Status of Geohelminth Infections - Nine Years After Mass Administration of Medicine in Primary Schools in Nnewi, Anambra State

Mmekowulu Juliet Chinenye¹, Ekwunife Chinyere Angela¹, Okwelogo Izunna Somadina¹, Ekelozie Ifeoma Stella²

¹Department of Parasitology and Entomology, Nnamdi Azikiwe University, Awka, Anambra State
²Department of Medical Laboratory Science, Nnamdi Azikiwe University, Nnewi, Anambra State

Corresponding Author: Okwelogo Izunna Somadina
is.okwelogo@unizik.edu.ng

ABSTRACT

Geohelminths are known to be endemic in developing tropical countries. A study on the status of geohelminth infection, nine years after mass drug administration in medicine in primary schools, was carried out in Nnewi, Anambra State. **Objective:** The investigation was conducted to determine the prevalence of geohelminth infections among school-aged children and the status of the deworming exercise in Nnewi, Anambra State. **Methods:** The stool samples collected from 324 pupils aged 3-17 years in three primary schools were analyzed using normal saline and formalin-ether concentration techniques. **Results:** Overall prevalence of geohelminths in the area was 1.9%; no mixed infection was recorded among the pupils. The ova of geohelminth parasites detected were Hookworm 3(0.9%), A. lumbricoides of 2(0.6%) and T. trichiura 1(0.3%). Pupils attending Nnewichi Central School recorded the highest prevalence 4(3.5%) of infection in the three primary schools sampled. Children aged 9-11 years old were more infected with hookworm 2(2.3%), 1(1.2%) for A. lumbricoides followed by children aged 6-8 years. Male pupils 4(2.9%) were more infected than females 2(1.1%). From the questionnaire distributed, 241(74.4%) were dewormed, of which 216(89.6%) respondent said they were dewormed in school and home. This indicated that deworming exercise has been carried out in primary schools in Nnewi. **Conclusion:** From the study, the prevalence was low, this infers that deworming is effective and should be sustained at least once every year since children can be re-infected, the exercise should be complemented with Water Safety and Hygiene (WASH), health education and sanitation.

**Keywords:** Pupils, geohelminths, mass administration of medicine, deworming, Nnewi, Prevalence

1. INTRODUCTION

Geohelminths are a group of parasitic nematode worms causing human infection through contact with parasite eggs or larvae and are transmitted primarily through contaminated soil. There are four main nematode species of soil-transmitted helminth (STH) infections. They include Ascaris lumbricoides, Trichuris trichiura and two species of hookworms, (Necator americanus and Ancylostoma duodenale). These parasites are considered together because it is common for a single individual, especially children living in developing countries, to be chronically infected with all the three worms, such children have malnutrition, stunted growth, intellectual retardation, cognitive and educational
deficits\(^1\). Risk factors associated with soil-transmitted helminths especially in primary schools include indiscriminate defecation, open dumping of refuse, poor source of water and lack of health education\(^2\).

In 2001, the World Health Assembly passed a resolution urging member states to control the morbidity of soil-transmitted helminth infections through the large-scale use of anthelmintic drugs for school-aged children in less developed countries. In response to this resolution, most countries including Nigeria have started the exercise. Deworming exercise is sponsored by Anambra State Government in conjunction with United Nations Children Emergency Fund (UNICEF), Christian Aides and Shoulder for Gender Support. The investigation was conducted to determine the prevalence of geohelminth infections among school-aged children and the status of the deworming exercise in Nnewichi community, Anambra State.

2. METHODS

The study was carried in Nnewichi, Anambra State, Nigeria. Nnewi falls within the tropical rain forest region of Nigeria. Nnewi remains an area of rich agricultural produce and epicenter of business and manufacturing. The town is located East of River Niger and about 22 kilometers South East of Onitsha in Anambra State. Nnewi has four communities Otolo, Uruagu, Umudim, and Nnewichi. Nnewi is in 6º 1´ N Latitude, and Longitude 6º 55´ E. Rainfall is between April and October reaching its peak in July with a short break in August and average humidity of 90%. The main occupation of Nnewi people is trading and farming. Therefore they depend mainly on agriculture and commerce for their livelihood. This study is a cross-sectional survey of primary school pupils in Nnewichi, Anambra State to determine the status and prevalence of geohelminth infections nine years post-deworming exercise by Anambra State Government. Ethical consent was approved before the study commenced. Three out of the five primary schools in Nnewi were selected randomly for the study by balloting. They include Abubo Central School, Odida Central School, and Nnewichi Central School.

One hundred and seventeen (117) pupils were randomly selected from each school making a total of 351 pupils. Three hundred and fifty-one (351) specimen bottles for stool collection were distributed to the pupils, out of which three hundred and twenty-four (324) pupils returned their stool specimen for examination; Odida Central School (110), Abubo Central School (100) and Nnewichi Central School (114). Selected pupils were given a clean screw-capped, dry, well-labelled plastic specimen container and also questionnaires. Each pupil was given an instructed on how to collect the stool specimen with the container at home the next morning with the help of their parents and return it to school immediately. Those included in this study were pupils within age group 3 to 17 years old. The pupils were selected randomly from the different classes using the list of the pupil in their class register, every second pupil from the class register was selected to participate in the study. Thirteen pupils were selected from each class, making a total of 117 pupils from each school. Also, questionnaires were distributed to the civil servants in Nnewi North Local Government Ministry of Health Department. The stool specimens were examined in using normal saline wet mount, flotation and formalin-ether concentration methods\(^3\). Each stool sample was first examined and recorded for its consistency, color, and the presence of blood, mucus and adult worms. Data accruing from the study were analyzed using Statistical Package for Social Science (SPSS). Chi-square was used, as a statistical test of significance on the effect of the different variables on the observed worm infestation among school children. P-value was also determined at P < 0.05.

3. RESULTS

Three hundred and twenty-four pupils (137 males and 187 females) within the age group of 3 to 17 years old were randomly selected for the study. Six (1.9%) out of 324 examined stool samples were positive for various helminth eggs. Males had a higher prevalence 4(2.9%) when compared to the females 2(1%). This showed that the incidence of parasitic infection was not related to the gender of the subjects. There were no multiple infections in stool sample examined. Pupils with Hookworm infection had the highest prevalence of 3(0.9%) followed by Ascaris lumbricoides with 2(0.6%) and T. trichiura with 1(0.3%) respectively.
Table 1: Prevalence of parasitic infections in relation to gender

<table>
<thead>
<tr>
<th>Gender Distribution</th>
<th>Total Number Examined</th>
<th>Hookworm (%)</th>
<th>A. lumbricoides (%)</th>
<th>T. trichiura (%)</th>
<th>Total Positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>137</td>
<td>3(2.2)</td>
<td>1(0.7)</td>
<td>0(0)</td>
<td>4(2.9)</td>
</tr>
<tr>
<td>Female</td>
<td>187</td>
<td>0(0)</td>
<td>1(0.5)</td>
<td>1(0.5)</td>
<td>2(1.1)</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>3(0.9)</td>
<td>2(0.6)</td>
<td>1(0.3)</td>
<td>6(1.9)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 2.96; \text{df}= 1; p = 0.085 \)

The result from Table 1 showed that Nnewichi Central School had the highest prevalence of 4 (3.5%) followed by Abubo Central School with a prevalence of 1(1%) and Odida Central School with 1(0.9%) respectively. There was no significant difference in the prevalence of soil-transmitted helminth infections among studied public school \( (p = 0.265) \).

Table 2: Prevalence of geohelminth infection in relation to schools in Nnewichi

<table>
<thead>
<tr>
<th>Public School</th>
<th>Number Examined</th>
<th>Number positive (%)</th>
<th>Total positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Odida central school</td>
<td>110</td>
<td>0(0)</td>
<td>1(0.9)</td>
</tr>
<tr>
<td>Abubo central school</td>
<td>100</td>
<td>0(0)</td>
<td>1(1)</td>
</tr>
<tr>
<td>Nnewichi central school</td>
<td>114</td>
<td>2(1.75)</td>
<td>4(3.5)</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>2(0.6)</td>
<td>6(1.9)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 2.66; \text{df}= 2; p = 0.265 \)

Children aged 9-11 years old had the highest hookworm prevalence of 2(2.3%) while children aged 6-8 years had the highest prevalence of 1(1.2%) for T. trichiura and children aged 6-8 years and 9-11 years had highest prevalence of 1(1.2%) and 1(1.2%) for Ascaris lumbricoides (Table 3). There was no significant difference in prevalence of the parasites among the age groups \( (p= 0.118) \).

Table 3: Prevalence of parasitic infection in relation to age

<table>
<thead>
<tr>
<th>Age Distribution (years)</th>
<th>Total Number Examined</th>
<th>Hookworm (%)</th>
<th>A. lumbricoides (%)</th>
<th>T. trichiura (%)</th>
<th>Total Number Positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3-5</td>
<td>57</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>6-8</td>
<td>83</td>
<td>1(1.2)</td>
<td>1(1.2)</td>
<td>1(1.2)</td>
<td>3(3.6)</td>
</tr>
<tr>
<td>9-11</td>
<td>86</td>
<td>2(2.3)</td>
<td>1(1.2)</td>
<td>0(0)</td>
<td>3(3.5)</td>
</tr>
<tr>
<td>12-14</td>
<td>60</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>15-17</td>
<td>38</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
<td>0(0)</td>
</tr>
<tr>
<td>Total</td>
<td>324</td>
<td>3(0.9)</td>
<td>2(0.6)</td>
<td>1(0.3)</td>
<td>6(1.69)</td>
</tr>
</tbody>
</table>

\( \chi^2 = 7.360; \text{df}= 4; p = 0.118 \)

Two hundred and forty-one 241(74.4%) pupils responded they were dewormed, 70(21.6%) said no, while 13(4.0%) of them did not respond. 216(89.6%) responded that the drugs were given to them in school and 25(10.4%) said it was given to them at home. Among all the respondents dewormed in school, 209(96.8%) responded that the drug was distributed by Ministry of Health while 7(3.2%) did not respond, among those dewormed at home, 12(48%) received self-medication, 10(40%) received drug from hospital.
and 3(12%) did not respond. One hundred and ninety-one 191(20.7%) of respondents that were dewormed were not knowledgeable on the name of the drug that was given. but 50(79.3%) from the dewormed respondents were knowledgeable drug names. Twenty of them knew the name of the anthelminthic drug that was distributed. From the dewormed respondents, 141(58.5%) responded that they were dewormed in May 2015, 75(31.1%) of the respondents said that they were dewormed in June 2015 while 25 (10.4%) had no idea of the month they were dewormed.

4. DISCUSSION

The results of this study showed an overall 1.9% prevalence. Hookworm, Ascaris lumbricoides, and T. trichiura respectively recorded (0.9%), (0.6%), (0.3%) prevalence of soil-transmitted helminths among the subjects. This was contrary to the findings(4), who reported an overall prevalence of 48.08% in Ozubulu; 15.38% for A. lumbricoides, 5.77% for T. trichiura and 25.38% for hookworm infection. This low prevalence in this study and absence of mixed infection probably could be as a result of the present deworming exercise integrated into Maternal and Newborn Child Health Week carried out twice every year by Anambra State Government in collaboration with Christian Aides, United Nations Children’s Emergency Fund and Shoulder for Gender Support prior to the study. These findings are similar to the study of Aniwada(5) who reported a low prevalence of soil-transmitted helminth infections following deworming exercise in Enugu State of which Ascaris had a prevalence rate of 1.0%, 0.9% for hookworm and there was no mixed infection.

Male pupils were more infected than the females with a prevalence of 2.9% and 1% respectively. This may be due to peculiar male activities that enhance relative contact with the infective stage of the parasites. The results showed that the incidence of parasitic infection was not related to the gender of the subjects. This is in conformity with the study done by Odinaka(6) in Imo State, which recorded the prevalence of 38.4% for males and 21.1% for females, with the belief that male children are known to be more adventurous. Saka(7) recorded that female and male pupils had a prevalence rate of 26.5% and 31.9% respectively while Amaechi(8) noted that the prevalence was higher in males (82.0%) than females (71.4%). In contrast, Chukwuma(9) stated that the prevalence of the infection was higher in females (91.6%) than males (83%) in Ebenebe, Awka South L.G.A, Anambra State.

From the study, the prevalence of soil-transmitted helminth varied among different age groups. The age group 6-8 years and 9-11 years recorded higher prevalence rate of 3.6 % and 3.5% respectively, though there was no significant difference in prevalence among the age groups at 5% probability level (p = 0.118). Children in this age group engage in playing activities in a contaminated environment that could facilitate transmission of soil-transmitted helminths. These children tend to be less cautious of their personal hygiene because they are not old enough to understand the need for general cleanliness. Similar reasons have been adduced by Odinaka(6) who recorded the higher prevalence of 33.9% for the age group of 8-10 years. This could be as a result of adventurous and poor hygienic habit among the age group. Prevalence of geohelmint infection was highest among the age group 7 to 9 years old (37.2%)(10).

Their findings confirmed that intestinal helminthiasis is still a major problem in Nigerian environments. The soil-transmitted helminths found in the study group may be due to reinfection after the deworming exercise carried out annually in Nnewi. The findings showed that there was no multiple infections among the pupils examined, the result is in consonance with the result of Aniwada(5) that there was no multiple infections in the study. This result disagrees the findings carried out by Odinaka(6) where multiple infections occurred in 3.5% of the subjects. (8, 11) recorded polyparasitism in their various studies with a prevalence of 60.9% and 28.0% respectively. (4) Recorded mixed infection of 1.54% during their study in Ozubulu. The result from the questionnaires and focus discussion group showed that the deworming exercise was effectively carried out in schools and has been an annual event for the past nine years within Nnewi, Anambra State. Their responses showed that the deworming exercise was carried out effectively; the effect of this exercise was reflected on the low prevalence of soil-transmitted helminth and in the absence of multiple infections as seen in the tables. The effect of this exercise was reflected on the low prevalence of soil-transmitted helminth and in the absence of multiple infections.

5. CONCLUSION

The prevalence of soil-transmitted helminthic infection in the present study was low compared to
some studies in Nigeria. However, there is a need for continuation of regular deworming in the area to reduce the burden of soil-transmitted helminthiasis.

An important factor after mass drug administration is reinfection; there should be a follow-up to determine the status of geohelminth in the area subsequently.

REFERENCES