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Urinary Schistosomiasis Amongst Children in Some Selected Primary Schools in Bagwai Local Government Area of Kano State – Nigeria

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Abstract

Urinary schistosomiasis is one of the neglected tropical diseases that mostly affect children of the poor in resource limited settings of developing countries especially in Africa. It evolves when children come in contact with stagnant water and those of school age are among the most vulnerable. The research aimed to assess the burden of schistosomiasis among school children in the study area. Samples were collected in universal bottles and analysed by microscopy. From the research, overall prevalence of 25.3% was recorded. The result indicated variable disease prevalence amongst the selected villages, which revealed 45(47.3%) for Daddauda, 31(13.1%) for Kiyawa, 29(2.63%) for Jarumawa, 22(13.1%) from Sare-Sare and Kauyen Adam with 23(23.6%). Daddauda recorded the highest prevalence (47.3%) followed by Kauyen Adam (23.6%), Kiyawa and Sare-Sare with 13.1% respectively and the least was Jarumawa with 2.63%. There is statistically significant difference in infection among the different villages from which the children came from (P-value = 0.0001. According to the results, males had higher prevalence 71.0% compared to their females counterpart, 28.9%. Based on age group, the age bracket with the highest prevalence was 15-18 years of age 68.4% while the least infection rate was recorded in 5-7 years age group with 10.5%.

Keywords: Schistosomiasis, School children, Neglected tropical diseases, Stagnant water

INTRODUCTION

The first report of endemicity of schistosomiasis was in 1904 in Sudan and was credited to Balfour, who investigated for urinary schistosomiasis among children in Khartoum Primary School were his findings showed that, 17% of the enrolled subjects were positive of the disease in question (Hassan *et al*., 2017).

In this disease, the predisposing factors largely include activities that involved water contact like swimming, irrigation and other farming activities, all these are believed to play key role in the spread of this ailment in humans, with male child at higher risk compared to female (Ismail *et al*., 2014; Senghor *et al*., 2014). Due to their nature, school age children happen to be more at risk of schistosomiasis because of their tendency to be in greater contact with water bodies (Zida *et al*., 2016).

Schistosomiasis had its clinical significance due to its ability to gradually damage host tissues/organs as a result of formation of granuloma around ova trapped in affected tissues, leading to chronic inflammation and fibrosis, affecting liver and the spleen, resulting in

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hepatosplenomegaly which cause conditions like gastroesophageal varices, ascites, gastrointestinal bleeding among others and death in some cases (Senghor *et al*., 2014). Even with the serious effect of this disease due to its higher frequency in areas with high level of poverty, their distribution especially in rural areas of Sub-Saharan Africa remains under reported (Hotez and Kamath, 2009; McCreesh and Booth, 2 013).

The second most affected country after Nigeria as far as *S. mansoni* and *S. haematobium* are concern is Tanzania, in terms of the disease burden in Africa (Steinmann *et al*., 2006; Mazigo *et al*., 2012). The disease intestinal schistosomiasis has been shown to be of immense public health significance (Mazigo *et al*., 2012). Frequent exposure to contaminated water bodies with the disease agents makes school children to be the most affected group that results in their poor school performance and growth retardation in some cases (Assefa *et al*., 2013). Some of the things that influence transmission of the parasitic agent and the disease, either directly or indirectly include demographic, economic, cultural, social and environmental factors among others (Beniston, 2002; Cox, 2002).

For a good and effective control strategy for schistosomiasis to be in place, a clear understand of the burden, intensity, and local transmission pattern of the parasite is of great importance. For diagnosis of these diseases, WHO make effort to recommend some methods to ensure mapping and field diagnosis for schistosomiasis, these include urine filtration technique for *S. haematobium* eggs from urine (WHO, 2006), as well as Kato-Katz thick smear method, for *S. mansoni* eggs from stool. In addition, urine dipstick method is also used together with filtration method to detect presence of blood in urine or (haematuria), which serves as important indicator of *S. haematobium* infection (WHO, 2012).

Some African countries make efforts, after 30th January, 2012, London declaration by WHO, which called for the control and elimination of schistosomiasis (WHO, 2012), Countries like the Gambia initiated the neglected tropical diseases (NTDs) control programme for the parasitic disease schistosomiasis. Before then, studies on the disease in the country focused on prevalence and distribution while others dwelled on its transmission and vectors of the disease (Ministry of Health and Social Welfare, 2014). Observational and interventional approaches were also used (Ministry of Health and Social Welfare, 2014), example is a study that used molluscicide with a view to drastically reduce *Bulinus senegalensis* snail populations in the usual seasonally accumulated pools, to help stop transmission to humans. It was already recognized that, in developing countries, children with age range of 5 to17 years are the highest risk group for the infection in most cases (Maru, 2015) and it was also noticed that, poor personal hygiene, frequency of contact with water especially in endemic regions increase the vulnerability of people to the disease (Bajiro *et al*., 2016). It was also discovered that, the disease is associated with serious adverse effects, like bladder and urethral fibrosis hepatosplenomegaly and hydronephrosis while colorectal and bladder cancers could be a possible late-stage complication of the disease (Ismail *et al*., 2014). This study surveyed on the burden of schistosomiasis among some school children in a local government in Kano state.

MATERIALS AND METHODS

Study area

The study was carried out in Bagwai Local Government Area of Kano State. The local government is lying between latitude of 10°33′ South to 12°37′ North and longitude 7°34′ West

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to 90°25′ East. It is located in the Northern part of Kano State and covered an area of 7120 sq km. It has one district head and 10 wards head. The area has a total population of 162,847 (Ado, 2009).

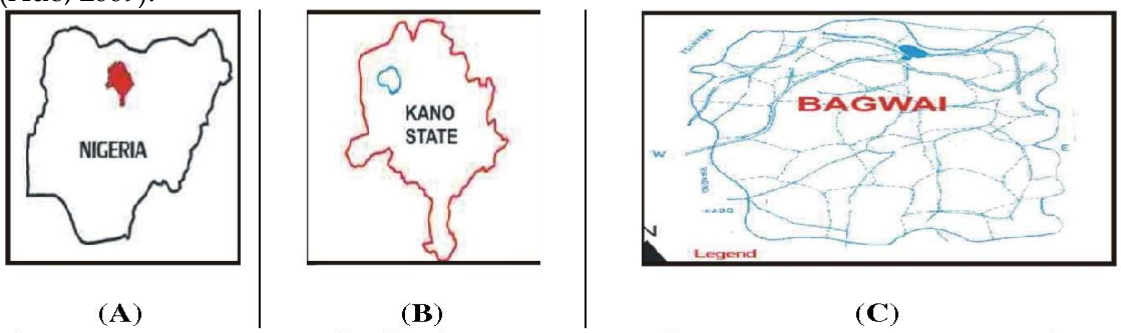

Figure 1: (A): Map of Nigeria. (B): Map of Kano State. (C): Bagwai Local

Figure 1: Map of Bagwai L. G. A. Kano State (Kiyawa and Ayodele, 2012)

Study population

The study population comprises of children in some selected primary schools (Bagwai special primary school, Bagwai Model Primary School and Kauyen Adam Primary School) in Bagwai Local Government Area of Kano State.

Sample size determination

The sample size for this study was determined using the formula as describe by (Lwanga and Lameshow, 1991)

$n = \frac{Z^2 pq}{d^2}$

Also $n = \frac{z^2\, p\,(1 - p)}{d^2}$

Where:

n=sample size

z = statistic for level of confidence 95%=1.96

P =Prevalence of schistosomiasis (10.6) = 0.11

d = Allowable error at 5% (0.05)

q = 1-P

$\mathbf{n} = \frac{(1.96)2x0.11x0.962}{(0.05)2}$

$\mathbf{N} = \frac{3.8416x0.11x0.962}{(0.0025)}$

n = 150

Ethical clearance and consent form

Ethical permission was collected from Kano State Ministry of Health and Bagwai local government education authorities. The verbal and written consent as the case may be were obtained from the participants before administration of questionnaires.

Sample collection and processing

A clean universal container was labeled with the participant's identity and was given to each of them for the collection of terminal urine samples with high concentrated of the parasite (Sarkinfada *et al.,* 2009).

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Macroscopy
The colour, turbidity and visible haematuria of the urine were recorded and recorded.

Microscopy
About 10 mL of the well mixed urine was poured into a centrifuge tube, and centrifuged at 3000 revolutions per minute for 3 minutes. The supernatant was decanted without disturbing the sediment. A drop of the sediment was transferred onto a clean glass slide, covered with a clean cover slip and examined microscopically under 10x and 40x objective with the condenser iris closed sufficiently to give good contrast for better identification of *Schistosoma haematobium* eggs (Cheesbrough, 2000).

Statistical analysis
The data obtained was analyzed using statistical package for social sciences (SPSS) version 20.0 software.

RESULTS
A total of 150 primary school children in some villages of Bagwai Local Government Area, Kano State were enrolled in the study. Out of the 150 sample, 38 were found to be positive representing a prevalence of 25.3% in the study area.
Table 1 shows the distribution of the disease among the selected villages were 45(47.3%) participant were from Daddauda, 31(13.1%) from Kiyawa, 29(2.63%) in Jarumawa, 22(13.1%) from Sare-Sare and Kauyen Adam with 23(23.6%). Daddauda recorded the highest prevalence 47.3% followed by Kauyen Adam 23.6%, Kiyawa and Sare-Sare with 13.1% respectively and the least was Jarumawa with 2.63%. There is statistically significant difference in infection among the different villages from which the children came from (P-value = 0.0001**.** According to the results, males (71.0%) had higher prevalence compared to their females counterpart (28.9%) table 2. Base on age group the age bracket with the highest prevalence was 15-18years with 68.4% and the one with the least infection rate was the 5-7years age group with 10.5%, Table 3.

Table 1: Urinary schistosomiasis among the participants in the study area

Variable: villages	Number Examined	Number Positive	Prevalence (%)	X^2	*P-value*
				28.4691	0.0001
Daddauna	45	18	47.3		
Kiyawa	31	5	13.1		
Jarumawa	29	1	2.63		
Sare-Sare	22	5	13.1		
Kauyen Adam	23	9	23.6		
Total	**150**	**38**	**100**		

Key: X^2=Chi square, % = Percentage, p–value = Probability value (≤0.05) was significant.

Table 2: Distribution of urinary schistosomiasis based on gender

Variable: gender	Number examined	Number positive	Prevalence (%)	X^2	*P-value*
				2.5905	0.107509
Male	90	27	71.0		
Female	60	11	28.9		
Total	**150**	**38**	**100**		

Key: X^2=Chi square, % = Percentage, p–value = Probability value (≤0.05) was significant.

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Table 3: Urinary schistosomiasis among the study subjects according to age group

Variable: age-group	Number examined	Number positive	Prevalence (%)	X^2	*P-value*
				6.0668	0.048152
5-7	28	4	(10.5)		
8-14	17	8	(21.0)		
15-18	105	26	(68.4)		
Total	**150**	**38**	**100**		

Key: X^2=Chi square, % = Percentage, p–value = Probability value (≤0.05) was significant.

DISCUSSION

From the study, out of the 150 samples examined, overall prevalence of 25.3% was recorded. In a similar research conducted by Faith *et al*. (2021), a total prevalence of 37.7% was reported based on characteristic eggs of *S. haematobium* identified in urine samples examined in the course of the research (Faith *et al*., 2021). In another study, in which up to 1,113 samples from school children were examined, 153 of them representing 13.7% prevalence rate were found shedding eggs of *S. haematobium* in their urine samples (Kenneth *et al*., 2021). A similar finding was also reported in a study on school children were a prevalence of 33.5% was recorded based on the *S. haematobium* parasite ova identified (Mohammed *et al.,* 2018). However, a lower prevalence rate of 8.0% was reported in another research (Umoh *et al*., 2020).

According to the results, males had higher prevalence with 71.0% compared to their female counterpart 28.9%. In another study, according to recorded findings in 2020, males had a prevalence of 10.3% as the most affected with the parasites compared to 4.3% for female subjects as reported (Umoh *et al*., 2020). Another result reported based on eggs intensity revealed that males had 14.3 egg/10 mL than females 4.98 eggs/10 mL as found in the study (Imrana *et al*., 2019). It was observed in another findings that males had the highest prevalence of 50% than 35% observed in females in 2014 as one of research findings according to records (Okwori *et al*., 2014).

Base on age group, it was found that, age bracket with the highest prevalence was 15-18years with (68.4%) and that with the least infection rate was the 5-7years represented by (10.5%). According to previous reported work in 2021, the highest prevalence of infection 47.2% was observed among pupils in the age range of 8-10 years of age while the lowest 28.0% was reported among 11-13 years old group (Faith *et al*., 2021). A similar study in 2019 among school children showed that age group of 5-9 years old had the highest prevalence of the infestation with 17.1% prevalence rate observed (Kenneth *et al*., 2021). It was also found according to a report in 2019 that, highest infection rate was recorded among pupils of 4-6 aged range with 62.82% while aged limit of 7-9 years old had the least infection frequency (Imrana *et al*., 2019). A similar study also revealed that aged range of 6-10 years old had the highest prevalence 10.3% recorded compared to the other age limits involved (Nse *et al*., 2020).

CONCLUSION

We can conclude based on the findings that, there is significant burden of schistosomiasis among school aged children residing in the study area, with males having the highest infection rate and age group of 15-18 as the most affect age category.

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