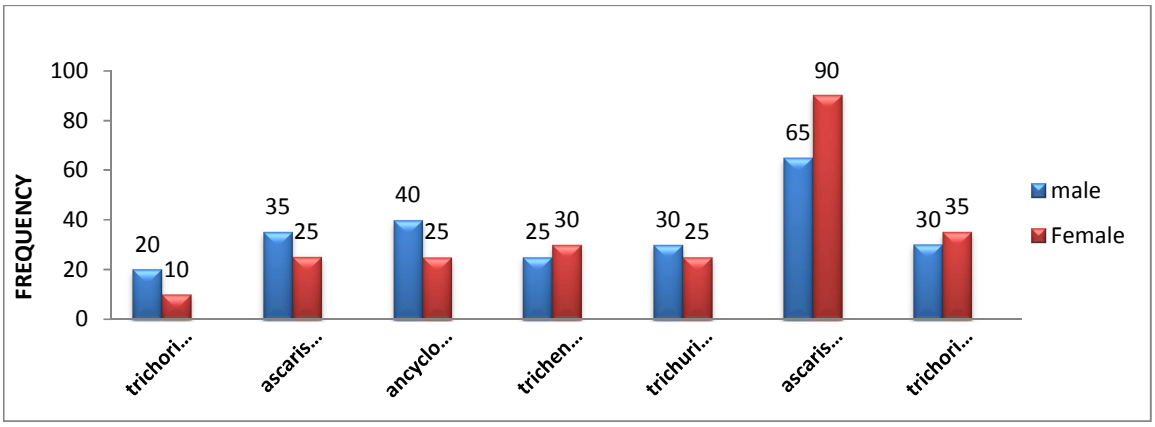

Figure 1: Distribution of Geohelminths Infection in Unwana Community among Male and Female Pupil.

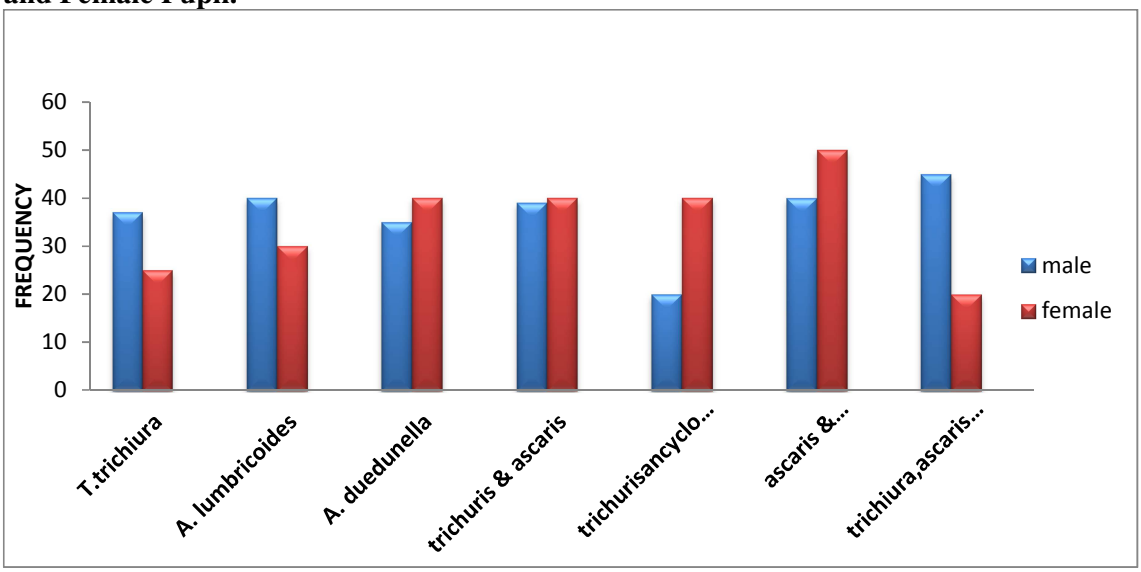

Figure 2: Distribution of Geohelminth Infection in Akpoha Community

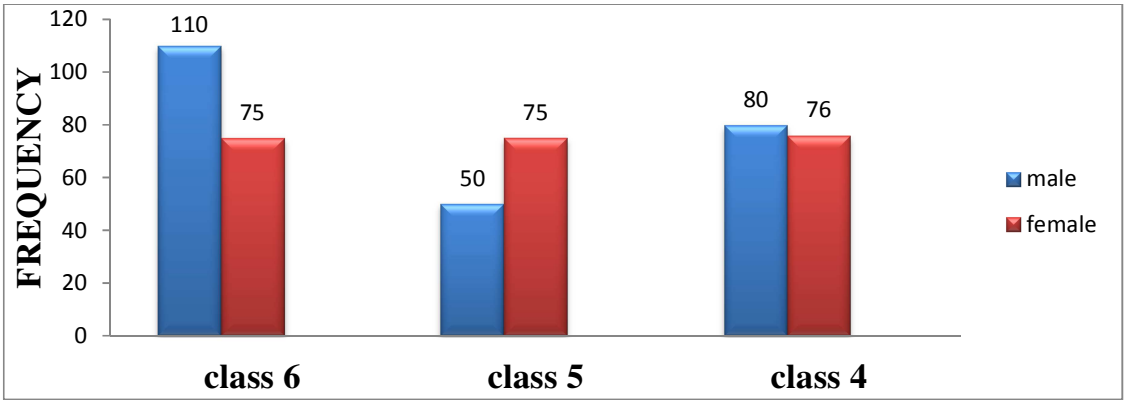

Figure 3: Frequency Of Distribution Of Geohelminths In Uwana Based On Class Interval

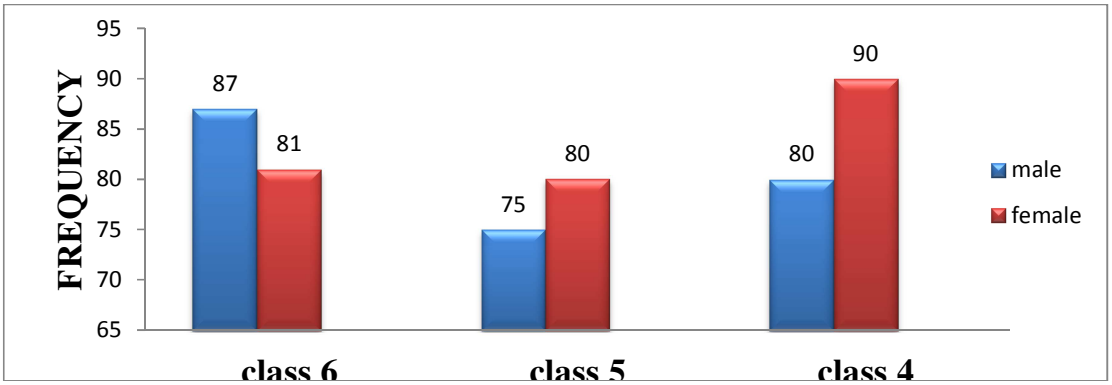

Figure 4: Distribution of Geohelminths Infection According To Class in Akpoha Community.

Table 1: Age Distribution of Geohelminths Infection among Male and Female Population in Unwana.

GENDER	AGE 13	AGE 12	AGE 11	AGE 10	AGE 09	AGE 08
MALE	**42**	**55**	**35**	**53**	**40**	**40**
FEMALE	**25**	**40**	**55**	**35**	**50**	**37**

Table 2: Age Distribution of Geohelminth Infection among Male and Female Population in Akpoha.

GENDER	AGE 13	AGE 12	AGE 11	AGE 10	AGE 09	AGE 08
MALE	**28**	**60**	**55**	**35**	**30**	**40**
FEMALE	**40**	**40**	**30**	**50**	**50**	**20**

Using ANOVA, the mean for Unwana was determined to be 53.0 and akpoha is 66.3, 95% confidence interval for the mean was determined for both lower boundary and upper boundary to be 0.42 and 105.57 and 49.79 & 82.87 respectively for both locations. The significant difference between the two groups was determined using ANOVA to be 0.357 which shows that the NULL hypothesis would not be rejected because there is no statistical difference between the two locations. Fig 1 and 2 chart shows the distribution of Geohelminths infection in Unwana and Akpoha communities respectively, Ascaris and Ancyclostoma duodenale has the highest frequency in unwana community among male and female while *Trichuris trichiura* shows the least distribution among male and female population. Fig 3 and 4 showed the class intervals with primary 4 having highest prevalence and primary 5 having the least

DISCUSSION

The total prevalence of geohelminths from Akpoha and Unwana are 39.8% (199) and 31.8% (159) respectively, where n=500. The total prevalence from both locations is 71.6% (358), this result is close to 75.7% found by Wusu *et al* (2014) in South Eastern Nigeria. However, it is higher than the 30.6%, 45.5% and 52.0% reported by Adekunle *et al* (2015), Emeka (2015) and Adefioye *et al* (2011) respectively. The difference in results above could be attributed to timing, seasonal changes when conducting the survey, lack of awareness to presence of these organisms and poor personal and environmental hygiene, shortages of clean potable water and indiscriminate defecation as most vegetable farmers use excreta as manure which is a source of infection since children and their mothers often go to the farm to tender to the vegetables (Suswan., 2013).

These infections affect most frequently children in endemic countries and are associated with poor growth, reduced physical activities and impaired learning abilities. In Nigeria, there have been no national school-based parasites or soil-

transmitted helminthes control programs (Odu, *et al.,* 2011).

The study showed that males had a higher infection rate with P=50.2% (502) and females having P=49.8% (498) where n=1000, there was no statistical difference in the sex prevalence with P>0.05%. This result agrees with the work of Oluwarotimi *et al.*, (2019) which showed that males (48.6%) were more infected than females (40.4%).

The study also showed the age group with the highest prevalence which shows that age 12 had the highest occurrence of P=39.0% (195) and the least age with occurrence were age 13 and 8 with least occurrence of 17.8% (139) respectively. This result agrees with the work of Kirwan *et al*. (2009) which are farmers and can be expose to animal dung which they use as fertilizers in their farms or could potentially expose them to washed away soils which could be contaminated with fecal matter during weeding of the soil or during plays with the soil. This agrees with Kirwan, *et al* (2009) who said that children of farmers usually harbor higher loads of *A.lumbricoides* than those whose parents were business or professionals

The study showed that males had a higher infection rate with P=50.2% (502) and females having P=49.8% (498) where n=1000, there was no statistical difference in the sex prevalence with P>0.05%. This result agree with the work of Oluwarotimi *et al* (2019) which showed that males (48.6%) were more infected than females (40.4%) but the difference was not statistically significant.

CONCLUSION

The soil-transmitted helminthes causing helminthic infection among children in this study area includes *Ascaris lumbricoides, Trichuris trichiura, and Ancyclostoma duodenale*. *Ancyclostoma duodenale* was the most prevalent among the other geohelminths. The result of this study also showed relatively highly prevalence of soil suggested that older children get more infected as they have become independent of their parents supervision. Hence the important role of parents in aiding their wards towards practicing personal and domestic hygiene such as wearing of sandals which is a significant protective factor for Ascaris and hookworm co-infection in this study should not be undermined.

This study also showed the prevalence among the class intervals with primary 4 having the highest prevalence of 70.4% (352) and primary 5 having the least with 59.4% (297). Other factors such as parents occupation could be seen as a risk exposure to these infections as 74.2% (83) where n=200 for questionnaire obtained accounted for pupils whose parents transmitted helminthic infection among the school children.

This study also identified risk factors associated with soil transmitted helminthic infections in the study area; factors such as toilet system used and poor personal and environmental hygiene were significantly associated with soil transmitted helminths. Therefore, education and advocacy should be given to parents and teachers on these organisms and their mode of transmission. Furthermore, the school curriculum should lay ample emphasis on intestinal parasites, their prevention and control so that improved awareness, positive change in personal hygiene and environmental sanitation related habits as well as avoidance of certain behaviors aggravating infection can be achieved.

RECOMMENDATIONS

From the study, it is therefore recommended that increased public awareness on the pattern and mode of transmission of these parasites should be carried out to sensitize both parents and children on the risk factors associated to its transmission. Mass drug administration is also recommended as the next step in eradicating the eggs or ova and maintaining a personal hygienic and environmental sanitation and good piped water system for drinking water are among

the best ways to prevent contamination with these infections as well as practicing good water system toiletry.

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Conflicts of interest

There is no conflict of interest.

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