

The Prevalence of Ascariasis (*Ascaris lumbricoides*) Infection among Pupils Attending Kwaccham and Girpata Primary Schools in Mubi South, Adamawa State

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Abstract

Intestinal helminthiasis affects children's health and physical growth. The study aims to determine the focus of *Ascaris lumbricoides*, risk factors, and effects on the growth of pupils attending Kwaccham and Girpata Primary Schools. Fresh fecal samples were collected from 100 consented children in the selected schools. Samples were processed by normal saline concentration technique and examined for *Ascaris lumbricoides* with a light microscope. The overall statistical analysed prevalence data of *Ascaris lumbricoides* was 21.0%. The infection was present in children from both schools, with 22.0% of female children being more infected than males at 20.0% respectively. Children aged 5-10 years had less ascariasis, while children of 11-13 years had infections. Children who eat raw vegetables and walk barefooted on farms are more at risk of ascariasis. No sign/symptom was associated with ascariasis. Proper environmental sanitation, safe water, and adequate sanitary facilities can prevent ascariasis.

Keywords: Intestinal helminthiasis, *Ascaris lumbricoides*, preventable, children, primary schools.

Introduction

The largest and most common human intestinal roundworm is *Ascaris lumbricoides*. It is one of the soil-transmitted *helminths*, also known as *geohelminths* (Amechi *et al.*, 2013). Intestinal *helminths* affect approximately half of the world's population (Hall *et al.*, 2008), but children are the most vulnerable group (Saath *et al.*, 2004). School children are exposed to ascariasis while playing on contaminated sand, licking fecal-contaminated with feces, eating contaminated fruits and vegetables, and practicing geophagy (Montessor *et al.*, 2002). *Ascaris lumbricoides* can damage the intestinal wall, affecting nutrient absorption and appetite (Stephenson *et al.*, 2000). Intestinal helminthic infections can cause anemia, malnutrition, underweight, retarded growth, and poor performance (WHO, 2002). Intestinal helminthiasis has adverse effects on children's cognitive development, learning abilities, nutritional status, and overall health (Montessor *et al.*, 2002). Children are often unaware of the dangers of some of their daily behaviors, such as playing on contaminated soil, eating sand, and consuming fruits, vegetables, and water from questionable sources. Deciphering the relationships between parasitic infections and children's nutritional status is critical to offer better intervention strategies (Scott *et al.*, 2008).

Geo-helminth infections have been associated with a significant amount of morbidity in children in developing countries (Ukoli *et al.*, 2000). Ascariasis is the most prevalent among other intestinal nematodes, such as *Necator americanus*, *Ancylostoma duodenale*, trichuriasis trichura, *Strongyloides stercoralis*, and *Enterobius vermicularis* (Debora *et al.*; 2018, Ahmed *et al.*, 2004). Ascariasis has an estimated 1 billion human cases worldwide (WHO, 2000).

According to the World Health Organization's report on waste management (1990), only 30% of urban cities in less developed countries like Nigeria are connected to a sewage system, and 90% of

sewage is discharged without treatment (Ismaila et al., 2022). This means that during the rainy season, runoff drains waste into houses and their surroundings, contributing to the high prevalence of soil-transmitted ascariasis. The prevalence varies widely with attitude, climate, and ecological or human factors and may exceed 80% in certain areas (Ukoli et al., 2000). This explains why the high prevalence of soil-transmitted ascariasis varies widely with attitude, climate, and ecological or human factors and may exceed 80% in certain areas (Ukoli et al., 2000).

Barriers that decrease the rates of parasitic infections include insufficient attention to parasitic diseases, neglect of the problem in developing countries, and a lack of follow-up treatments (Sayyari et al., 2005). Therefore, this study aims to identify the prevalence and type of pathogenic intestinal parasites infesting primary school children, which will help in identifying the high-risk group and formulating appropriate control strategies. .

The pathological effects of ascariasis in humans and its related morbidity and mortality have been extensively reviewed (Sharma et al., 2018). Some of these effects include abdominal complications, intestinal obstruction, biliary ascariasis, vomiting, and coughing up of worms. Ascariasis has also been associated with childhood malnutrition (Sharma et al., 2017) and is known to affect mental processing in some children (O'Lorcain et al., 2000). It is most common in pre-school children who are most likely to suffer from protein-energy malnutrition, gastroenteritis, and respiratory infections (Sharma et al., 2017).

Aim and objectives

To evaluate the prevalence of ascariasis infection among pupils in primary schools in Mubi, Adamawa State, Nigeria

To educate primary school children on the health effects of ascariasis.

Methology

Study Area

The study was conducted in the Mubi-South Local Government Area of Adamawa State. It lies on Latitude 10° 00' North and Longitude 13° 30' East (Adebayo, 2004). Mubi South shares a common border with the Republic of Cameroon and Maiha of Adamawa State to the South. It also shares a common border with Mubi-North Local Government Area. is characterized by a tropical climate, with distinct dry and wet seasons (Adebayo, 2004).

Mubi-South Local Government Area is an urban area with inadequate infrastructural facilities, especially in the rural parts of the Local Government. The sanitary conditions in the study area were below the WHO standard. Residential areas are underdeveloped with no piped water, and therefore, residents rely mostly on wells and commercial boreholes for their water needs (Adebayo, 2004). Mubi South, comprises the following tribes: Fulani, Gude, Kamwe, and Godo-godo (Adebayo, 2004).

Sample:

The study population consists of primary school pupils, with a total of 100 samples collected, 50 in each of the schools (Girpata and Kwaccham), with 25 males and 25 females. A random sample was collected, consisting of 50 boys and 50 girls.

Stool Sample Collection

For the collection of samples, screw-capped and properly labeled plastic containers were distributed to 100 school pupils. Informed consent was obtained from teachers, parents, and the school authority.

Stool samples were collected from all 100 pupils, with 50 females and 50 males. They were given specimen bottles with tight-fitting caps for collecting. The bottles were returned the following day with fresh stool samples, which were taken to the biology laboratory and examined for *Ascaris lumbricoides* larvae and eggs. According to the World Health Organization (2000), the direct smear technique with normal saline was used. A thin and smooth preparation was made. The emulsified sample on the slide was covered with a coverslip and left for approximately 10 minutes to prevent bubble formation. The prepared slide, labeled for identification, was mounted on the microscope stage for examination. The prevalence of *Ascaris lumbricoides* among primary school pupils attending Kwaccham and Girpata was determined by age, sex, and location.

The specimens were identified by labels indicating code number, name, age, and sex. The containers were provided a day earlier, and the subjects were instructed to defecate in them the next morning. Precautions were taken to avoid diluting the samples with urine or water during collection. The specimens were collected and transferred to the Biology Laboratory in the Department of Biological Science and Technology at Federal Polytechnic, Mubi, Adamawa State for analysis.

Laboratory Diagnosis

A macroscopic examination of the stool was first performed to find evidence of blood, mucus, parasitic segments, or whole parasites. Saline wet mounts were prepared by adding a drop of normal saline to clean glass slides and mixing it with a small amount of stool. A coverslip was placed, and the slide was first viewed microscopically at low power (10X) to detect *trophozoites* and eggs, and then at high power (40X) for morphological details during analysis. All stool samples were processed with normal saline to increase the yield of *helminth* eggs (Efstratiou et al., 2017) during analysis. Saline preparations from each concentrated sample were examined similarly under 10X and 40X magnifications (Efstratiou et al., 2017).

Statistical analyses

Numerical data obtained from the samples were organized and summarized from the sample with the help of simple percentages.

Results

Table 1 shows that the prevalence of *Ascariasis lumbricoides* infection shows that the age group of 11-13 years, with a prevalence of 22.2%, while the age group of 5-10 years has the lowest prevalence, which is the lowest.

Age Range	Total No Examined	No infected individuals. %
5-10	46	10 (21.7%)
11-13	54	12 (22.2%)
Total	100	21 (21.0%)

Table 2 shows **that the** prevalence of *Ascariasis lumbricoides* infection *differs by sex*, with females having the highest infection rate at 24.0%, while males have the lowest infection rate at 20.0%.

Sex	Total No Examined	No Infected
Male	50	10 (20.0%)
Female	50	12 (24.0%)
Total	100	Total 100 22 (22.0%)

Table 3 shows **the** prevalence of *Ascaris lumbricoides* based on school location. It that Kwaccham Primary School has the highest infection rate of 22.0%, followed by Girpata Primary School, which has the lowest infection rate of 20.0%.

S/N	Name Of School	No Examined	No Infected%
1	Kwaccham	50	11 (22.0%)
2	Girpata	50	10 (20.0%)
3	Total	100	21 (21.0%)

Discussion

The study has shown the prevalence of *Ascariasis lumbricoides* in Kwaccham Primary School, Mubi South Local Government Area, to be 22.0%. The high prevalence could be attributed to a high level of indiscriminate defecation in the area, the high biotic potential of *Ascaris lumbricoides*, as well as the ability to withstand adverse conditions. The highest level of infection (22.0%) recorded in Primary School Kwaccham may be because the school in the area is very close to bushes. Bushes surround the school, and the houses around the school are less. This may likely predispose the pupils to defecate in bushes around them, where they also enter the bush and pick fruits (e.g., mango) which they eat most times without washing. Also, rain floods can carry some of the fecal matter from the bushes into the school playground (Croll et al., 2002). After playing, children use their dirty hands to eat whatever comes their way (e.g. Groundnuts (Croll et al., 2002).

The infection is more prevalent in children aged 11 - 13 years, maybe because this group of children go barefooted during outdoor activities and play mostly with sand. Moreover, their understanding of the dangers of insanitation is low. These, along with their habit of defecating and handling food,

are the behavioral factors involved in disease transmission. This observation confirms the reports by Mafiana (2005).

The study also indicates that females are more susceptible to infection than males. In Nigeria, the responsibility of maintaining cleanliness - of the kitchen, surroundings, and toilet, etc. mostly falls on girls. In villages, girls often accompany their mothers to weed the farms. The boys assist their fathers on the farm, but in most cases, they are sent on errands. In Yoruba land (Ogun State), girls are more likely than boys to help their mothers sell or hawk their goods. Therefore, in addition to general behaviors of children such as defecating indiscriminately, not washing hands, and eating unwashed fruits and other foods, the type of work assigned to a boy or girl outside of school activities can significantly impact the rate of *Ascaris* infection in different sexes (Gelpi et al., 2002).

Additionally, adult worms appear to interfere with normal metabolism by blocking the lumen, reducing the absorptive area, and destroying intestinal mucosa, likely through neutralizing pepsin and trypsin with an anti-enzyme. This interference can lead to reduced absorption of intestinal contents and ingestion of blood, causing ascariasis. Furthermore, ascariasis interferes with protein digestion in children and, in combination with hookworm infection, could cause and accentuate kwashiorkor. Therefore, it becomes a matter of urgency for the government to enlighten pupils and students of secondary schools, peasants in villages, and the general public about the need to maintain good personal hygiene and proper environmental sanitation. This can be achieved by using various media such as radio, television, and films, and public health in primary school curriculum development (Toutai et al., 2012).

Conclusion

The study of the prevalence of ascariasis (*Ascaris lumbricoides*) infection among pupils attending Kwaccham and Girpata Primary Schools in Mubi South, Adamawa State has been successfully conducted. In conclusion, the study revealed that the prevalence of *Ascariasis* in Kwaccham and Girpata, Mubi South Local Government Area, Adamawa State may be attributed to indiscriminate defecation, lack of good hygiene, absence of proper toilets in schools, and lack of good portable water.

Recommendation

- Children should be advised not to walk barefoot.
- The government and relevant authorities should assist the pupils in the area, as children are the future and hope of the nation.

Conflict of interest by the authors:

The authors declare that there are **no** conflicts of interest.

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