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# Remedying Urinary Schistosomiasis and Risk of Infection Amongst Primary School Pupils in Kontagora Local Government Area, Niger State

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## Abstract

The research work is based on the prevalence, intensity and infection of urinary schistosomiasis among primary school pupils in Kontagora Local Government Area. One hundred (100) primary school pupils from five (5) primary schools were selected for the study. Urine samples were examined for schistosoma haematobium eggs by centrifuging and microscopy technique. A well-structured questionnaire was administered to obtain socio-demographic data such as school location and source of water supply. The statistical analysis of the data obtained was conducted using simple percentage and chi-square. The overall prevalence and intensity as well as infection rate were determined at 5.0% significance. There was a significant difference (P>0.05) in the prevalence and intensity of schistosoma haematobium in relation to schools, and infection due to water source. It was therefore recommended that state and local government authorities should provide safe and drinkable water, treat infected people to avoid further spread of the disease, map out strategies toward the elimination of the snail intermediate host and public enlightenment in the schools, mass media and the rural communities be carried out to prevent further spread.

**Keywords:** *Microorganism, Disease, Water, Snail, Host*

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## Background to the Study

Schistosomiasis also known as Bilharziasis or snail fever is a chronic and debilitating water-borne parasitic infection that leads to a significant ill health and economic burden. The name bilharziasis was derived from the name Theodor Bilharz, a German pathologist, who first identified the worms in 1851 (Nawal, 2010: WHO, 2010). Schistosomiasis is caused by digenetic trematode flatworms (flukes) of the genus schistosoma and is a prevalent tropical disease, ranking second to malaria and posing a great public health and socio-economic threat in Sub-Saharan Africa (Hotez et al., 2009).

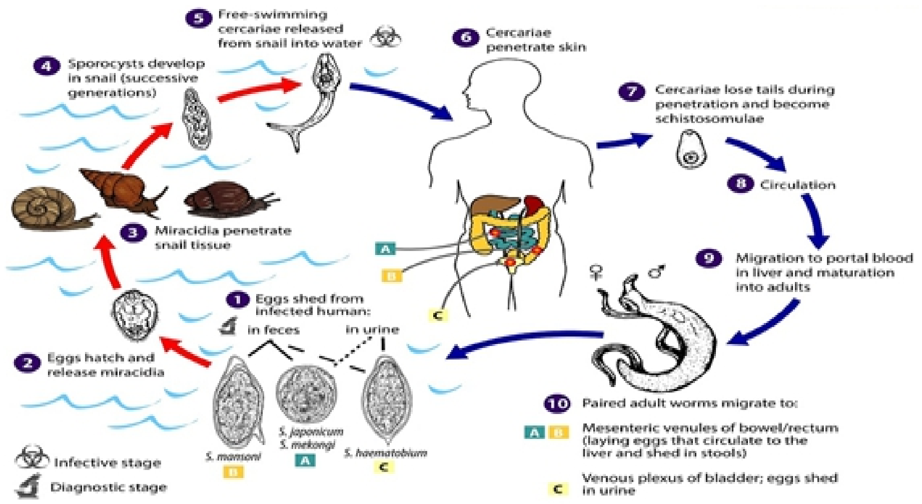


**Fig 1:** Life cycle of *Schistosoma Spp;* Source: CDC (2019)

Schistosomiasis has been a major public health problem in about 77 developing countries in the tropics and sub-tropics. It is estimated that aver 240 million people are infected, with about 700 million people worldwide at risk of infection. Over 90% of this infection occurs in sub-Saharan Africa with almost 300,000 deaths annually from schistosomiasis in Africa (Dawaki, et al. 2015). Schistosomiasis, prevalence and morbidity are highest among school children, adolescents and young adults. Thus, the negative impacts on school performance and the debilitation caused by untreated infections demoralize both social and economic development in endemic areas (Dawaki et al., 2016). The main disease causing schistosoma species are *Schistosoma haematobium, S. mansoni, S. Japonicum, S. mekongi* and *S. intercalatum* (Gryseel et al., 2006). In Nigeria, three species (spp.) are pathogenic to man, these are *S. haematobium, S. mansoni* and *S. intercalatum*.

The disease caused by *Schistosoma haemiobium* is characterized by blood in urine (haematuria), difficulty in urinating (dysuria), lesions and calcification of bladder, kidney failure and bladder cancer in children (Norberg, 2004). *Schistosoma mansoni* infection however is characterized by bleeding from gastro-esophageal region, persistent bloody diarrhoea, pain, growth retardation, delayed sexual maturity and chronic dermatitis (Norberg. 2004; WHO, 1980). Nigeria has the greatest number of cases of schistosomiasis worldwide, with about 29 million infected people among whom 16 million are children and about 101 million are at risk of schistosomiasis (Dawaki et al., 2015).

**Statement of Problem**

To make the most of human species, it is expected that the wellbeing such human organism must not be compromised. Yet man has never been spared of infections from microbes either directly or indirectly. Despite more than a century of control efforts and the introduction of highly effective anti-schistosomal drugs such as Niridazole, Metrifonate, Oxamniguine and Praziquantel (WHO, 1980), the eradication of the schistosoma is still far from being actualized. Mahmood, Philip, Umar, and Muhammad (2015) have shown that the nutritional Status and prevalence of intestinal Schistosomiasis among Almajiri people in Kawo district of Kaduna should be given required attention. The prevalence, intensity and morbidity assessment of schistosomiasis have not been properly investigated in Kontagora Local Government Area which could be the reason for the ignorance of the disease is this study area. The research provided baseline information on the status of schistosoma infection among primary school pupils in Kontagora from which the disease burden and risks of transmission were assessed so that possibly adequate intervention to protect the lives of primary school pupils could be provided, thereby reducing the rate of transmission.

**Objectives of the Study**

The study examined:

i. The prevalence of urinary schistosomiasis infection among pupils in relation to schools in Kontagora.
ii. The morbidity assessment of urinary schistosomiasis in relation to water source in Kontagora schools.

**Research Questions**

1. How prevalent is urinary schistosomiasis among primary school pupils in Kontagora?
2. What is the infection rate of urinary schistosomiasis among primary school pupils in relation to water source in Kontagora?

**Research Hypothesis**

1. There is no significant difference in the prevalence of urinary schistosomiasis among primary school pupils in Kontagora.
2. There is no significant difference in the infection rate of urinary schistosomiasis among primary school pupils in Kontagora based on water source.

**Method and Materials**

**Study Area**

Kontagora Local Government Area is located between latitude 10°23N and Longitude 5°28E. Its headquarters is Kontagora with an area of 13.219$m^2$ (34,237) square kilometers and an estimated human population of 98.763 people (www.tipglob.com) (www.britannica.com/Kontagora). The climatic condition is in two distinct seasons, the wet season and dry season. The wet-rainy season lasts from April to October with average rainfall of 1162mm, while the dry season begins from November and ends in March; it experiences temperature fluctuation of 24.3°C to 30.2°C in a year. The vegetation in the area is typically grass dominated Savanna with trees. The climatic conditions in Kontagora Local Government Area greatly influences the activities of the people, who are predominantly engaged in agriculture, during the rainy season and in petty trading and artisan work during the dry season.

**Study Design and Sample**

The study is experimental in nature. The Sample comprised 100 male and female primary school pupils who were randomly selected from five (3) primary schools in the study area. The five (5) primary schools selected for the study include: Ibanga, Masaha, U.B.E Nomadic (TunganHabu), SabuwarMadara, and Ragadawa Primary Schools. Permission was obtained from the Education Secretary Kontagora Local Government Education Authority, and the Head Teachers of the five (5) primary schools with the consent of the pupils. A structured questionnaire was administered to each pupil to obtain information such as source of drinking water and contact activities.

**Collection of Urine Samples**

One hundred (100) samples of urine each was collected from the pupils who consented to participate. White sterile, plastic universal labeled containers were given to the 100 pupils to collect their urine samples. This was done between the hours of 8:00am to 12:00pm after ensuring that the first and the last few drops of the urine were included. This was done to ensure accumulation of schistosome eggs (WHO, 1980). The 100 samples of urine collected were taken to the Federal College of Education Kontagora Clinic laboratory for analysis.

**Laboratory Analysis**

**Examination of urine samples for Schistosoma heamatobium**

The urine sample were well mixed, 10ml of the well mixed urine sample were centrifuged at RCT 500-1000g to sediment the schistosome eggs. The supernatant was decanted and the sediment transferred to a clean free glass slide to which a cover slip was added. This was mounted on a light microscope and examined at 10x objective with the condenser iris closed sufficiently to give good contrast so as to identify *Schistosoma haematobium* eggs characterized by a terminal spine.

**Data Analysis**

All the data obtained were analyzed. Comparison of the association between prevalence with respect to schools was made using simple percentage and chi-square test. The association between the prevalence and various parameters obtained from the questionnaires such as water contact activities and source of water were analyzed using the chi-square, with 0.05 significant level considered.

**Results**

**Prevalence of Schistosomiasis**

**Research Question 1:** How prevalent is urinary schistosomiasis among primary school pupils in Kontagora?

**Table 1:** Prevalence of Schistosomiasis haematobium in schools

| NAME OF SCHOOLS | N | + | - | N of eggs in Urine | (%) |
|---|---|---|---|---|---|
| Ibanga Primary School | 20 | 0 | 20 | 0 | 0 |
| SabuwarMadara Primary School | 20 | 1 | 19 | 3+ | 5 |
| U.B.E. Normadic Primary School | 20 | 3 | 17 | 3+,3+,3+ | 15 |
| Masaha Primary School | 20 | 1 | 19 | 3+ | 5 |
| Ragadawa Primary School | 20 | 0 | 20 | 0 | 0 |

From table 1, the prevalence of urinary Schistosomiasis by schools shows that U.B.E Nomadic Primary School TunganHabu had the highest prevalence of (15%) followed by SabuwarMadara and Masaha Primary schools, both with (5%), while none (0%) was recorded in Ibagan and Ragadawa Primary schools.

**Testing Hypothesis 1**: There is no significant difference in the prevalence of urinary schistosomiasis among primary school pupils in Kontagora.

**Table 2:** Chi-Square Analysis of Prevalence of Schistosoma Haematobium Based on School

| Schools | +tive$O_f$ [$E_f$] | -tive$O_f$ [$E_f$] | df | $X^2$-cal | $X^2$-crit | Remark |
|---|---|---|---|---|---|---|
| Ibanga Primary School | 0[1] | 20[19] | 3 | 12.000 | 7.815 | S |
| SabuwarMadara Primary School | 1[1] | 19[19] | | | | |
| U.B.E. Normadic Primary School | 3[1] | 17[19] | | | | |
| Masaha Primary School | 1[1] | 19[19] | | | | |
| Ragadawa Primary School | 0[1] | 20[19] | | | | |

*significance $P<0.05$

A chi-square($x^2$) calculated value of 12.000 on table 2 which is higher than the critical value of 7.815 at degree of freedom of 3 and $\alpha = .05$ necessitated the rejection of the null hypothesis 1 tested. This shows that there was a significant difference in the prevalence and intensity of urinary schistosomiasis among primary schools in Kontagora.

**Research Question 2:** What is the infection rate of urinary schistosomiasis among primary school pupils based on water source in Kontagora?

**Table 3:** Infection Rate of *Schistosoma haematobium* based on water source

| Water Source | N | + | - | (%) |
|---|---|---|---|---|
| Pipe | 32 | 0 | 32 | 0 |
| Stream | 27 | 3 | 24 | 11.11 |
| Well | 11 | 0 | 11 | 0 |
| Both Piped/Stream | 30 | 2 | 28 | 6.67 |

From table 3, the highest infection occurred in schools where the source of water is a stream at 11.11% and 6.67% for both piped and stream while piped and well water sources had 0% each.

**Testing Hypothesis 2:** There is no significant difference in the infection rate of urinary schistosomiasis among primary school pupils in Kontagora based on water source

**Table 4:** Chi-Square Analysis of Infection Rate of Schistosoma haematobium Based on Water Source

| Water Source | +tive$O_f$ [$E_f$] | -tive$O_f$ [$E_f$] | df | $X^2$-cal | $X^2$-crit | Remark |
|---|---|---|---|---|---|---|
| Pipe | 0[1.6] | 32[30.4] | 3 | 15.430 | 7.815 | S |
| Stream | 3[1.35] | 24[25.65] | | | | |
| Well | 0[0.55] | 11[10.45] | | | | |
| Both piped/Stream | 2[1.5] | 28[28.5] | | | | |

*significance P<0.05

A chi-square ($x^2$) calculated value of 15.430 obtained at degree of freedom of 3 and $\alpha<0.05$ for a critical value of 7.815 requires that the null hypothesis 2 of no significant difference in the infection rate of *Schistosoma haematobium* based on water source is rejected.

**Discussion of Findings**

The overall prevalence of urinary schistosomiasis in the areas of this study ranged from 15.0% to 5.0%. The overall prevalence recorded is said to be low based on World Health Organization categorization of area with schistosomiasis as follows: high risk = ≥50%, moderate = ≥20% but low risk = ≤15% (WHO, 2015b). This could be attributed to the presence of piped borne water and a prior treatment of the communities with praziquantel and other drugs by the intervention of the World Health Organization in 2018. The overall prevalence reported in this research work is lower than other prevalence reported from the different parts of Nigeria and Africa at large, such as the 19.0% recorded among students in L.G.A of Kaduna state (Damen *et al.*, 2006). Other prevalence includes the 60% (Barakat, 2013), 17.5% (Nwosu *et al*. 2015) and 18.7% (Mahmood *et al.* 2015). However, the results from this research work are higher than the findings of Okpala *et al*. (2004) who reported a prevalence of 0.67% and 4.6% in Jos.

Statistically, there was a significant difference recorded in the prevalence of *schistosoma haematobium* in relation to schools in Kontagora which means the pupils in the schools are prone to varying chances of being infected. This finding agrees with the earlier report from Bigwan et al., (2012) who stated that the prevalence of schistosomiasis in relation to schools indicated a significant relationship in Yobe state. The difference in prevalence may be influenced by peculiar ecological characteristics and level or contact of individuals with water bodies.

The overall infection of *Schistosoma haemarobium* based on water source shows that there was higher risk of infection in the open water source such as river or streams due to the fact that pupils must have visited infested streams for one or more water contact activities which might have exposed them to the water containing cercariae thereby acquiring infection even if they take piped borne water or borehole water. This can be associated with the occupation of the pupil's parents who are predominantly farmers which predisposes the pupils to the infection of *Schistosoma haematobium*. Therefore. the relationship between stream or river and the infection in pupils could be since the rivers contain infective stages known as cercariae that infect the pupils. In other related literature, defecating in the bush also had association with the prevalence of the infection in the pupils. This could be attributed to the fact that the inhabitants of those areas get exposed to water parasites in the bush they defecate. They could be exposed when bathing, walking through, defecating in the water bodies, or drinking the infested water. This agrees with the findings of Okpala *et al.*, (2004).

## Conclusion

The focus of this study was to examine urinary schistosomiasis prevalence and infection among school pupils in in addition to morbidity assessment of urinary schistosomiasis vis-à-vis water sources available to pupils in public schools. The result obtained from this research work shows that there was a low prevalence and intensity of urinary schistosomiasis among public primary schools in Kontagora Local Government Area of Niger state, however some locations were potential harbour of schistosomiais which requires adequate and emergency attention to prevent the proliferation and spread of the nematode.

## Recommendations

1. The state and the local government should provide safe water for drinking and domestic use to the people to reduce the rate of exposure to infested water bodies.
2. Pupils in the local government who are infected should be identified and giving treatment to avoid further spread of the disease.
3. Community Health workers should map out strategies to survey snail at time intervals so as to check for the snail intermediate host towards destroying them to avoid harboring infective stage.
4. There should be public health enlightenment in schools, mass media and in the rural areas on procedures for controlling or preventing certain parasites against infection.

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