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RESEARCH ARTICLE

THE PREVALENCE OF URINARY SCHISTOSOMIASIS IN AWI, AKAMKPA LOCAL GOVERNMENT AREA OF CROSS RIVER STATE, NIGERIA

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ABSTRACT

This study was carried out mostly on pupils and teachers of St. Theresa's Primary School, Awi. Villagers living within the immediate vicinity of the school were also included in the study. All the participants were recruited after seeking and obtaining their consent. Urine samples were collected between 10 a.m. and 1 p.m. from a total of 418 subjects comprising 354 pupils, 24 teachers and 40 villagers. Urinalysis, to detect proteinuria and haematuria, was performed on the urine specimens on the spot, using Combi 9 urinalysis reagent strips. In the laboratory, 10 ml aliquot of each urine specimen was placed in a centrifuge tube and spun at 3,000 revolutions per minute for 5 minutes. Wet preparations were made from the sediment on clean slides and examined for eggs of *Schistosoma haematobium* using x 10 and x 40 objective lenses. An overall prevalence of 12.9% (9.5% in males and 16.4% in females) was recorded among the 418 subjects screened. The result showed a low prevalence of urinary schistosomiasis in Awi community. The intensity of infection was assessed using egg counts and the levels of proteinuria and haematuria. The mean egg count was 8.4 eggs per 10 ml of urine. Egg counts were generally low in positive cases. Only one male subject excreted up to 625 eggs per 10 ml of urine. Levels of proteinuria and haematuria were also low at 48.4 mg/dl and 24.6 ery/µl, respectively. This study was conducted in 1991 within the dry season between January and February. Because of the low prevalence recorded in this study, the work was not published. However, it has now been acknowledged that this work is a very important resource material, considering the proximity of the study area to Calabar, the capital of Cross River State. Moreover, many workers have reported on the prevalence of schistosomiasis (particularly urogenital) in the Northern parts of Cross River State. So far, no form of schistosomiasis has been reported in Calabar. But Awi Community lies on the outskirts of Calabar. If any of the streams found in Awi (Ebanga, Essai, Kerekere, etc.) communicates with other water bodies which drain into Calabar, it could be possible for both snail intermediate hosts and schistosome parasites to become established within the coastal areas of the capital city.

INTRODUCTION

All forms of schistosomiasis are parasitic diseases caused by the penetration of the unbroken skin by cercaria of a digenetic trematode of the Genus *Schistosoma*. The Genus was originally designated *Bilharzia* and the disease bilharziasis in honour of Theodor Bilharz of the parasite [1]. Conservative estimates put that 200 million people are infected with schistosomiasis in 74 countries in Africa, South America and Asia with 600 million people at risk of infection [2]. Both intestinal and urinary (urogenital) forms of the disease exist. Intestinal schistosomiasis is caused mainly by *S. mansoni* and *S. japonicum* while urinary schistosomiasis is caused by *S. haematobium*. Urinary schistosomiasis occurs in 44 African countries, while *S. intercalatum* and *S. mansoni* cause intestinal schistosomiasis in 10 and 40 African countries, respectively [3, 4, 5]. The transmission of schistosomiasis is through the penetration of the unbroken human skin by infective cercaria. This occurs when there is skin contact with natural water bodies (e.g. streams, rivers, ponds, dams, irrigation channels, etc.).

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It is estimated that 90% of those who require treatment for schistosomiasis live in Africa [5]. Available literature indicates that urinary schistosomiasis is more endemic in Nigeria than intestinal schistosomiasis. Urinary schistosomiasis has been reported in more than 9 local government areas of Cross River State [6]. Due to ignorance, some local dwellers in endemic communities often misinterpret haematuria, due to the disease, as a variant of menstruation among male subjects [7, 8].

Schistosomiasis is predominant in rural communities where people do not have access to safe drinking water. Its epidemiology is linked with the practice of releasing *Schistosoma* eggs via urine and faeces into streams, rivers and irrigation channels. If these natural water bodies also harbour suitable snail intermediate hosts, the scenario provides conducive breeding grounds for the parasites, which are later transmitted to human and often domesticated animals. Different *Schistosoma species* have host-specificity to particular snail intermediate hosts. *Schistosoma haematobium* and *S. mansoni* have various species of freshwater *Bulinus* and *Biomphalaria* snails as their intermediate hosts, respectively. For *S. japonicum*, species of amphibious, freshwater *Oncomelania* snails are the suitable intermediate hosts [9].

Chronic intestinal schistosomiasis leads to intermittent abdominal pains, diarrhoea and rectal bleeding. The frequency of the above symptoms co-relates with the intensity of the infection [9, 10]. The classical symptom of urogenital schistosomiasis is haematuria, often with urinary frequency, burning micturition and supra-pubic discomfort [9].

The standard method of diagnosis of schistosomiasis is the detection of parasite eggs in urine (*S. haematobium*) or faeces (*S. mansoni*, *S. japonicum*), as well as in rectal biopsies. Examination of polycarbonate filters for schistosome eggs in urine, rapid diagnostic tests for heme products and Kato-Katz faecal examination for eggs, are all recommended methods for surveillance [9, 11, 12, 13]. Serologic methods of diagnosis are unable to differentiate between current and past infections. However, serologic methods are useful in detecting antibodies against schistosomal antigens, especially among travellers to endemic regions [14].

The drug of choice for the treatment of all forms of schistosomiasis is Praziquantel. A standard dose of 40 mg/kg body weight is believed to be effective against adult *S. haematobium* and *S. mansoni* [9]. The provision of an alternative safe water (e.g. tap or bore-hole) will help to reduce human contacts with water infested with infective cercariae. Also, improved sanitation, health education and snail control with molluscicides are useful methods of prevention and control of schistosomiasis [5].

The Study Area

Awi is a small community in Akamkpa Local Government Area of Cross River State in Southern Nigeria. It is located about 50km North-East of Calabar. The local people are mostly farmers and traders. The different ethnic groups resident in Awi include the Efiks, Ibibios, Igbos, Quas, etc. The indigenous language of the area is Ejagham. There was no pipe-borne water in the area as at the time of conducting this study. The major sources of water for domestic use were streams and rain.

Collection of Urine Specimens

Urine specimens were collected, between 10 a.m. and 1 p.m. during each visit, into screw-capped universal bottles of 20ml capacity. Demographic data (e.g. age, gender, class, occupation, etc.) were obtained from each subject. Combi 9 urinalysis reagent strips were used to detect proteinuria and haematuria in the field. Microscopy was performed on all the specimens in the laboratory.

Processing of Urine Specimens

Each urine specimen was examined macroscopically first. After a gentle mixing, 10 ml aliquot of each urine specimen was transferred into a centrifuge tube and spun at 3,000 revolutions per minute for 5 minutes. The supernatant was discarded and a wet preparation was made from the urine deposit on a clean slide. The preparation was examined for eggs of *S. haematobium* using x 10 and x 40 objective lenses.

Statistical Analysis

Using Chi Square, data generated in this study were tested for statistical significance.

RESULTS

A total of 418 subjects (210 males and 208 females) were enlisted in the study. Out of the total number, 54 subjects {20 males (9.5%) and 34 females (16.3%)} were positive for ova of *S. haematobium*. Figure 1 shows a photomicrograph of an egg of *S. haematobium* detected in a urine sample during the study. There was an overall 12.9% prevalence for urinary schistosomiasis in the study area.

Table 1 shows that the prevalence of urinary schistosomiasis in the study area rises gradually from the age of 6 years, reaching its peak at the age of 14 years, before declining. The Table also shows that the greatest number of eggs was excreted by 12 year old children, with the mean egg count of 58.8 / 10 ml of urine. Although a proportion of the adult population (i.e. 15 years and above) was positive for urinary schistosomiasis, the intensity of infection (i.e. mean egg count per 10 ml of urine, levels of proteinuria and haematuria) was, however, less than what happened among the younger age groups.

Table 2 shows the prevalence of infection among male subjects. No egg of *S. haematobium* was detected in the urine of male subjects aged 6 to 9 years. The highest prevalence of 16.7% was detected among male subjects aged 14 years and above.

Table 3 shows the prevalence of infection among female subjects. Infection occurred among female subjects of all age groups. However, the highest prevalence rate of 21.4% was observed among female subjects aged between 12 and 13 years.

Table 1 The percentage prevalence and intensity of infection according to age of subjects

S/No.	Age (yrs)	Total Number Examined	Total Number Positive	Percentage Prevalence	Mean No. of eggs/ 10ml urine	Mean proteinuria (mg / dl)	Mean Haematuria (ery /µl)
1.	6	25	1	4	1.0	37.0	7.0
2.	7	33	2	6.1	10.5	42.7	7.0
3.	8	44	4	9.1	5.5	75.4	43.3
4.	9	46	5	10.9	3.8	70.7	16.2
5.	10	56	6	10.7	16.7	30.0	13.3
6.	11	56	8	14.3	19.5	60.9	25.4
7.	12	71	12	16.9	58.8	56.2	48.0
8.	13	36	8	22.2	3.0	33.9	17.1
9.	14	23	6	26.1	9.2	47.5	58.9
10.	15^+	28	2	7.1	6.0	30.0	10.0
Total		418	54	127	13.4	48.4	24.6

Table 2 The prevalence of urinary schistosomiasis among male subjects

Age Groups (Yrs)	Total Number Examined	Total Number Positive	Percentage prevalence
6 - 7	30	-	-
8 - 9	45	-	-
10 - 11	54	8	14.8
12 - 13	51	7	13.7
14 - 15$^+$	30	5	16.7
Total	210	20	9.5

Table 3 The prevalence of urinary schistosomiasis among female subjects

Age Groups (Yrs)	Total Number Examined	Total Number Positive	Percentage prevalence
6 - 7	28	3	10.7
8 - 9	45	9	20.0
10 - 11	58	7	12.1
12 - 13	56	12	21.4
14 - 15$^+$	21	3	14.3
Total	208	34	16.3

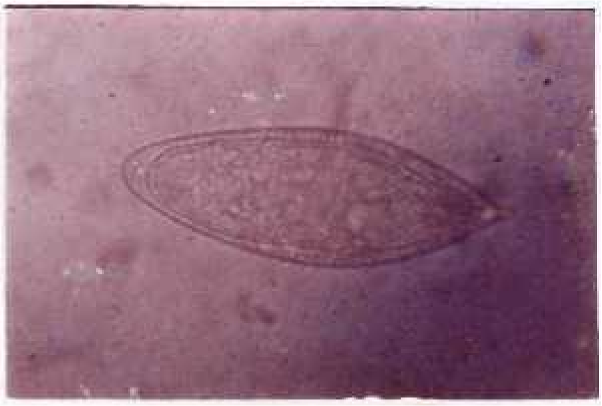

Plate 1 An egg of *Schistosoma haematobium* detected in a urine specimen during the study.

DISCUSSION

This study has shown that infection with *Schistosoma haematobium* rises gradually at the age of 6 years among the local dwellers. This is a clear indication of the approximate time of exposure when the children begin to visit streams and rivers, some of which might have been infested with infective cercariae. The reduction of positive cases among the adult population can be explained in two ways. First, the adult population must have relinquished the routine chores of visiting streams and rivers (to fetch water, etc.) to the children; and this in return reduced their contacts with the infested waters and infective cercariae. Secondly, if infections within the adult population had become chronic, then shedding of eggs in urine would have become less frequent, thus leading to false negative results upon urine microscopy. The pattern of infection observed in this study agrees with the work of Colley *et al*. (2014), who reported that the highest prevalence and intensity of schistosomiasis occur in young adolescents; after which both the intensity and prevalence of infection generally decrease in adulthood [9].

A higher prevalence rate (16.3%) was observed in female than in male subjects (9.5%). This finding may be as a result of over-exposure of females than males to infection due to more water contacts. Interactions with the local residents revealed that it was customary for their females to be more involved in activities (such as washing and fetching water) which made them to have more regular contacts with natural waters, than their male counterparts. In agreement with this finding, Vlassoff & Bonilla (1994) reported that men and women are infected in equal numbers, but that women are more intensely affected by schistosomiasis than men. They also observed that the local differences often noticed in the prevalence and intensity of schistosomiasis, between men and women, can be explained in terms of the social and occupational roles taken up by men and women [15].

Haematuria was high among subjects with high egg counts. But Chi Square test showed that there was no significant difference in haematuria between male and female subjects ($P > 0.05$; $X^2 = 6.84$). The slight increase in haematuria among female subjects might have been caused by menstrual flow.

In conclusion, the overall prevalence of 12.9% recorded in this study showed that the occurrence of urinary schistosomiasis in the study area is low. However, this low prevalence should not warrant complacency because urine samples were only collected once from each subject. Collection of multiple urine specimens was not feasible, considering the inherent difficulty in tracking subjects to collect multiple specimens.

Malacological survey for snail intermediate hosts did not yield any positive result. This finding may be attributed to the fact that the study was conducted during dry season when some of the seasonal streams had ebbed or even dried up completely. In order to control the disease in this community, provision of pipe-borne water is quintessential. Organized public health campaigns are equally necessary; to educate the people on the dangers of indiscriminate disposal of faeces and urine into natural water bodies.

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