***Original Research Article***

# Prevalence of Urinary Schistosomiasis Among School-Age Children In Kashinzama And Sabiyal In Aliero Local Government Area, Kebbi State, Nigeria.


## ABSTRACT

**Background:** Urinary schistosomiasis remains an intractable parasitic disease, associated with populations living in poverty in sub-Saharan Africa and it has placed an enormous toll on the health sectors of affected countries

**Aims**: The study was conducted to determine the prevalence of urinary schistosomiasis among school-age children in Aliero Local Government Area of Kebbi State, Nigeria.

**Study Design**: This was a cross-sectional, descriptive study

**Place and Duration of Study**: This study was conducted among school aged children, Aliero Local Government, Kebbi State,from March to June, 2016.

**Methodology**: A total of 400 participants were enrolled for the study.**Ten** (10 ml) of urine samples were collected from each participant in to universal containers.Samples were preserved with 10% formal saline and then transported to laboratory for analysis. Samples were filtered using vacuum pump filtration machine and Whatman No.1 filter paper and were then examined under the microscope to determine the presence of ova of *Schistosoma haematobium*.

**Results:**Out of 400 urine samples 128(32.0%) had infection with mean egg intensity of 63.4/10ml of urine, with significant difference (p>0.005) in infection rates among males (35.1%) and females (19.7%). The age specific prevalence is higher among 10-14years (38.8%) with significant difference (p>0.001). The occupational distribution of the infection was higher among fishermen (64.1%) with significant statistical difference (p>0.001).

**Conclusion:**The result of this study shows the establishment of moderate *S. haematobium* infection in the study area (32.0%).The finding of our study shows a significant correlation between the associated risk factors and *Schistosoma haematobium* infection using simple and multiple regression analysis each with significant statistical difference. The attention of concerned authorities is needed to address the problem.



**Key Words:** Prevalence,,, Urinary Schistosomiasis ,School Children, Aliero, Kebbi State, Nigeria.


## 1.0 INTRODUCTION

Schistosomiasis is regarded as one of the major health related problems among the neglected diseases in tropical Africa, with the school aged children being the most affected and second after malaria as the most devastating disease in tropical countries ofAfrica, East Asia, and South America [1].Urinary schistosomiasis remains an intractable parasitic infections, associated with populations of people living in sub-Saharan Africa [2,3].

High prevalence of schistosomiasis is observed in tropical and sub-tropical areas, especially in communities that have no access to portable drinking water and adequate sanitation. Many parts of the Nigeriaare high-risk areas for schistosomiasis because of the dependence on surface water for various activities [4]. Schistosomiasis is associated with water resources development projects such as dams, irrigation schemes, rice and fish-farming, which increase the human contact and thus increase the risk of infection [5].

Despite the high burden of Schistosomiasis especially in Africa which accounted for more than 85 percent of the estimated 238 million people infected with the disease in 2010 ; [6;7], schistosomiasis is still considered a neglected tropical disease.

Recent estimates from sub-Saharan Africa indicate that 280,000 deaths per year can be attributed to schistosomiasis [8].

Numerous studies conducted over the years, have compared detection of haematuria and proteinuria with filtration methods and were shown to be reliable, but sensitivity and specificity are values differ considerably from one endemic area to another.

Urinary Schistosomiasis results to passing of eggs through the bladder wall causes damage leading to the passage of small amounts of blood and protein in to the urine[9;10]. Reagent strips can detect such small amounts of blood and protein present in urine and can thus be used as indicators of infection with *Schistosoma haematobium* especially in field surveys. [9] so the reagent strips can provide a semi quantitative result.

The symptoms of Schistosomiasis include; dry cough with changes on chest x-ray, fever, fatigue and muscle aches. Others include malaise, abdominal pains and enlargement of spleen and liver. The symptoms usually get better on their own but little number of people may have prolonged weight loss, diarrhea, diffuse abdominal pain and rash [3].

Large-scale production of millet during the raining season is the major practice and vegetables especially onion and pepper are grown through irrigation farming. The major tribes in Aliero local government area are Hausa, Fulani, Arawa and some minority tribes that include Yoruba's and Igbo's. Aliero local government is a major onions producer and has the largest onion market in northwestern Nigeria. Aliero residents are known for traditional bone setting across West and Central Africa. However, some areas of Aliero local government are blessed with several water bodies which enable the inhabitants to engage in water contact activities such as fishing, swimming, rice farming and other irrigation works as their source of daily income. The availability of water and the tropical type of weather may provide suitable breeding grounds for the snail intermediate host, leading to the possible transmission of urinary schistosomiasis in the area.

Findings obtained from this study could provide an easier, rapid and cheaper method for the diagnosis of urinary schistosomiasis which can improve the disease management and control in the area. The aim of his study is to determine prevalence of urinary schistosomiasis among School-Age Children in Aliero Local Government area of Kebbi State, Nigeria.

## 2.0 MATERIALS AND METHODS

### 2.1 STUDY AREA

The study was conducted in Aliero Local Government Area. Aliero local government area is approximately located at latitudes 4°23'S and 12°26'40"N and longitudes 3°6'W and 4°27'35"E. The local government was created in 1996, with a total land mass of 412.25 $km^2$, [11]. Aliero local

government area has a total population of 67,078, and is one of the 21 local governments which make up the present Kebbi State[12].

Aliero local government area shares common boarders with Gwandu Local government area by the east, Jega Local government area to the West, and Birnin Kebbi Local government area to the north. The local government has three (3) districts which comprise Aliero, Sabiyal, and Danwarai districts. Aliero local government has 21 health facilities of various capacities throughout the local government areas. The local government has experienced significant improvement, with most of the facilities participating in routine immunizations. It is the permanent site of Kebbi State University of Science and Technology, has many primary and post primary institutions [11].

Aliero local government area is in dry Sahel, hot season with high temperature experienced in the months of March and April, while harmattan a dry cold and dusty condition is experienced between the months of November and February each year. The area has an annual rainfall ranging from 500mm to 1,300mm(. Rainfall begins early May and ends in October each year. Major occupation of the inhabitants include, farming, irrigation works, rice farming, fishing and trading with a reasonable proportion of the population working in private and public sectors.

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## 2.2 STUDY POPULATION

The study population consists of 400 school aged children, in Aliero Local Government Area of Kebbi State, Nigeria.

### 2.3 STUDY DESIGN

This Is a cross-sectional, descriptive study designed to determine prevalence of *Schistosoma haematobium,*among school-aged children (5-19) years detected using reagent strips was compared with microscopy in the examination of *Schistosoma haematobium* eggs in urine.

The research was conducted during the raining season from May-July 2016. The procedure was explained to all participants and were each given the consent forms to sign. Questionnaires were distributed to generate information on their bio-data.

### 2.4 SAMPLING METHOD

Simple random sampling technique was used to recruit 400 School children into the study.A total of 400 participants were enrolled for the study.**Ten** (10 ml) of urine samples were collected from each participant in to universal containers.

### 2.5 INCLUSION CRITERIA

The study included all consented, apparently healthy, school childrenwithin the age range of 5 – 19 years that were in Kashinzama and Sabiyal villages, those that have not been on any sort of Schistosomiasis treatment within the last 4 weeks.

## 2.6 EXCLUSION CRITERIA

All subjects that did not meet the inclusion criteria were excluded from the study; and children on anti-Schistosomal therapy within the last 4 weeks, those that did not consented, those that were less than 5 years or greater than 19 years of age. As well as those that have any form of internal bleeding or bladder injury are excluded.

## 2.7 SAMPLE SIZE DETERMINATION

Sample size determination for this research was based on the findings of 38% obtained from the previous study [13]. Number of sample size was determined using the formula;

$n = Z^2 P Q/d^2$

n = Minimum sample size

Z (standard deviation of normal) = 1.96

P (prevalence rate) = 38% (0.38%) [13].

Q (1-P) = (1 - 0.38) = 0.62

d = confidence interval = 5% (0.05)

$n = (1.96) \times 0.125 \times 0.875/ (0.05)^2$

n = 362

Due to attrition, 10% of 168 were added to the sample size

362 + 38 = 400

Therefore the minimum sample required was 400

## 2.8 ETHICAL CONSIDERATION

Ethical clearance was obtained from the ethical committee of the Ministry of health, Kebbi State in accordance with the code of Ethics for Biomedical Research involving Human subjects. The relevance and benefit of the study was explained to all of the subjects to ensure their voluntary participation and a written informed consent was taken from each subject.

## 2.9 SAMPLE COLLECTION

Dark and labeled plastic containers were given to each participant for collection of urine sample which was done between the hours of 10:00 am to 2:00 pm. A total of 400 urine samples were received and were preceded for analysis.

## 2.10 LABORATORY TEST

### *2.10.1 Test for haematuria and proteinuria*

After collection, samples of urine were examined macroscopically for gross haematuria and then tested for micro haematuria and proteinuria using Combi-9 reagent strips. The Haematuria strips were

deepen in to the freshly collected urine and the result were read by comparing with the colour chart on the container.

### *2.10.2 Preservation and Transportation of Samples*

Urine samples were then preserved using 1drop of 10% Formal Saline and then transported to laboratory for further analysis.

#### *2.10.2.1 Filtration*

Urine samples were filtered using vacuum-pump filtration machine (Millipore Cooperation Bedford, Massachusset 01730, USA). The filtration method using microscopy was used during the analysis for diagnosis of urinary schistosomiasis [14] [15;16]. The sample was mixed and 10ml of each urine sample was collected from the container using 20ml syringe. The filter paper was then removed from the vacuum, fixed with Ninhydrine solution and stained with Lugol's iodine solution and allowed to stain overnight [16].

#### *2.10.2.2 Microscopy and egg counts*

The stained filter papers containing urine deposits were examined under the binocular microscope using x10 objectives to determine the presence of ova of *S. haematobium.* Terminal spine eggs, characteristic of *S. haematobium*, were counted from fields of each positive sample and number of eggs was recorded.

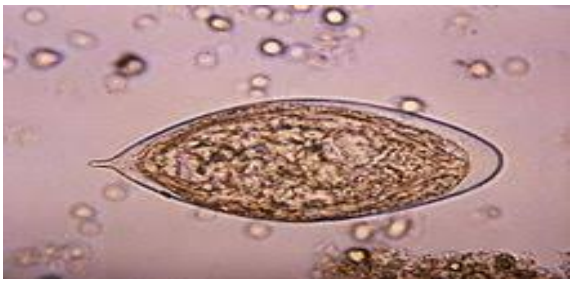

**Figure 1.** Shows *Schistosoma haematobium* Ova in Urine

## 2.11 RESEARCH TOOLS

### 2.11.1 QUESTIONNAIRE

Data collection was carried out using questionnaire in order to obtain socio-demographic of the respondents.During data collection, research investigator ensures that the data were collected accurately and correctly.

### 2.11.2 VALIDATION OF QUESTIONNAIRE

After the questionnaire was designed, it was sent to 3 experts in order to seek for their opinion as part of expert review panel to evaluate questionnaire test validity.

### 2.11.3 DOMAIN OF THE QUESTIONNAIRE

The questionnaire survey consists of items socio-demographic characteristics of the participants as well as the risk factors associated with *Schistosoma haematobium* infection .The questionnaire has 3 domain which includes socio-demographic domains in section A consisting of age, gender, ethnicity and religion. Section B socio- economic data consisting of occupation, type of family, etc. section C Laboratory investigation results.

### 2.12 STATISTICAL ANALYSIS

Data obtained was analyzed using SPSS statistic version 20 (2013 Chicago, Illinois).The prevalence of infection was calculated in percentages. *P-value* less than 0.05 were considered significant.

## 3.0 RESULTS

A total of four hundred (400) participants were enrolled for this study and are within the age range of 5-19 years old. All the participants are from Kashinzama and Sabiyal communities in Aliero local government area of Kebbi State. Out of the number examined, 158/39.5% were positive for haematuria and 128 were positive for *S. haematobium* infection using microscopy giving an overall prevalence of 128(32.0%) and total intensity of 163.4% (Table 1).

Out of the number examined, 145/36.2% were positive for proteinuria and 128 were positive for S. haematobium infection using microscopy. (Table 2).

Out of the (400) participants used in this study' 319(79.5) were males and 81(20.2) were females. Among the participants 270(67.5%) are between 10-14 years old and 75(18.7%) are between 15-19 years while 55(13.7) among them are 5-9 years old. The highest prevalence of infection was among children 10-14 years of age 105(38.8%) followed by 5-9 years age-groups with 13(23.6%) and 15-19 years age-group with 10(13.3%). (Table 3)

The distribution of the disease based on gender shows that males have higher prevalence 112(35.1%) than females with lower prevalence 16(19.7%). The occupational distribution of *S. haematobium* infection shows that 78(19.5%) are children of fishermen with the highest prevalence of 50(64.1%), followed by children whose parents are farmers 178(44.5%) with the prevalence of 65(36.5%), and then children whose parents are Civil servants 55(13.7%) with prevalence of 6(10.9%) and children whose parent are traders 89(22.2%) with the least prevalence of 7(7.8%)..(Table 3)

**Table 1: Detection of Urinary Schistosomiasis using Haematuria versus Microscopy( n= 400)**

| Screening Test | Microscopy | | Haematuria Strip | |
|---|---|---|---|---|
| | n | % | n | % |
| Positive | 128 | 32.0 | 158 | 39.5 |
| Negative | 272 | 68.0 | 242 | 60.5 |
| Total | 400 | | 400 | |

Table 2: **Detection of Urinary Schistosomiasis using Proteinuria versus Microscopy (n= 400)**

| Screening Test | Microscopy | | Proteinuria Strip | |
|---|---|---|---|---|
| | n | % | n | % |
| Positive | 128 | 32.0 | 145 | 36.2 |
| Negative | 272 | 68.0 | 255 | 63.7 |
| Total | 400 | | 400 | |

**Table3: Prevalence and Distribution of *S. haematobium* infection in respect to gender, age-group and occupation in thestudy area**

| *Variables* | *Infected* | | *Not infected* | | *Total* | | |
|---|---|---|---|---|---|---|---|
| | *n* | *%* | *n* | *%* | *n* | *%* | *p-value* |
| *Gender* | | | | | | | *0.005*[a] |
| *Male* | *112(35.1)* | | *207(64.8)* | | *319(79.7)* | | |
| *Female* | *16(19.7)* | | *65(80.2)* | | *81(20.0)* | | |
| *Age-group(yrs)* | | | | | | | *0.001*[a] |
| *5-9* | *13(23.6)* | | *42(76.3)* | | *55(13.7)* | | |
| *10-14* | *105(38.8)* | | *165(61.1)* | | *270(67.5)* | | |
| *15-19* | *10(13.3)* | | *65(86.6)* | | *75(18.7)* | | |
| *Occupation* | | | | | | | *0.001*[a] |
| *Fishing* | *50(64.1)* | | *28(35.8)* | | *78(19.5)* | | |
| *Farming* | *65(36.5)* | | *113(63.4)* | | *178(44.5)* | | |
| *Civil service* | *6(10.9)* | | *49(89.0)* | | *55(13.7)* | | |
| *Trading* | *7(7.8)* | | *82(92.1)* | | *89(22.2)* | | |

## 4.0 DISCUSSION

In this study, four hundred (400) samples were enrolled.The findings in this study showed the establishment of moderate *S. haematobium* infection in the study area which is below the WHO range

which consider 40% to be endemic or high. The result agrees with the result obtained by [17] in a study conducted in Argungu Local government Area of Kebbi State with a moderate prevalence of 34.0%.

Other studies conducted in many African countries reported sensitivities of Haematuria and Proteinuria ranging from 67-93%, with specificities of up to 66-99% [18], including a sensitivity of 87% in White Nile province in Sudan [19]. Haematuria and Proteinuria testing can thus be proposed as a simple indirect method for identifying children with *S. haematobium* infection, and hence may be a useful tool for the rapid mapping of the prevalence of schistosomiasis to identify high risk areas that requires mass treatment with praziquantel.

The findings in this study contradict the results obtained by [20] in their research on Schistosomiasis in Dutsinma, Katsina State where a higher prevalence of 72.0% was obtained. The higher prevalence of schistosomiasis in the area may be due to low level of awareness about the associated risk factors in addition to high level of poverty among the inhabitants. It may also be due to the high level of water contact activities such as fishing and irrigation farming as the major sources of income in the area and high dependence on surface water[4]

Out of 400 school children examined in the study area, the prevalence and distribution of *S. haematobium* infection with respect to gender, age-group and occupation of parent showed that males have higher prevalence of infection 112(35.1%) intensity133.4% eggs/10ml of urine, and 207(64.8%) non infected with total percentage of 319(79.7) while their female counter parts have 16(19.7%) intensity 30.0% eggs/10ml of urine, and 65(80.2%) non-infected with the total percentage of 81(20.2%).

The high prevalence of infection recorded among males, may be due to the fact that males usually engage more in water contact activities because of the nature of their occupation and responsibilities as house holders than females leading to their higher exposure to infection with *S. haematobium*. This agreed with the results obtained by several researchers in Nigeria such as [21]. It may also be because the number of females participating in studies is usually smaller compared to the number of participating males.

The findings from this study contradicts the findings of [22] in a study conducted on urinary schistosomiasis among pre-school children in a rural community near Abeokuta, Nigeria, where prevalence of *S. haematobium* infection was higher among females (59.2%) than males (57.1%) although the difference is not statistically significant. However, the higher prevalence among females may be due to their exposure to water contact activities related to domestic works such as fetching water from the ponds, washing clothes and eating utensils. It may also be due to the fact that in some communities, women engage in agricultural and irrigation works than their male counter parts which may likely expose them to infections.

The prevalence based on age-groups showed that, children 10-14years old have the highest prevalence of infected individuals' 105 (38.8%) while 5-9years old have 13(23.6%) infected, 42(76.35%) non-infected and total percentage of 1397%). Children 15-19years have 13(3%) infected, 65(86.6%) non-infected and total percentage of 75(18.7%).The higher prevalence recorded among 10-14 years age-groups which with significant statistical difference ($x^2$=19.666[a] and (P value= 0.001), may be due to the fact that children at that age perform more water contact activities than other age-groups and may not have developed their immunity fully enough to give them the needed protection against schistosomal infection. Children at the age of 5-9 usually have less water contact activities that may expose them to infection since parents may not allow them by virtue of their age which is similar to the findings of [23: 13]

The high prevalence of infection among children of fishermen and farmers, and the least prevalence of infection recorded among children of traders and civil servants shows a significant correlation

between urinary schistosomiasis and occupation. It also shows that urinary schistosomiasis has a significant relationship with the economic status, level of awareness and the educational background of an individual. Traders and Civil servants may be more economically and socially fit than farmers and fishermen and so can take good care of their children and their environment which may however reduce the chances of their children acquiring the infection. Fishermen and farmers may also have higher level of water contact leading to exposure to contaminated water bodies more than the traders and civil servants with less water contact activities and thus little chances of acquiring the infection.

High prevalence of urinary schistosomiasis in the area study, shows that the disease is still an important public health problem in north-western Nigeria and has demonstrated that Nigeria remains one of the most important endemic areas.

## 5.0 CONCLUSION

This study showed high or moderate prevalence of urinary schistosomiasis in the area and is still an important public health problem in north-western Nigeria. Study also showed high sensitivity and specificity of Haematuria and Proteinuria in the detection of urinary schistosomiasis. Haematuria and Proteinuria testing can thus be proposed as a simple and reliable indirect method for identifying children with *S. haematobium* infection, and hence may be a useful tool for the rapid mapping of the prevalence of schistosomiasis to identify high risk areas.

## 6.0 RECOMMENDATION

Haematuria and Proteinuria testing for diagnosis of Urinary Schistosomiasis, should further be carried out in other settings and validated for use as rapid screening test for *Schistosoma haematobium* infection. Prevention and control measures should be adopted such as provision of adequate portable drinking water, sanitation and health education by the concerned authorities to address the problem. Presence of haematuria should be reported as early as possible so as to take immediate diagnostic and chemotherapeutic measures.

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