Full Length Research

Prevalence of intestinal helminths among primary school children in Chikun and Kaduna South Local Government areas of Kaduna state, Nigeria

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Intestinal parasitic infections have been the most important diseases in Tropical countries especially among primary school children, which affect their living potentials. This study was conducted to determine the prevalence of intestinal helminths among 400 pupils aged 6 to 13 years in eight primary schools in Chukun and Kaduna South, Local Government Areas, Kaduna State, Nigeria. A cross-sectional study was used in the survey. Four private and four public schools were selected for the study. The pupils in each particular class in a school were randomly selected. A total of 400 stool samples were collected and analyzed for ova/larvae of intestinal helminths using direct wet mount and formaldehyde-ether concentration techniques. Out of 400 samples examined, 63 (15.75%) were positive for parasitic infection. Of the 63 positive cases, four different types of helminths were encountered namely; Ascaris lumbricoides 33 (52.4%), Hookworm 14 (22.2%) Taenia spp 12 (19.0%) and Schistosoma mansoni 4 (6.3%). Mixed parasitism was also encountered. Helminthic infection rate was higher among males (18.5%) than female pupils (13.2%). Pupils within the group 8 to 9 years had the highest prevalence (42.0%) which decreased with increase in age. The rate of infection was significantly higher in the rainy season than the dry season (P = 0.003). This was also higher among those whose parents were farmers and traders than those of civil servants and artisans. Intestinal infection was also higher among pupils who used nearby bushes for defecation than those who used pit latrines and water system (flush). The rate of infection was also significantly higher among those pupils who never wash their vegetables and fruits before consumption than those who sometimes and always do (P = 0.05). The high prevalence found in this study indicates that intestinal helminths infection is still in existence among the pupils in primary school children.

Key words: Prevalence, intestinal helminths, children, microscopy.

INTRODUCTION

Most parasitic diseases of the intestines have been recognized as important public health problems in Tropical Africa (Adeyeba, 1986; Gbakima et al., 1994). Disease due to intestinal parasites are among the most prevalent human infections affecting approximately one quarter of the world’s population mainly of school age children due to their poor sanitation condition coupled with their eating habits (Bradley and Giles, 1984; Murray and Lopez, 1994). Intestinal parasitic infections are very common in Nigeria and important because of the high rates of morbidity and sometimes mortality recorded among children in Nigerian towns and villages (Adedoyin et al., 1980; Meremikwu et al.,
These are mostly the major problems in rural settlements in Nigeria because of their poor socio-economic status and lack of basic amenities, such as water and toilet facilities (Okon and Oku, 2001; Uchenna et al., 2005).

The intestinal helminthes of major medical importance are Ascaris lumbricoides, Enterobius vermicularis, Strongyloides stercoralis, Trichuris trichiura, Ancylostoma duodenale, Necator americanus and Schistosoma, mansoni (Cheesbrough, 1998). Helminthiasis occur usually asymptotically or produce only mild symptoms, which are often neglected until serious complication or chronic clinical picture appear (Xulong et al., 1995). Ogunba and Aedegeji (1986) reported that helminths can be readily demonstrated in fresh vegetables and other food items consumed raw due to polluted eggs containing the infective larval form. The habit of eating raw food is common among children of primary school ages who are not being given proper orientation about table manners.

The mode of distribution of these intestinal parasites is dependent upon their route of transmission and environmental factors (Crompton and Savioli, 1993; Okoronkwo and Zoakah 1997; Inabo et al., 2000). Bhattacharya et al. (1992) attributed the variations in endemicity and frequencies of the infections to different factors of ecological zones. In endemic countries, most especially in rural communities, semi-urban settlement and urban slums, high percentages of gastro intestinal parasites infections are observed (Fashuyi, 1992). Rural areas have been found to be very suitable for the transmission of these parasites because of ignorance and poor environmental hygien (Galadima and Olatunde, 1987; Suswam et al., 1992). Certain factors such as inadequate health education, poverty and conducive environmental conditions promote the spread of such parasitic infection (Crompton and Savioli, 1993; Oyerinde et al., 1981).

Studies on the prevalence of intestinal parasites infection among different groups of individuals have been observed in Nigeria and other parts of the world (Adyeyba, 1986; Okon and Oku, 2001; Inabo et al., 2000; Galadima and Olatunde, 1987; Rajeswari et al., 1994). Okpala (1961) found a prevalence of 85.1% among some school children in Lagos, prevalence of intestinal parasites among Ilorin School children was 70.8% (Awogun, 1984). Although a lot of research has been carried out in different parts of the world on helminthiasis, most rural communities having these diseases are yet unidentified and unstudied. There is a need to determine the prevalence of intestinal helminthes in these Local Government Areas (LGAs) of Kaduna state because there is little or no information on these parasites.

MATERIALS AND METHODS

Ethical consideration

Approval for the study was obtained from the Secretary, Local Government Education Authority (LGEA), in case of public schools while that of private schools was from their Directors. Parents of all children were informed about the study and asked to consent to their children participation. The participating pupils were given biscuits, sweets and chewing gum to motivate them. Infected pupils were advised to go for immediate treatment.

Faecal samples collection

Transparent, wide mouthed, corked, clean, labeled bottles were given to the pupils for the collection of their stool samples, which were submitted that same day. The pupils were taught how to collect stool samples and with the aid of their teachers, the questionnaires were correctly filled. The stool samples were properly labeled and were carried in a container filled with ice packs and transported to the laboratory of the department of microbiology, Gwana Awan General Hospital Kakuri, Kaduna for analysis. A total of 400 stool samples were collected from the four locations with 100 samples from each location. Of these, 185 samples were collected in the wet season and 215 in the dry season.

Faecal sample analysis

The diagnosis of intestinal parasite was confirmed by the recovery of helminths eggs and larvae from each stool sample in the laboratory. Two methods
were used in the identification of these parasites.

1. Direct Wet Mount for preliminary investigation and detection of heavy infection (Intensity). The direct wet mount technique involved placing a drop of fresh physiological saline at the centre of a clean grease-free glass slide. With the aid of applicator stick, little amount of the faecal specimen was picked and placed in the saline preparation. It was emulsified thoroughly removing any debris. The entire preparation was then covered with cover-slip taking care that no air bubbles were trapped. The preparation was observed under ×10 objective and ×40 objective of the microscope for confirmation.

2. Concentration method - For the confirmation of eggs and larvae in light infection.

The Formol-Ether concentration method was also employed to increase the probability of finding the parasites in faecal samples (Murray et al., 1990). One gram of faeces was suspended in 10 ml of 10% formol-saline solution and mixed with a glass rod. The suspension was passed through a funnel covered with a wire gauze pad into a centrifuge tube. Then 3 ml of ether were added and the suspension was mixed for 1 min. The tubes were centrifuged for 2 min at 2,500 rpm, after which the supernatant was discarded and the sediment examined for ova or larvae. After mixing the sediment with the aid of a Pasteur pipette, a drop was placed on a glass slide. The deposit was then examined using ×10 and ×40 objectives of the compound microscope.

RESULTS

Out of the 400 stool sampled, a total of 63 (15.8%) intestinal helminths infection were recorded among the primary school children. The positive cases of individual parasites were A. limbricoides 33 (8.3%), A. duodenale 14 (3.5%), T. species 12 (3.0%), 4 (1.0%) S. mansoni and 2 (0.5%) Helminths combination. The results in Table 1 show that the prevalence of the intestinal helminths were statistically associated with age (P = 0.03). The rate of infection decreased with age except for age 6 to 7 (15.8%). Intestinal helminths infection was higher among those who do not compared to those who always or sometimes wash vegetables and fruits. This difference was statistically significant (P = 0.05). This was however not associated with occupation (P = 0.15), type of toilet facility used (P = 0.45) and source of drinking water (P = 0.55) (Tables 2 and 3).

In Table 4, the prevalence of intestinal helminths was significantly higher in the wet than in the dry season (P = 0.003). The result showed significant association with seasonal variation (P < 0.05).

DISCUSSION

Different factors contribute to the prevalence of intestinal parasites among a given population, the
Table 3. Prevalence of intestinal helminths among school children in relation to sanitary standards and habits of children.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>NE</th>
<th>NP (%)</th>
<th>X²</th>
<th>Df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toilet facility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Flush</td>
<td>190</td>
<td>30 (15.8)</td>
<td>1.615</td>
<td>2</td>
<td>0.45</td>
</tr>
<tr>
<td>Pit</td>
<td>200</td>
<td>3 (15.0)</td>
<td>1.197</td>
<td>2</td>
<td>0.55</td>
</tr>
<tr>
<td>Bush</td>
<td>10</td>
<td>3 (30.0)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sources of drinking water</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tap</td>
<td>229</td>
<td>30 (13.1)</td>
<td>1.197</td>
<td>2</td>
<td>0.55</td>
</tr>
<tr>
<td>Well</td>
<td>140</td>
<td>24 (17.9)</td>
<td>1.197</td>
<td>2</td>
<td>0.55</td>
</tr>
<tr>
<td>Stream</td>
<td>31</td>
<td>8 (25.8)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Washing vegetable and fruits</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Always</td>
<td>206</td>
<td>33 (16.0)</td>
<td>5.854</td>
<td>2</td>
<td>0.05</td>
</tr>
<tr>
<td>Sometimes</td>
<td>117</td>
<td>23 (19.65)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>77</td>
<td>17 (22.0)</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

NP = Number positive; NE = Number examined.

Table 4. Seasonal prevalence of intestinal helmenth infection by sex and age.

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Wet season (NE)</th>
<th>NP (%)</th>
<th>Dry season NE</th>
<th>NP (%)</th>
<th>X²</th>
<th>df</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>75</td>
<td>20 (26.6)</td>
<td>120</td>
<td>16(13.3)</td>
<td>8.942</td>
<td>1</td>
<td>0.003</td>
</tr>
<tr>
<td>Female</td>
<td>110</td>
<td>20 (18.2)</td>
<td>95</td>
<td>7(7.4)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6-7</td>
<td>50</td>
<td>12(24.0)</td>
<td>45</td>
<td>3(6.6)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8-9</td>
<td>43</td>
<td>9(20.9)</td>
<td>60</td>
<td>11(18.3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10-11</td>
<td>60</td>
<td>10(16.7)</td>
<td>62</td>
<td>7(11.3)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12-13</td>
<td>42</td>
<td>5(11.9)</td>
<td>38</td>
<td>6(15.7)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

NP = Number positive; NE = Number examined.

most important being environmental, parasites and host factors Cheesbrough (1998). The results generally show a low level of intestinal parasitic infection in the study population (15.75%) when compared to 62.9% obtained in Malaysia and 73.36 in India (Rajeswari et al., 1994; Wani and Ahmad, 2009). Similarly, Oyerinde et al. (1981) recorded a prevalence rate of 89.5% in Lagos state, Nigeria while Awogun (1984) observed a prevalence rate of 70.8% in Ilorin, Nigeria. The low infection rate recorded in this study is similar to the prevalence rate of 16.9% observed by Chigozie et, al. (2007) in South Eastern Nigeria. The variability in prevalence could be as a result of low sanitary standard and personal hygiene in the study area.

The result of this study is in agreement with the one documented previously by Chigozie et al. (2007). They observed a high prevalence of A. lumbricoides among the school children because of contamination of their hands with polluted soil, which often contain the infective eggs of the parasites, thereby enhancing transmission from hand to mouth. The prevalence of hookworm infections also could be as a result of the children not wearing protective shoes as a cover while playing within and outside school premises in the
study area. The prevalence of taeniasis also could be related to the consumption of raw or improperly cooked meat (beef and pork) by the children.

In the current study, the age group 8 to 9 years was the most affected while the age group 12 to 13 years was the least affected. The differences in infection rates between the age group was statistically significant (P = 0.03). This is in agreement with earlier report that infection disease was much with age of the pupils (Asaolu et al., 1992; Sakti et al., 1999; Budy, 1990). This survey revealed a decrease in infection rate as the age of the pupil increased. This could be attributed to the increased public health awareness of the danger of intestinal helminthiasis as the children grow older.

The distribution of intestinal helminths infection was associated with parental occupation. The preponderance of the infection in farmer's children may be due to poor sanitation, frequent contact with polluted soils. Most of the children of farmers and traders live in rural areas. Therefore, there is tendency of their acquiring intestinal helmintiasis in these rural communities (Okon and Oku, 2001). Children are known to defaecate indiscriminately in the environment and this may serve as a source of helminths infections.

The result of the current study is in agreement with previous report that major behavioral factors play a role in disease transmission (Habbari et al., 1990). Non washing of vegetables and fruits with unclean water before eating was found to be a risk factor. Thorough washing of fruits and vegetable with clean potable water reduces the risk of infection. Uchenna et al. (2005) observed that these vegetables are normally cultivated in open farms where people defaecate and where untreated refuse are also used as manure. These coupled with the absence of clean portable water to wash the vegetables and fruits, probably accounted for the helminthiasis prevalence.

The higher prevalence of infection recorded in those children that use the bush to pass excreta against users of pit latrines and water system toilets could be explained by the fact that poor personal hygiene and usage of faecally contaminated soil and water contribute to high levels of soil transmitted helminths infection. These observations were also made by Chigozie et al. (2007) and Obiukwu et al. (2008). Furthermore, illiteracy, poverty and associated poor environmental sanitation practices have been implicated in the heavy burden of helminthiasis among children. Uwen et al. (2008) observed in their study that the pit latrines of the school were so dirty that the pupils preferred to defecate in the surrounding bush close to public school compound. During this study, it was observed that there was no wash-hand basin and soap for pupils to wash their hands after using the toilet. The presence of garbage piles around the school compound could also serve as a source of infection.

The association between sources of drinking water and infection with intestinal helminths was not significant both in public and private schools. However, pupils who use stream and well water had higher prevalence than those who used tap water. In another report, Wani and Ahmad (2009) observed that children drinking water from well were found to have a greater prevalence of infection than those who had access to tap water. Poor hygiene practices associated with access to faecally contaminated water is a highly probable risk factor for increased parasitic infection (Omar et al., 1995). This is however in contrast to the report of Agi (1997) in the Niger-Delta region. This was attributed to the fact that water supplied in taps were not properly treated or contaminated before usage.

The higher prevalence of helminthiasis in the wet season recorded in this study is not surprising because it is well established that well or damp soil favours the embrayonation of helminths thereby making them to thrive well in rainy season (Chigozie et al., 2007), while the low rate of intestinal helminths infection observed in dry season might be due to desiccation of ova as a result of high temperature and low humidity.

Based on these findings, efforts must be made to create better sanitary and toilet facilities in schools at all times to avoid indiscriminate defecation that could lead to the transmission of helminthic infections. The government, non-governmental agencies and private individuals should help in the provision of these social amenities to ensure total eradication of these diseases. The teaching of health education in both public and private schools should be encouraged by the government. Also, children should be educated on the need to always observe good hygienic practices and behavioral
activities both at school and homes. Parents should teach their children about the dangers of playing in contaminated soil and walking barefooted. The prevalence of intestinal parasites in indiscriminately passed faeces in the area should be studied to establish the possible sources of the infections.

REFERENCES


