



URINARY SCHISTOSOMIASIS AMONG PRIMARY SCHOOL PUPILS IN DAWAKIN KUDU LOCAL GOVERNMENT AREA, KANO STATE

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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. The study focused on the urine associated schistosomiasis in Dawakin Kudu Local Government Area, Kano state. Two hundred and twenty seven (227) urine samples were collected and processed using standard methods, which include macroscopy for colour, turbidity and any blood tinge and microscopy, in which the urine samples were centrifuged and the sediments examined using 10x and 40x objectives with condenser closed sufficiently to give contrast. In the results, overall prevalence rate obtained was 19.4%. According to gender, the result of *Schistosoma haematobium* infestation in the five villages revealed that, infection was found only among males 44(25.7%) while females had 0(0.00%). Prevalence according to localities indicated, 24(54.5%) for Tsakuwa, 7(15.9%) for Yan Barau, and 13(29.6%) for Yaburawa while Kore and Dawaki had zero prevalence. Based on the result obtained, infection rate was higher among individuals in the age bracket of 9-12, with (50.0%) prevalence rate. It can be concluded from the result that, males are more at risk of urinary schistosomiasis than females among school aged children in the study area.

Keywords: Schistosomiasis, School Children, Dawakin Kudu, *S. haematobium*

INTRODUCTION

Schistosomiasis is among the tropical diseases mostly encountered in poor developing nations of the world, especially in Africa, it causes significant morbidity especially in school aged children of resource poor settings. The infestation occurs as chronic disease caused by the blood flukes belonging to the genus *Schistosoma*. The major disease causing agents in this genus comprises of *Schistosoma haematobium* (*S. haematobium*), *Schistosoma mansoni* (*S. mansoni*), *Schistosoma japonicum* (*S. japonicum*), *Schistosoma mekongi* (*S. mekongi*) and *Schistosoma intercalatum* (*S. intercalate*) (Gryseels *et al.*, 2006). 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). A study in the same vein by Duwa *et al.* (2018) reported schistosoma prevalence data 19.7% infected children, in which males had 12.1% females had 7.6%. Also, in Ondo state Nigeria, in 2014, revealed 41.0% prevalence rate of *S. haematobium* eggs in urine, while in 2015, 64.5% prevalence rate was discovered. Thus, there was a 23% increase in prevalence rate which call for emergency action (Peletu *et al.*, 2018). 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. A study in Anambra Southeastern

Nigeria, on 232 children also revealed 42% prevalence rate (Iwueze *et al.*, 2018).

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, where intermediate snails are naturally available like white Nile state (Ahmed *et al.*, 1996), Rahad (Elias *et al.*, 1994), Blue Nile State (Mohammed *et al.*, 2006), River Nile State (Elmadhoun *et al.*, 2013) and other similar places, mostly in developing nations across the globe. Schistosomiasis are also basically found in rural areas where the sanitation is poor and water sources are polluted and no alternative source to use (Agnew-Blais *et al.*, 2013). For best results, Behavioural 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 one (CDC, 2011). Among these parasites, *S. haematobium* is the aetiologic agent of urinary schistosomiasis and its prevalence is higher in Africa (NaTHNaC, 2014). Based on available data, *S.*

haematobium infection in sub-Saharan Africa, is estimated to cause 70, 32, 18 and 10 million cases of hematuria, dysuria, bladder-wall pathology and major hydronephrosis, respectively (Van der *et al.*, 2003). 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 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 (Deribe *et al.*, 2011; 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). Additionally, 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).



Stagnant water; a natural source of schistosomiasis in Children

Based on the current situation on schistosomiasis, about a quarter billion people requires preventive treatment form schistosomiasis worldwide and three major species of the genus *Schistosoma* (*S. mansoni*, *S. haematobium*, and *S. jabonnicum*) are responsible for both chronic and acute forms of the disease affecting about 78 countries of the world (Vos *et al.*, 1012). By its two forms (urinary and intestinal), schistosomiasis kills around 11,770 individuals worldwide according to some reports. It also costs the communities a 3.31 million disability-adjusted life years (DALY) around the world (Hotez *et al.*, 2014).

According to reports on the issue of these schisosomiasis in 2000, it was estimated that, there were 70 million people in Sub-Saharan Africa who experienced haematuria due to *S. haematobium*, this also proved that schistosomiasis is and still remains an important public health problem in the world and sub-Saharan Africa in particular (Van der Werf, 2003).

Nigeria has the greatest number of cases of schistosomiasis worldwide (Hotez, *et al.*, 2012), with about 29 million infected people, among which 16 million are children, and about 101 million 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 Kano (Evans, *et al.*, 2013), there is scarcity of research on the real burden of the disease in the state including the study area. 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 (school aged children) in Dawakin Kudu Local Government Area of the state which can help to determine the burden of the disease in the state.

MATERIALS AND METHODS

Study area

The study was conducted in some villages (Kore, Tsakuwa, Yan Barau, Yaburawa and Dawaki) in Dawakin Kudu Local Government Area of Kano State. Dawakin Kudu is one of the

44 Local Government Areas of the State and is geographically located in the southern part of the main city, along Kano to Zaria Express way, and has a distance of about 30km from the State Capital the Local government has the coordinates of N: 14° N S: 4° N W: 2° E E: 15° E (National Population Commission, 2006).



Map of Dawakin Kudu Local Government Area, Kano State Population census 2006

Study design

The work was cross-sectional prospective study.

Study population

The study population comprised some selected primary school pupils in Dawakin Kudu Local Government Area, Kano State.

Inclusion criteria

All selected primary school pupils who agreed to participate in the study and not on treatment for parasitic disease

Exclusion criteria

Primary school pupils not willing to participate in the study and those on treatment of parasitic disease were excluded from the study.

Sample size determination

The sample size was determined using the formula according to (Lwanga and Lameshow, 1991; Naing *et al.*, 2016)

$$n = \frac{Z^2 P(1-P)}{d^2}$$

Where:

n=sample size

z = statistic for level of confidence 95%=1.96

P =Prevalence of schistosomiasis (17.8) = 0.18 (Dawaki *et al.*, 2016)

d = Allowable error at 5%(0.05)

q = 1-P

$$n = \frac{(1.96)^2 \times 0.18(1-0.18)}{(0.05)^2}$$

$$n = \frac{(3.84) \times 0.16(0.84)}{(0.0025)} = 226.7$$

n= 227

Sample collection and processing

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 antischistosomal drug or not, from the pupils.

A clean universal container leveled with the participants' identity was given to each of them, for the collection of urine samples. The collected samples were immediately transported to the lab and processed.

Sample processing

Macroscopy

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

Microscopy

The urine samples were prepared for examination using the sedimentation method as described by (Cheesbrough, 2006). About 10ml 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 gently 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 and examined (Cheesbrough, 2000).



The microscopic appearance of schistosoma haematobium ova

Statistical analysis

The data obtained were subjected to X^2 test using SPSS statistical software version 20.0, with level of significance set at ≤ 0.005 .

RESULTS

Of the 227 samples collected, overall prevalence rate obtained was 19.4%. Among the subjects enrolled, 38(16.7%) were from Kore, 55 (24.2%) reside in Tsakuwa, 53(23.3%) in Yan Barau, 55 (24.2%) from Yaburawa and 26 (11.5%) from Dawaki. About 172 (75.8%) of them were males while 55(24.2%) were females. Prevalence according to localities revealed 24 (54.5%) subjects from Tsakuwa, 7(15.9%) subjects from Yan barau, and 13(29.6%) subjects from Yaburawa respectively. Kore and Dawaki were found to have zero prevalence of the disease.

According to gender of the subjects, the result of *S. haematobium* infection in the five villages revealed infection only in males which had prevalence of 19.4%. Sample number per age groups of the participants, were: 5-8 years (59), 9-12 years (104) and 13-16 years (64) respectively. Majority of the participants 104 (45.8%) belonged to the age group 9-12 years infection rate was higher among this age group (50.0%) than the other age ranges. Regarding the communities, a Tsakuwahave the highest infection rate (54.5%) and the lowest was found in Yan Barau (15.9).

Table 1: Demographic and socioeconomic characteristics of the participants (n = 227)

Variables	Number of sample	Percentage
Gender		
Males	171	75.3
Females	56	24.7
Age groups (years)		
5-8	59	26.0
9-12	104	45.8
13-16	64	28.2
Have contact with water body		
Yes	132	58.1
No	95	49.9
Experienced haematuria		
Yes	57	25.1
No	170	74.9

Tables 2: Distribution of the parasite according to the five villages

Villages	NE	NI(44)	Prev. (%)
Kore	38	0	0.0
Tsakuwa	55	24	54.5
Yan barau	53	7	15.9
Yaburawa	55	13	29.5
Dawaki	26	0	0.0
Total	227	44	100.0

NE=Number of samples examined, NI=Number of samples infected (44).

Table 3: Gender distribution of the disease in the five villages

Villages	NE			NI (44)			Prev. (%)
	M	F	T	M	F	T	
Kore	26	12	38	Nil	Nil	0	0.0
Tsakuwa	42	13	55	24	Nil	24	54.5
Yan barau	45	8	53	7	Nil	7	15.9
Yaburawa	42	13	55	13	Nil	13	29.5
Dawaki	17	9	26	Nil	Nil	0	0.0
Total	172	55	227	44	0	44	100.0

NE=Number of samples examined, NI=Number of samples infected (44).

Table 4: Age group distributions of the disease

Age	NE	NI (44)	prev (%)	p-value
5-8	51	2	4.5	0.000
9-12	104	22	50.0	
13-16	64	20	45.5	
Total	227	44	100.0	

NE=Number of samples examined, NI=Number of samples infected (44).

DISCUSSION

The findings of the study revealed an overall prevalence rate of 19.4%. Dawaki *et al.* (2016) also report almost same prevalence rate of *S. haematobium* infection of 17.8% in a study on prevalence and risk factors of schistosomiasis in Hausa communities in Kano. Nwosu *et al.* (2015), in a study titled: Prevalence of urinary schistosomiasis infection among primary school pupils in Ezza-North Local Government Area of Ebonyi State, reported similar findings of *Schistosoma haematobium* infection 17.5%. In the same vein, Mbata *et al.* (2009) reported a prevalence of urinary schistosomiasis of up to 45.6%, in Ogbadibo Local Government Area, Benue State, Nigeria. The higher prevalence could be due more proximity to water bodies in Benue communities than found in this our study area here in Kano state Nigeria.

Also, a more recent study conducted by (Peletu *et al.*, 2018), reported two prevalence rates across two years, he revealed that, out of 624 pupils examined in 2014, 256 (41.0%) were positive for *S. haematobium* eggs in their urine, while in 2015, 381 out of 591 urine samples, representing the prevalence rate of (64.5%) were positive for the parasite. Gender distribution of the parasite indicated that Infestation was found only in males 44 (19.4%) while females had 0(0.0%). But, Moses *et al.* (2015) examined 180 urine samples and come up with 34(18.9) and 19(10.6) as male to female prevalence ratio in his study. According to the results obtained, a greater percentage of the parasite infestation (50.0%), was observed in the age bracket of 9-12 years of age in the study. However, Duwa *et al.* (2009) also reported highest infestation rate of (51.8%) in the age bracket of 11-13, which has intersection with age limit with highest prevalence rate in our study (9-12 years of age). Similarly, Bashir *et al.* (2016) reported highest infection rate in the age bracket of 11-15 in a study on prevalence of urinary schistosomiasis in Dutse Jigawa state.

CONCLUSION

It can therefore be concluded, based on the obtained result that, a large number of school aged children suffers the disease in the study area and that males are at higher risk of the diseases than females in the study area.

RECOMMENDATION

It is recommended, based on the study that, administration of praziquantel appropriate interventions and health education for the communities are required for the control and prevention of urinary schistosomiasis and its attendant illnesses in the area.

Ethical approval

The ethical approval to conduct the work was obtained from Research and Ethics Committee of Aminu Kano Teaching Hospital Kano.

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Conflict of interest

The authors declare that, there is no conflict of interest in whatever form.

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