Reliability Of Self-Reported Blood In Urine For Diagnosis Of Schistosoma Haematobium In A Community In South-Eastern Nigeria
O Okon, A Ememayom, K Opara

Abstract
The present study assessed the value of self-reported blood in urine as a tool to estimate the prevalence of infection with Schistosoma haematobium. A questionnaire which sought questions about blood in urine was administered to 150 school children from Adim, Cross River State, Nigeria. Each child also provided a urine sample that was parasitologically processed for eggs of S. haematobium. The prevalence of self-reported blood in urine was 82 (54.7%) while the laboratory diagnosis revealed a prevalence of 68 (45.3%) \( P>0.05 \). The prevalence of self-reported blood in urine correlated positively \( (r = 0.833; p<.05) \) with the prevalence of infection determined by microscopy. There was no significant difference between infection and gender \( (P>0.05) \). The peak prevalence was observed among children aged between 7 –8 years old. This finding suggest that self-reported blood in urine might provide a reliable tool for identifying schools and communities with high prevalence of S. haematobium infection. This will be of immense benefits to any control programme in the distribution of the drug of choice praziquantel to endemic communities.

INTRODUCTION
Urinary schistosomiasis is caused by Schistosoma haematobium. It is an occupational disease acquired by man through water related activities such as washing, fishing, bathing and recreation \(^{1}\). Due to lack of information or insufficient attention to hygiene, infected individuals may contaminate their water supply with urine. The disease can be diagnosed by the presence of blood in urine (haemathuria) and the presence of the schistosome ova in the urine of the infected person. Urinary schistosomiasis has been known as a serious public health problem in Nigeria since the early part of this century \(^{2}\). Schistosomiasis is classified as the second most important parasitic disease with over 200 million people being infected in 74 countries worldwide \(^{3}\).

In Nigeria, there is a wide distribution of the disease with numerous endemic foci particularly in rural riverine areas where infection rate as high as 90% have been reported \(^{1}\). Studies in Nigeria indicate that the disease may be increasing in prevalence and importance particularly in remote poorly accessible rural communities \(^{4,5,6}\).

There are recent reports of urinary schistosomiasis in Nigeria \(^{7,8,9,10,11,12,13}\).

Presently, the drug of choice for the control of urinary schistosomiasis is praziquantel. It is not cost-effective to distribute the drug amongst all individuals living in endemic communities, so it is necessary to devise a quick technique for assessing infected persons in endemic communities before distribution. This would reduce the laborious, time-consuming, laboratory screening of urine samples to ascertain the presence of ova of S. haematobium. Hence, the main objective of this research was to assess the reliability of self-reported blood in urine for individual diagnosis of S. haematobium among school children in Adim community, Biase Local Government Area located in the South Eastern Nigeria.

MATERIALS AND METHODS
DESCRIPTION OF STUDY AREA
This survey was carried out in the Presbyterian Primary School, Adim, Biase Local Government Area of Cross River State, Nigeria. Samples were obtained from a random selection of Primary School children aged 7 – 13 years.

Adim village is a rural community with population of 9,612 people made up of mainly peasant farmers. Adim is located
in the South Eastern part of Nigeria near the Atlantic Ocean. There is no pipe borne water and villagers depend on various streams and ponds for their water-related activities. There are also no proper toilet facilities, hence individuals defecate and urinate indiscriminately in their surrounding environments and water bodies. A detailed description of the study site is given elsewhere.

**SUBJECTS AND CONSENT**

The study was conducted in the Presbyterian Primary School, Adim. One hundred and fifty pupils were randomly selected from the school to participate in the study. The Cross River State Ministry of health approved the study. The Village Head (Onum) and headmaster were briefed on the significance of the study, thereafter consent was sought and obtained from the parents/guardians of the children.

**SAMPLE ANALYSIS**

Labelled sample bottles were used to collect terminal urine between 11.00 and 14.00 hours from the pupils. Selection of the 150 pupils was randomized for both age and sex with representative from different classes. Samples were collected from December 2004 to February, 2005.

After urinalysis, 10ml of urine was preserved in four drops of commercial bleach. The 10ml of preserved urine was poured into a centrifuged tube (Health Universal 11 Model) at 5000 rpm for five minutes. The supernatant was decanted and the deposit at the bottom of the tube. The deposits were viewed under the compound microscope with x10 objective to identify the S. haematobium. A tally counter was used to count the eggs as the microscopic field was moved and the total number of eggs found in each 10ml of urine sample was recorded. Questionnaires were also administered to determine individuals who reported blood in their urine. This was to assist in the determination of individuals for self-diagnosis.

**DATA ANALYSIS**

A $\chi^2$ test was used to determine any significant different between those that reported blood in urine and those screened by laboratory techniques, and also between males subjects and female subjects examined in this study, while linear correlation was used to test for relationship between prevalence of self-reported blood in urine and prevalence of infection determined by microscopy.

**RESULTS**

From the laboratory diagnosis, the overall prevalence of S. haematobium in the study population was 68 (45.33%) (Table 1). From the questionnaire analysis, the overall prevalence of S. haematobium as a result of self-reported blood in urine was 82 (54.67%) (Table 1). The number of individuals diagnosed for S. haematobium through laboratory test and those diagnosed through self-reported blood in urine showed no significantly difference (P>0.05). There was a positive correlation (r = 0.813; P<0.05) between the prevalence of infection determined by microscopy and prevalence of self-reported blood in urine.

**Figure 1**

Table 1: Prevalence and intensity of infection in relation to age in Adim Community

<table>
<thead>
<tr>
<th>Age (years)</th>
<th>No. of individuals examined</th>
<th>No (%) of children who reported blood in urine</th>
<th>No (%) with eggs in urine</th>
<th>Mean ova/10ml of urine</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>14</td>
<td>7 (50)</td>
<td>8 (57.1)</td>
<td>22.9 ± 3.3</td>
</tr>
<tr>
<td>8</td>
<td>11</td>
<td>6 (54.5)</td>
<td>6 (54.6)</td>
<td>25.5 ± 4.2</td>
</tr>
<tr>
<td>9</td>
<td>25</td>
<td>14 (56.0)</td>
<td>6 (24.0)</td>
<td>249.0 ± 10.8</td>
</tr>
<tr>
<td>10</td>
<td>37</td>
<td>23 (62.2)</td>
<td>17 (45.9)</td>
<td>74.9 ± 5.5</td>
</tr>
<tr>
<td>11</td>
<td>25</td>
<td>14 (44.0)</td>
<td>11 (44.0)</td>
<td>93.7 ± 7.2</td>
</tr>
<tr>
<td>12</td>
<td>29</td>
<td>14 (48.3)</td>
<td>14 (48.3)</td>
<td>88.2 ± 8.5</td>
</tr>
<tr>
<td>13</td>
<td>9</td>
<td>7 (77.3)</td>
<td>6 (66.7)</td>
<td>82.8 ± 9.3</td>
</tr>
<tr>
<td>Total</td>
<td>150</td>
<td>82 (54.7)</td>
<td>68 (45.3)</td>
<td>90.9 ± 7.0</td>
</tr>
</tbody>
</table>

The prevalence of infection and intensity in relation to age and sex is shown in table 2. Overall prevalence for males and females were 64 (42.19%) and 86 (47.67%) respectively (P>0.05). Peak prevalence was reported in females 7-8 years while peak prevalence was reported for males 11-13 years old (Table 2). Moreover, the highest intensity of infection was reported for males 9-10 years (156.77 mean ova/10ml of urine) while highest intensity for females was reported for children between 9-10 years old (72.1 mean ova/10ml of urine) (Table 2). However, a pupil of 9 years old had the highest intensity of infection excreting 953 ova/10ml of urine.
DISCUSSION

Works in some African countries have shown that self-reported blood in urine can be used as an indirect method of estimating the prevalence of infection\textsuperscript{15,16}. The positive correlation recorded in the present study confirms these earlier reports. In related studies Ansell et al.,\textsuperscript{17} in Muheza District, Tanzania reported that out of the 25,433 children examined in 137 primary schools, the prevalence of self-reported blood in 15 schools correlated positively with the prevalence of infection determined by microscopy. Also, according to Ansell et al.\textsuperscript{15}, the percentage of children who were correct in their self-diagnosis for urinary schistosomiasis was independent of the prevalence of infection of eggs in urine, and averaged 75%. It was also reported that the sensitivity of diagnosis by questionnaire survey (interview) increased almost linearly with the prevalence of infection\textsuperscript{15}. Ansell and Guyatt\textsuperscript{18} found the use of self-reported schistosomiasis or blood in urine as a cheap and simple technique for diagnosing individuals infected with S. haematobium.

This fact was observed in the present study where questionnaire survey and laboratory analysis showed no significant difference in prevalence. Guyatt et al.\textsuperscript{19} in their predictive values analysis suggested that a threshold of 30% reported blood in urine would identify most of the high prevalence schools. Hence, Adim Community in South-Eastern Nigeria could be classified as a high prevalent community for urinary schistosomiasis. In laboratory studies, Okon and Umeche\textsuperscript{13} found 91\% overall prevalence among 200 school children, while Etim et al.\textsuperscript{7} found 33.95\% overall prevalence among 84 persons in Biase community, Cross River State, Nigeria. In another investigation, Arene and Asor\textsuperscript{20}, found 58.2\% out of 930 persons examined in Emelego community, River state, Nigeria. Abolarinwa\textsuperscript{9} found 30.6\% overall prevalence among 624 schools children examined in Esie community, Kwara State, Nigeria. This high prevalence recorded in different part of Nigeria shows that Nigeria is highly endemic for urinary schistosomiasis.

From our laboratory diagnosis, the overall prevalence for males (62.19\%) and females (47.67\%) were not significantly different from each other (P>0.05). This implies that both sexes are equally exposed to infection, peak prevalence was found mainly in children between 7 – 8 years old. This is consistent with other reports elsewhere\textsuperscript{21,22}, in different rural settlements in Nigeria. In general, children play a pivotal role in the dissemination of infection as a result of their association with water bodies. They were found to spend more time in water either washing, fishing, swimming or playing, hence they were more exposed to infection.

The present study have confirmed previous reports that the prevalence of self-reported blood in urine determined by questionnaire administration to school children gives a good estimate of the prevalence of infection with schistosome, haematobium\textsuperscript{17}. This method is cheap and simple and helps in identifying schools and communities with high prevalence of infection, so that praziquantel (which is the drug of choice) can be distributed easily. In conclusion, appropriate Federal Government agencies should intervene by distributing praziquantel to endemic schools and communities in order to control this scourge. They should also compliment this strategy with integrated control management by provision of pipe-borne water, intensive health education and vector control.

ACKNOWLEDGEMENT

The authors are grateful to the village head, headmaster and teachers of Presbyterian Primary School, Adim. We thank the parents of the students for consenting to the participation of their wards.

References

Author Information

Okpok E. Okon, PhD
Department Of Zoology & Environmental Biology, University Of Calabar, Calabar, Nigeria

Adanna I. Ememayom, BSc
Department Of Zoology & Environmental Biology, University Of Calabar, Calabar, Nigeria

Kenneth N. Opara, PhD
Department Of Zoology, University Of Uyo, Uyo, Nigeria