Prevalence of Schistosomiasis among Primary Pupils in Dawakin-Kudu Local Government Area Kano State, Nigeria

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Abstract

Schistosomiasis remains one of the most prevalent parasitic worm infections and has significant economic and public health consequences. The study was aimed at determining the prevalence of Schistosomiasis among primary school pupils in Tudun-Bayero community in Dawakin-Kudu Local Government Area, Kano Northern Nigeria. A total 117 (67 boys and 50 girls) were involved in the study. Early morning urine samples from the subjects were collected and examined for the presence eggs of Schistosoma haematobium using Filtration techniques. The results showed that out of 117 urine samples examined, only 9 samples were positive which accounted for 7.7%. According to the result, more males were infected 6 (5.1%) than female. The highest prevalence was observed among age group 12-14 years (3.4%) while the least prevalence was observed in age group 6-8 years (1.7%). The prevalence of urinary Schistosomiasis based on father's occupation showed higher prevalence among farmers with 3.4%, followed by those that are fishermen and artisan with 1.7% each. The statistical analysis showed that neither sex nor age had significant influence in the prevalence of the disease in the area (p>0.05). There is low prevalence of S. haematobium in the study area.

Keywords: *Kano, Prevalence, Schistosomiasis, Schistosoma haematobium*

1. INTRODUCTION

Human schistosomiases are acute and chronic infectious diseases associated with abject poverty in 78 low and middle-income countries in the sub-tropical and tropical parts of the world where there is negligible access to potable water and adequate sanitation. The agents of etiology of these diseases are "blood-thirsty" digenetic trematodes in the genus Schistosoma [1, 2]. Urinary schistosomiasis caused by *Schistosoma haematobium* is endemic in the sub-Saharan region of Africa, including in Nigeria [3, 4]. About 200 million people in some 74 countries are infected worldwide and at least 600 million are at risk of infection [5]. An estimated 120 million suffer severe consequences of the infection with an estimated annual mortality rate of about 20,000 worldwide [6]. An estimated 30 million Nigerians need to be treated annually for the disease [7]. In most

endemic areas, the highest intensities of infection are found in children between 5 and 15 years of age [6]. In sub-Saharan Africa alone, it is estimated that 70 million individuals experience haematuria, 32 million difficulty in urinating, 8 million bladder-wall pathology, and 10 million major hydronephrosis from infections caused by *S. haematobium* annually. The mortality rate due to non-functioning kidneys (from *S. haematobium*) and haematemesis has been estimated to be 150,000 per year [8]. The above figures show that urinary schistosomiasis is an important public health problem in sub-Saharan Africa, second only to malaria in morbidity [9]. The distribution of the disease is focus and its effects are more common in rural areas in the tropics where the population uses natural fresh water for their domestic water supply, recreational activities, and agricultural production. Hence, disease transmission is

contingent on the presence of infected water, the primary snail host, and contact with the human population [10]. Extreme poverty, lack of knowledge of the risks, an inadequacy or total lack of public health facilities along with the unsanitary conditions in which millions of people live their daily lives, especially in the rural areas of developing tropical countries, are all factors contributing to the risk of infection [11, 12].

Nigeria has the greatest number of cases of schistosomiasis worldwide [13], with about 29 million infected people, among which 16 million are children, and about 101 million people are at risk of schistosomiasis [14, 15, 16]. Several studies indicated that the disease is found mostly among school children and transmission is usually focal. Mbata et al. [17] that is to say that the geographical distribution of the infection and of severe morbidity is restricted to a particular place. Still on the same trail, Stothard et al. [18] added that primary school children are particularly vulnerable to schistosomiasis because of their habit of playing in water, where they may contract the infection. As such, they are the ideal target group to investigate the prevalence of schistosomiasis and the data collected from this age group can be used to assess not only whether schistosomiasis threatens the health of schoolchildren, but can also be used as reference for evaluating the need for community intervention. The study was aimed at determining the prevalence of schistosomiasis among primary school pupils in Tudun-Bayero community in Dawakin-Kudu Local Government Area, Kano Northern Nigeria.

2. MATERIALS AND METHODS

2.1. Study Area

Dawakin-kudu is one of the Local Government areas of Kano State. It is located in the southern part of the state adjacent to Kano-Zaria express with a distance of about 25 Kilometer from the state capital. Geographically, it is located at latitude $11^0 50$'N and Longitude $8^0 35$'E. It covers an area of about 384 Km^2 of land. According to 2006 population census, it has a total population of 225,497 and the projected population of 313,700 as of 2016 [19]. Dawakin-kudu Local Government shares common boundaries with Kura (West), Warawa and Wudil (East), Garko (South) and Kumbotso Local Government (North). Farming, trading and dying remain the major occupations in the area. However many educated indigenes in the area are employed in the formal sector while others engaged in various trading activities.

2.2. Sample Size Determination

Sample size determination for this study is calculated based on the prevalence reported from initial studies carried out in the state using the following epidemiological formulae;

$$n = (Z^2 pq)/d^2$$

Where;

n = Number of samples (sample size)

Z = Standard normal deviate at 95% confidence interval = 1.96

p= Prevalence from initial studies = 8.3% = 0.083 [20]

d = degree of confidence at = 0.05

q = 1-p = 1 - 0.083= 0.917 = $([1.96]^2 \times 0.083 \times 0.917)/[0.05^2]$ = $(3.8416 \times 0.07611)/0.0025$= $0.2923/0.0025 = 116.95 \approx 117$

2.3. Collection of Urine Samples

The study population consists of 117 (67 boys and 50 girls) primary school pupils from Tudun-Bayero Primary school in Dawakin kudu Local Government Area of Kano State. A total of 117 early morning urine samples were collected randomly from the pupil with the assistance of their teachers. About 10ml of urine sample was collected in a clean, dry, sterile, plastic 30ml universal urine bottles. Each urine sample was macroscopically observed for the presence of blood, colour and consistency. Few drops of 10% formal saline were added to each sample for preservation as described by Cheesbrough [21]. The urine samples were protected from light to avoid miracidia being hatching from the egg and then transported to the laboratory for further analysis. A simple structured questionnaire was administered to each participant in order to collect demographic data. The questionnaires were filled with the assistance of their teachers.

2.4. Parasitological Examination of Urine Samples

Filtration techniques were employed for parasitological examination of the urine samples as described by Muhammad et al. [22]. About 10ml of well-mixed urine was dispensed into the

filtration unit of the filtration chamber. The urine was then drained through a Whatman No.1 filter paper. The filter paper was then removed and stained with the saturated Ninhydrin solution (few drops of iodine was added to enhance the staining). It was allowed to stay overnight at room temperature for the eggs to pick up the stain. It was examined under the light microscope under ×10 and ×40 objectives. Terminal spine eggs of *S. haematobium* were counted for each positive sample. The result was express as eggs/10ml urine.

2.5. Statistical Analysis

The presence of *S. haematobium* was expressed as positive and absence was expressed as negative results in form of percentage. Data obtained from the participants were analyzed by statistical software package (SPSS version 20) using X^2 test through contingency table to determine the significant differences between the data obtained.

2.6. Ethical Approval

The ethical approval for the study was obtained from Health Department and Local Education Authority of Dawakin Kudu Local Government Area of Kano State.

3. RESULTS

3.1. Demographic Distribution of the Subjects

A total 117 subjects participated in the study with 67 (57.3%) males and 50 (42.7%) females of all ages. Majority of the participants were 12 to 14 years age bracket. Participant parent's occupation is mostly farming 39 subjects accounted for 33.4%, followed by trading 26 subjects (22.2%).

Table1. *Demographic distribution of the subjects*

Variable	Frequency (n)	Percentage (%)
Gender		
Male	67	57.3
Female	50	42.7
Age (years)		
6 – 8	25	21.4
9 – 11	43	36.7
12 – 14	49	41.9
Father's occupation		
Farming	39	33.4
Fishing	17	14.5
Artisan	20	17.1
Trading	26	22.2
Civil servant	15	12.8

3.2. Prevalence of Urinary Schistosomiasis by Gender

The prevalence of the infection in relation to sex is shown in Table 1. A total of 117 subjects were examined for the presence of *S. haematobium* eggs out of which 9 samples accounted for 7.7% were positive. The result shows that of 67 male urine samples examined, 6 (5.1%) showed the presence of *S. haematobium* eggs while 3 out of 50 (2.6%) female urine samples examined contained the eggs. There was no observed significant difference in infection among the sexes (p>0.05).

Table2. *Prevalence of Urinary Schistosomiasis by Gender*

Gender	No examined	No. infected	Prevalence (%)	P value
Male	67	6	5.1	.581933*
Female	50	3	2.6	
Total	**117**	**9**	**7.7**	

Key: ** = result is not significant at p<0.05, X^2 = 0.3031*

3.3. Prevalence of Urinary Schistosomiasis among Age Groups

The prevalence rate of the disease with respect to age is shown in Table 2. The result shows that the infection rate uniquely cut across all the age brackets studied although the age bracket 12 - 14 years contained more infection than the other age groups but still there was no observed significant difference in infection among the age groups (p>0.05).

Table3. *Prevalence of Urinary Schistosomiasis among age Groups*

Age (years)	No examined	No. infected	Prevalence (%)	P value
6 - 8	25	2	1.7	.978892*
9 - 11	43	3	2.6	
12 – 14	49	4	3.4	
Total	**117**	**9**	**7.7**	

Key: ** = result is not significant at p<0.05, X^2 = 0.0427*

3.4. Prevalence of Urinary Schistosomiasis based on Father's Occupation

The prevalence of urinary schistosomiasis based on father's occupation of the subjects is presented in Table 4. In regards to that, higher prevalence of urinary Schistosomiasis was recorded among farmers with 3.4%, followed by those that are fishermen and artisan with 1.7%

each, followed by trading with 0.9%, while no prevalence was recorded among those that are civil servant.

Table4. *Prevalence of Urinary Schistosomiasis based on Father's Occupation of the Subject*

Father's occupation	No examined	No. infected	Prevalence (%)	P value
Farming	39	4	3.4	.901252
Fishing	17	2	1.7	
Trading	26	1	0.9	
Civil servant	15	0	0.0	
Artisan	20	2	1.7	
Total	**117**	**9**	**7.7**	

Key: * = *result is not significant at p<0.05, X^2 = 1.0556*

4. DISCUSSION

Prevalence of urinary schistosomiasis among school children continues to be a major public health concern in tropical countries especially in Nigeria. The overall prevalence of urinary schistosomiasis the present study is 7.7% which can be further classified as low with respect to World Health Organization documentation on endemic communities [23]. This prevalence was lower compared to studies carried out in Ondo State Nigeria (13.8%) [24], Benue State (46.6%) [17] and Region of Ethiopia (24.54%) [25]. It was also lower compared to studies conducted Swaziland (5.3%) [26] and middle Awash Valley of Ethiopia (3.1%) [27]. The difference in prevalence from place to place could be explained as a result of differences in environmental factors that can, in turn, lead to differences in transmission intensity [28]. The lower prevalence reported by the present study could be attributed to the integrated and cost-effective approaches implemented by the Federal Ministry of Health to eliminate multiple NTDs in Nigeria including Schistosomiasis. The major factors that may be responsible for the presence of urinary schistosomiasis infection in this study area is ignorance of the infection as regard to water contact with snails infested streams and rivers, lack of basic amenities, inadequate and indiscriminate disposal of human sewage [17, 29, 30].

Finding from the present study reveals that males were more infected (6 infected) with urinary schistosomiasis than females (3 infected). This finding was in conformity with those of Abu-Zaid et al. [31]; Risikat and Ayoade, [32] and Gyuse et al. [33] who all found higher infection among male than female. Socio-cultural factors where males are mostly engaged in water- contact activities like swimming and bathing, fishing, farming and watering cattle could lead to higher exposure among males and this attributed to the higher prevalence among male subjects

Age groups 12-14 years were more prevalent in the study with occurrence rate of 3.4% and the lowest occurrence recorded among the age groups 6 - 8 (1.7%). This finding agrees with that of Dakul et al. [34] who reported the highest prevalence 65.8% among the age group 10-14 years in Plateau State, Nigeria. Higher prevalence among this age category could be attributed to the high rate of water contact activities by the age group and their susceptibility to infection with respect to their immune response. The statistical analysis showed that neither sex nor age had significant influence in the prevalence of the disease in the area (p>0.05).

According to the present study, the occupation of father is associated with urinary schistosomiasis where children whose fathers are farmer were more infected (3.4%), followed by fishing and artisanship (1.7%) each. This finding agreed studies from Sudan [35] and Nigeria [36] where children participated in field activities with their fathers. This shows lack of awareness towards risk of urinary schistosomiasis among fathers to make their children aware of the risk of urinary schistosomiasis. A protective role of the head of the family being literate and informed on urinary schistosomiasis was reported from an earlier study in South-western Nigeria [31].

5. CONCLUSION

Based on the findings of this study, there is low prevalence (7.7%) of urinary schistosomiasis among primary school pupil in the study area. However, more male were infected than female and children of higher class (aged 12 – 14 years) were more infected. Despite low prevalence of the infection in the study area, it is recommended that that schistosomiasis control program in the community should be embarked upon to educate the populace on risk factors that predispose an individual to urinary schistosomiasis and the need for proper sewage disposal, adequate provision of social amenities such as pipe borne water and toilet facilities to the study area in order to reduce the menace of the infection.

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