

Schistosomiasis and Water Related Activities: A Major Road Block to Disease Control among School-Aged Children in Endemic Communities along Oyan Dam in Ogun State, Nigeria

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ABSTRACT

Majority of sub-Saharan countries have restricted access to potable water supply, leaving them with the option of utilizing natural water bodies for their domestic chores which are polluted with advance stages of the schistosome parasite. This study was investigated to determine the water contacts usage among school pupil in Abuleoriowo and AbuleTitun along Oyan Dam in Ogun State, Nigeria. A structured questionnaire was employed in collecting data of school pupil of 0-19 and their house hold. Result from the study indicates that schistosomiasis is endemic in the study communities with a high risk to source of 35 (46.7) % and 38 (50.7) % in Abule-Titin and Abule-Oriowo respectively. There was no significant difference between male and female, the result shows that 40(53.3%) females and 37(49.3%) male were exposed to water contact activities. Children are being vulnerable to Schistosomiasis as consequences of frequent water contact which affect the schistosomiasis control in school minor in the study areas. The communities living in Schistosome endemic area should be educated on important role of improved water, sanitation, and hygiene as pivotal to sustained intervention for the mitigation of schistosomiasis, whereas attitudes, and practices of water contact among school children should be discourage through community sensitization in order to mitigate their passive vulnerability to infective water.

Keywords: Schistosomiasis, water, school-aged children endemic communities, Nigeria

Introduction

Human schistosomiasis otherwise called bilharzia is a fresh water snail transmitted intravascular debilitating disease resulting from infection by the parasitic dimorphic *Schistosoma* trematode parasite, which resides in the bloodstream of the host (Steinman *et al.*, 2006 and Gryseels *et al.*, 2006). Nigeria has the highest burden of

endemicity of schistosomiasis these includes intestinal schistosomiasis caused by *Schistosoma mansoni* and urogenital schistosomiasis caused by *Schistosoma haematobium* (WHO 2015; FMOH 2013; Hotez and Kamath 2009). These parasites are known to have adverse effects on child health as they drain nutrients in children and negatively

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affect their physical and mental development. This disease is more common in poor and rural communities where fishing and agricultural activities are dominant. Domestic activities in infected water bodies expose women and children to infection (WHO, 2014). Therefore, World Health Organization regards the disease as NTDs with an estimated 732 million persons being vulnerable to infection worldwide (WHO, 2014). An estimated 76% of the sub-Saharan population lives near to various sources of pen water bodies which are contaminated with the intermediate snail host necessary for the transmission of the disease (Steinman *et al.*, 2006). The study was conducted to investigate the water contact practices among school pupil affecting the control of schistosomiasis and to evaluate the knowledge and activities that predisposed them to disease along Oyan-dam, in Ogun State, Nigeria. Therefore, World Health Organization regards the disease as a neglected tropical disease, with an estimated 732 million persons being vulnerable to infection worldwide in renowned transmission areas (WHO, 2014). The objectives of this study were to investigate the water related practices among people affecting the control of schistosomiasis and to evaluate school-aged children on the knowledge, practice and activities that predisposed them to infections in endemic communities along Oyan dam, Ogun State Nigeria.

Materials and Methods

Description of Study-Area

The Study communities are Abule-Ori-Owo and Abule-Titun which lies approximately between Longitude 30 9' and 40 31.E and Latitude 60 31' and 80 N, near Oyan dam. The dam has a crest length of 1044 m, height 30.4 m and gross storage capacity of 270 million m³ Ofoezie and Asaolu (1997). It was designed to supply raw water to Lagos and Abeokuta, and to support the 3,000 hectare Lower Ogun Irrigation Project.

The dwellers of Abule-Ori-Owo and Abule-Titun are mainly immigrant fishermen who engage in other occupation. The inhibitor of the study area depends on the dam for fishing, cooking, washing and swimming (Sam-Wobo *et al.*, 2009). The lack of waste disposal system results in the disposal of human wastes in the dam, which the community members regard as feeds for the fishes (Sam-Wobo *et al.*, 2009).

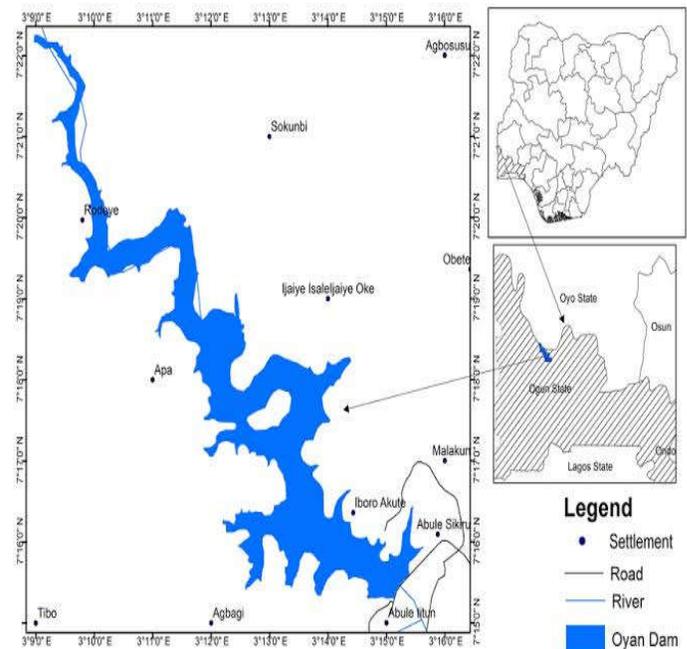


Figure 1: Communities along Oyan dam

Consent

Written consent and approval were sought and obtained from the village heads on the aims of the study. Interactive sessions and the aims of the study were explained to the respondent and verbal consent obtained before participation in the study.

Sampling method

150 respondents, from 5 – 19yrs old in which 75 respondents per community were selected using a previous national census house numbering in which alternate household method was employed, for the study. Structured questionnaires interpreted in local languages were used in obtaining information such as: name, age, sex, marital status, occupation,

educational qualification, water usage and contact practices from respondents.

Data analysis

EPI Info version 6 employing simple percentiles were used in analyzing the questionnaires. SPSS Version 10 Software employing paired t-tests was used in the analysis for prevalence of infection.

Results

Demographic characteristics of the respondents

A total of 75 participants each were enrolled from the two communities. Majority of the respondents (51.3%) were females, while a high proportion of the participants 72(48.0%) are within the age bracket of 10-14 years, the least proportion of the respondents 31(20.7%) were within the age brackets of 15-19 years. A high percentage of the children (75.3%) were still in primary school, while 12.7% of the respondents had no formal education. The most predominant father's occupation was farming (32.0%), while that of the mothers' was civil servant (34.7%). Christianity is the predominant religion followed by (44.7%), Islam (42.7%) and traditional worshipers (12.7%) (Table 1).

Knowledge about Signs and Symptoms of Schistosomiasis

About 56% of the respondents claimed to have suffered from schistosomiasis before. Majority of the respondents (74%) attributed infection to worm invading the body while swimming, 6.0% and 20.0% attributed infection to spiritual attack and bathing in infected water respectively. Majority of the respondents (80.7%) stated blood in urine as major sign of schistosomiasis (Table 2).

Table 1: Demographic characteristics of the respondents

VARIABLES	FREQUENCY N=150	PERCENTAGE (%)
Gender		
Male	73	48.7
Female	77	51.3
Age		
5-9 years	47	31.3
10-14 years	72	48.0
15-19 years	31	20.7
Level of education		
Informal	19	12.7
Primary	113	75.3
Secondary	18	12.0
Father's occupation		
Farming	48	32.0
Fishing	37	24.7
Business	22	14.7
Civil servant	35	23.3
Unemployed	8	5.3
Mothers' occupation		
Farming	14	9.3
Fishing	24	16.0
Business	31	20.7
Civil servant	52	34.7
Unemployed	29	19.3
Religion		
Christianity	67	44.7
Islam	64	42.7
Traditional	19	12.7

Table 2: Knowledge about Signs and Symptoms of Schistosomiasis

Variables	Frequency N = 150	Percentage
Previous infection		
Yes	84	56.0
No	66	44.0
Mode of Acquisition		
Worm invading the body when swimming	111	74.0
Spiritual attack	9	6.0
Bathing with infected water	30	20.0
Signs and symptoms		
Blood in urine	121	80.7
Abdominal pain	8	5.3
Fever	21	14.0

Knowledge and Degree of exposure to risk factors and prevention of Schistosomiasis across different communities

There was no significant difference ($p>0.05$) in level of knowledge about schistosomiasis between the two communities; about 96% and 92% had high knowledge about schistosomiasis from Abule - Titun and Abule - Oriowo (Table 4). A significant difference ($p<0.05$) existed in degree of exposure to risk factors between the two communities; respondents from Abule-Titun were more exposed to risk through water contact practices compared to respondents from Abule-Oriowo (Table 4). Though, respondents from Abule-Orile had slightly higher exposure to risk factors, compared to the other community, no significant difference ($p>0.05$) was observed in level of knowledge about prevention of schistosomiasis between the two communities.

Knowledge of Schistosomiasis prevention across genders

There was no significant difference ($p>0.05$) in level of knowledge about schistosomiasis between males and females; about 93.2% of the males and 94.8% of the females had high knowledge about

schistosomiasis. A significant difference ($p<0.05$) existed in degree of exposure to risk factors between male and female; females were more exposed to risk through water contact practices compared to the males. Though, the female respondents had slightly higher exposure to risk factors, compared to the males, no significant difference ($p>0.05$) was observed in level of knowledge about prevention of schistosomiasis between male and females (Table 5).

Types and Frequency of Water Contact Practices among the respondents

About 55.3 and 61.3% percent of the respondents claimed to use the river for fetching water and swimming respectively. The most prominent activities carried out in the stream were Fishing (75.3%) and Religious activities (Water baptism) (74.7%), followed by washing (69.3%) and Bathing (56.0%). The least activity carried out at the river as claimed by the respondents was Transportation (37.3%). Majority of the respondents claimed to do all these activities at least 3 times a week with the exception of those that use the river for transportation in which 50% of the respondents claimed to do every day (Table 3).

Table 3: Types and Frequency of Water Contact Practices among the respondents

Variables	Frequency	Percentage	Everyday	At least 3 times a week	Occasionally
Fetching					
Yes	83	55.3			
No	67	44.7	15(10.0)	126(84.0)	9(6.0)
Swimming					
Yes	92	61.3			
No	58	38.7	20(13.3)	129(86.0)	1(0.7)
Washing					
Yes	104	69.3			
No	46	30.7	11(7.3)	130(86.7)	9(6.0)
Fishing					
Yes	113	75.3			
No	37	24.7	3(2.0)	140(93.3)	7(4.7)
Bathing					
Yes	84	56.0			
No	66	44.0	17(11.3)	127(84.7)	6(4.0)
Religious Activities (water baptism)					
Yes	112	74.7			
No	38	25.3	7(4.7)	132(88.0)	11(7.3)
Transportation					
Yes	56	37.3			
No	94	62.7	75(50.0)	56(37.3)	19(12.7)

Table 4: Knowledge and Degree of exposure to risk factors and prevention of Schistosomiasis across different communities

Variables	No. Examined	Low	Medium	High
Level of Knowledge				$p = 0.302$
AbuleTitun	75	3(4.0)	0(0.0)	72(96.0)
AbuleOriowo	75	6(80.0)	0(0.0)	69(92.0)
Degree of exposure to risk factors (through water contact practices)				$p = 0.000^*$
Abuletitun	75	0(0.0)	14(18.7)	61(81.3)
Abuleoriowo	75	12(16.)	45(60.0)	18(24.0)
Level of knowledge of prevention				$p = 0.283$
Abuletitun	75	7(9.3)	39(52.0)	29(37.8)
Abuleoriowo	75	4(5.3)	33(44.0)	38(50.7)

(n=150)

Table 5: Knowledge of Schistosomiasis prevention across genders

Variables	No. Examined	Low	Medium	High
Level of Knowledge				$p = 0.670$
Male	73	5(6.8)	0(0.0)	68(93.2)
Female	77	4(5.2)	0(0.0)	73(94.8)
Degree of exposure to risk factors (through water contact practices)				$p = 0.013^*$
Male	73	8(11.0)	29(39.7)	36(49.3)
Female	77	4(5.2)	47(61.0)	26(33.8)
Level of knowledge of prevention				$p = 0.917$
Male	73	6(8.2)	35(47.9)	32(43.8)
Female	77	5(6.5)	37(48.1)	35(45.5)

(n=150)

Discussion

To control schistosomiasis successfully and sustainably, the disease must be prioritized as public health problem depleting poor rural and hard to reach areas in Sub-Saharan African countries. In view of this, community members need to have the relevant knowledge, right perceptions and must be able to apply the correct preventive and control measures so as to mitigate the menace of the disease. The study exploring individual knowledge and activities that prone them to schistosoma infections in order to gain

parents and children's knowledge on schistosomiasis and to adequately sensitized the areas and to create awareness on ways in which the diseases is contracted and to discourages their water contact behaviours, good hygiene and water treatment before using for bathing and consumption. This behavioural change will go a long way in reducing contamination of water sources and thus lead to decrease in the rate of transmission of schistosomiasis and some other water-transmitted diseases. To set up effort at educating people on the vulnerability of schistosomal infection and transmission which, is

necessary to assist in accomplishing positive behavioural changes regarding waste elimination and personal risk to open water sources (Hotez and Kamath, 2009). The knowledge of transmission of schistosomiasis decreased with increase in age. However, the many of the study participants were more informed about the disease symptoms especially urinary schistosomiasis.

This study revealed that children were more at risk to schistosomiasis infection due to their active water contact during outdoor activities such as swimming, fishing, fetching, bathing, washing and transportation in contaminated water. These findings are in line with findings of other studies (Lothe *et al.*, 2018; Gbalégba *et al.*, 2017; Traorel *et al.*, 2016; King, 2012). Few of the study participants did suggest keeping away from contaminated water as a way forward against schistosomiasis. It should be aware that improved access to safe water such as deep and protected wells; water taps and sufficient sanitation are effective in means of reducing schistosomiasis infection (Freeman *et al.*, 2014).

Conclusions

A meaningful control programme on schistosomiasis should take into account of people's knowledge, belief, behaviour and practices on the disease, despite good knowledge and perceptions on schistosomiasis by a major part of the study participants. Majority of the respondents admitted that schistosomiasis can be prevented through government intervention by supplying adequate drugs for all rural endemic communities, also provides orientation programs on the benefit effects of taken drugs against schistosomiasis and by so doing will enhance control of schistosomiasis in the endemic rural communities in Nigeria and Africa.

Recommendations

Collective effort between the government and the community are required to reduce water contact

behaviours that may cause the transmission of urinary schistosomiasis. To make this feasible, health education, repairs all damages boreholes and provision of other sources of portable water supply are recommended to complement ongoing achievement to mitigate schistosomiasis in the study communities and other endemic areas of Sub-Saharan Africa.

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References

- Clennon, J. A., Mungai, P. L., Muchiri, E.M., King, C. H. and Kitron, U. (2006). Spatial and temporal variations in local transmission of *Schistosoma haematobium* in Msambweni, Kenya. *American Journal of Tropical Medicine and Hygiene*. 75(10) 34–41.
- Federal Ministry of Health 2013. Nigeria master plan for neglected tropical disease (NTDs) 2013–2017. Abuja: Federal Ministry of Health. 142 p.
- Freeman, M.C., Grimes, J. E. T., Croll, D., Harrison, W. E. and Templeton, M. R. (2014). The Relationship between Water, Sanitation and Schistosomiasis: A Systematic Review and Meta-analysis. *BMC Infectious Diseases*, 8: 1-10
- Gbalégba, N. G. G. C., Silué, K. D., Ba, O., Ba, H., Tian-bi, N. T. Y. and Yapi, G.Y. (2017). Prevalence and seasonal transmission of *Schistosoma haematobium* infection among

school-aged children in Kaedi town, southern Mauritania. *Parasites & Vectors*; 10:1–12.

Hotez, P. J. and Fenwick, A. (2009). Schistosomiasis in Africa: an emerging tragedy in our new global health decade. *Neglect Trop Dis*. 3:485.

Hotez, P. J., Kamath, A. 2009. Neglected tropical diseases in sub-Saharan Africa: Review of their prevalence, distribution, and disease burden. *PLoS Negl Trop Dis* 3: e412.

King, C. H. (2010). Parasites and poverty: the case of schistosomiasis. *Acta Trop*. 113:95–104.

King, C. H. (2012). Factors affecting infection or reinfection with Schistosomiasis. *PLoS Negl Trop Dis*., 6:83–92.

Kapito-Tembo, A. P., Mwapasa, V., Meshnick, S. R. (2009). Prevalence distribution and risk factors for *Schistosoma hematobium* infection among school children in Blantyre, Malawi.

Lothe, A., Zulu, N., Øyhus, A. O., Kjetland, E. F. and Taylor, M. (2018). Treating schistosomiasis among South African high school pupils in an endemic area, a qualitative study. *BMC Infectious Diseases*, 18:1–10.

Ofoezie, I.E. and Asaolu, S.O. (1997). "Water level regulation and control of schistosomiasis transmission: a case study in Oyan Reservoir, Ogun State, Nigeria". *Bulletin of the World Health Organization*. 75 (5): 435–41. PMC 2487010. PMID 9447776.

Rollinson, D., Knopp, S., Levitz, S., Stothard, J. R., Tchuem, T., Tchuenté, L. A. and Garba, A. (2013). Time to set the agenda for schistosomiasis elimination. *Acta Trop.*, 128:423–40.

Sam-Wobo, SO; Ekpo, UF; Ameh, IG; Osileye, OT (3 July 2009). "Continued high endemicity of urinary schistosomiasis in Ogun State, Nigeria". *Nigerian Journal of Parasitology*. 30 (1). doi:10.4314/njpar.v30i1.43992

Siddiqui, A. A., Phillips, T. and Charest, H. (2003). Enhancement of Smp-80 (large subunit of calpain) induced protective immunity against *Schistosoma mansoni* through co-delivery of interleukin-2 and interleukin-12 in a DNA vaccine formulation. *Vaccine*. 21:288 2–9.

Steinmann, P., Keiser, J., Bos, R., Tanner, M. and Utzinger, J. (2006). Schistosomiasis and water resources development: systematic review, meta-analysis, and estimates of people at risk. *Lancet Infect Dis*. 6:411–25.

Traorel, I., Karthe, D., Sie, A., Coulibaly, V. and Kappas, M. (2016). Influence of air temperature on children water contacts with respect to schistosomiasis transmission risk in the Sourou Valley, Burkina Faso. *Springer Berlin Heidelberg*, 30:2097–107.

World Health Organization. WHO schistosomiasis fact sheet; 2014. Available from <http://www.who.int/mediacentre/factsheets/fs115/en>[accessed 20.10.2020].

WHO 2015. Schistosomiasis, Fact Sheet No115; World Health Organization. Available at <http://www.who.int/mediacentre/factsheets/fs115/en/>.