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Full Length Research Article

Studies on Urinary Schistosomiasis in Selected Villages around Gusau Dam Site, Zamfara State, Nigeria

***[1]M.U Ladan, [1]U. Abubakar, [1]K. Abdullahi, [1]M.D.A. Bunza, [2]M.J. Ladan, and [1]T. Adamu**
[1]Department of Biological Sciences, Usmanu Danfodiyo University, Sokoto, Nigeria
[2]Department of Biochemistry, Usmanu Danfodiyo University, Sokoto, Nigeria
[Corresponding author: e-mail: lmuawiyyaumar@yahoo.co.uk; ☏: +234 (0) 8069615151]

ABSTRACT: A study on urinary schistosomiasis was conducted to determine its prevalence and intensity in five villages around Gusau Dam, Gusau Local Government Area, Zamfara state. A total of five hundred (500) urine samples were examined for the eggs of *Schistosoma haematobium* using standard filtration technique. The overall prevalence was 47%. However, the highest prevalence (65.47%) of the infection was recorded in Bokawa. The mean egg count for the whole study area was 237.94 eggs/10ml of urine. Koramar Gora had comparatively high mean egg count of 330.46 eggs/10ml, than other villages. Prevalence of the infection based on the sources of drinking water has indicated that, those persons who use river (60.00%), pond (50.37%) and dam (46.15%), respectively as their sources of water had higher prevalence than those who use well (38.05%), borehole (19.35%) and others (18.75%) who use tap and packaged water, at Gusau (capital city) during their business. However, a highly significant association ($x^2 = 36.571$; *df*=5; P<0.01) was found between prevalence of infection and source of drinking water. This study revealed that, the study area is endemic for urinary schistosomiasis and there is therefore, the need for government intervention to effectively control the disease in the area.
Keywords: Urinary, *S. haematobium,* Inhabitants, Gusau, Dam Site

INTRODUCTION

Schistosomiasis is a wide spread parasitic infection caused by blood flukes of the genus *Schistosoma* and transmitted by specific fresh water snails (Agi and Okafor, 2005). Urinary schistosomiasis (bilharziasis) was discovered by German Pathologist Theodore Bilharz in 1851 (Enersen, 2010). The disease, caused by trematode *S. haematobium,* is water based parasitic disease transmitted by fresh water-snails of the genus *Bulinus* (Pukuma and Musa, 2007). The disease is caused mainly by three blood flukes (trematodes). *Schistosoma mansoni,* which causes intestinal schistosomiasis, is widespread in Africa, and occurs in the Arabia peninsula, South America (Brazil, Venezuela and Suriname) and the Caribbean (including Puerto Rico but not Cuba (Tierney *et al.,* 2005). Vesicular (urinary) schistosomiasis, caused by *Schistosoma haematobium*, is found throughout the Middle East and Africa (WHO, 1990). According to Tierney *et al.* (2005), Asian intestinal schistosomiasis, due to *Schistosoma japonicum*, is important in China and the Philippines, and a small focus is present in Sulawesi, Indonesia, but transmission in Japan has been interrupted. A number of *Schistosome* species of animals sometimes infect humans, including *Schistosoma intercalatum* in central Africa and *Schistosoma mekongi* in the Mekong delta in Thailand, Cambodia and Laos (Butterworth, 1997). Schistosomiasis affects more than 200 million persons worldwide, half of whom are in Africa. It induces severe consequences in 20 million persons annually, resulting in up to 200,000 deaths, and about 120 million people are symptomatic (WHO, 1998; Tierney *et al*., 2005; The Carter Center, 2010). It has been estimated that 600 million people are at risk of infection (Mutapi *et al*., 2006). Human infection of schistosomiasis, occurs through direct penetration of the unbroken skin by cercaria which invade the circulatory system (WHO, 1996). According to Robert (1992), within 24 hours of the infection cercarial dermatitis may occur at the site of cercarial penetration. Patients frequently suffer from abdominal pain, fever, malaise, urticaria, bloody diarrhea, myalgia, dry cough etc. The severity of the disease alerted the Federal Ministry of Health to establish the National Expert Committee for surveillance of urinary schistosomiasis in August 1988, in order to determine the prevalence of disease rapidly to enable the government to develop feasible control strategies (Uko *et al*., 1993). Although the occurrence of urinary schistosomiasis in Nigeria has been documented in several areas, its distribution remains inadequately understood (Uwaezuoke *et al*., 2007). This is because the National Programme for its control has not been sustained due to some factors including the non-recognition by the great majority of the population of the public health importance of the disease, and lack of political will by the policy makers to invest in control (Nale *et al*., 2003).

Furthermore, there is dearth of information on the transmission of this disease and its concomitant morbidity in some parts of Northern Nigeria, especially in the rural areas of Zamfara State, where most families are engaged in subsistent farming and fresh water fishing. They also depend on rivers, ponds and wells for other water related activities. Peoples` behavior of defecation and urinating in and around water bodies contaminate the rivers and ponds. It is in this light, that this study was carried out to determine the prevalence of urinary schistosomiasis in some selected villages around Gusau dam. Since there has never been any comprehensive study on schistosomiasis in these communities, this will provide baseline data which would form the basis for a control programme in the area.

The major objective of the study is to determine the prevalence of urinary schistosomiasis and the intensity of its infection in terms of egg count/10ml of urine with respect to the sources of drinking water in the study area.

MATERIALS AND METHODS

Study Area

Gusau Local Government Area of Zamfara State is located between latitude 11^{0}53'N and longitude 06^{0}39'E, and occupies an area of 3,364km^2 (1,298.8sq ml) (Topographic-sheet, 1990). Based on the results of 2006 National Population Census Gusau Local Government had a population of about 383,162 people (NPC, 2006; Gusau, 2010).

The hottest months in the area are March and April that is just before the onset of the first rains. The onset of the rains tends to bring a cooling effect with temperatures dropping below 36^{0}C. The peak of the rainy season is from July to September except towards the end of October/November when the tropical continental air masses from the Sahara predominate which leads to lower temperatures of around 17^{o}C–20^{o}C. The mean annual rainfall in the area was 990mm. The type of vegetation in this area is the Northern Guinea savannah (Mamman *et al*., 2000).

Five settlements were randomly selected from Mayana district area of Gusau Local Government for the study, the settlements are Bokawa (12^{o}06'12"N; 6^{o}14'20"E), Dokau (12^{o}05'40"N; 6^{o}41'00"E), Gidan Malamai (12^{o}06'51"N; 6^{o}41'18"E), Gidan Musa (12^{o}05'30"N; 6^{o}40'08"E) and Gidan Alu (12^{o}05'00"N; 6^{o}41'00"E). These settlements are close to Gusau Dam. Bokawa is 0.25km to a river, Dokau is 0.40km to a water course, Gidan Malamai is 0.25km to a river, Gidan Musa and Gidan Alu are 0.60km and 0.40km to water courses respectively (Topographic-sheet, 1990).

The major preoccupation of the communities is farming. In addition, public servants, traders, fishermen, and artisans inhabit the villages. Hausa and Fulani are the main ethnic groups of the area. Their customs and cultures are similar. Their water sources for domestic and agricultural uses are rivers, ponds, and open wells. The few bore-holes available in some parts are non functional due to lack of maintenance. There is general lack of basic health and sanitary infrastructure such as health care unit, potable water, etc, in the area. High level of illiteracy among the communities give rise to dirty habits such as defecating and urinating indiscriminately in public places.

Study Population

After obtaining a prior permission from the village heads, and Health Department of the Local Government, the consent of the subjects was sought. Five hundred individuals were randomly selected from five villages for the study. Participation was entirely voluntary and the people were made aware of the study and its benefits through health education.

Cluster sampling techniques as described by Kreycie and Morgan (1970) and Baba (2005) was employed in random selection of 84 subjects from Bokawa, 117 from Dokau, 81 from Gidan Alu, 106 from Gidan Malamai and 112 from Gidan Musa.

Urine Sample Collection and Questionnaire Administration

This study was conducted from February 2009 to March 2010. Each subject was given a 30ml sterile plastic screw-capped bottle to provide terminal urine between 10:00am and 2.00pm. Each bottle was labelled to correspond to the number of subject`s questionnaire. A questionnaire was administered to each subject that provided the urine, in order to provide information on their village name, sex, age, occupation, type of drinking water, water contact activity, type of toilet used, perception about the disease, and disease treatment practice. The urine samples were preserved by adding two drops of 1% v/v domestic bleach (sodium hypochloride) solution, as described by (Adamu and Galadima, 1998; Bello *et al.,* 2003). It was then transported to the Parasitology Laboratory of the Department of Biological Sciences, Usmanu Danfodiyo University, Sokoto, for analysis.

Urine Analysis

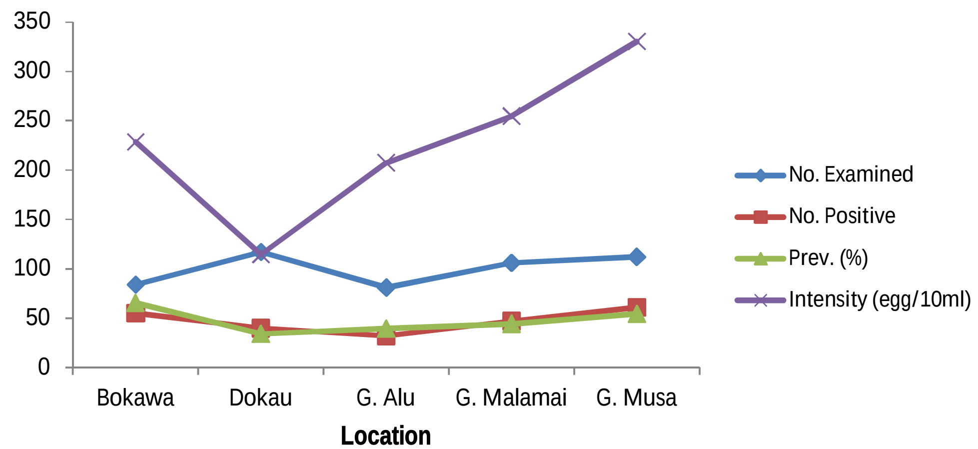
The five hundred urine samples collected were processed using the standard filtration technique as described by WHO (1991) and Bello *et al.* (2003). The method involved the use of vacuum-pump filtration machine (millipore corporation Bedford, Massachuse 01730 USA) coupled to a filtration unit; Whatman 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 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 also added to enhance staining. The filter paper was left for 3 hours at room temperature 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. The result was expressed as eggs/10ml of urine. All the urine samples were treated in the same way.

Analysis of Data

The data obtained was analysed using descriptive statistics and Chi-square analysis was used to compare the differences. However, line graphs were drawn to show the prevalence and intensity of the infection.

RESULTS

Out of the 500 urine samples examined for urinary schistosomiasis, 235 (47.0%) were found to be infected with mean intensity of 237.94 eggs/10ml of urine. However, the prevalence and intensity of the infection varied among the villages. Bokawa had the highest prevalence of 55(65.5%), followed by Gidan Musa with 61(54.46%), Gidan Malamai with 47(44.3%), Gidan Alu with 32(39.5%), and Dokau had the least prevalence of 40(34.18%). A Chi-square analysis showed significant association (x^2 = 13.086; *df*=4; P<0.05) in prevalence of infection among the villages. The highest mean intensity of 330.46 eggs/10ml of urine was recorded in Gidan Musa, followed by Gidan Malamai with 254.66 eggs/10ml, Bokawa with 228.69 eggs/10ml, Gidan Alu with 207.46 eggs/10ml and Dokau with the least mean intensity of 114.30 eggs/10ml of urine (Figure 1).

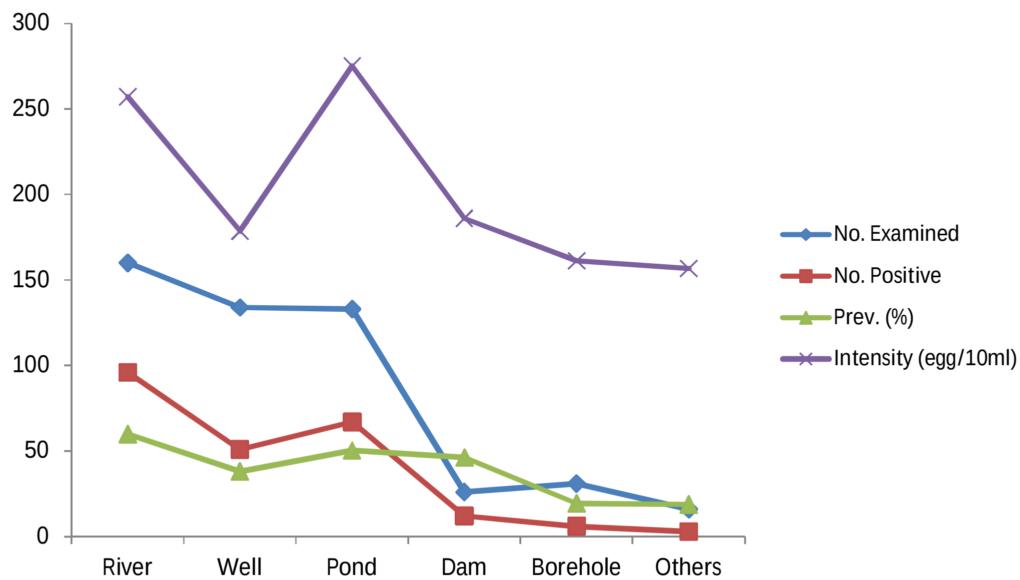


x^2 =13.086; *df*=4; P<0.05

Figure 1: Prevalence and Intensity of Urinary Schistosomiasis in the Study Areas

KEY: G. Alu = Gidan Alu, G. Malamai = Gidan Malamai G. Musa = Gidan Musa.

The prevalence of infection based on the sources of drinking water was found most prevalent in persons who use rivers 96(60.0%), followed by users of ponds 67(50.4%), dams 12(46.2%), wells 51(38.1%), boreholes 6(19.4%). The least infection 3(18.8%) was recorded in the group termed 'others' who use tap water and commercial package waters. A highly significant association (x^2 = 36.571; *df*=5; P<0.01) was found between prevalence of infection and source of drinking water. With regard to mean intensity of infection, 275.49 eggs/10ml of urine was found to be highest in persons who use ponds as their source of water supply, followed by those who use rivers 257.07 eggs/10ml, those who use dam has 186.00 eggs/10ml. Those who use wells have 178.62 eggs/10ml and those who use boreholes have intensity of 161.16 eggs/10ml. The least intensity of 156.66 eggs/10ml was recorded in those termed 'others' (Figure 2).



x^2 = 36.571; *df*=5; P<0.01

Figure 2: Prevalence and Intensity of Urinary Schistosomiasis with Respect to Source of Drinking Water

DISCUSSION

The results of this study show that the study area is endemic with urinary schistosomiasis. The prevalence of (47%) and intensity (237.94 eggs /10ml) is attributable to intense water contact activities in the area. This observation is in line with that of other researchers such as Adamu and Galadima (1998); Agi and Okafor (2005) and Pukuma and Musa (2007), who conducted researches in the Bakalori irrigation project area of Zamfara State, Odau community in the Niger Delta and in Lamurde Local Government Area of Adamawa State respectively. The study areas are rural communities, who depend on the river, ponds, wells, and dam for their water needs such as farming (irrigation), fishing, bathing and other domestic uses. Most of these water bodies are the main transmission foci in the community and are distributed within the area, they provide natural water sources and also serve as nidus for the schistosome parasites and snail intermediate host where people interacts for their various activities. These ensure that the people continue to be infested and re-infested since no intervention strategy has been carried out in the area. However, 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 Bokawa and Gidan Musa depend on the rivers as their water sources, Gidan Malamai depend on the pond with few people on wells for their daily uses, Gidan Alu depend on pond and wells, whereby Dokau has wells as their source of water supply. This observation is in line with that of other research works conducted in Esie community of Kwara state, by Abolarinwa (1999) and in Edo state by Ugbomoiko (2000).

The high infection noticed among people who depend largely on rivers (60%), ponds (50.37%) and dams (46.15%) as water sources, could be attributable to the preference shown by the snail hosts for slow flowing rivers, or stagnant bodies of water. A similar conclusion had been made by Okwoli (1993). Provision of safe drinking waters from borehole, tap, well, etc, has been recommended for the control of schistosomiasis (WHO, 2010). The high prevalence was also observed in people who used water from boreholes, wells, etc, in their villages and those people who used tap water and commercially packaged waters when they are at Gusau (capital city) during the day time for their business. The infection found in this group may be attributed to other contact activities with infested water in their villages.

From the result obtained, it could be concluded that the study area is endemic for schistosomiasis. It is obvious that ignorance play a vital role in the spread of the infection in the study area. As such there is the need for Federal, State, Local Government and Non Governmental Organisations to provide adequate control measures in the area to reduce or prevent transmission of schistosomiasis.

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