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Full Length Research Paper

Urinary schistosomiasis diagnosed among children of Omogho in Nigeria

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ABSTRACT

Urinary schistosomiasis has about 366 endemic foci in Nigeria but its status in Omogho, Anambra State has not been established. For this purpose, 232 school children from five communities of Omogho in Orumba North Local Government Area of Anambra State, Nigeria were examined for urinary schistosomiasis in the year 2014. Demographics of the subjects obtained by oral interviews were gender, age, schools, communities, major family occupations, and domestic water sources. Combi-9 reagent strips for detection of haematuria and proteinuria as well as Microscopy for identification of schistosome eggs in urine samples of the children were carried out. Data were analyzed in Excel MS version 2013 and reported in percentages, means and standard deviations. *Schistosoma haematobium* infection was observed in 42 or 18.1% of the sampled population, with a total egg-output of 1186. Mean intensity of infection was 6.03±0.79 eggs/10ml urine. Boys had higher prevalence of infection (19; 11.6%) than girls (15; 6.5%) ($P<0.05$). Infection was highest in 15-19 years age-group (19; 8.2%), followed by 10-15 years age group (13; 5.6%), and least in 20-24 years age-group (2; 0.9%). School-children from Iwollo community recorded highest prevalence (18; 7.8%) while combined communities of Ndikelionwu, Amaokpala, Ufuma and Nkpa had the least (3; 1.3%). Prevalence among children whose parents were mostly farmers and public servant were 7.7%) and 1.3%, respectively. Also, infection according to water-contact activities were in the order lake (24; 10.3%) > stream (16; 6.9%) > borehole (2; 0.9%) ($p<0.05$) which suggested that the freshwater snail-intermediate hosts for the larval stages of *S. haematobium* were present in the study area. Since *S. haematobium* eggs were mostly observed in cases with haematuria, it is inferred that haematuria may be a common clinical manifestation in urinary schistosomiasis, especially among boys examined. School-based mass chemotherapy would be a feasible control option for urinary schistosomiasis because livelihood patterns in Omogho depend largely on the presence of the water bodies in the area.

Keyword: Schistosomiasis, water bodies, school children, haematuria

INTRODUCTION

Schistosomiasis, caused by the blood fluke *Schistosoma haematobium*, is one of the most widely spread of all human parasitic diseases, ranking second only to malaria in parasitic disease morbidity and in terms of its socio-economic and public health importance (Biu *et al*., 2009; Okwelogu *et al*., 2012). According to Ogidi *et al*. (2008), urinary schistosomiasis affected 66 million people in 54 countries in Africa, particularly among rural and sub-urban dwellers. In Nigeria about 3 million people from 5 to 19 years old are mostly infected by schistosomiasis (Ekpo *et al*., 2004). Nigeria has about 366 schistosomiasis haematobium endemic foci (Ekpo *et al*., 2013), and both natural and artificial water bodies could serve as transmission foci of these parasites, whose larval stages must be harboured by the appropriate species of freshwater gastropods (Loker 2005; Odaibo 2012; Ikpeze and Obikwelu, 2016).

Although a lot of studies on urinary schistosomiasis has been carried out in different parts of Anambra State of Nigeria (Amazigo *et al*., 1997; Ekwunife 2004; Ezeagwuna *et al*., 2010; Okwelogu *et al*., 2012; Ugochukwu *et al*., 2013; Ikpeze and Obikwelu., 2016), none has been reported from Omogho community in Orumba North Local Government Area Anambra State where haematuria is commonly observed among adolescent school boys. This study will therefore establish the status of urinary schistosomiasis among school children in Omogho Community, as well as contribute to the baseline information about the endemicity of schistosomiasis in Anambra State, Nigeria.

MATERIALS AND METHODS

Study Area

Omogho in Orumba North Local Government Area, which comprises Kolulu, Umunaba, Iwollo, Isiamaenyi, Ndikelionwu, Amaokpala, Ufuma and Nkpa communities, situates between Latitude $6.08^0/6^04^1$ 59.99982” E and Longitude $7.13333^0/7^07^1$ 59.9988” N in the semi-tropical rainforest of Anambra State. The topography is characterized by undulating hills and valleys, with forested areas and freshwater swamps. Livelihood of the revolve around palm-wine tapping, commerce, arts and crafts, especially baskets, brooms and mats making, as well as fishing and farming around fresh water-bodies like Obutu Lake, Iyi-nta Stream Anaka-Agho stream, Agho-mmiri stream, Odo River, and associated swampy areas useful for rice and vegetables cultivation.

Study population and sample size

All the 278 (146 boys and 132 girls aged between 5 and 24 years) from the three schools at Omogho namely, Community Secondary School (CSS), Community Primary School (CPS), and Daughters of Mary Mother of Mercy Nursery/Primary School (DMM) constituted the study population. However 232 (120 boys and 112 girls fully participated to the end of the study. Demographics of all subjects (gender, age, schools, communities, parents’ major occupations, and family domestic water sources) were obtained by oral interviews.

Urine sample collection and Urinalysis

A total of 232 terminal urine samples from the children, collected between the hours of 10 am and 2 pm on each collection day, from CSS 62 (43 boys and 19 girls), CPS 76 (44 boys and 32 girls), and DMM 94 (33 boys and 61 girls) were each coded, processed and analyzed within two hours of collection at the Parasitology Laboratory of Nnamdi Azikiwe University Teaching Hospital Nnewi for analysis. Urinalysis for observation of haematuria and proteinuria was done with Meditest combi-9® reagent strip while microscopy was for identification of parasite eggs. The intensity of infection was determined by counting the number of the eggs/10 ml of urine, and was regarded as light (1-9eggs/10ml of urine), mild (10-49eggs/10ml of urine), and heavy (>50eggs/10ml of urine).

Data analysis

Data were analyzed in Excel MS version 2013 and reported in percentages, means and standard deviations. Error bars in histograms indicated significant differences at 0.05% level of probability.

RESULTS

Prevalence and intensity of *S. haematobium* infection as well as total egg output by gender, age groups, and schools are shown in Table 1 while prevalence of the infection according to communities, major family occupations and domestic water sources are presented in Table 2.

Outcomes of urinalyses with Meditest combi-9® reagent strip and corresponding Microscopy are shown in Figure 1. Error bars showed no significant difference (p>0.05) between ‘haematuria only’ and ‘*Schistosoma haematobium* eggs’. However, there was significant difference (p<0.05) between ‘proteinuria only’ and ‘*Schistosoma haematobium* eggs’, and between ‘both haematuria and proteinuria’ and ‘*Schistosoma haematobium* eggs’.

Table 1: Prevalence and intensity of *S. haematobium* infection by gender, age-group and school

	Examined	Infected	Intensity of infection (Number of eggs/10ml Urine)				Egg output
			Light (≤10)	Mild (11-49)	Heavy (>50)	Mean intensity	
	No. (%)	No. (%)	No. (%)	No. (%)	No. (%)		No.
Gender							
Male	120 (51.7)	27 (11.6)	15 (6.5)	9 (3.9)	3 (1.3)	3.90±2.12	1083
Female	112 (48.3)	15 (6.5)	13 (5.6)	2 (0.8)	0 (0.0)	2.13±2.47	103
Total	232 (100)	42 (18.1)	28 (12.1)	11(4.7)	3 (1.3)	6.03±0.79	1186
Age (y)							
5-9	87 (37.5)	8 (3.4)	7 (3.0)	1 (0.4)	0 (0.0)	1.13±1.32	291
10-14	95 (41.0)	13 (5.6)	11 (4.8)	1 (0.4)	1 (0.4)	1.87±2.07	788
15-19	45 (19.4)	19 (8.2)	10 (4.3)	9 (3.9)	0 (0.0)	2.73±1.93	102
20-24	5 (2.16)	2 (0.9)	0 (0.0)	0 (0.0)	2 (0.9)	0.30±0.42	5
Total	232 (100)	42 (18.1)	28 (12.1)	11 (4.7)	3 (1.3)	6.03±0.79	1186
School							
CSS	62 (26.7)	13 (5.6)	8 (3.5)	5 (2.1)	0 (0.0)	1.87±1.44	773
CPS	76 (32.8)	21 (9.1)	15 (6.5)	3 (1.3)	3 (1.3)	3.03±2.45	308
DMM	94 (40.5)	8 (3.4)	5 (2.1)	3 (1.3)	0 (0.0)	1.13±0.86	105
Total	**232 (100)**	**42 (18.1)**	**28 (12.1)**	**11 (4.7)**	**3 (1.3)**	**6.03±0.79**	**1186**

Table 2: Prevalence of *S. haematobium* infection by community, family occupation and domestic water source

	Samples examined No. (%)	Samples infected No. (%)
Community		
Isiamaenyi	33 (14.2)	8 (3.4)
Iwollo	37 (16.0)	18 (7.8)
Kolulu	37 (16.0)	4 (1.7)
Umunaba	80 (34.4)	9 (3.9)
*Other communities	45 (19.4)	3 (1.3)
Total	232 (100)	42 (18.1)
Family major occupation		
Civil servants	40 (17.24)	3 (1.3)
Farmers	55 (23.7)	18 (7.7)
Traders	58 (25.0)	9 (3.9)
Artisans	79 (34.1)	12 (5.2)
Total	232 (100)	42 (18.1)
Domestic water source		
Shallow well	8 (3.45)	2 (0.9)
Stream	55 (23.7)	16 (6.9)
Lake	140 (60.4)	24 (10.3)
Others	14 (6.04)	0 (0.0)
Total	**232 (100)**	**42 (18.1)**

*Ndikelionwu, Amaokpala, Ufuma and Nkpa

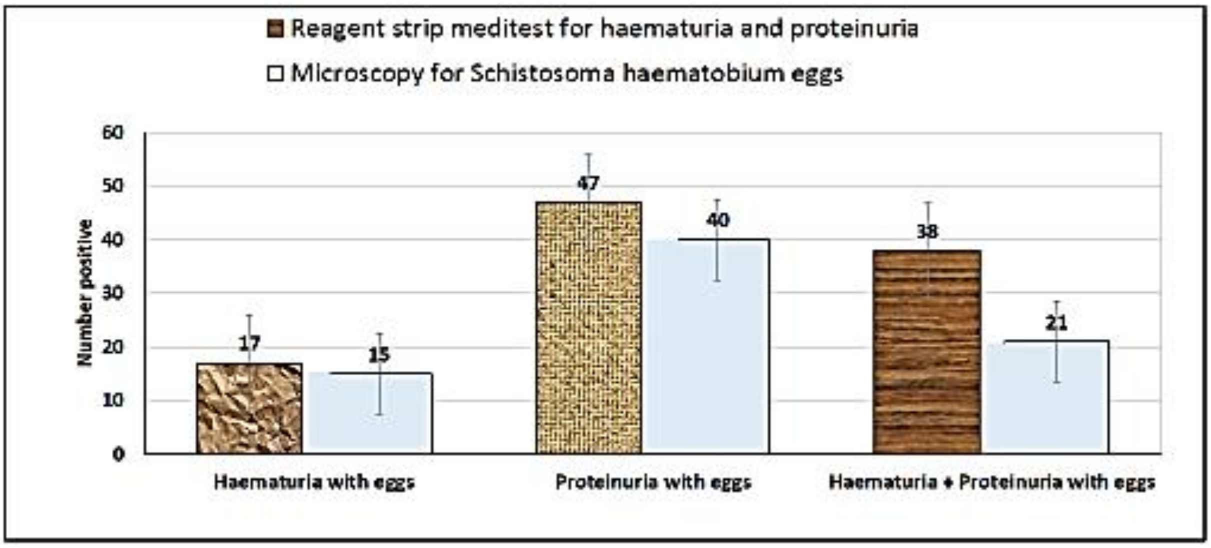

Figure 1: Urinalyses for haematuria, proteinuria and *Schistosoma haematobium* eggs

DISCUSSION

This present study has shown that urinary schistosomiasis is present among school children in Omogho, Orumba North Anambra State, Nigeria. The prevalence and intensity of infection with *Schistosoma haematobium* in the three schools did not happen by chance, the same causative agent was involved. Each student/pupil with *Schistosoma haematobium* infection in any of the three schools is a potential carrier that can equally transmit it anytime anywhere, all things being equal. However, the occurrence of *S. haematobium* in all the schools in Omogho with overall prevalence of 18.2% showed that the area is endemic for the disease, just like in Umueze-Anam (Amazigo *et al.,* 1997), Agulu (Ekwunife, 2004) and other parts of Anambra State (Ugochukwu *et al*., 2013).

The high prevalence among pupils of Community Primary School may be attributed to the proximity of their school to the Obutu Lake where the pupils visit for recreational activities like the pupils at Okija (Okwelogu *et al.*, 2012). It appears that snail intermediate hosts of *Schistosoma haematobium* are found near the lakes in Anambra State because urinary schistosomiasis has been reported from a similar study at Agulu Lake (Ekwunife 2004) where the presence of some snail intermediate hosts of *Schistosoma haematobium* was recently confirmed by Ikpeze and Obikwelu (2016).

The high prevalence in boys could be attributed to their active and adventurous nature. It was observed that after school hours, and on the way back to their homes, some boys would engaged in fishing and swimming activities, as also reported by Okwelogu *et al.* (2012). However, girls also had equal chances like boys of being infected *with Schistosoma haematobium* cercariae since they were often involved in processing of cassava and breadfruits, as well as in washing of clothes in the shallow areas of the water bodies. These activities may bring them in contact with infective cercariae.

It was observed that the intensity of infection in an individual in the study area can be mild, moderate and/or heavy but many reports from parts of Nigeria show that no consistent pattern is attributable to gender (Edungbola *et al*., 1998; Bello and Edungbola, 1992; Amazigo *et al.,* 1997; Nnoruka *et al.,* 2002; Abdullahi *et al.,* 2011).

The high prevalence among school children aged 15-19 years old could be attributed to their unrestricted prolonged water contact activities like swimming and fishing in the water-bodies. School-children below this age-bracket, still under strict parental surveillance, and being afraid of drowning, were also thought to be too young for active involvement in these water activities. This observation confirms the reports of Mbata *et al.* (2009) and Banji *et al.* (2012) that infection rate uniquely cut across all the age brackets but was more prevalent in children between 15-19 years followed by those within 10-14 years age bracket.

The proximity Obutu Lake to Iwollo community may be responsible for the higher infection recoded in school children at Iwollo than in those from other communities. People of this area usually cultivated rice in swampland, and older school-children often assisted in farm works after school-hours, and on weekends and holidays. Hence, school children whose parents were farmers were more exposed to infection, and may also be involved in contamination of the water bodies through which other groups were infected.

Sources of water supply also played a major role in the epidemiology of urinary schistosomiasis in the study area. Individuals whose sources of water supply was Obutu Lake were more infected than those whose sources were streams and shallow well. Lack of potable water supply in schools and homes in Omogho put the children at high risk of exposure to schistosomiasis.

Majority of the urine samples analyzed for haematuria indicated that the blood stains contained *S. haematobium* eggs.

So haematuria could be a better sign for the diagnosis and detection of *S. haematobium* in affected individuals. Proteinuria and haematuria were seen with urinary schistosomiasis as earlier reported by Mafiana *et al*. (2003) and Ezeagwuna *et al*. (2010). Some urine samples had neither proteinuria nor haematuria yet microscopy revealed ova of *S. haematobium*. According to Harrison *et al*. (1987), most people infected with *S. haematobium* experience few, if any signs and symptoms, and only a small majority develop significant disease. From this study, haematuria has been demonstrated to be the most common clinical manifestation of urinary schistosomiasis. The high number of the school-children with these symptoms is a reflection of the level of traumatic lesion caused by the penetration of the terminal-spine eggs of *S. haematobium* through the urinary bladder to exit in urine.

Provision of safe water and adequate sanitation, and a School-based mass chemotherapy programme would be a feasible control option for urinary schistosomiasis because livelihood patterns of Omogho residents would continue to depend on the presence and use of their available water bodies. Mass Chemotherapy would therefore check contamination of water bodies with eggs that would hatch to miracidia and infect snail intermediate hosts in the area. This will break development and further transmission of parasites responsible for urinary schistosomiasis in the study area.

Conflicts of Interest

The authors declared no conflicts of interest.

Contributor's Statement

Multiple contributors were required to complete this study, and each author read and approved the final manuscript before submission.

Iwueze, M.O developed the study design, interpreted the results, and wrote the manuscript.

Anakenyi, A.M participated in the conception of the study design, collected demographic data and urine samples of the subjects. Carried out bench work.

Ezeagwuna, D.O participated in urinalyses, parasite identification, and data analyses.

Ikpeze, O.O made input to the study design, presented the results, is responsible for the integrity and accuracy of data, and critically edited the final version to be published.

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