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Studies of Urinary Schistosomiasis amongst School Age Children in Ebonyi North Senatorial District of Ebonyi State, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. All authors read and approved the final manuscript.

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ABSTRACT

The prevalence of urinary schistosomiasis among school age children in seven primary schools in Ebonyi North Senatorial district of Ebonyi State was investigated using standard parasitological technique. Out of 525 pupils examined, 119(22.7%) were found to be excreting ova of *S. haematobium* in their urine, which comprised 44 females (17.5%) and 75 males (27.5%). Children between the age of 15 -16 years recorded the highest prevalence of 35.9%. Chi square test showed that the differences among the age groups are not statistically significant. The distribution of the infection was significantly high in Hill Top Primary School Amoffia Ngbo, Ohaukwu Local Government Area with the prevalence of 55.3% when compared to other locations assayed. Children whose parents were farmers recorded the highest prevalence (26.4%) when compared to those of other occupations ($p<0.05$). In the same vein, children that make use of quarry pit water as their main source of water supply recorded more infection than those that use

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borehole and pipe-borne water. However, health awareness programmes, provision of portable water, mass chemotherapy as well as environmental measures that may reduce population density of snail intermediate host of *S. haematobium* will be useful in the control of urinary schistosomiasis in the study area.

Keywords: Urinary schistosomiasis; prevalence; pupils; Ebonyi State.

1. INTRODUCTION

Schistosoma haematobium is the causative agent of urinary schistosomiasis also called Bilharziasis. It is an important digenetic trematode found in Middle East, Asia, Oceania and Africa. It afflicts the poor, rural villagers, especially school aged children, women and fishermen who lack access to safe water and sanitation, and where daily activities bring them into direct contact with infected water sources.

The adult organisms are found in the venous plexuses around the urinary bladder and their released eggs traverse the wall of the bladder causing haematuria and fibrosis of the bladder. The bladder becomes calcified and there is increased pressure on ureters and kidneys otherwise known as hydronephrosis. Inflammation of the genital due to *S. haematobium* may contribute to the propagation of HIV [1]. Schistosomiasis is not only endemic in Nigeria but is also known to be prevalent in all countries of Africa [2]. According to estimates of [3], at least 200 – 300 million are infected with the disease (and another 600 million are at risk of infection) and endemic in 74 developing countries. Estimates suggest that 85% of all schistosomiasis cases are now in sub –Saharan Africa [4].

Nigeria is one of the countries known to be highly endemic for urinary schistosomiasis with estimated 101.28 million persons at risk and 25.83 million infected [5]. The estimates for morbidity and mortality in affected populations are high with school age children. In Nigeria, pocket of foci of infection have been documented in various parts of the country. In the Northern region, *S. haematobium* is marked particularly by heavy infection rates. These include the territory extending from Katsina, Kano, Zaria and Kaduna to the Western frontier, in the region of Birinin Kebbi, Argungu and Kankiya areas [6]. In these area Schistosomiasis associated with haematuria infection rate up to 60%-95% have been recorded. Other Northern regions include Wulgo region of lake Chad basin, the riverine area along the Niger from Wawa to Pategi and Bida, Niger [7].

In the western region, *S. haematobium* is universally distributed. The highest infection rates are found in Ibadan, Oyo, Abeokuta and Epe area. [7] has also reported the endemic foci in Ogoja province and around Owerri of the Eastern region [8] states that urinary infection due to *S. haematobium* is endemic all over Nigeria but later work by [7] has narrowed the endemicity in Nigeria down to Western and Northern regions. However several works by [9,5,10,11], all indicate prevalence in the Southern and Eastern parts of Nigeria.

The health complications due to schistosomiasis such anaemia, UTI and nephritic syndrome have adversely affected children of school age, reducing their school hours and ability to learn. This work therefore is aimed at determining the prevalence of urinary schistosomiasis amongst children of school age in Ebonyi North Senatorial District of Ebonyi State, Nigeria.

2. MATERIALS AND METHODS

2.1 Study Areas

The approximate population of the State is 2.093 million (Population Census, 2006). There are thirteen Local Government Areas in the state which is divided into three senatorial districts: Ebonyi North, Ebonyi Central and Ebonyi South. Ebonyi North is made up of four local Government areas; —Abakaliki, Ohaukwu, Ebonyi and Izzi local Government Areas. The major inhabitants are the Ngbo and Izzi people. While the Izzi people occupy three Local Government Areas of Abakaliki, Izzi and Ebonyi; Ngbo people only occupy Ohaukwu LGA.

The major economic activity of these people is agricultural farming like rice farming which keeps them in constant contact to water surfaces with very few people engaged in white collar jobs. The major sources of water supply to the people are from rivers, dams, streams, stagnant ponds, quarry pit water, few shallow hand dug wells which are found in few rich families and

boreholes provided by government in some areas. These ponds, streams, quarry pit water, dams and rivers harbor most of the snail intermediate hosts from where the effective stage of the parasite called cercariae emerge ready for transmission.

The people are infected as they come in contact with water from contaminated ponds and streams during farming, fetching water, washing and swimming. The mode of infection is by the penetration/piercing of the skin by the cercaria infective stage.

2.2 Sampling Technique

A total of 525 pupils were sampled from seven primary schools namely Central School Ngbo (57), Hill Top Primary School Ngbo (76), Amaeffia Community Primary School Ngbo (74), Igbeagu Central School Izzi (60), Junction Primary School Nwezenyi (61), Oguzoronweya Primary School Ozibo (97) and Okaria Nkaleke Community Primary School (100). The children's ages range between 6-17 yrs and their sex were also noted. The teachers and pupils were enlightened on the relevance of the study especially the public health significance. The method of urine collection was also explained to them. After this the pupils were randomly selected. The children were given serial number and containers were distributed noting on the container their age and sex. Collection was done and immediately taken to the Federal Teaching Hospital laboratory for immediate examination.

2.3 Macroscopic Method

This involves noting the appearance of the urine samples. The color and appearance of each urine sample was noted. Each urine sample was poured into clean 10 ml centrifuge tube and properly labeled.

2.4 Microscopic Method

This was done in line with [12] for Sedimentation technique for *Schistosoma haematobium*. Thus 10 ml of urine was poured into the centrifuge test tube. The urine samples were centrifuged at 1000 g rpm for 5 minutes. After centrifugation, the supernatant fluid was decanted and the sediment was mixed and a drop was placed on a clean, grease free slide. It was covered with a cover glass and examined using x10 objective and x40 objective of the microscope in search of the *S. haematobium* ova.

2.5 ETHICAL CLEARANCE

Ethical approvals were obtained on the sample children from the Directorate of Research and Innovation Ebonyi State University Abakaliki. Informed consent were also sort from the school head teachers, teachers and their parents on privacy of students, informing them that samples collected from them will only be used for research to assist in their diagnosis. There was no clash of interest among authors.

3. RESULTS

The result revealed that in a total of 525 pupils who were examined for *Schistosoma haematobium* infection, 119 pupils were found to be excreting ova of *Schistosoma haematobium* in their urine. This gave a prevalence of 22.7%.

Among the different age groups, children of 15 - 16 years age range recorded the highest prevalence of 35.9%, followed by those under 9-10 years while those between 11-12 years recorded the least infection rate (17.4%) (Table 1). However, the differences were not statistically significant ($\chi 2 = 8.995$; df=1; $P > 0.05$).

Table 1. Distribution of *Schistosoma haematobium* infection amongst primary school pupils in Ebonyi North in relation to age groups

Age group	No of pupils examined	No of pupils infected	% of infection
<6.	11	2	18.2%
7-8	53	12	22.6%
9-10	105	30	28.6%
11-12	172	30	17.4%
13-14	134	29	21.6%
15-16	39	14	35.9%
17	11	2	18.2%
∫Total	525	119	

χ2=8.995; df=1; p>0.05

Table 2. Distribution of *Schistosoma haematobium* infection amongst pupils in the seven primary schools in Ebonyi North in relation to location

Location	No examined	No infected	% of infection
Amaeffia Comm. prim. School	74	3	4.1%
Central School Ngbo	57	21	36.8%
Hill-Top Pri. School Amoffia	76	42	55.3%
Igbeagu Central School	60	4	6.7%
Junction Pri. School	61	0	0.0%
Oguzoronweya Comm. Pri. School	97	33	34.0%
Okaria-nkaleke Comm. Pri. School	100	16	16.0%
Total	525	119	22.7%

$\chi^2=103.538$; df=1; p<0.05

Table 3. Distribution of *Schistosoma haematobium* infection amongst pupils in Ebonyi North in relation to Sex

Sex (Gender)	No examined	No infected	% of infection	% to total infection
Female	252	44	17.5%	37%
Male	273	75	27.5%	63%
Total	525	119	22.7	100%

$\chi^2=7.494$;df=1;p<0.05

The distribution of infection among the different schools showed that pupils of Hill Top Primary School Amofia Ngbo had the highest infection rate of 55.3%. This was followed by Central School Mgbo (36.8%), Oguzoronweya Community Primary School (34.0%) while no infection was recorded in Junction Primary School, Ezza Mgbo (Table 2).

Infection among sexes was higher in males (63%) than in females (37%) and the difference was statistically significant ($\chi2=7.49$; df =1; p<0.05) (Table 3).

Children whose parents were farmers recorded the highest prevalence of (26.4%) when compared to those of other occupations while children of traders had 9.3%. Children of artisans and civil servants recorded no infection ($\chi2=18.626$; df=5; p<0.05) (Table 4).

Table 4. Relationship between infection and occupation of parents in the overall population study

Occupation	Total	No infected	% infected
Artisan	3	0	0
Civil servants	23	0	0
Farmers	424	112	26.4
Traders	75	7	9.3
Total	525	119	22.7

$\chi^2=18.626$; df=5; p<0.05

Table 5. Relationship between infection and type of water source in use in the overall population study

Water source	Total	No with infection	%
Borehole	274	0	0%
Pond	24	13	54.2%
Quarry pit water	14	13	92.9%
Stream	213	93	43.7%
Total	525	119	22.7%

$\chi^2=186.808$; df=3; p<0.05

Children that make use of quarry pit water as their main source of water supply recorded highest infection rate (92.9%), followed by those that use pond water (54.2%) and those that use stream water (43.7%). On the other hand, those that use borehole water recorded no infection ($\chi2=186.808$; df=3 p<0.05) (Table 5).

4. DISCUSSION

Schistosoma haematobium infection was recorded in children examined in the six of the seven primary schools surveyed in Ebonyi North with a prevalence of 22.7%. This finding suggested that urinary schistosomiasis may be a public health problem in Ebonyi North senatorial zone of Ebonyi State. The study equally agreed with a number of previous finding that *Schistosoma haematobium* infection was

endemic in Nigeria where school age children were at a greater risk of infection [6,13,9].

From this study, 119 (22.7%) out of 525 pupils were infected with *Schistosoma haematobium.* The high prevalent rate of infection is consistent with reports already made by [5,14,15]. It is equally consistent with reported prevalence in other areas of Nigeria such as [7] in a school survey in the western region of Nigeria who recorded a 20% prevalence rate in children under 14 years. [15] in the survey of the inhabitants of Ebonyi, Benue river valley south eastern Nigeria showed a prevalence rate of 23.5% from randomly selected villages. [5] in a survey of urinary schistosomiasis among school age children in Ebonyi State also recorded 235 (26.8%) infection out of the 876 pupils examined with Ohaukwu local government which is part of Ebonyi North recording significantly high prevalent rate of 49.9%.

All these further confirmed that adequate attention was not given to the control of the disease in many parts of Nigeria [13,16] and for certain reasons it is not yet considered a priority in National and local health policies and programmes. The persistent high prevalence of *Schistosoma haematobium* is an indication that much intervention is needed.

In this study, it was observed that males had a higher prevalence rate of 27.5% as compared to females with prevalent rate of 17.5%. The difference in gender specific prevalence of infection was statistically significant ($\chi 2 = 7.494$; df =1; $p< 0.05$). This is in agreement with several studies with similar relationships. Pugh and Gilles, (1978) in the course of the Malumfashi Research Project observed that males accounted for 83% of the infection. [17,18,14] in their separate studies revealed that male subjects were infected more than the females. Perhaps, this is due to more frequent water contact by males who engage in swimming hobby more than their female counterpart and since tradition, socio-cultural and religious customs prohibit females especially those in menstrual cycle from bathing and swimming in certain streams, the females have less water contact than the males [5,19]. However, this finding is in contrast to [11] which stated that there was no sharp difference between the rate of the infection between the males and females.

The study equally revealed that even though pupils of age group 15-16 years recorded higher prevalent of 35.9% than other age group, the difference among the age groups is not statistically significant ($\chi 2 = 8.995$; df =1; $p> 0.05$) and this indicates that the infection cuts across all age groups and does not depend on age. This is in conformity with the work of [11] but in contrast to [14] who reported high prevalent rates among age groups of 10-11 years and 8-13 years.

It was equally revealed that there is significant difference between one school location and the other in relation to infection rate ($\chi 2 = 103.538$; df =1; $p<0.05$) with Hill Top Primary School Amoffia Ngbo recording highest prevalence of 55.3% closely followed by Ngbo Central School with prevalence of 36.8% and Oguzoronweya Community Primary School with 34% prevalence. The high infection rate in Hill Top Primary School and others may be attributed to the presence of several quarry pits and several streams harboring the intermediate host (snails) in which these children engage in swimming and washing. The major occupation of the people of this area which includes farming especially rice equally helps to increase level of water contact that can predispose the victim to infection. This report is in conformity with the study carried out by [5] which recorded high prevalence among school age children in this location.

Schools in Urban and peri- urban areas like Igbeagu and Junction Primary Schools recorded low prevalence probably because of availability of potable water and boreholes with low number of streams. Amafia Community School's low level of infection can equally be attributed to the use of bore holes as main source of water supply. The study equally revealed that children whose parents were farmers recorded the highest prevalent rate when compared with other occupation ($\chi 2=18.626$; df=5; $p<0.05$) .This is in agreement with [14] and can be attributed to the fact that this children assists their parents thereby rendering them susceptible to infection through close contact to water source as they engage in the farm work. Also, children that make use of stream, pond and quarry pit water recorded more infection than those that use borehole and pipe borne water $\chi 2=186.808$; df=3 $p<0.05$.

5. CONCLUSION

This study established a high prevalent rate of urinary schistosomiasis infection in Ebonyi North, particularly Ohaukwu and Ebonyi Local

Government Areas. Infection rate was highest in children of farmers and those that make use of quarry pit water. The high prevalent rate (22.7%) in this study is attributed to lack of portable water, lack of awareness of the risk factors, unsanitary conditions, poverty, inadequate or total lack of public facilities. The major limitation of the study is the difficulty in getting the consent of the head teachers of schools and the parents of the children. The information from the study will aid the government and other stage holders in initiating intervention programmes. Such programmes include provision of portable water, creation of awareness among the populace, treatment of infected individuals as well as making health policies geared at preventing the disease.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Leutscher PD, Reimart CM, Vennervald BJ. Morbidity assessment in urinary schistosomiasis infection through ultrasonography and measurement of eosinophil cationic protein in urine. Trop Med Int Health. 2005;5:88-93.
2. Wurapu F, Barakamfitiya D, Moh KE. Current status of the epidemiology and control of schistosomiasis in Afr. Trop Med and Parasitol. 1989;40:149-152.
3. WHO. The control of schistosomiasis Technical Report Series. 1985;728:8-66.
4. Chitsulo L, Engel D, Montresor A, Salvioli L. The global status of schistosomiasis and its control. Acta Trop. 2000;77:41-51.
5. Uneke CJ, Oyibo PG, Ugwuoru COC, Nwanokwai AP, Iloegbunam RO. Urinary schistosomiasis among school – age children in Ebonyi State, Nigeria. Internet J. Lab. Med. 2007;2(1):1-10.
6. Nmorsi OP, Egwunyenga AO, Bajomo DO. Survey of urinary schistosomiasis and trichomomasis in a rural community in Edo State Nigeria. J. Com Dis. 2000;33(2):96-101.
7. Cowper SG, Wood WH. Parasitic infection recorded at UCH Ibadan, Nigeria over a three year period (1957-1960). West Afr Med Journ. 1963;8:191.
8. Akinkugbe OO. Urinary schistosomiasis in Ibadan school children. West Afr Med Jour. 1962;11(6):124-127.
9. Ekejindu IM, Ekejindu GOC, Agbasi A. *Schistosoma haematobium* infection and nutritional status of residents in Ezianam, a riverine area of Anambra State Nigeria. The Nig J. Parasitol. 2002;23:111-118.
10. Uwaezuoke JC, Anosike C, Nwoke BEB, Dozie INS. Urinary schistosomiasis in Ihitte Uboma local government area of Imo State, Nigeria. Nig J. Parasitol. 2007;28(2): 90-94.
11. Mbata T, Orji M, Oguoma VM. The prevalence of urinary schistosomiasis in Ogbadibo Local Government Area of Benue State. The Internet J. Infect Dis. 2009;7:1–4.
12. Cheesbrough M. District laboratory practice in tropical countries part 1. Cambridge University Press, London. 1998;454.
13. Nnoruka VC. Epidemological studies of urinary schistosomiasis in Imo State rapid assessment. The Nig J. Parasitol. 2000;21:21-32.
14. Okwelogu IS, Ikpeze OO, Ezeagwuna DA, Aribodor DN, Nwanya AV, Egbuche CM, Okolo KV, Ozumba NA. Urinary schistosomiasis among school children in Okija, Anambra State, South Eastern Nigeria. Sch J. of Bio Sc. 2012;1(1):1-6.
15. Anosike JC, Okere AN, Nwoke BE, Chukwu JU, Nwosu DC, Njoku TRF. Endemicity to vesical schistosomiasis in the Ebonyi Benue River valley, South Eastern Nigeria. Intern Journ of Hyg and Env Health. 2003;206(3):205-210.
16. Pugh RNH, Gilles HM. Malumfashi endemic disease Research Project III. Urinary schistosomiasis a longitudinal study. Annal of Trop Med and Parasitol. 1998;72:471-482.

17. Ban Wat ME, Ogbonna C, Daboer JC, Chingle MP, Envuladu EA, Audu A, Lar LA. Prevalence of urinary schistosomiasis amongst children of school age in langai, plateau: Pre and post intervention. Nig J. Med. 2012;2:146-9.
18. World Health Organization. The control of schistosomiasis. Second report of the WHO expert committee. Geneva, WHO, WHO Technical Report Series. 1993;830.
19. Houmsou R, Kela S, Suliman M, Ogidi J. Perceptions and assessment of risk factors in *Schistosomia haematobium* infection in Buruku and Katsina Ala Local Government Area of Benue State Nigeria. The Internet J. Infect Dis. 2010;8(1):65-72.

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