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*Original Research Article*

# Prevalence of Intestinal Parasites and Associated Risk Factors among School Children (5 - 16 Years) in Ihite-Ude, Ofeme Community in Umuahia North L.G.A, Abia State

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## ABSTRACT

The aim of this study was to determine the prevalence of intestinal parasites and associated risk factors among children of 5-16 years old in Ihite-Ude Ofeme Umuahia North Local Government Area of Abia State. Out of two hundred (200) children that participated in the study, 70 were males and 130, females. Well structured questionnaire was used to identify environmental, socio demographic and behavioural factors. Stool samples were collected from all the participants and examined for parasites using direct smear method. Three species of intestinal parasites were identified with an overall prevalence of 60 (30%) out of which 30 (42.86%) were males and 30 (23.08%) were females. The most prevalent intestinal parasite identified was *Ancylostoma duodenale* 34 (17%) followed by *Trichuris trichiura* 12(6%) and *Ascaris lumbricoides* 14(7%). The highest prevalence rate of intestinal parasitic infection was observed in age group of 5-8 years 24 (32.43%) whereas 9-12 years age group had the lowest prevalence rate of 24 (27.91%). The prevalence rate of intestinal parasitic infection in the area is moderate and the infection is dependent on sex, whereas it is independent on age. This information may provide valuable statistics needed for planning meaningful public control programmes that aim at reducing the prevalence and morbidity of parasitic infections. Therefore, interventions including improvement of sanitation, provision of safe water, repeated deworming and health education on personal hygiene to the children and to their parents should be intensified.

***Keywords:*** Intestinal Parasites, Prevalence, School Children, Risk Factors.

## INTRODUCTION

Intestinal parasites are parasites that can infect the gastro-intestinal tract of humans and other animals. They can live throughout the body, but most prefer the intestinal walls. The two main types of intestinal parasites are the helminths and protozoans that reside in the intestines. Helminthes are worms with many cells which can be divided into two: Nematodes and Trematodes. Nematodes (roundworms), Cestodes (tapeworms) and trematodes (flukes). Protozoan parasites are parasites that possess only one cell and can multiply inside the human body. There are four species of intestinal helminthic parasites, also known as the geohelminthes or soil transmitted helminthes (STH): *Ascaris lumbricoides* (roundworm), *Trichuris trichiura* (whipworm), *Ancylostoma duodenale* and *Necator americanus* (Hookworms). Intestinal helminthes rarely cause death, Instead, the burden of disease is related to less mortality than to the chronic and insidious effects on health and nutritional status of

the host (Stephenson *et al.*, 2000; Stoltzfus, *et al.*, 2004). Parasites can get into the intestine by going through the mouth from uncooked or unwashed food, contaminated water or hands, or by skin contact with larvae infected soil, they can also be transferred by sexual intercourse in some cases. When the organisms are swallowed, they move into the intestine where they can reproduce and cause symptoms. Various risk factors are responsible for the prevalence of this disease, which include low socio-economic status, poor hygienic conditions, impure drinking water, low literacy rate of parents, large size of the family and poor health status of the child.

Young children are often disappropriationately affected by intestinal parasitic infections compared to adults due to their increased nutritional requirements and less developed immune systems. Parasites are important causal agents of gastrointestinal disorders such as diarrhoea, dysentery, vomiting, lack of appetite, haematuria, abdominal distention and sometimes mentally related disorders (Garcia, 2004; Bethony, *et al.*, 2006).

In addition to their health effects, intestinal helminth infections also impair physical and mental growth of children, thwart educational achievement and hinder economic development (Drake, *et al.*, 2000; Guyatt, 2000). These infections are ubiquitous with high prevalence among the poor and socio-economically deprived communities where overcrowding, poor environmental sanitation, low level of education and lack of access to safe water are prevalent (Mehraj, *et al.*, 2008), trapping them in a perennial cycle of poverty and destitution (Hotez, 2009).

## MATERIALS AND METHODS

**Study Area:** The study area conducted in Ihite-Ude Ofeme Community in Umuahia North local Government Area of Abia State. The area is predominantly rural and most residents who live in the village are agriculturists. The area is sparsely populated with people of low educational status. Umuahia is the capital city of Abia State in Southeastern Nigeria. Its coordinates are $5^{o}32'N$ $7^{o}29E$ (latitude) and $5.533^{o}N$ $7.483^{o}E$ (longitude). Its time zone is WAT (UTC +1), postcode is 440 and area code is 088. Its indigenous ethnic group is Igbo with a population of 359, 230 according to the 2006 Nigerian census.

**MAP OF IHITE-UDE**


Source: Map data @ 2015

**Ethical Consideration:** A written note was obtained from the Head of Department (HOD), Biology/Microbiology Department of Abia State Polytechnic, Aba and was taken to the village head, who granted the request for the samples to be collected.

**Questionnaire:** Before the commencement of the study, an oral briefing explaining the objectives of the study was given to the villagers at the village square. A pretested questionnaire was then given to them so as to get information on the demographic data (i.e. age, gender), behavioral (i.e. personal hygiene such as wearing shoes and food consumption), medical treatment (i.e. whether the participant deworm regularly and takes iron supplement), environmental sanitation and living condition characteristics (i.e. type of water supply, latrine system, garbage disposal system and presence of domestic animals) which

will be used to assess the potential risk factors for IPIs. For children who are below age 6, the questionnaire was answered by their parents or guardians.

**Faecal Sample Collection:** A wide mouthed screw capped containers pre-labelled with their names and number were distributed to each of the participants. The participants were instructed to scoop a thumb size faecal sample using a provided scoop into the container, making sure that the sample is not contaminated with urine. To ensure proper precaution and reliable information, the children were interviewed in their mother tongue. Parents and guardians were instructed to monitor their children during the sample collection to ensure that they place their faecal samples into the right container and at the right time.

**Parasitological Examination:** Each of the stool samples was examined both macroscopically and microscopically using saline preparation and lugol's iodine preparation as described by Cheesbrough (2006) at Biology/Microbiology Laboratory of Abia state Polytechnic on the same day of collection.

**Macroscopic Examination**

The stool samples were examined macroscopically to identify the presence of blood, mucus, pus, worms, colour and its consistency (i.e. if formed, semi-formed and unformed (watery stool).

**Microscopic Examination**

***Direct Smear Method:*** A drop of freshly prepared normal saline was placed at the middle of a clean, grease free glass slide and a little portion of the stool sample was emulsified with the saline using an applicator stick. A clean cover slip was placed over the smear and was viewed under the microscope using X10 and X40 objective lens respectively for the presence of ova and cysts of the intestinal parasites.

Also, a drop of lugol's iodine was placed at the center of another clean grease free glass slide using a Pasteur pipette. With the aid of the spoon fixed to the lid of the sample container, a small portion of the faecal sample was collected and emulsified evenly on the drop of lugol's iodine. A clean cover-slip was placed on the prepared slide avoiding air bubbles. The preparation was examined using X10 and X40 objectives of the microscope for the proper identification of the cysts and ova (Cheesbrough, 2006).

***Data analysis:*** Data was analyzed using the chi-square ($X^2$) method.

## RESULTS

**Table 1: Prevalence of intestinal parasitic infection with respect to gender**

| Sex | No. of Samples Examined | No. of Individuals Infected (%) | P value |
|---|---|---|---|
| Male | 70 | 30(42.86) | 0.05 |
| Female | 130 | 30(23.08) | |
| **Total** | **200** | **60 (30)** | |

Table 1 shows the prevalence of intestinal parasites with respect to sex. It showed that the prevalence of intestinal parasites was higher in males (42.86%) than females (23.08%). However, statistical analysis showed that there was significant difference between intestinal parasites and gender. ($X^2$cal = 4.40, $X^2$tab = 3.841, df = 1, P <0.05)

**Table 2: Prevalence of intestinal parasitic infection with respect to age group**

| Age Group(yrs) | Number Examined | Number Infected (%) | P value |
|---|---|---|---|
| 5 – 8 | 74 | 24(32.43) | 0.05 |
| 9 – 12 | 86 | 24(27.91) | |
| 13 – 16 | 40 | 12(30) | |
| **Total** | **200** | **60** | |

Table 2 shows the prevalence of intestinal parasites with respect to age. It showed that the prevalence of intestinal parasites was higher among children ages 5-8 years old (32.43%) than their counterparts. However, statistical analysis showed that there was no significant different between intestinal parasites and age. ($X^2$cal = 0.20, $X^2$tab = 5.991, df = 2, P > 0.05)

**Table 3 Frequency of occurrence of intestinal parasites**

| Parasites | No (%) |
|---|---|
| *Ancylostoma duodenale* | 34 (17) |
| *Trichuris trichiura* | 12 (6) |
| *Ascaris lumbricoides* | 14 (7) |
| **Total** | **60 (30)** |

A total of three parasite species were observed (All helminths) from the stool samples.

Table 3 shows the frequency of occurrence of intestinal parasites from the stool. *Ancylostoma duodenale* was the most predominant (17%) while *Trichuris trichiura* was least predominant (6%). Mixed infection was not observed.

**Table 4: Potential Risk Factors Associated With Intestinal Parasitic Infections (IPIs)**

| Variables | N | Number infected | Percentage % |
|---|---|---|---|
| **Sex** | | | |
| Male | 70 | 30 | 42.8 |
| Female | 130 | 30 | 23.0 |
| **Age group in years** | | | |
| 5- 8 | 74 | 24 | 32.4 |
| 9 – 12 | 86 | 24 | 27.9 |
| 13 – 16 | 40 | 12 | 30.0 |
| **Awareness of IPIs** | | | |
| Yes | 84 | 20 | 23.8 |
| No | 116 | 40 | 34.4 |
| **Source of Drinking water** | | | |
| River/Rain water | 146 | 52 | 35.6 |
| Sachet water | 54 | 8 | 14.8 |
| **Hand washing before eating** | | | |
| Yes | 83 | 22 | 26.5 |
| No | 117 | 38 | 32.4 |
| **Practice of fingernail trim** | | | |
| Yes | 159 | 26 | 16.3 |
| No | 41 | 34 | 82.9 |
| **Close contact with pets/livestock** | | | |
| Yes | 121 | 41 | 33.8 |
| No | 79 | 19 | 24.0 |
| **Waste Disposal** | | | |
| Indiscriminately | 118 | 39 | 33.0 |
| Collected | 82 | 21 | 25.6 |
| **Defecation Places/Toilet facilities** | | | |
| Bush, River | 109 | 41 | 37.6 |
| Pits/WC | 91 | 19 | 20.8 |
| **Regular Deworming practices** | | | |
| Yes | 48 | 16 | 33.3 |
| No | 152 | 44 | 28.9 |
| **Eating Practice** | | | |
| Raw/unwashed foods | 159 | 42 | 26.41 |
| Washed foods | 41 | 81 | 43.90 |

## DISCUSSION

Intestinal parasitic organisms have always been an important public health problem in various countries, but the severity may vary depending on the location and period of time. The present study assessed the prevalence of different intestinal parasitic infections and the associated risk factors in Ihite-Ude Ofeme, Umuahia North Local Government Area of Abia State.

From the results obtained, the prevalence of intestinal parasites was analyzed by sex; the males had a higher frequency of 42.86% of IPIs, whereas the females had a lower frequency rate of 23.08% of IPIs. This is contrary to the findings of Gimba and Dawam (2015) that females showed a significant difference between the enteric parasitosis and sex.

The study showed that children within 5-8 years age group had the highest prevalence of intestinal parasites, closely followed by the 13-16 years age groups. A similar trend was reported by Damen *et al.*, (2011). The highest prevalence observed among children aged between 5-8 years could be as a result of the fact that children play with soil always. The soil is known to harbour a good number of intestinal parasite eggs which eventually find their way into the body of their host as a result of unhygienic practices. It could also be observed that the rate of intestinal

parasitosis decreased as the age increased. This shows actually that older ones are mindful of hygiene and what they ingest than younger ones. Also, low body immune system especially as concerned children might be responsible for high infection rate (Alli *et al*., 2011).

Out of 200 samples that were analyzed, the overall prevalence rate of intestinal parasites was found to be 30%. However, for the soil transmitted helminthes (STH) *Ancylostoma duodenale* were encountered with an overall of 17% of the infected samples, *Trichuris trichiura* was reported to be 6% of the infected samples and *Ascaris lumbricoides* was reported to be 7% of the infected samples. This was in contrast with the findings of Romano *et al.,* (2011) who reported *Trichuris trichiura* as the most prevalent at 66.8% followed by *Ascaris lumbricoides* 38.5% and hookworm 12.8%. One factor that could be attributed to the prevalence rate of these intestinal parasites is environmental factor. It should be recalled that these parasites are soil transmitted helminthes and due to suitable soil conditions such as water availability, favourable pH etc, and these parasites were able to thrive while those that could not withstand the conditions the environment presented did not thrive.

The present study also assessed the possible association of intestinal parasitic infections with potential risk factors among school children. Several recent studies have identified a range of environmental, behavioural and social risk factors associated with intestinal parasitic infection (Wordemann, *et al.,* 2006). Previous local studies indicated that there was a web of risk factors associated with the high prevalence of intestinal parasitic infections which include age, low family income, inadequate sanitation, presence and close contact with livestock or pets, untreated water supply, low level of parental education, poor geographical and personal hygiene (Al-Mekhlafi *et al.,* 2007).

Higher prevalence of intestinal parasitic infection also found among subjects who do not washed their hands before meal compared to those who washed their hands regularly. This is probably due to low knowledge of children about the fecal-oral transmission of intestinal parasite through their unwashed hands. The present study also found out that drinking water from rivers and rain water were risk factors that contributed to intestinal parasitism children. This may arise from the contamination of water with animals and human waste that flood into the river. This finding was in harmony with Asrat *et al.,* (2011).The inconsistent pattern of association observed between poor hygiene, sanitation practices and intestinal parasitic infections could be partially explained in differences in transmission and epidemiological features between the different intestinal parasite species and hence lead to various confounding factors, since infections are related to a range of host and environmental aspects. The other factor that exposed children to intestinal parasitic infection identified in this study was eating of unwashed/uncooked vegetables or foods. The reason might be due to the contamination of vegetables with faecal materials in the farm. A similar finding was also observed in other studies. Growing of vegetables in faecally-polluted gardens was found to be another risk factor for the transmission of geohelminthes and intestinal protozoans (Erko *et al*., 1995).

## CONCLUSION

Intestinal parasitic infections are highly prevalent in the poorest sections of the populations in endemic areas of developing countries. They can be the cause of a wide spectrum of clinical problems ranging from apparently symptomless infections to life threatening conditions such as intestinal obstruction as

in *Ascaris* infestations as well as anaemia if not properly treated. The goal is to reduce morbidity from soil - transmitted helminthic infections to such levels that these infections are no longer of public health importance. Given that intestinal parasitic infections are intimately associated with poverty, poor environmental sanitation and lack of clean water supply, it is crucial that these factors are addressed effectively. Improvement of sanitation, health education to promote awareness about health and hygiene together with periodic mass deworming are better strategies to control these infections. With effective control measures in place, these communities (especially children) will have a greater opportunity for a better future in terms of health.

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