Epidemiology Of Schistosomiasis Haematobium In Ibadan South West Area Of Oyo State, Nigeria

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Abstract

A total of 360 urine samples were collected from the pupils of Ibadan South West Area of Oyo state, Nigeria. 53.1% of the school children tested positive for *Schistosoma haematobium* infection. The males had higher prevalence of 59.6% than females with 42.2%. The prevalence of urinary schistosomiasis increases from elementary Primary one to six except in primary three males. The rise in prevalence in academic classes corresponds with the rise of prevalence from age 4 to 18 years. Except in few instance, intensity of infection decreased with age. Males had more than three times the level of intensity of females. 26.2% of the pupils had heavy infections. Ona river located close to the school was found to contain infected *Bulinus globosus* and *Biomphalaria pfeifferi.* Majority of the pupils had contact with the infested water.

Key Words: Schistosomiasis, schistosoma haematobium, infected water.

Introduction

Schistosomiasis, a disease caused by the blood fluke, *Schistosoma* , afflicts over 271 million people in the world, 168 million of them in Africa, making the disease second only to malaria in socio-economic and public health importance in tropical and sub-tropical areas[1]. Nigeria is one of the African countries with a high morbidity [2]; every State in Nigeria, except Lagos State, is endemic with schistosomiasis [3]. Two species of *Schistosoma* are endemic in Nigeria, *S. mansoni* and *S. haematobium* and there have been numerous epidemiological surveys on them. Wide ranges of prevalence, 0% to 76.2%, have been reported, by various authors [4-12]. Other West African countries with epidemiological surveys of *S. haematobium* include Cameroon [13], Sierra Leone [14] and Gambia [15]. This study was carried out to determine the prevalence and intensity of urinary schistosomiasis among the school children of Ibadan, South West area of Oyo State, Nigeria.

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Materials And Methods

Epidemiological survey was carried out among the pupils of St. Michael Church Primary School in Ibadan, South West area of Oyo State. Ona River was located on the way to the school.

Urine samples were collected from the school children into clean, brown specimen bottles between the hours of 11.00 and 13.00. The data sheet for each urine sample contained the name, age, sex, occupation and water contact activity of the person examined.

Parasitological examination was carried out on the urine samples using the membrane filtration technique with PATH-Urinary Diagnostic Kit (Canal Place, Seattle, Washington, USA). The urine samples collected were mixed thoroughly by a syringe fitted with a plastic extension tube. 10mls of the mixed sample was passed through a 13mm diameter swinnex filter support containing a nylon membrane filter. The membrane filter containing the eggs was carefully removed from the support and placed on the microscope slide. The eggs on the filter were then stained with a drop of Lugol's iodine for proper identification. The number of eggs on the filter were counted and recorded.

Bulinus globosus and *Biomphalaria pfeifferi* snails were hand-picked from the Ona river and exposed to light for shedding of cercariae. After 2 to 3 hours exposure, some of the water in the snail container (300 microlitre) was stained with Lugol's iodine and examined under the microscope.

Results

Prevalence of Urinary schistosomiasis in the School children

Urine samples were collected from a total of 360

pupils; 225 of them were males and 135 females. Of the 360, 53.1% tested positive for *S. haematobium* infection; the males, however, had higher prevalence of 59.6% than females (42.2%). The prevalence of urinary schistosomiasis increases from Primary One to Six except for the highest value of 75% recorded for male in Primary Three (Figure 1); the girls had the highest prevalence of 82% in Primary Six.

Like in the academic classes, the prevalence of *S. haematobium* infection in males and females increased with age, from age 4 to 18, as shown in Figure 2. The highest prevalence of 100% was recorded in the age group of 16 to 18 years (Figure 2).

Intensity of *S. haematobium* infection in the school children

The total mean egg count for both sexes was 108 eggs per 10ml urine; the intensity in males (137 eggs/10ml urine) was more than three times higher than that of females. In the males, intensity decreased slightly from Primary 4 to 6 (Figure 3). Intensity for both sexes follow the pattern in the males.

In the females, the intensity of infection increased from Primary 1 to 2 and then decreased in Primary 3; an increase of intensity was observed between Primary 3 and 4, followed by a gradual decrease until Primary 6, as shown in Figure 3.

The highest mean egg count was recorded in age group 4 - 6 and the lowest in age group 16 - 18 in both males and females (Figure 4). Except for age group 7 to 9 in females and 10- 12 in males, the intensity of infection decreased with age as shown in Figure 4. However, for both sexes, high intensity was recorded in age group 13 - 15 years (Figure 4). 73.8% of the infected pupils had low level of infection (<50eggs / 10ml urine) while the remaining 26.2% had heavy infection (>50eggs / 10ml urine).The frequency distribution of *S. haematobium* eggs in the infected pupils is shown in Figure 5.

Cercarial shedding by Freshwater Snails collected from Ona River

Bulinus globosus and *Biomphalaria pfeifferi* were collected from Ona river. Both types of freshwater snails were found to shed the characteristic schistosome cercariae when exposed to light.

Water Contact Activities of the Pupils

Majority of the pupils examined made contact with the infected water body, for the purposes of bathing / swimming, washing of legs, hands and clothes, as shown in Table I. About one-third of the pupils washed plates with the infested water while one-quarter-fetch water from the river (Table I). Approximately 20% of the pupils crossed the river, with the males having higher percentages than females for both activities (Table I). Results in Table I also shows that very few males and no females made contact with foreign water body.

TABLE 1: WATER CONTACT ACTIVITIES OF THE PUPILS

SEX	NO (%) OF PUPILS POSITIVE FOR ACTIVITY							
	Washing plates	Washing cloth	Fetching Water	Washing legs /hands	Bathing /Swimming	Fishing	Crossing stream	Contact with foreign water
MALE	70 (31.1)	164 (72.9)	43 (19.1)	182 (80.9)	208 (92.4)	61 (27.1)	54 (24.0)	6 (2.7)
FEMALE	51 (37.8)	111 (82.2)	46 (34.1)	108 (80.0)	113 (83.7)	8 (5.9)	17 (12.6)	0 (0)
BOTH SEXES	121 (33.6)	275 (76.4)	89 (24.7)	290 (80.5)	321 (89.2)	69 (19.2)	71 (19.7)	6 (1.7)

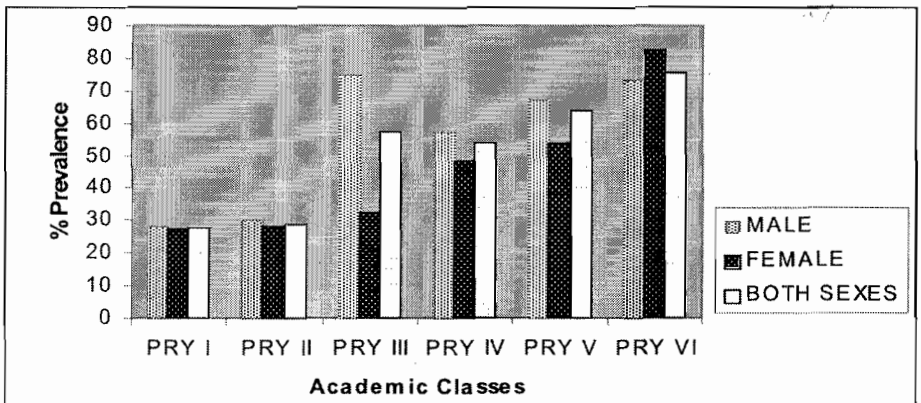

Figure 1: Prevalence of urinary schistosomiasis in academic classes

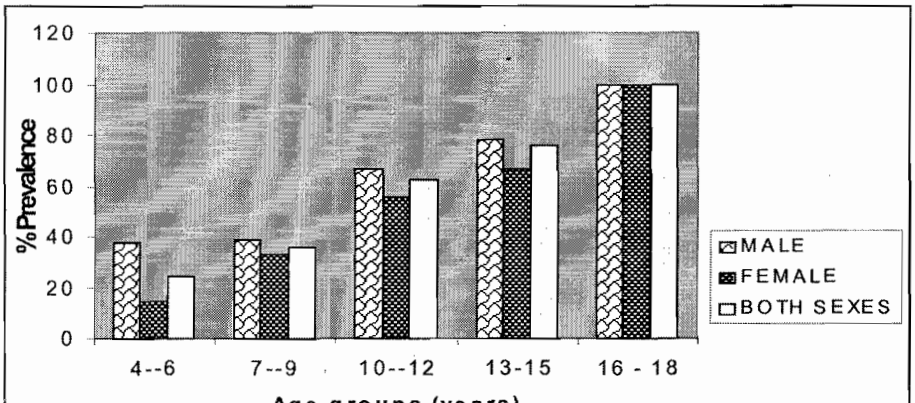

Figure 2: Prevalence of urinary schistosomiasis by age group

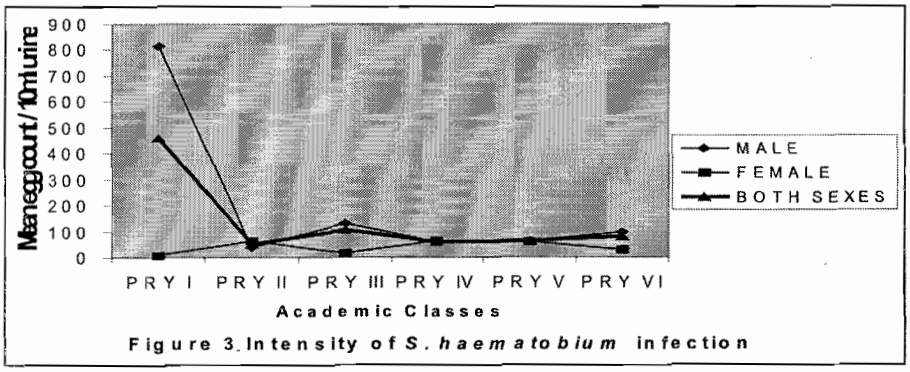

Figure 3. Intensity of *S. haematobium* infection

Discussion

The 53.1% prevalence recorded in the survey of urinary schistosomiasis among the pupils of Ibadan South West Area of Oyo State, Nigeria, revealed the endemic status of the disease in the area and indicates that the majority of the children are at risk of being infected. According to World Health Organization (WHO)'s recommendation, when the prevalence of schistosomiasis in school-age children is greater than 50% by parasitological methods, the community is categorized as 'high risk community, and all the school-age children in that community should be treated with adequate dose of praziquantel [16]. Adults considered to be at risk, from special groups (pregnant and lactating women; groups with occupations involving contact with infested water, such as fishermen, farmers, irrigation workers, or women in their domestic tasks), to entire communities living in the endemic areas, would be eligible for treatment with praziquantel.[16] The high prevalence could be due to considerable dependence on the infected river as there were no pipe-borne water systems in the area. Ona river had been found in this study to contain infected freshwater snails, *Bulinus globosus* and *Biomphalaria pfeifferi.*

Other factors enhancing the transmission and spread of schistosomiasis in the area include increased human activities around the stream and scarcity of public utilities such as latrines and swimming pools. The higher prevalence and intensity recorded among male pupils compared to females might be due to higher percentages of water contact activities of the boys as shown in Table I. Boys are better swimmers compared to girls; the percentage of fishing activity recorded for boys was more than four times that of girls. Very few girls compared to boys crossed the river and only males made contact with foreign water. This result is expected as boys are more adventurous and energetic compared to girls. Boys take part more in outside errands while the activities of girls were linked more to domestic work such as washing plates, cloth and fetching water. Both boys and girls, however, equally used the infected water for washing of hands and legs. Several authors [17,7,18,9,19,20] recorded higher prevalence in males than females. In contrast, higher prevalence of infection was reported in females compared to males [8] while similarity in the pattern of infection was reported in males and females [5].

The rise of prevalence in academic classes one to

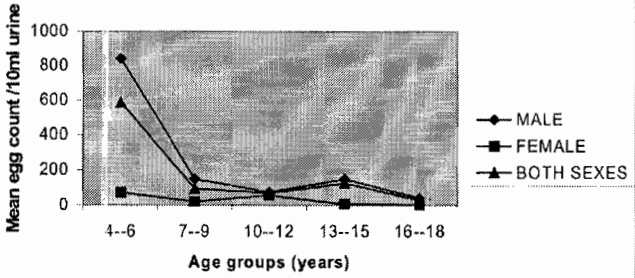

Figure 4: Intensity of *S. haematobium* infection by age groups

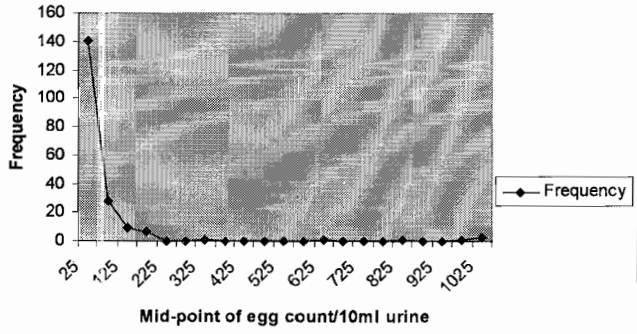

Figure 5: Frequency distribution of *S. haematobium* eggs in the infected pupils

s i x corresponds with the prevalence increase from age 4 to 18 years. The occurrence of infection in Primary One pupils indicates that children become infected before school age. This might have taken place when they followed their parents especially the mothers to the stream for washing of cloth or bathing. While the mother is busy washing, the children might be playing inside the water, thereby becoming exposed to infection with cercariae. The longer the children stay in infected water, the higher the intensity of infection. Hence, primary one pupils of age 4 6 years had the highest intensity of infection in both sexes. Rise in prevalence with age have been reported [5,21,22] while decrease in intensity with age were also reported [4,23]. The rate of egg output in older children, 15 18 years, could indicate death of established worms with age as there was no record of treatment of the disease in the pupils.

The analysis of the egg-count distribution showed that it was over-dispersed, with few younger pupils responsible for most of the transmission; this finding could be used in planning a programme of intervention for the disease in the area. The high egg count (>50 eggs / 10ml urine) recorded in 26.2% of the pupils with heavy infection calls for urgent solution to the problem of schistosomiasis in Ibadan, South West area of Oyo State. The control programme is necessary as there exists a close relationship between excretory egg counts and morbidity. In heavy infection, there is the tendency that some of the eggs might become trapped in the tissues, stimulating a granulomatous reaction which leads to most of the subsequent pathological effects. Health education, chemotherapy and vector control would be very appropriate for the control of urinary schistosomiasis in the area. Adequate water facilities, latrines and alternative means of recreation, such as provision of swimming pools should also be made for the community.

References

1. Iarotski, L. S., and Davis A. (1981) The schistosomiasis problem in the World: Result of a World Health Organisation questionnaire survey Bulletin of the World Health Organization 59: (1), 115 127.

2. Cowper, S. G. (1973) Bilharziais (Schistosomiasis) in Nigeria. Tropical and Geographical Medicine 25 (2), 105 118.

3. National Council on Health (2007) Fact Sheet, National Schistosomiasis Control Programme and National Lymphatic Filariasis Elimination Programme, Federal Ministry of Health, Nigeria, 1pp.

4. Edungbola L. O., Asaolu S. O., Omoniyi M. K. and Aiyedun B. A. (1988) *Schistosoma haematobium* infection among school children in the Babana Districts, Kwara State. *African Journal of Medicine and Medical Science, 17*, 187 193.

5. Ogbe M. G. and Olojo A. O. (1989) A preliminary survey of Urinary schistosomiasis in Abeokuta, Nigeria. *The Nigerian Journal of Basic and Applied Sciences, 3* (2), 11 18.

6. Adewunmi C. O., Furu P., Christensen N. O. and Olorunmola F. (1991) Endemicity, seasonality and focality of transmission of human schistosomiasis in 3 communities in south western Nigeria *Tropical Medicine and Parasitology* ***42*** (4),332 4.

7. Adeoye G. O. and Ipeayeda M. (1994) *Schistosoma haematobium* infection among school children in Owena Army Barracks, Akure, Nigeria *The Nigerian Journal of Parasitology, 15*, 43 50.

8. Adeoye G. O. and Akabogu O. A. S. (1996) Occurrence of urinary schistosomiasis among residents of Ado-Odo/Ota Area of Ogun State, Nigeria *The Nigerian Journal of Parasitology,* ***17***,23 30.

9. Daniel A. A., Adamu T., Abubakar U., and Dakul D. A. (2001) Preliminary Studies on Schistosomiasis in Zuru Emirate of Kebbi State, Nigeria *The Nigerian J. Parasitology* ***22*** (1 & 2), 65 74.

10. Mafiana C. F., Ekpo U. F. and Ojo D. A. (2003) Urinary schistosomiasis in preschool children in settlements around Oyan Reservoir in Ogun State, Nigeria: implications for control *Tropical Medicine and International Health* ***8*** (1), 78 82.

11. Ekpo U. F. & Mafiana C. F. (2004) Epidemiological studies of urinaryschistosomiasis in Ogun State: Identification of high-risk communities *Nigerian Journal of Parasitology* ***25,*** 111 119.

12. Atu B. O., Galadima M. & Alice F. (2006) Prevalence of intestinal parasites in Etulo, Benue State, *Nigeria Nigerian Journal of Parasitology,* ***7***, 1 6.

13. Ratard, R. C., Konemeni L. E., Ekani, B. M. and Ndamkon C. N. (1992) Estimation of the number of cases of schistosomiasis in a country: the example of Cameroon *Transaction of the Royal Society of Tropical Medicine and Hygiene* ***86,*** 274 276.

14. Onabamiro, S. D. (1971) Studies on schistosomiasis in Sierra Leone *Annals of Tropical Medicine and Parasitology* ***65*** (4), 497 504.

15. Wilkins, H. A., Goll, P. H., Marshall, T. F. and MooreP. J. (1984) Dynamics of Schistosoma haematobium infection in Gambian Community 1. The pattern of human infection in the study area *Transaction of the Royal Society of Tropical Medicine andHygiene* ***78,*** 216221.

16. WHO (2006) Preventive Chemotherapy in human helminthiasis: co-ordinated use of anthelminthic drugs in control interventions: a manual for health professionals and programme managers, 74pp.

17. Uko, I. E., Adeoye G. O., Tayo-Mafe M. and Ogbe M. G. (1993) Evaluation of three diagnostic techniques for urinary schistosomiasis (Reagent strip, Egg Count and ELISA) in Kainji Lake Area, *Nigeria Nigerian Journal of Parasitology,* ***14,*** 65 73.

18. Abolarinwa, S. O. (1999) Urinary schistosomiasis in children in Esie Community, Kwara State, Nigeria *Nigerian Journal of Parasitology,* ***24***, 77 80.

19. Bello, Y. M., Adamu, T., Abubakar, U.and Muhammad, A. A. (2003) Urinary schistosomiasis in some villages around the Goronyo Dam, Sokoto State, *Nigeria Nigerian Journal of Parasitology* ***24,*** 109 114.

20. Bassey, S. E. and Umar, Z. (2004) A re-assessment of schistosomiasis infection in Garun-Babba, Kadawa and Kura in Kano State, Nigeria *Nigerian Journal of Parasitology,* ***25***, 107 109.

21. Kabatereine, N. B., Brooker, S., Tukahebwa E. M, Kazibwe, F. and Onapa, A. W. (2004) Epidemiology and geography of *Schistosoma mansoni* in Uganda: implications for planning control *Tropical medicine and International Health,* ***9*** (3), 372 380.

22. Pugh, R. N. H., Bell, D. A. and Gilles, H. M. (1980) Malumfashi endemic Disease Research Project XV. The potential medical importance of Bilharzia in Northern Nigeria: a suggested rapid, cheap and effective solution for control of *Schistosoma haematobium* infection *Annals of Tropical Medicine and Parasitology,* ***74,*** 597 613.

23. Ejezie, G. C. (1979) The pattern of parasitic infections in villages of Lagos State, Nigeria *Tropical and Geographical Medicine,* ***31,*** 503 508

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