



## Prevalence of Urinary Schistosomiasis in Two Selected Communities of Shinkafi Local Government Area, Zamfara State, Nigeria

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### ABSTRACT

This study was carried out to determine the prevalence and intensity of urinary schistosomiasis in two villages of Shinkafi Local Government Area, Zamfara state. A total of two hundred (200) urine samples were examined for the eggs of *Schistosoma haematobium* using standard filtration technique. The overall prevalence of 48.5% was obtained in this study. However, the highest prevalence of 58.00% was recorded in Shanawa. For gender-specific prevalence, males were found to have the highest prevalence of 49.29%, and people within the age group of 11-20 years had the highest prevalence of 55.55%. The mean eggs count for the whole study area was 87.03 eggs/10ml of urine. Shanawa had the highest mean eggs count of 132.17 eggs/10ml than the other village. The age-specific intensity showed that age group 11-20 years had the highest mean egg count of 103.24 eggs/10ml. In sex-specific intensity, the highest mean eggs count was recorded in males 88.41 eggs/10ml than in females with 86.50 eggs/10ml. This study indicates that, the study area is endemic for urinary schistosomiasis and therefore, there is the need for Government intervention to effectively treat and control the disease in the area.

**Keywords:** Urinary, Schistosomiasis, Shanawa, Badarawa, Bunsuru, Shinkafi LGA, Zamfara

### INTRODUCTION

Schistosomiasis is an acute and chronic parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma* (WHO, 2019). The parasites that cause schistosomiasis live in certain types of freshwater snails. The infectious forms of the parasite, known as cercariae, emerge from the snail body and then contaminate the water (CDC, 2018). Some of the factors which influence the transmission of schistosomiasis in an endemic area include the presence of fresh water snail intermediate hosts of the parasites and human contact with the infested waters (Mutapietal., 2006). Schistosomiasis is prevalent in tropical and subtropical areas, especially in poor communities without access to safe drinking water and adequate sanitation. The infection is reported to have plagued the humans since the ancient times. It is estimated that at least 90% of those requiring treatment for schistosomiasis live in Africa (WHO, 2019). The two major forms of schistosomiasis are intestinal and urogenital schistosomiasis caused by these species of blood fluke; *Schistosoma mansoni* which is found in Africa, the Middle East, the Caribbean, Brazil, Venezuela and Suriname. *Schistosoma japonicum* found in China, Indonesia, Southeast Asia and the Philippines. *Schistosoma mekongi* found in several districts of Cambodia and the Lao People's Democratic Republic and *Schistosoma intercalatum* found in Rain forest areas of Central and West Africa. While urogenital schistosomiasis is caused by *Schistosoma haematobium* it is found in Africa, the Middle East, Corsica (France) (WHO, 2019; CDC, 2018). Urinary schistosomiasis,

caused by *S. haematobium* was reported to be more prevalent in Nigeria than intestinal schistosomiasis due to the wider distribution of its snail host (*Bulinus species*) (Ugbomoiko, 2000). The disease is associated with rivers, streams, ponds and water development projects, where the snail intermediate hosts breed and people make various water contacts with these bodies of water for their domestic, economic and recreational purposes (Foster, 1967). People become infected when larval forms of the parasite released by freshwater snails penetrate the skin during contact with infested water. Schistosomiasis mostly affects poor and rural communities, particularly agricultural and fishing populations. Women doing domestic chores in infested water, such as washing clothes, are also at risk and can develop female genital schistosomiasis. Inadequate hygiene and contact with infested water make children especially vulnerable to infection (WHO, 2019). In Nigeria, especially in the rural communities, insufficient knowledge of the etiology of the disease, poor sanitary habits, lack of health education and safe drinking water are the main causes of its endemic (WHO, 1996). This is in addition to indiscriminate passing of urine and faeces that may contain Schistosomes eggs into water bodies containing the fresh water snail host (Ukoet al., 1993; Agi and Okafor, 2005).

Shanawa and Badarawa villages of Shinkafi Local Government Area were selected for this study based on their close proximity to the rivers that harbor snail intermediate hosts for schistosomes. Most of the inhabitants come into contact with the river at least twice a day for various reasons such as, fishing,

bathing, washing, irrigation farming, collecting water for domestic uses etc. This is due to lack of basic infrastructures such as portable water, health care units, etc, within the communities. Even the few boreholes and hand pumps available in some parts are none functional due to lack of maintenance. Poor infrastructural facilities coupled with high level of illiteracy, make most of the populace defecate and urinate indiscriminately in public places, that consequently, resulted in higher degree of contamination of water sources with excrete and urine. In Shinkafi Local Government Area of Zamfara state, there is an insufficient knowledge of the factors that are associated with transmission of Schistosomiasis. Poor sanitary habits, lack of basic care and portable water, frequent contact with infested water, etc all gave rises to chances of Schistosomiasis infection. Available literature indicated that there has never been a comprehensive research work on schistosomiasis in Shinkafi Local Government Area of Zamfara State, hence the status of the disease is not known in the area. Due to the public health importance of the disease and the need to control it, there is need to have a picture of the disease in the area. It was in line of the above that this study was conducted to determine the prevalence of urinary schistosomiasis in the study area. The results obtain is expected to provide useful information for the treatment and control measures of the disease in the study area.

## MATERIALS AND METHODS

### Study Area

The study was conducted within Shinkafi Local Government Area (LGA) of Zamfara State. It shares boundaries with Isa Local Government Area of Sokoto State and Niger Republic from the north, Zurmi Local Government Area to the South and South-East, Maradun Local Government Area and Raba Local Government Area of Sokoto State by the west (Shinkafi, 2017). The LGA lies between Latitude 13°04'22.66" - 13.072960N and longitude 6°30'20.66" - 6.505740E and occupied a total land area of 674km<sup>2</sup> with the population of 159,560 (Nysczamfaranews, 2016; NPCN, 2011; Latitude, 2019). The climatic condition of the area is tropically warm with temperature rising up to 38 °C (100.4 °F) and above between March to May. Rainy season starts in late May to September while the cold season known as Harmattan lasts from December to February (Cometonigeria, 2016). Two villages (Shanawa and Badarawa) were purposely selected for the study due to their proximity to the rivers. Majority of the inhabitants are Hausa and Fulani, their major occupation is farming and livestock production. However, there are few other ethnic groups in the area.

### Collection of Urine Samples

Two hundred (200) urine samples, (100 from each village) were randomly collected from the volunteers among the villages. The volunteers comprised people of both sexes and at all ages, the urine samples were collected between 10 am – 12noon. Each person was given a sterile plastic screw capped 30ml universal bottle to provide the terminal urine. Each bottle was

labeled to correspond to the number of the subject's questionnaire in order to provide information on the village name, sex, age and other relevant information. After collection, the urine samples were preserved by adding two drops of 1% v/v domestic bleach (sodium hypochloride) solution, as described by Ladan *et al.* (2011). The samples were then transported to the Parasitology Laboratory of the Department of Biological Sciences, Usmanu Danfodiyo University, Sokoto for analysis.

### Analysis of Urine Samples

The two hundred urine samples collected were processed using the standard filtration techniques as described by WHO, (1991) and Bello *et al.* (2003). The method involved the use of vacuum-pump filtration machine (millipore corporation Bedford, Massachuse 01730 USA) coupled to a filtration unit; Whartman No. 1 filter paper (5.5 cm diameter) was inserted into the filtration unit. 10ml of the urine sample was thoroughly mixed and then withdrawn with a 10ml syringe from the sample bottle and then transferred into the filtration unit of the machine. The machine was switched on to drain the urine through the filter paper by suction. The filter paper was removed carefully by the use of pair of blunt ended forceps, and placed on a clean sheet of paper and stained with saturated ninhydrin solution. Drops of iodine solution were added to enhance staining. The filter paper was left for 3 hours at room temperature to dry and for the eggs to pick up the stain (Bello *et al.*, 2003). After three (3) hours the filter paper was placed on a clean- glass slide and examined under the light microscope, using x10 objective. Terminal spine eggs, characteristics of *S. haematobium* were counted for each positive sample. All the urine samples were treated in the same way.

### Statistical Analysis

The data obtained was analysed using descriptive statistics. Prevalence of infection was calculated using

the formula: 
$$\frac{\text{Total No. infected}}{\text{Total No. examined}} \times 100$$
, while

intensity of the infection was calculated as: 
$$\frac{\text{Total No. of eggs counted}}{\text{Total No. infected}}$$

Association between infection and Local Government Areas, gender and age of the people were determined using Chi-square test. *P*-value less than 0.05 were considered significant for association. Tables were drawn to show the prevalence and intensity of the infections.

## RESULTS

Out of 200 urine samples examined for urinary schistosomiasis, an overall infection prevalence of 48.5% was obtained in the study area. However, Shanawa village was found to have the highest prevalence of 58.0% than Badarawa with 39.0% of infection. With regard to mean intensity of the infection, an overall mean intensity of 87.0 eggs/10ml of urine was recorded in this study. Badarawa also recorded the highest mean intensity of 132.2 eggs/10ml of urine. A chi-square analysis showed no significant (*P*<0.05) association between infection and the study villages (Table 1).

Gender specific prevalence of infection indicated the highest prevalence of 49.3% and mean intensity of 88.4 eggs/10ml of urine, than in the female counterparts with 46.6% and mean intensity of 86.5 eggs/10ml of urine. No significant ( $P<0.05$ ) association existed between infection and gender of the people (Table 2). Schistosomiasis infection with respect to age of the people revealed that persons within the age bracket 1-10 years had the highest prevalence of 66.7%, followed

by 11-20 years with 55.6%, 21-30 years with 46.5%, and the least of 34.4% was obtained in 31> years. However, Chi-square analysis indicated a significant ( $P<0.05$ ) association between infection and age of the people. The highest mean intensity of infection was recorded in age bracket 11- 20 years with 103.2 eggs/10ml of urine, followed by 1-10 years with 94.5 eggs/10ml, 21-30 years with 75.1 eggs/10ml, and least of 67.1 eggs/10ml was recorded in 31 > years (Table 3).

**Table 1:** Prevalence and Intensity of Urinary Schistosomiasis in Two Selected Communities of Shinkafi LGA

Community	No. Examined	No. Infected	Prevalence (%)	Mean egg count/10ml (intensity)
Shanawa	100	58	58.0	132.2
Badarawa	100	39	39.0	19.9
Total	200	97	48.5	87.0

$$\chi^2=3.722; df=1; P<0.05$$

**Table 2:** Prevalence and Intensity of Urinary Schistosomiasis with Respect to Gender of the People

Gender	No. Examined	No. Infected	Prevalence (%)	Mean egg count/10ml (intensity)
Male	142	70	49.3	88.4
Female	58	27	46.6	86.5
Total	200	97	48.5	87.0

$$\chi^2=0.078; df=1; P<0.05$$

**Table 3:** Prevalence and Intensity of Urinary Schistosomiasis with Respect to Age of the People

Age	No. Examined	No. Infected	Prevalence (%)	Mean egg count/10ml (intensity)
1-10	42	28	66.7	94.5
11-20	45	25	55.6	103.2
21-30	71	33	46.5	75.1
31>	32	11	34.4	67.1
Total	200	97	48.5	87.0

$$\chi^2=53.894; df=4; P<0.0$$

## DISCUSSION

The results of this study indicated the presence of *Schistosoma haematobium* infection in the study area. The overall prevalence of 48.5% and mean intensity of 87.0 eggs/10ml of the urine obtained in this study seem to be lower than what was obtained by Adamu and Galadima (1998) who reported a prevalence of 50.9% in Bakolori, irrigation project area and that of Sam-Woboet *et al.* (2017) who discovered overall prevalence of 69.7% in Ogun State, Nigeria. This result was however, higher than what was obtained by Ladan *et al.* (2011) who reported a prevalence of 47% in selected villages near a dam site in Gusau Local Government Area, Zamfara State and that of Obadiah *et al.* (2018) who reported overall prevalence of 21.5% in some parts of Benue State, Nigeria.

The overall prevalence rate obtained in this study could be attributable to intense water contact activities of the people within the community, such as irrigation farming, fishing, bathing, swimming, playing and other domestic activities coupled with the ignorant about the implications of having body contact with any water from water bodies that are infested with fresh water snail vectors of schistosome parasites. Another

contributing factor may be the presence of schistosome infected individuals coupled with the habit of urinating and defecating indiscriminately on open land. This observations agreed with that of other studies conducted elsewhere by Adamu and Galadima, (1998); Agi and Okafor, (2005); Pukuma and Musa, (2007); Ezeet *et al.* (2010) and Obadiah *et al.* (2018).

The variation found in the prevalence and intensity of the infection among the villages examined could be attributed to the fact that people living in Shanawa largely depend on the river as their water source while those of Badarawa use other sources like wells and available boreholes in addition to the river. This indicated that Badarawa people have less contact with river as compared to those living in Shanawa who must visit the river for one reason or the other. Therefore, differences in exposure and duration of contact with infested water that each village has might play an important role in the prevalence and intensity of infection with schistosome parasites within the communities. These observations are in line with that made by Abolarinwa, (1999); Ugbomoiko, (2000); Akinboyeet *et al.* (2011); Hassan *et al.* (2012) and Nwelet *et al.* (2017).

The high prevalence of infection observed in males than in females may be connected with the belief and socio cultural set up of the people within the study area. According to religion and culture of these communities majority of the females are confined to their respective household, they are therefore, not expected to participate in many outdoor activities compared to their males counterparts, talk less of going to the nearest water bodies for playing, bathing, washing, swimming, farming, fishing as such they have less contact with infested water compared to their male counterparts. These observations are in line with that of Nanvya *et al.* (2010); Ladan *et al.* (2011); Bala *et al.* (2012) and Nwele *et al.* (2017).

The present study indicated that the prevalence of infection is decreasing with an increase in age of the people. The fact that persons aged 1-10 years had the highest prevalence of infection is not surprising as these persons fall within the school age group (mostly primary) and in the villages this is the population most commonly found in prolonged water contact activities like bathing, swimming and playing in water bodies like; ponds, rivers etc, and such type of waters are likely to be infested with infected snails. According to Anosike *et al.* (2001) in every endemic areas children are the most infected group of people that contributes significantly to the potential contamination of aquatic environment. This finding is in accordance with that of Ugbomoiko, (2000). The highest mean intensity recovered in age bracket 11-20 years may be attributed to increased worm burden and the high fecundity rate of schistosome parasites while its decreased in the older individuals may be due to the possible development of concomitant immunity against the parasite. High level of awareness on the cause and implication of schistosomiasis also played an important role in reducing the infection among the adults. Similar observations were made by Bala *et al.* (2012) and Umar *et al.* (2014).

The outcome of this study has shown that urinary schistosomiasis is present in Shanawa and Badarawa villages of Shinkafi Local Government Area, Zamfara state, Nigeria and could constitute a great source of socio-economic problem if not stemmed on time. The risk of future complication is high. Prompt intervention in the study area and further investigation to identify other possible foci of transmission has become necessary. Treatment of infected person and health education are suggested as the first attempt of intervention. Long term integrated control measures aimed primarily at improving water supply, house sanitary condition and health facilities to the community are advocated. Governments, Non Governmental Organizations and concern individuals are encourage to pay more attention and devotion to eradicate the disease.

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