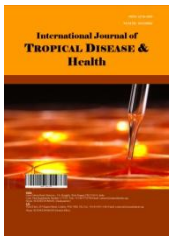

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The Prevalence Study of Urinary Schistosomiasis among the Primary School Pupils in Kisayhip, Bassa Local Government Area, Plateau State-Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

Schistosomiasis is a chronic disease caused by parasitic flat worms also known as trematodes, which belongs to the genus *Schistosoma.* Schistosomiasis is considered to be the third most acute tropical illnesses globally, after malaria and helminthiasis as it is a main origin of morbidity and mortality, highly prevalent among school children, adolescents and young adults. The study was aimed to determine the prevalence of schistosomiasis of the urine and intestine in primary school pupils in Kisayhip, Bassa local Government Area of Plateau State. This study was conducted in five primary schools in Kisayhip, Bassa Local Government Area, Plateau State. A total of 230 children who were within the age 5-14years participated in the study. The schools and participating subjects were selected randomly provided they met the inclusion criteria. Fresh urine samples were collected between 10am-2pm, twice a week. The samples were examined macroscopically and microscopically to determine physical characteristics and parasite presence respectively. The result showed that prevalence of urinary schistosomiasis in A, B, C, D and E schools in Bassa Local

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government area were 6.00%, 4.00%, 8.00 and 4.00% respectively. There was no significant difference in the prevalence among the participating schools, P-value>0.05. There was also no significant difference was recorded in gender based comparison, P-value>0.05. There was no significant difference in the prevalence with respect to various age distributions. The study has revealed that though schistosomiasis was present in the area, the prevalence of the infection was very low and below WHO threshold.

Keywords: Schistosomiasis; school children; prevalence; parasite; cercariae.

1. INTRODUCTION

Schistosomiasis is a chronic disease caused by parasitic flat worms also known as trematodes, which belongs to the genus *Schistosoma.* Schistosomiasis is considered to be the third most acute tropical illnesses globally, after malaria and helminthiasis as it is a main origin of morbidity and mortality for developing countries within the continent of Africa to South America, to the Caribbean, Asia, and the Middle East [1]. A research conducted by Hotez and Kamath (2009) showed schistosomiasis prevalence and morbidity to be highest in school children, adolescents and young adults [2]. Thus, poor educational outcomes and the incapacitating effects of untreated diseases discourage social and economic progress in endemic regions.

Salwa *et* al. (2016) reported that percentage prevalence of *Schistosoma species* (*haematobium* and *mansoni*) in Kano, Northern Nigeria are 17.8% and 8.9%, and was found to occur more among the poor and children in school [3]. Schistosomiasis is known to have low rate of mortality, however, it is often an acute disease capable of damaging internal organs, and causing cognitive development and growth impairment in infants [4]. Urinary schistosomiasis is linked to elevated risks for bladder illnesses in adults. After malaria, schistosomiasis is the parasitic disease that has the second-highest socioeconomic impact [5]. Despite the disease only killing a small number of people, its clinical effects, prevalence, and growth of agriculture and water development projects, movement of people and increase in population density, as well as some social customs like passing urine and feces close to water bodies, make it a problem of great health importance [4]. The microscopic adult worms are resident in the veins that drain the intestines and urinary tract. Schistosomiasis is a poverty-related illness that causes chronic illness. When individuals make contact with fresh water contaminated with the larval (cercariae) stages of parasitic blood flukes called schistosomes, infection results. The majority of the eggs they produce are lodged in tissues, where the body's response to them can severely harm the body. The intestines or the urinary tract may be compromised. Abdominal pain, diarrhea, bloody stools, and blood in the urine are a few signs and symptoms that may be present. Those who have experienced long term infection may witness damages to the liver, kidney failure, infertility, or bladder cancer. In infants, it may lead to poor growth and learning difficulty [6]. *Schistosoma haematobium* is the specie of schistosome responsible for Urinary Schistosomiasis which is depilating illness*,* marked by the presence of blood in urine. Proteinuria, dysuria, bladder carcinoma, bladder stones, calcification of bladder walls and sometimes renal dysfunction are other symptoms. [7]. Children in school-age groups are more susceptible to infection due to poor hygiene and specific play behaviors like swimming or fishing in contaminated water. To ascertain the prevalence of urinary schistosomiasis among primary school students in Kisayhip, Bassa local Government Area, Plateau State, was the study's primary objective.

2. MATERIALS AND METHODS

2.1 Study Area

This study was conducted in five primary schools in Kisayhip, Bassa Local Government Area, Plateau State, Nigeria. Bassa is a Local Government Area in the north of Plateau state, Nigeria, bordering Kaduna and Bauchi states. Some major occupations of the inhabitant include farming, irrigation works, fishing and large production of vegetables and cereals. They are blessed with several water bodies which enable the inhabitants to engage in water contact such as fishing, swimming, rice farming, etc. The availability of water and the tropical type of weather may provide suitable breeding grounds for snail intermediate host leading to possible transmission of schistosomiasis.

2.2 Sample Size

Sample Size Determination

The sample was determined from the statistical equation below:

Sample size (N) = $(Zt\text{-}\alpha/2)^2P(1\text{-}P)/d2$

Where;

N= sample size

Zt-α/2= confidence interval (95%=1.96)

P= Expected proportion in population based on previous studies in Kano State (17.8%=0.178) Salwa et al. [3]
d = Absolute error or precision (5%=0.05)

Thus;

N= 1.96^2 x 0.178(1-0.178)/0.05^2
N= 0.562/0.0025
N=225

The same size was approximated to 230.

2.3 Eligibility Criteria

Pupils within the age bracket of 5-14 years old were included in the study provided they were registered pupils of the selected schools and their parents or guardians provided written consent for study participation on their behalf. Pupils on anti-parasitic treatments were excluded from the study and those were yet to complete their school registration.

2.4 Sampling Method

Five schools were randomly selected for the study and students were also randomly selected using a numbering system [8,9]. All the pupil were interviewed using structured questionnaire in order to find out their knowledge of personal hygiene and practices that could expose them to infective cercaria of schistosome parasite.

2.5 Sample Collection

Urine (15ml) samples were collected into sterile, leak-proof containers from the pupils in different schools and were properly labeled, kept in ice and transported to the laboratory for processing within 2 hours of collection. As described in Cheesbrough [10].

2.6 Laboratory Methods

2.6.1 Examination of urine specimen

Macroscopic examination: Each urine sample was observed for colour appearance of amber, reddish, and the presence or absence of blood.

2.6.2 Microscopy (Centrifugation technique)

Simple centrifugation and sedimentation techniques for microscopic examination were used. The method described by Dazo in 1974 was employed [11].

Ten (10) ml of each well mixed urine sample were transferred into a centrifuge tube, labelled and centrifuged at 4000 rpm for 5 minutes. The supernatant was discarded into a disinfectant jar and a drop of well mixed sediment was placed on a clean grease-free slide with the aid of a Pasteur pipette which was covered gently with cover-slip avoiding air bubbles and over flooding. The preparation was then examined using x10 and x 40 objective for the terminally spined ova of *Schistosoma haematobium*. The results were recorded appropriately.

2.7 Statistical Analysis

The study data were collected and the prevalence among the schools was compared using Chi-square function in SPSS 23.0. The difference in prevalence among the schools was considered statistically significant at $p<0.05$.

3. RESULTS

Tables 1-3 are the presentation of the study results.

The prevalence of schistosomiasis among the primary schools is presented in Table 1. It shows the absence of significant difference in infection rate among the five primary school designated A, B, C, D and E, sampled in the study area, ($P>0.05$). The overall prevalence was 11(4.80%). School A had a prevalence of 3(6.00%), B 2(4.00%), no infection was observed in C, D had 4(8.00%), and E 2(4.00%).

Table 2 represents the prevalence of urinary schistosomiasis based on sex. There is no significant difference in infection level of *S. haematobium* based on sex of pupils at (P>0.05). Male had 8(7.00%) while female had 3(2.60%). The overall prevalence for *S. haematobium* is 11(9.56%).

Table 1. Prevalence of urinary schistosomiasis among the primary schools

Primary school	No. examined	No. infected (%)
A	50	3(6.00)
B	50	2(4.00)
C	30	-
D	50	4(8.00)
E	50	2(4.00)
TOTAL	230	11(4.80)
χ^2=2.941	Df=4	P=0.568

At (P<0.05), result is significant.
Key: A is LEA Bangai
B is LEA Kisayhip B
C is LEA Kubeaye
D is Breadwinner International School Kisayhip
E is Baptist Nursery and Primary School Kisayhip

Table 2. Prevalence of urinary *Schistosomiasis* between sex groups

Sex	No. examined	No. infected with S. *haematobium* (%)
Male	115	8(7.00)
Female	115	3(2.60)
Total	**230**	**11(9.56)**
χ^2=2.400		df=1

Result is significant at (P<0.05)

Table 3. Prevalence of urinary schistosomiasis on age groups

Age	No. examined	No. infected (%)
5-6	50	-
7-8	55	3(5.50)
9-10	45	2(4.40)
11-12	40	1(2.50)
13-14	40	5(12.50)
TOTAL	**230**	**11(4.80)**
χ^2=8.266	df=4	P=0.082

At (P<0.05), result is significant

The prevalence of urinary schistosomiasis according to age groups is presented in Table 3. As presented, no significant difference was recorded in the levels of infection with respect to age group at (P>0.05), all age groups had some levels of infection except 5-6 years that showed no prevalence. Overall prevalence based on age group was 11(4.80%).

4. DISCUSSION

According to World Health Organization in 2013 [13], the prevalence from this study should be considered low. However, the observed prevalence lies in the continual contamination and repeated exposure of these school-aged children, [14]. This could be attributed to a number of reasons, some of which include the location of the study area, their source of water, occupation, poor sanitation conditions as well as ignorance of the source of infection and the mode of the disease transmission. This prevalence (4.80%) is much lower than 19.0% recorded by Damen and his team in 2006 [15] in Jema's Local Government, Kaduna State. The Federal Ministry of Health's comprehensive and cost-effective strategies to eradicate numerous NTDs in Nigeria by the year 2020 may be responsible for the lower prevalence observed by the current study[16].

The high prevalence recorded in males in this study than females agrees with Gaji and Thilza in 2010 [17], who reported that males recorded a higher prevalence than females in relation to sex. This study is in agreement with the research conducted in 2017 [18] by Hassan and his colleagues, who revealed that males had a greater prevalence of schistosomiasis (35.1%) compared to females (19.7%%) in the Aliero Local Government Area of Kebbi State. This may be attributed to socio-cultural practices such as bathing, washing and fishing in cercariae-contaminated water bodies which facilitate disease transmission and since males participate more in such activities, they are more prone to infection. However, it varies with Ugbomako and Heukelback study who reported insignificantly higher prevalence in females than males [19].

The higher infection among pupils of ages 13 and 14 years in this study is in agreement with report by Hassan and his colleagues who reported 38.80% in age group 11-14 years at Aliero, Kebbi state [18] and Ejinaka *et al*. [20] in Jos who reported 10% in the age range 15-16 years. This could probably due to the degree of exposure and engagement in many outdoor activities including swimming and fishing due to the youthful exuberance. The heightened incidence rates in this age group may be due to

adolescents' increased mobility with respect to bathing, playing, and swimming in open water. Additionally, earlier research from Nigeria and Kenya revealed an uptick in infection rates among children between the ages of 6 and 13 with a reduction starting at 14 years old. [20]. There is no doubt that control measures highlighted by Ejinaka *et al*. [22] could not be ignored especially among the pupils in Bassa Local Government Area of Plateau State.

5. CONCLUSION

This study reveals that urinary schistosomiasis is present among pupils from Kisayhip, Bassa Local Government Area though not endemic according to World Health Organization range of 40% and above prevalence.

ETHICAL CONSIDERATION AND CONSENT

Ethical approval for the study was obtained from the Ethics Committee of Plateau Specialist Hospital, Jos. Document registration number is NHREC/05/01/2010b. Written consents were obtained from the parents or guardian of the pupils before they were considered for study participation.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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