URINARY SCHISTOSOMIASIS AMONG KINDERGARTEN AND PRIMARY SCHOOL CHILDREN IN OKPECHI COMMUNITY, CROSS RIVER STATE, NIGERIA: A PRELIMINARY STUDY


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Abstract
Preliminary studies on schistosomiasis and its snail vectors were carried out between October 2010 – May 2011 among Kindergarten and Primary School children in Okpechi, a rural community on the North western border of Cross river State, Nigeria. The inhabitants of Okpechi village are predominantly farmers, with only one stream, a well and some ponds as sources of water. Of the 258 urine specimens examined from these pupils, 52 (20.2%) were positive with schistosoma haematobium ova. The prevalence of infection among boys 32(20.8%) and girls 20(19.2%) were comparable (x² test: P<0.05). Prevalence and intensity of infection increased significantly (x² test: P<0.001) with age. There was no significant difference (x² test: P<0.05) between intensity in boys (9.8 eggs/10ml urine) and girls (8.2 eggs/10ml urine). Among the children, 37.6% and 32.2% had haematuria and proteinuria respectively, and this was not gender specific (t-test: P<0.05). A total of four species of snails, Bulinus globosus B. truncatus, B. forskali, and B. natalensis, were identified with B. globosus being the most abundant.

Keywords: Kindergarten, Primary, schistosomiasis, children, Okpechi, Nigeria.

INTRODUCTION
Schistosomiasis is a parasitic disease caused by fluke worms called schistosomes (Lwambo, 1988 and Anosike et al, 2006). Schistosoma haematobium, S. mansoni and S. japonicum are the most important and widespread parasites of man, while S. mekongi and S. intercalatum have a localized distribution (Rollinson & Vaughan, 1998). Schistosomiasis is endemic in 76 tropical and subtropical countries with more than 700 million people at risk of infection due to their occupational activities, which exposed them to water infection with the snail intermediate host (Nanvya et al, 2011). There are two types of schistosomiasis, namely, urinary schistosomiasis (Bilhaziasis) which is caused by S. haematobium and intestinal schistosomiasis caused by S. mansoni and S. japonicum (Ukoli, 1990). Urinary and intestinal schistosomiasis are endemic in Nigeria, particularly in rural areas among primary and kindergarten school children (Ukoli, 1990; Ozumba et al, 1989, Ejezie et al, 1991, Adewunmi et al, 1991; Okoli and Odaibo 1999, Opara et al, 2001, Mafiana et al, 2003; Ekpo and Mafiana, 2004).

Reports on schistosomiasis showed that different levels of infection have been documented in many parts of Nigeria (Cowpers, 1963; Dakul et al, 1997; and Houmsou et al, 2010). 50%, 8%, 0.67%, 4.6%, 62.4%, 40.2%, 22.%, 45.4%, 58.8% and 50.0% have been reported in Jos Plateau, Larto area, Jos, Panskin, Shendam, Qua’anpan, Lantang South and Langtang South respectively (Cowpers, 1996, Akusangwe et al, 1996 Okpala et al, 2004; Goselle et al, 2010). Other infection levels reported are 5.5%, 21.1%, 19.8%, 44% in Oyo State, Ebonyi State and Cross River respectively (Akinboye et al, 2011; Anosike et al, 2006 and Opara et al, 2007). Both S. mansoni and S.
haematobium are endemic in Nigeria with the latter being more widely distributed (Wilkins, 1997).

Despite much research work on schistosomiasis, a lot more research need to be done to discover new endemic areas. This study was undertaken to determine the prevalence and intensity of schistosomiasis among primary and kindergarten school children in a rural community of Okpechi on the North-western border of Cross River State, Nigeria.

MATERIALS AND METHODS

The study was carried out in Okpechi, a rural community on the North-western border of Cross River State, Nigeria, between October, 2010 and May, 2011. Cross River State occupies an area lying between latitude 5°32' and 4°27'N and longitude 7°50' and 9°28'E. Okpechi is an agrarian community specialized in the cultivation of yams, cassava, plantain and maize. Pupils attending Okpechi primary school made up the core population of the study.

The community head of Okpechi was informed about the Public Health importance of the study. The exercise was hosted in the chief’s palace. The chief ensured that the cooperation of the headmaster, class teachers and parents were obtained for the study.

SAMPLE COLLECTION

Urine samples were collected from pupils recruited for the study with specimen bottles labeled with the needed information on age, sex and name of students. This was carried out between 10.00 hours and 13.00 hours during which maximum egg output is likely (Pugh and Gilles, 1997). Pupils whose ages ranged between 12 to 20 years were advised to discard the first stream of urine and also exert some pressure on their pelvic muscles so that the very last drop of urine was included in the samples (Akinboye et al, 2011). In respect of children below 5 years, parents were advised by the researcher to collect any voided urine into dark plastic bowls at the specified time above.

SNAIL SAMPLING

Snail samples were collected from the Ekakang stream in Okpechi with a metal scoop net. Sampling was carried out in the morning hours between 9.00 hours and 11.00 hours and in the evening between 16.00 hours and 18 hours. The natural vegetation was noted at points where snail samples were obtained. Snails collected were taken into glass jars transported to CRUTECH Biology laboratory for examination and identification. Identification of snails was done using the keys of Franden et al, (1980).

INFECTION OF SNAILS

Single snails harvested from Ekakang stream, were placed in glass jars containing a mixture of dechlorinated stream water. These were exposed to laboratory bench lamps before examining the shedding of cercariae with hand lens.

PARASITOLOGICAL EXAMINATION OF URINE

Haematuria and proteinuria were detected in urine samples in the field within 2 hours of collection, using dipsticks. The reagent end of the dipstick was dipped into fresh urine for 45 seconds after which the test areas were compared with the standard coloured chart provided by the manufacturers. Haematuria was graded as positive when 3 to 20 erythrocytes were detected per microlitre (µl) of urine, moderately positive by presence of 50RBC/µl and highly positive by presence of more than 250 RBC/µl. Proteinuria was graded according to the concentration of protein per µl of urine. Therefore the presence of 30mg/ µl was regarded as “trace”, and 100mg/ µl as “positive and 300mg/ µl as “strongly positive”. After the detection of haematuria and proteinuria, all urine samples were transported to the laboratory for detection of S. haematobium ova.

The urine samples were subjected to ordinary centrifugation sedimentation techniques (WHO, 1991). Ten milliliters of urine was taken from the deposit of each specimen bottle and centrifuged at 3,000 rounds per minute (r.p.m.) for 5 minutes. The supernatant was decanted, and the sediment spread on a grease-free glass slide and covered with a cover slip. This was viewed under a binocular microscope using magnifications 10 and 40 to detect the presence of S. haematobium ova describe as golden yellowish and elliptical in shape, with characteristic terminal spines (Soulbsy, 1982). The eggs were counted and expressed as number of egg per 10 millilitres of urine (egg/10ml). The intensity of infection was graded as low if less or equal to 50 eggs/10ml and high when more than 100 eggs/10ml of urine (WHO, 1983).

RESULT

A total of 258 urine samples were examined, 64 from kindergarten children below 5 years, and 194 from primary school children in Okpechi. Out of these, 52 (20.2%) were found to be positive for S. haematobium ova (Table 1). Infection occurred among all age groups of both sexes and were comparable between boys (32 or 20.8%) and girls (20 or 19.2%). This was not statistically significant (x² = 3.492, df = 4, p>0.05). The rate of infection increased progressively with age with the highest infection rate (40.0%) in pupils above 20 -years-old. The lowest infection rate (12.5%) was observed among the 6-10 years old.
pupils (Table 1).

Table 2 illustrates the relationship between egg count, haematuria, and proteinuria among the pupils. The total haematuria prevalence rate was 37.6%. There was no significant difference ($x^2 = 9.2, df = 4, P > 0.05$) in haematuria prevalence rate between boys (22.5%) and girls (17.4%). The overall proteinuria rate was 32.2%. The boys had a higher proteinuria rate (17.8%) than girls (14.3%). There was no significant difference ($x^2 = 1.78, df = 4, P > 0.05$) in proteinuria prevalence rate between boys (17.8%) and girls (14.3%). There was variation in the intensity of egg count between age groups. The overall mean egg count ranges from 5.7 to 12.9 eggs/10ml urine. There was strong correlation between the intensity of infection of S. haematobium and the existence of haematuria ($r = 0.56$) and proteinuria ($r = 0.77$) among children in Okpechi.

The investigation result of snails revealed the presence of four species in the study area, namely, Bulinus globosus, B. forskali, B. truncatus and B. natalensis (Table 3). Bulinus globosus was the most abundant species found in the study area and Lymnaea natalensis the least.

**DISCUSSION**

As revealed by this preliminary investigation, pupils in Okpechi kindergartens and primary school showed moderate infection with S. haematobium, and overall prevalence of 20.2%. This conformed with the report of Anosike et al. (2006) in parts of Ebonyi State, (21.1%), Opara et al. (2007) in Cross River State (19.1%), Anosike et al. (2000) in parts of Ebonyi State (21.5%) and Khallaayoune and Lamrani (1992) in Morocco (21.2%). A lower prevalence rate has been reported by Akinbode et al. (2011) in Oyo State (5.5%) and Arene et al. (1989) in Port Harcourt (5.7%). In contrast to these moderate and low prevalence rates, Nanvya et al. (2011) recorded a high prevalence of (41.3%) in Plateau State, while Biu et al. (2009) reported 51 -63% in Zamfara State. The prevalence rate of 20.2% recorded in this study area is of public health concern in view of damages to the gentitilia and cost of control intervention.

This moderate prevalence could be due to the swimming activities of pupils in Ekakang stream. Infection in children is mainly due to their swimming activities when they accompany their mothers to the stream and during crossing of rivers and streams as they wade across (Anosike et al., 2006, Opara et al., 2007; Akinbode et al., 2011, Mafiana et al., 2003; Blu et al. 2009). The rate of S. haematobium infection increased progressively with age as has been reported elsewhere (Opara et al., 2007; Akinbode et al., 2011). The age-related prevalence could be attributed to the higher propensity of children going out for swimming, bathing, and washing of clothes as they grow older. Secondly, older children spend more time in swimming than younger ones. (Akinbode et al., 2011; Nanvya et al., 2011, Opara et al., 2007; Okoli & Odaibo, 1999). The sex-related prevalence of infection showed no gender specificity. This was because girls were not restricted from most water activities such as fishing, farming and swimming that boys engaged in.

This result is in contrast with the observation of Nanvya et al. (2011) in Plateau State. However, the pupils in Okpechi primary school visit Ekakang stream in groups to fetch drinking water and carry out other domestic activities. Aside this, pupils accompany their parents to farms where they work in several swampy areas where they contact infection in these infected water bodies (Udonsi, 1990; Okoli & Odaibo, 1999; Anosike et al., 2001, 2007).

Furthermore, despite the close proximity of Obubra general hospital across the river, there is no community-based control programme targeted at enlightening the people on the aetiologies of this disease. These factors could be responsible for the moderate prevalence of

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### Table 1: Number (%) of ova positive urine among kindergarten and primary school children in Okpechi village

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number examined</th>
<th>Boys</th>
<th>Ova positive (%)</th>
<th>Girls</th>
<th>Ova positive (%)</th>
<th>Total</th>
<th>Ova positive (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;5</td>
<td>36</td>
<td>28</td>
<td>8(22.2)</td>
<td>4(14.3)</td>
<td>6(16.7)</td>
<td>34</td>
<td>12(18.8)</td>
</tr>
<tr>
<td>6-10</td>
<td>28</td>
<td>16</td>
<td>4(14.3)</td>
<td>2(12.5)</td>
<td>44</td>
<td>42</td>
<td>6(14.3)</td>
</tr>
<tr>
<td>11-15</td>
<td>32</td>
<td>18</td>
<td>5(15.6)</td>
<td>3(16.7)</td>
<td>50</td>
<td>21</td>
<td>8(16.0)</td>
</tr>
<tr>
<td>16+</td>
<td>38</td>
<td>24</td>
<td>5(20.8)</td>
<td>4(18.2)</td>
<td>62</td>
<td>28</td>
<td>12(15.4)</td>
</tr>
<tr>
<td>Total</td>
<td>154</td>
<td>104</td>
<td>32(20.8)</td>
<td>16(33.3)</td>
<td>38</td>
<td>147</td>
<td>52(26.2)</td>
</tr>
</tbody>
</table>

### Table 2: Prevalence (%) of mean intensity of egg count, haematuria and proteinuria according to age and gender.

<table>
<thead>
<tr>
<th>Age group</th>
<th>Number examined</th>
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<td>147</td>
<td>52(26.2)</td>
</tr>
</tbody>
</table>

### Table 3: Infection rates of schistosome in fresh water snails collected from Ekakang stream

<table>
<thead>
<tr>
<th>Species</th>
<th>No. of snails</th>
<th>No. infected (%)</th>
<th>Total count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulinus globosus</td>
<td>120</td>
<td>13(10.8)</td>
<td></td>
</tr>
<tr>
<td>Bulinus forskali</td>
<td>63</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bulinus truncatus</td>
<td>18</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Lymnaea natalensis</td>
<td>4</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>205</td>
<td>13(6.3)</td>
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</table>
S. haematobium in these pupils.

This study observed that more than half of the sampled pupils were not aware of the causative agent of schistosomiasis which is similar to report from Ebonyi State, Oyo State and Plateau State (Goselle et al. 2010; Anosike et al. 2006).

Result from the snail survey revealed a low infection rate (6.3%) of Bulinus globosus, the proven intermediate host of S. haematobium (Wilkins, 1977; Anosike et al., 2001). This low prevalence is indicative of infection rate of S. haematobium among primary school pupils in Okpechi, compared to the high intensity reported from other parts of the country (Cowper, 1963; Houmsou et al., 2010).

There was moderate haematuria and proteinuria prevalence among the studied population, with no significant difference in prevalence rate between boys and girls. It was observed that haematuria has existed long ago in Okpechi village and that is probably why the name ‘Ntitagha’ for urine with blood is a common household word. It was therefore not surprising that all the sampled age groups had pupils with various levels of infection. Haematuria and proteinuria are recognized clinical signs of urinary schistosomiasis (Mafiana et al. 2003; Anosike et al., 2006; Opara et al., 2007).

This apparent haematuria and proteinuria infection among the kindergarten and primary school pupils showed that urinary schistosomiasis is endemic and of Public Health concern in the study area. Although the people of Okpechi have lived with haematuria, control intervention is hampered by lack of knowledge of the aetiological agent, cost of diagnosis and praziquantel - the drug of choice.

We therefore recommend sound Public Health education programme as well as price reduction in cost of diagnosis and of praziquantel to reduce the worm burden in the study area.

ACKNOWLEDGEMENT

The authors sincerely thank the village head of Okpechi Chief Ovarr Asibeng and his subordinates, as well as the headmaster of Okpechi primary school, for mobilizing their subjects and pupils to participate in this study.

REFERENCES


