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Urinary Schistosomiasis Among School Aged-Children in Some Selected Local Government Area of Kogi State: Prevalence and Risk Factors

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ABSTRACT

Schistosomiasis is largely a water-snail related disease that mostly affects school aged children in developing countries. The disease is also related to poverty and lack of health education among other factors. This study was designed to determine the prevalence and risk factors for Schistosomiasis among school-aged children in three selected riverine local government of Kogi State. Schistosomiasis burden among school-aged children in Kogi is not well documented in the literature. This study used field research (in the form of a snail survey), laboratory work (urinalysis and microscopy for parasite identification), and questionnaire-guided interviews to determine the prevalence and risk factors for Schistosomiasis among school –aged children. Contact with infested water put these children and the general population at risk of infection and reinfection. Inclusion of school children in treatment programmes should be considered imperative, along with safe treatment guidelines. To prevent infection, the population in these areas should be provided with health education and safe alternative water sources.

Keywords: schistosomiasis, statistical analysis, infection, prevalence, school children

1.0 INTRODUCTION

Schistosomiasis is a major neglected tropical disease that afflicts more than 240 million people, including many children and young adults, in the tropics and subtropics. The disease is characterized by chronic infections with significant residual morbidity and is of considerable public health importance, with substantial socioeconomic impacts on impoverished communities. One of the most serious public health problems in the tropics and subtropics is human Schistosomiasis, a parasitic infection that is estimated to affect over 200 million people. According to WHO, Schistosomiasis is estimated to have affected up to 249 million people worldwide, of which at least 224 million affected people are in habitants of sub-Saharan Africa (WHO, 2015). The parasites, schistosomes, have to go through an intermediate host (snails in most cases) to complete their life cycle: from eggs, to

miracidia, to cercaria, finally to adult worms. Schistosomes have two stages of reproduction: the first one consists in a sexual reproduction in the blood vessels of humans and the second stage is an asexual reproduction in snails.

In Jigawa, Bashir et al. (2016) also reported that Males were more infected than the females with 3.3% and 1.7% positive cases respectively. Similarly, Sule et al. (2019) reported from their studies in Kano state that 25% Males are infected against 0.0% females. A study in Anambra Southeastern Nigeria, on 232 children also revealed 42% prevalence rate (Iwueze et al. 2018). Schistosomiasis is largely a water-snail related disease that mostly affects school aged children in developing countries. The disease is also related to poverty and lack of health education among other factors.

Historically, Schistosomiasis was first introduced to the Susan at the beginning of the

20th century, and it has swarmed everywhere since then. It appears to be endemic in rural areas, where there are irrigated agricultural schemes and fishing farming are dominant. (Ahmed et al.1996). Schistosomiasis are basically found in rural areas where the sanitation is poor and water sources are polluted and no alternative source to use (Agnew et al. 2013). For best results, Behavioral change and environmental improvement/sanitation are necessary for control, in addition to treatment with praziquantel which is the corner stone of schistosomiasis control (Ahmed et al.2012).

This poverty related disease Schistosomiasis ranks second only to malaria as the most common parasitic disease, which kills an estimated 280,000 people each year in the African continental (CDC, 2011). For infestation cycle to continue, transmission of urinary Schistosomiasis is dependent on availability of specific intermediate snail hosts and human activities leading to water contacts (WHO, 2010). Therefore, the risk and emergence of urinary Schistosomiasis in an area, is attributed to the range of snail habitats available promoted by water development schemes such as dam construction, natural ponds and the likes (Jamison et al.2006). When among which 16 million are children, and about 101million people are at risk of Schistosomiasis (WHO, 2013).

According to the Nigeria master plan for NTDs 2013-2017, out of the 36 states of the federation, mapping and baseline surveys on Schistosomiasis have been conducted in a total of 19 states, all located in southern part of the country, and Schistosomiasis has only been completely mapped in 9 of those states (Hotez, et al., 2012).

Apart from several cases on hematuria associated to schistosomes in many parts of Kogi, there is scarcity of research on the real burden of the disease in the state including the study area, (Evans et al. 2013). This lack of enough data hampers intervention and effective control measures in the state, as such additional data is needed on the burden of the disease in the state. Considering this gap, the present study aimed to investigate urinary Schistosomiasis among the most affect group

those conditions are available on the other hand, school age children normally engage in frequent water contact that makes them more vulnerable to Schistosomiasis, hence this age group is usually associated more frequently with Schistosomiasis problems than other age ranges (Bala et al. 2012).

In one study in Ethiopia, a developing country, it was discovered that both *S. haematobium* and *S. mansoni* were found to be endemic, with an estimated 4 million people infected and 30–35 million being at risk of one Schistosomiasis or the other (Kassa et al. 2005). Also, an infection rate of urinary Schistosomiasis as high as 62.7%, was reported among children younger than 14 years of age in certain parts of the same country. However, the distribution of urinary Schistosomiasis in the country (Ethiopia) is highly focal and is limited to lowland areas where development of irrigation schemes, and stagnant ponds among other factors contributes to spread of the disease among population as in many other African countries (Kassa et al., 2005).

Nigeria has the greatest number of cases of Schistosomiasis worldwide Hotez et al. (2012), with about 29 million infected people, (school aged children) in three selected riverine Local Government Area of Kogi state which can help to determine the burden of the disease in the state.

2.0. MATERIALS AND METHODS

2.1. Study area

The study was undertaken in three riverine areas of Kogi, Bassa and Ajaokuta local government areas of Kogi state. The selection of the locations was one local government per district area of the state. Three villages were purposively selected from each local government areas for the study, since they are impact areas for the Ecological Health Project, of which this study was a Component. These villages were Okpareke, Okofi, Edeha (Kogi), Ejule-Ojebe, Odugun, Onyedega (Bassa) and Eleta, Geregu, Ajaokuta (Ajaokuta).

2.2 Study design

A cross-sectional study was carried out between August and September 2019 on school aged children between 3-15 years of age in the three local government areas.

The study population comprised some selected primary and secondary school pupils within the selected villages in the local government areas. Prior to sample collection, structured questionnaires were used to obtain some relevant information like: age, sex, water supply, whether they passed blood in urine and Whether they recently use any anti-schistosomal drug or not, from the pupils.

2.3. Sample size determination

The sample size was determined using the formula according to (Lwanga et al.2016).

$$\frac{z^2 P(1 - P)}{d^2}$$

Where;

n =Sample size

z= Statistic for level of confidence

P= Prevalence of Schistosomiasis

d= Allowable error at 5%

2.4 Statistical analysis

All analysis was carried out using Microsoft Excel 2016 and SPSS statistical software version 22 software (IBM Corp., 2013). Data were presented in table and charts. Frequencies, percentages, constitute the statistical tools for summarizing the data. The Chi-square test is a measure of relationship, association or independence. It is the best known of all nonparametric methods. The Pearson Chi-square was used to evaluate the association between some key variables like genders; age-groups; parents' occupation; water contact activities of respondents and prevalence of infection (*schistosomiasis*) respectively. A p-value of < 0.05 was considered significant.

Summary of Socio-demographic characteristics of respondents

Table 1a: Distribution of respondents by L.G.A

L.G.A	Frequency	%
Kogi	385	33.5
Ibaji	381	33.1
Ajaokuta	384	33.4
Total	1150	100

Table 1a shows that 33.5% of the study were school-aged pupils from Kogi, 33.1% from Ibaji and 33.4%

Table 1b: Gender Distribution of respondents across L.G.A

L.G.A	Gender		Total
	Female	Male	
Kogi	184	201	385

Ibaji	145	236	381
Ajaokuta	143	241	384
Total	472	678	1150
%	41.0	59.0	100

The majority of the respondent were male (59.0%) while female (41.0%).

Table 1c: Age-groups distribution of respondents across three L.G.A

L.G.A	Age-groups	Frequency	Percentage (%)	
Kogi	3 – 5	27	2.3	33.4
	6 – 8	94	8.2	
	9 – 11	121	10.5	
	12 +	143	12.4	
Ibaji	3 – 5	10	0.9	33.4
	6 – 8	151	13.1	
	9 – 11	147	12.7	
	12 +	77	6.7	
Ajaokuta	3 – 5	0	0.0	33.2
	6 – 8	219	19.0	
	9 – 11	135	11.7	
	12 +	29	2.5	
Total		1153	100	100

The age group of respondents ranged from 3 to 12 and above, majority of the respondents in the study were in age-group 6 – 8 years, while Kogi recorded higher frequency of

respondents in age-group 12 years and above; age-group 6 – 8 years for Ibaji and Ajaokuta respectively. Age-group 3 – 5 years has the least number of respondents across each L.G.A.

Table 1d: Respondent parents' occupation distributed across L.G.A

Parent Occupation	L.G.A			Total	%
	Kogi	Ibaji	Ajaokuta		
Farming	138	122	132	392	35.2
Fishing	121	169	154	444	39.8

Farming and Fishing	48	5	17	70	6.3
Teacher	18	4	9	31	2.8
Civil Servant	13	31	32	76	6.8
Others	39	39	24	102	9.1
Total	377	370	368	1115	100

The predominant occupation of the parents of respondents was fishing (39.8%) while farming (35.2%), and Teaching having the lowest (2.5%).

Table 2: Summary of the Information concerning water contact pattern of respondents

Table 2a: Respondents' source of water.

Sources of domestic water	L.G.A				
	Kogi	Ibaji	Ajaokuta	Total	%
Stream	11	15	101	127	11.1
River	118	318	183	619	54.1
Pipe borne Water	23	22	32	77	6.7
Well	229	24	69	322	28.1
Total	381	379	385	1145	100

Table 2b: Respondents' frequency of visit to the river.

Frequency of visit to the river					
Option	L. G. A			Total	%
	Kogi	Ibaji	Ajaokuta		
Daily	155	132	120	407	35.6
Weekly	148	196	203	547	47.9
Monthly	8	40	47	95	8.3
Never	72	7	15	94	8.2

Total	383	375	385	1143	100
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Table 2b shows that majority of the respondents (47.6%) visited the river weekly for various activities, (35.6%) visited the river daily, (8.3%) visited monthly while (8.2%) never visited the river.

Table 2c: Activities engaged in the river by the respondents

Activities engaged in the river				
	L. G. A			Total
	Kogi	Ibaji	Ajaokuta	
Washing	199	132	201	532
Swimming	77	116	47	240
Fishing	136	75	139	350
Bathing	119	60	110	289
Other	42	10	15	67
Total	573	393	512	

River served has the major source of domestic water supply (54.1%), together with Stream accounted for 65.2% among the study area. Despite the availability of well and pipe borne water (28.1% and 6.7% respectively) for domestic water supply, the respondents still visited the river for various purposes, higher number of respondents (47.9%) visited the

river weekly, (35.6%) visited river on daily basis. While (8.3%) visited monthly.

Washing of clothes is the major source of water contact activity engaged in by the respondents. While some did engage in Fishing, Swimming, Bathing and others activities.

Table 3: Summary Statistics on Information concerning Health Status of respondents

Question	Option	L. G. A			Total	%
		Kogi	Ibaji	Ajaokuta		
Did you sleep mosquito net last night?	Yes	239	215	228	682	59.5
	No	141	162	148	451	39.4
	No response	4	0	9	13	1.1
How often do you urinate in a day?	Once	2	0	2	4	0.4

	Twice	31	41	102	174	15.5
	Several times	275	314	126	715	63.8
	No response	39	1	127	167	14.9
	Others	34	4	22	60	5.4
Do you experience pain during urination?	Yes	36	34	7	67	5.8
	No	338	347	367	1052	91.6
	No response	5	14	10	29	2.5
Did you notice blood in your urine in the past one month	Yes	19	23	8	50	4.3
	No	349	331	361	1041	90.1
	No response	17	31	16	64	5.5
Do you constantly experience abdominal pain?	Yes	94	50	33	177	15.4
	No	260	290	265	815	70.8
	No response	29	45	85	159	13.8
Do you experience pain in any part of limbs (legs, hands)?	Yes	66	41	14	121	10.5
	No	318	317	331	966	83.6
	No response	1	27	40	68	5.9
Do you have difficulty reading from the blackboard?	A lot of difficulty	6	20	13	39	3.4
	Little difficulty	10	74	204	288	25.3
	No difficulty	367	284	162	813	71.3

Table 4: Association between prevalence of *Schistosomiasis* and socio-demographic characteristics of respondents.

	Infected (%)	Not infected (%)	No response (%)	Total	χ^2	p-value
Age groups						
3 – 5	0 (0.0%)	34 (91.9%)	3 (8.1%)	37 (3.2%)	30.7561	< 0.0001
6 – 8	13 (2.8%)	420 (90.5%)	31 (6.7%)	464 (40.2%)		
9 – 11	19 (4.7%)	378 (93.8%)	6 (1.5%)	403 (35.0%)		

12 +	18 (7.2%)	208 (83.5%)	23 (9.2%)	249 (21.6%)		
Total	<i>n</i> = 50			(100%)		
Gender						
Female	14 (3.0%)	434 (91.9%)	24 (5.1%)	472 (41.0%)	4.1557	0.1252
Male	36 (5.3%)	602 (88.8%)	40 (5.9%)	679 (59.0%)		
				(100%)		
Local government area						
Kogi	19(4.9%)	349(90.6%)	17(4.4%)	385	15.1479	0.0044
Ibaji	23(6.0%)	329(86.4%)	29(7.6%)	381		
Ajaokuta	8(2.1%)	360(93.7%)	16(4.2%)	384		
Parents Occupation						
Farming	16(4.1%)	356(90.8%)	20(5.1%)	392(35.2%)	40.5583	< 0.0001
Fishing	22(5.0%)	407(91.7%)	15(3.4%)	444(39.8%)		
Farming and Fishing	5(7.1%)	65(92.9%)	0(0.0%)	70(6.3%)		
Teacher	1(3.2%)	29(93.5%)	1(3.2%)	31(2.8%)		
Civil Servant	3(3.9%)	63(82.9%)	10(13.2%)	76(6.8%)		
Others	1(0.1%)	85(7.6%)	16(15.7%)	102(9.1%)		
				(100%)		

Table 5: Association between prevalence of *Schistosomiasis* and water contact pattern of respondents.

		Infected (%)	Not infected (%)	No response (%)	Total	χ^2	p-value
Domestic Source of water							
Stream		2(1.6%)	118(92.9%)	7 (5.5%)	127 (11.1%)	16.6828	0.0105
River		37(6.0%)	544(87.9%)	38 (6.1%)	619 (54.1%)		
Pipe Borne Water		0 (0.0%)	77 (100%)	0 (0.0%)	77(6.7%)		
Well		10(0.9%)	293(25.9%)	19 (5.9%)	322(28.1%)		
					(100%)		
Frequency of Visit to the river							
Daily		30(7.4%)	366(89.9%)	11(2.7%)	407(35.6%)	77.7586	< 0.0001
Weekly		16(2.9%)	506(92.5%)	25(4.6%)	547(47.9%)		

Monthly		2(2.1%)	87(91.6%)	6(6.3%)	95(8.3%)		
Never		1(0.1%)	71(75.5%)	22(23.4%)	94(8.2%)		
					(100%)		
Activities in River							
Washing		15 (2.8)	504	13	532	24.5916	< 0.0001
Swimming		19	208	13	240	9.4192	0.009
Fishing		24	315	11	350	12.6278	0.0018
Bathing		17	267	5	289	12.4693	0.0020
Others		8	58	3	67	10.0018	0.0067

3.0 DISCUSSION

A high burden of the disease was recorded in Ibaji local government area (6.0%) ($p < 0.0001$); Kogi recorded a slightly lower burden (4.9%) while Ajaokuta having the least burden (2.1%) of prevalence of disease. However, male recorded slightly higher prevalence rate of (5.3%) than female (3.0%). Although, the observed difference was not statistically significant ($\chi^2 = 4.1557$, $p = 0.1252$).

The respondents were divided into four age-groups (3 – 5, 6 – 8, 9 – 11, 12 +), the result from (table 4) showed that the infection cut across all the age-groups except for age-group 3 – 5, meanwhile, a statistical significance difference was observed in prevalence of disease between age-groups ($\chi^2 = 30.7561$) ($P < 0.0001$). With regard to age-group distribution, age group 6 – 8 years has the least prevalence (2.8%) of the disease while age-group 12 years and above has the highest prevalence of infection (7.2%).

Parents' occupation also contributed to the prevalence of the disease, with a statistically significant difference ($\chi^2 = 40.5583$, ($p < 0.0001$). Children whose parent's occupation were fishing; farming; fishing and farming contributed largely to the prevalence rate of the infection. While those whose parent occupation were teaching, Civil servant and others contributed less to the prevalence rate.

The respondents who had river and well as their domestic source of water reported the highest prevalence rate of infection. Those making of use stream reported very low prevalence rate of infection while those making use of pipe-borne

water reported no case. However, a statistical significant difference was observed ($\chi^2 = 16.6828$, ($p < 0.0105$) in prevalence rate according to the various source of domestic water.

A statistically significant difference was observed in prevalence between the frequencies of visit to the river of respondents. Respondents who visited the river on daily basis recorded a higher than prevalence rate of infection of disease than respondents who visited weekly, monthly or never visited the river.

All activities (washing, swimming, fishing, bathing and others) engaged in by the respondents were also found to be statistically significant. Each having a p-value less than 0.05

4.0 CONCLUSION

This study found *S. haematobium* infection to be low endemic in the three (Kogi, Ibaji, Ajaokuta) local government area. The endemicity were attributed to the water contact pattern (source of domestic water, frequency and activities engaged in), parents' occupation (fishing, farming, fishing and farming), and dominant among the male gender than the female gender, this is as a result of the fact that the males are more exposed to the water bodies than the female gender.

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