

# Self Diagnosis as a Possible Means of Diagnosing Urinary Schistosomiasis among School Children in an Endemic Community in Nigeria.

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## Abstract

Self diagnosis as a possible means of diagnosing urinary schistosomiasis in an endemic community was studied among school children aged 1 -15 years in Adim community, Biase Local Government Area of Cross River State, Nigeria. Questionnaire and parasitological data were collected from 900 children randomly selected from all the schools in Adim community. Parasitological analysis revealed infection in 357 (39.7%). Children within the ages of 14 years and above had the highest prevalence rate 36 (66.7%). Male subjects had a higher prevalence rate of infection 195 (39.9%) than the females 162 (39.4) but there was no statistically significant difference in the distribution of infection by gender ( $P > 0.05$ ). The percentage of children with knowledge of having the infection was 300 (33.3%) while those who truly had the infection were 357 (39.7%). The questionnaire data revealed that children of Adim community can easily detect the symptoms of urinary schistosomiasis but do not have knowledge of the aetiological agents, mode of infection nor what to do if infected. We conclude that urinary schistosomiasis is still endemic in Adim Community and self diagnosis can be used as a possible means of diagnosing urinary schistosomiasis for the purpose of administering mass treatment and also monitoring outcome of the treatment in the community.

## INTRODUCTION

Urinary schistosomiasis is a major health problem especially among school age children of the endemic tropical areas of the world. It is primarily a disease of rural agricultural communities where poverty is common (Useh & Ejezie 1999). Parents are likely to be constrained financially procuring drugs for the treatment of their children and if left untreated, may consequently lead to poor school attendance and academic performance (Useh and Ejezie, 1999a), growth retardation and decrease productivity (WHO, 1990a) and urinary tract abnormalities (Chugh et al., 1986). Various reports of the endemicity of urinary schistosomiasis have been presented in Cross River State; for Adim (Ejezie et al., 1991 and Inyang-Etoh et al. 2009), Ogoja, Obubra and Obudu, (Opara et al 2003), Ijiman community (Ekanem et al 1994), and Otukwang community (Okun and Umeche, 2003). Urinary schistosomiasis is highly endemic in Adim community even with the various studies conducted on the efficacy of chemotherapy with praziquantel /or artesunate by various research groups on the control of this disease in this community (Ejezie et al., 1991, Meremikwu et al., 2000, Inyang-Etoh et al., 2004 and Inyang-Etoh et al. 2009).

Among others, Ejezie et al., 1991 and Inyang-Etoh et al. 2009 had reported a prevalence rate as high as 43.5% and 38.5% respectively.

Adim community is a typical rural setting which lacks clean piped water and good sanitation with no effective integrated approach for the control of schistosomiasis in this endemic community. World Health Organisation (WHO) recommends mass treatment of all school children with Praziquantel in areas where the prevalence of urinary schistosomiasis is greater than 50% (WHO, 1995). The symptoms of urinary schistosomiasis include lower abdominal pain, bloody urine and pain when urinating. Infection tends to be heaviest among school-age children and this can have harmful consequences for their nutrition, growth and school performance. Treating school children for worm infections is a highly cost-effective public health intervention in the developing world. However, laboratory-based microscopy for eggs in urine sample is expensive and time-consuming. The objective of the present study was to determine the present prevalence status of urinary schistosomiasis in Adim community, to determine whether

children in this endemic community have knowledge of the disease, aetiologic agent, mode of infection or can easily detect or identify the symptoms of urinary schistosomiasis and to evaluate the efficiency of self diagnosis as a strategy for administration of mass treatment.

## **SUBJECTS AND METHODS**

**Study area** The study was conducted in Adim community located in Biase Local Government Area in Cross River State, Nigeria. Adim is a typical rural community located 110 kilometres to the North of Calabar, the Cross River State capital. There is no pipe-borne water in the community. The inhabitants depend on three fresh water streams namely: Ibeteuroma, Egboga and Ogamaenah for their domestic, economic and recreational activities. The rainy season starts about May and ends in October and the dry season occurs from November and end in March with an average annual rainfall of 1500-2000 centimetres. The main occupations of the residents of this community include farming, hunting and fishing.

### **Subjects and Consent**

The targeted populations were primary school children between the ages of 4 and 17 years. Ethical clearance from the Honourable Commissioner for Health, Cross River State was sought and obtained to enable us approach the school authorities and parents/guardians of pupils for participation in the study. The Onun of Abini (Village head) and that of Ukwelo-Obudu were also briefed on the significance of the study and the level of involvement of the pupils before its commencement. The procedures, significant benefits, and the unharmed nature of the study were also explained to all concerned. The headmasters then briefed their pupils who thereafter sought the consent of their parents to be part of the study by signing the consent letters.

## **COLLECTION OF URINE SAMPLES**

Two clean universal containers for collection of urine samples were issued to each pupil selected for the study. The samples were collected between 12.00 and 14.00 hours when maximum egg excretion occurs (Chen and Mott, 1989). After a rigorous exercise which involved the pupils jogging up to three times from one goal post of their school football pitch to the other, they were then made to produce two urine samples each in two successive days, to reduce the effects of the day-to-day variation in *S. haematobium* egg counts (Van Etten et al 1997). All the study subjects submitted their urine samples. The age and sex of the participants were duly

recorded.

## **DETECTION OF HAEMATURIA AND PROTEINURIA**

A report on the appearance of the urine, that is colour whether clear or cloudy, presence or absence of visible blood were made. Haematuria was detected soon after collection of urine samples in the field using dipsticks (Ames; Bayer Diagnostic, Brussels, Belgium). The results were read and recorded immediately. Haematuria was reported as 5-10 ery/μl (+), 50 ery/μl (++), 250 ery/μl (+++). Proteinuria was reported as 10mg protein/dl indicating trace proteinuria, 30mg/μl (+), 100mg/μl (++), and 500mg/μl (+++).

## **DETECTION OF OVA OF**

After vigorous agitation, 10ml of the urine sample was transferred into a universal container holding 5ml of 1% aqueous solution of carbol fuchsin for staining and preservation of ova (Useh and Ejezie 1999). The specimens were preserved this way until the time for filtration. The modified filtration system for the detection of ova of *S. haematobium* was adopted for the study. This has been elaborately described elsewhere by Useh and Ejezie, (1999) These authors have associated the method with the generation of standard and reproducible results.

**Data Analysis:** All statistical analyses were performed using a commercial statistical package (SPSS for Windows; SPSS Benelux, Gorinchem, Netherlands). The chi-squared ( $X^2$ ) test was used to test for statistically significant difference in prevalence of infection, haematuria and proteinuria by gender. Comparison of the relationship between the presence of infection (presence of ova of *S. haematobium*) proteinuria and haematuria was analysed using the Pearson Correlation coefficient. A two tailed P-value of  $< 0.05$  was considered indicative of a statistically significant difference.

## **RESULTS**

Table 1 shows the prevalence of infection, haematuria and proteinuria among subjects examined by age. Subjects aged 14 years and above had the highest prevalence rate of infection 36 (66.7%), haematuria 30 (55.6%) and proteinuria 45 (83.3%) while subjects aged 8 -10 years presented with the lowest infection 57 (21.8%) and haematuria 48 (18.4%). The lowest rate of proteinuria 39 (27.1%) occurred among subjects in the age group 5 – 7 years. Gender distribution of infection, haematuria and proteinuria among subjects examined is shown in Table 2. Male subjects had a slightly higher mean ova count ( $39.8 \pm 5.8/10\text{ml}$  urine), proteinuria

(68.4 ± 11.1mg/dl) and haematuria (43.4 ± 6.8ery/μl) than female subjects with 33.2 ± 5.5/10ml urine, 50.6 ± 9.9mg/dl and 38.6 ± 6.9ery/μl respectively.

**Figure 1**

Table 1: Prevalence of infection, haematuria and protienuria among subjects examined by age

| AGE GROUP (YRS) | NO. EXAMINED | NO. (%) WITH INFECTION | NO. (%) WITH HAEMATURIA | NO. (%) WITH PROTEINURIA |
|-----------------|--------------|------------------------|-------------------------|--------------------------|
| 5 – 7           | 144          | 39 (27.1)              | 27 (18.8)               | 39 (27.1)                |
| 8 – 10          | 261          | 57 (21.8)              | 48 (18.4)               | 81 (31.0)                |
| 11 – 13         | 441          | 225 (51.0)             | 210 (47.6)              | 255 (57.8)               |
| ≥ 14            | 54           | 36 (66.7)              | 30 (55.6)               | 45 (83.3)                |
| ALL SUBJECTS    | 900          | 357 (39.7)             | 315 (35.0)              | 420 (46.7)               |

**Figure 2**

Table 2: Gender distribution of morbidity indicators of infection, among subjects examined.

| GENDER       | NO. EXAMINED | NO. (%) INFECTED | MEAN OVA COUNT/10ML URINE | NO. (%) WITH HAEMATURIA | MEAN HAEMATURIA (ERYL/μL) | NO. (%) WITH PROTEINURIA | MEAN PROTEINURIA Mg/dl |
|--------------|--------------|------------------|---------------------------|-------------------------|---------------------------|--------------------------|------------------------|
| FEMALE       | 411          | 162 (39.4)       | 33.2 ± 5.6                | 147 (35.8)              | 38.6 ± 6.9                | 192 (46.7)               | 60.6 ± 9.9             |
| MALE         | 489          | 195 (39.9)       | 39.8 ± 5.8                | 168 (34.4)              | 43.4 ± 6.8                | 228 (46.8)               | 68.4 ± 11.1            |
| ALL SUBJECTS | 900          | 357 (39.7)       | 36.8 ± 4.0                | 315 (35.0)              | 41.2 ± 4.8                | 420 (46.7)               | 60.3 ± 7.6             |

MEAN ± SEM

Table 3 shows the intensity of infection, haematuria and proteinuria among subjects examined by age. The highest mean ova count (79.4 ± 21.9/10ml urine), proteinuria (227.2 ± 53.4mg/dl) and haematuria (87.8 ± 27.9 ery/μl) occurred among subjects aged 14 years and above while the lowest mean ova count (14.9 ± 5.6/10ml urine), proteinuria (35.0 ± 14.8 mg/dl) and haematuria (8.5 ± 5.4 ery/μl) occurred among subjects aged 5 – 7 years respectively.

**Figure 3**

Table 3: Intensity of infection, haematuria and protienuria among subjects examined by age

| AGE GROUP (YRS) | NO. EXAMINED | MEAN OVA COUNT/10ML URINE | MEAN HAEMATURIA ERY/μL | MEAN PROTEINURIA Mg/dl |
|-----------------|--------------|---------------------------|------------------------|------------------------|
| 5 – 7           | 144          | 14.9 ± 5.6                | 8.5 ± 5.4              | 35.0 ± 14.8            |
| 8 – 10          | 261          | 22.8 ± 6.6                | 21.1 ± 6.8             | 41.1 ± 12.5            |
| 11 – 13         | 441          | 47.1 ± 6.2                | 58.1 ± 7.8             | 59.5 ± 9.7             |
| ≥ 14            | 54           | 79.4 ± 21.9               | 87.8 ± 27.9            | 227.2 ± 53.4           |
| ALL SUBJECTS    | 900          | 36.8 ± 4.0                | 41.2 ± 4.8             | 60.3 ± 7.6             |

MEAN ± SEM

The comparison of subjects with infection to those with knowledge of having the disease is shown in Table 4. Subjects within the age of 14 years and above had a greater knowledge of infection (50%) compared to the lowest knowledge of infection (16.1%) among subjects aged 8-10 years. However, there was no statistically significant difference (p>0.05) between the number of subjects with infection and the number with knowledge of having the disease by age (t = 0.26; p>0.05). Table 5 shows the gender

comparison of subjects with infection to those with knowledge of having the disease. Male subjects had a slightly higher percentage 195 (39.9%) and 168(34. 4%) for both number (percentage) with infection and number (percentage) of subjects with knowledge of having the disease compared to 162(39.4%) and 132(32.1%) seen among female subjects respectively. However, there was no significant difference (p>0.05) between the number (percentage) of subjects with infection and knowledge of having the disease by gender (t = 0.48; p>0.05).

**Figure 4**

Table 4: Comparison of knowledge of having the disease by age

| AGE GROUP (YRS) | NO. EXAMINED | NO. (%) WITH INFECTION | NO (%) WITH KNOWLEDGE OF HAVING THE DISEASE |
|-----------------|--------------|------------------------|---|
| 5 – 7           | 144          | 39 (27.1)              | 27 (18.8)                                   |
| 8 – 10          | 261          | 57 (21.8)              | 42 (16.1)                                   |
| 11 – 13         | 441          | 225 (51.0)             | 204 (46.3)                                  |
| ≥ 14            | 54           | 36 (66.7)              | 27 (50)                                     |
| ALL SUBJECTS    | 900          | 357 (39.7)             | 300 (33.3)                                  |

**Figure 5**

TABLE 5: Comparison of subjects with knowledge of having the disease by Gender

| GENDER       | NO. EXAMINED | NO. (%) INFECTED | NO (%) WITH KNOWLEDGE OF HAVING THE DISEASE |
|--------------|--------------|------------------|---|
| FEMALE       | 411          | 162 (39.4)       | 132(32.1)                                   |
| MALE         | 489          | 195 (39.9)       | 168 (34.4)                                  |
| ALL SUBJECTS | 900          | 357 (39.7)       | 300 (33.3)                                  |

## DISCUSSION

This study has reconfirmed the endemicity of urinary schistosomiasis in Adim community with a prevalence of 39.7%. This is in consonance with that of Ejezie et al., 1991 and Inyang-Etoh et al. 2009 who had reported a prevalence rate of 43.5% and 38.5% respectively. The reliability of using proteinuria and haematuria as a diagnostic marker for treating urinary schistosomiasis in this community was also established by Inyang-Etoh et al., (2005).

Among the 900 subjects screened for urinary schistosomiasis, self diagnosis with the aid of gross haematuria has proven to be a reliable diagnostic tool for diagnosing urinary schistosomiasis as the 34. 4% and 32.1% of male and female subjects respectively who reported having current infection were tested positive as against the 39.9% and 39.4% of male and female subjects respectively who truly had the infection. The reliability of this result was confirmed using a diagnostic reagent strip and urine microscopy where the history of gross haematuria correlated. Compared to microhaematuria and urine microscopy, a

history of gross haematuria was much specified and had a reasonably good sensitivity in detecting morbid conditions. This makes history of gross haematuria an appropriate method for the monitoring of morbidity control and mass treatment of a community. There was no statistical significant difference ( $p>0.05$ ) between subjects who reported having current infection and those who truly had the infection (Tables 4 & 5) This ascertains the fact that when ever there is a report of gross haematuria (bloody urine) especially in urinary schistosomiasis endemic community, it is usually associated with urinary schistosomiasis. Based on the above facts, the act of self diagnosis can be used as a basis for diagnosing urinary schistomiasis infection in an endemic community thus, avoiding time consuming aspect of detecting the ova in urine and urinary strip test. Savings made by not spending money on microscopy and microhaematuria detection by strip could be invested in procuring drugs for infected subjects.

The prevalence of infection observed in this study reflects the continued exposure of children in this community to urinary schistosomiasis due to absence of pipe – borne water which compels the inhabitants to frequently visit the only stream in the community for the domestic and recreational activities. The high level of water contact in children can explain the preponderance of infection in children. This is supported by an earlier study by Useh & Ejezie, 1999 on the questionnaire approach of the water contact pattern of infection in this community. Although the proportion of infected individuals with history of gross haematuria was relatively high 100(33.3%), the questionnaire approach revealed that the children of this community do not have knowledge of the aetiologic agent and mode of infection of urinary schistosomiasis. We conclude that urinary schistosomiasis is still endemic in Adim Community and self diagnosis can be used as a possible means of diagnosing urinary schistosomiasis for the purpose of administering mass treatment and also monitoring outcome of the treatment in the community. However, a combination of mass treatment with control of snail vector will be advantageous.

## References

1. Chen MG, Mott KE. Progress in the assessment of morbidity due to *Schistosoma haematobium* infection. *Trop Dis Bull* 1989; 86:21-256.
2. Chugh KS, Harries AD, Dahmya MH, Nwosu AC, Gashau A, Thomas O, Thaliza TD, Hoggers S, Ajewski Z and Onwuchekwa AC. Urinary schistosomiasis in Maiduguri; North East Nigeria. *Annals of Tropical Medicine and Parasitology*; 1986; 80: 593-599.
3. Ejezie GC, Uko IE, Braide EI. Schistosomiasis in Cross River State, Nigeria. Prevalence and intensity of infection in Adim – Akamkpa Local Government Area. *J Hyg Epidemiol Microbiol & Immunol* 1991; 35: 141 – 147.
4. Ekanem EE, Asindi AA, Ejezie, GC, Antia-Obong OE. Effects of *Schistosoma haematobium* infection on the physical growth and school performance of Nigeria children. *Centr Afr J Med* 1994; 40: 38 – 43.
5. Inyang-Etoh, P. C., Ejezie, G. C. and Useh, M. F. Assessment of haematuria and Proteinuria as a diagnostic marker for monitoring treatment of urinary schistosomiasis with artesunate. *Mary Slessor Journal of Medicine*; 2005, Volume 5, No.1: 1-6.
6. Inyang-Etoh, P. C., Ejezie, G. C., Useh, M. F. and Inyang-Etoh, E. C. Efficacy of artesunate in the treatment of urinary schistosomiasis, in an endemic community in Nigeria. *Annals of Tropical Medicine and Parasitology*; 2004, Volume 98, 51: 491-499.
7. Inyang-Etoh, P. C., Ejezie, G. C., Useh, M. F. and Inyang-Etoh, E. C. Efficacy of a combination of praziquantel and artesunate in the treatment of urinary schistosomiasis in Nigeria. *Transaction of the Royal Society of Medicine and Hygiene*; 2009, 103, (1) pages 38 - 44.
8. Meremikwu MM, Asuquo PN, Ejezie GC, Useh MF, Udoh AE. Treatment of *Schistosoma haematobium* with praziquantel in children. Its effect on education performance in rural Nigeria. *Trop Med* 2000; 42: 39-45
9. Okun OE, Umeche N. Distributors of urinary schistosomiasis among high school students in Otukwang, Obudu, Cross River State of Nigeria. *Global J Med Sci* 2003; 2: 19-22
10. Opara KN, Mbagwu HC, Ekpo UF. Urinary Schistosomiasis in two endemic communities of Cross River Basin: Prevalence, Intensity and Treatment. *Mary Sless J Med* 2003; 3: 28-34 .
11. Useh MF, Ejezie GC. Modification of behaviour and attitude in the control of schistosomiasis. Observations on water-contact patterns and perception of infection. *Ann Trop Med Parasitol* 1999a; 93: 711-720.
12. Useh MF, Ejezie GC. School based schistosomiasis control programmes. A comparative study on the prevalence and intensity of urinary schistosomiasis among Nigerian school age children in and out of school. *Trans R Soc Trop Med Hyg* 1999; 93: 387 – 391.
13. Van Etten L, Kremsner PG, Krijger, FW, Deelder AM. Day-to-day variation of egg output and schistosome circulating antigen in urine of *Schistosoma haematobium* –infected school children from Gabon and follow up after chemotherapy. *Am J Trop Med Hyg* 1997; 57: 337- 341.
14. World Health Organization The Schistosomiasis Manual. Social and Economic Research Project. Reports, No. 3. World Health Organization, Geneva. 1995b.
15. World Health Organization. The control of schistosomiasis. Second Report of the WHO Expert Committee. Technical Report series; 1990a No. 830. Geneva: WHO.
16. World Health Organization. Health of School Age Children. Treatment of Intestinal Helminths and Schistosomiasis. WHO/SCHISTO/95.112. WHO/CDS/95.1, WHO, Geneva, 1995.

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