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PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS IN ABARMA VILLAGE, GUSAU, NIGERIA: A PRELIMINARY INVESTIGATION

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ABSTRACT
A study was conducted to determine the prevalence and intensity of urinary schistosomiasis in Abarma district of Gusau Local Government Area of Zamfara State, Nigeria. A total of 400 urine samples were collected and analyzed for the eggs of *Schistosoma haematobium* using the standard filtration technique out of which 296 (74.0%) were found to be infected. The mean egg intensity of infection was 77.63 eggs/10ml of urine. The infection rate was higher among males 81.7% than the females 68.6%, although the difference was not statistically significant ($p > 0.05$). The males had higher mean egg intensity of 139.36 eggs/10ml of urine compared to the females with 38.16%eggs/10ml of urine. The highest infection was recorded in the age group 10-19 years, with 86.8% and egg mean intensity of 102.7 eggs/10ml of urine while the least infection rate occurred within the 30-39 years and 50-59 years age groups, with 55.0 and 50.0 eggs/10ml of urine respectively indicating infection to be age specific ($p < 0.05$). Statistical analysis indicated the infection to be higher in lower age group ($p < 0.05$). With respect to occupation, students were the highest infected (87.65%), followed by farmers (85.7%), traders (75.0%), housewives (58.7%) and civil servants (12.5%). Prolonged contact with water was a factor aiding infection as the people engaged in farming had the highest infection rate of 100.0% while those that went to the river to fetch water had the least infection rate of 52.7%. Those that went to the river for fishing had the highest mean egg intensity of 112.18 eggs/10ml of urine, while the least mean egg intensity occurred among those that engaged in swimming with 32.13 eggs/10ml of urine. These findings indicate that the area is endemic to urinary schistosomiasis and therefore prompt intervention in the study area is needed.

Key words: Prevalence, intensity, *S. haematobium*, Abarma district, Gusau, Nigeria.

INTRODUCTION

Schistosomiasis is a chronic and debilitating disease caused by digenetic Trematode flatworms (flukes) of the genus *Schistosoma* (Noble & Glem, 1982). It is one of the most common parasitic infections in the world (Gracio *et al.,* 1992), ranking second to only malaria in terms of its socio-economic and public health importance in tropical and subtropical areas (Ogbe, 2002). It is also the most prevalent of the waterborne diseases and one of the greatest risks to health in rural areas of developing countries (Ogbe, 2002).

Infection occurs through contact with water infested with the free swimming larval stages of parasitic worms (cercariae) that penetrate the skin and develop in the human body to maturity. Parasite eggs leave the human body with urine or excreta. They hatch in freshwater and infect the appropriate aquatic snail intermediate hosts. *Bulinus* snails are intermediate host for *S. haematobium* (Ukoli, 1984). Within the snails they develop into cercariae, which are, in turn, released into the water to infect new human hosts. Transmission can take place in almost any type of habitat from large lakes or rivers to small seasonal ponds or streams (WHO, 2002). In urinary Schistosomiasis, the worms live in the blood vessels of the bladder. Only about a half of the eggs are excreted in the urine. The rest stay in the body, damaging other vital organs. It is the eggs and not the worm itself which cause damage to the intestines, the bladder and other organs (Banerjee & Agrawal, 1992).

The disease occurs in 74 countries in Africa, South America and Asia, with an estimated 200 million people infected, 85 percent live in sub-Saharan Africa, and at least 600 million are at risk of infection (WHO, 1993). Recent estimates from sub-Saharan Africa indicate that 280,000 deaths per year can be attributed to Schistosomiasis (van der Werf *et al.*, 2003).

In Nigeria, Schistosomiasis due to *S. haematobium* is widespread, constituting a public health problem particularly in children (Sulyman *et al*., 2009 Fana *et al*., 2009 & Akinboye *et al*., 2011). The distribution of the disease is focal, aggregated and usually related to water resources and development schemes such as irrigation projects, rice/fish farming and dams. It occurs in all the states of the federation, with a high infection rate among school children (Mafe *et al.,* 2000; Okpala *et al.,* 2004).

There are reports of Bilharziasis in Zamfara State (Adamu *et al*., 2001; Ladan *et al*., 2011), but none in Abarma village in Gusau Local Government Area of Zamfara State, Nigeria, where the inhabitants that predominantly farmers, traders and civil servants rely on one river for their daily water needs. This study is design to investigate the prevalence and intensity of urinary Schistosomiasis among the inhabitants of Abarma village. It is our hope that findings from this study will inform control managers on the status of the infection in the study area.

MATERIALS AND METHODS

Study Area: Abarma village in Gusau Local Government Area of Zamfara State is located in North western part of Nigeria (latitude $11^{0}53$ N and longitude $06^{0}39$ E) and occupies an area of approximately 3,364 km^2. In 2006 population census, Gusau was estimated to have approximately 383,162 persons. Out of this, Abarma village as a district in Gusau Local Government had an estimated population of approximately 3,500 (NPC, 2006). Gusau is in the southern part of Zamfara State. The mean annual rainfall in the area is about 990 mm and the vegetation type is Northern guinea savannah.

The Abarma village is a heterogeneous environment made of mainly Hausa community as their major tribe. Their major occupations are farming, trading as well as civil service. No health centre is located in the village. The inhabitants rely on and draw water from bore hole and a river, which is running water from Tsafe and drainages from Gusau Local Government.. The drawn water from the river is usually used by the inhabitants of Abarma for cooking, drinking, washing, bathing, Irrigation among others.

Sample Collection: Consent for this study was obtained from the village head, Health Centre Gusau and also willing participants. Four hundred (400) urine samples were randomly collected from the inhabitants of Abarma village of Gusau Local Government Area of Zamfara State, Nigeria. Collection was made between 11am and 12noon. Each person was given a clean plastic screw capped 30 ml universal bottle to be labelled to correspond to the number of subject questionnaire. A questionnaire was administered to each person

that provided urine in order to provide information on their sex, age, occupation and water contact activity. Each urine sample was preserved by adding 5 drops of 1% vv domestic bleach (Sodium Chloride). The urine samples were then transported to Parasitological Laboratory of the Department of Biological Sciences, Usmanu Danfodio University Sokoto for analysis.

Sample Analysis: The samples were analyzed using filtration technique, as described by WHO (1991). The filtration was achieved by the use of vacuum-pump filtration machine (Millipore Cooperation Bedford, Massachusset 01730, USA). Terminal spine eggs, characteristics of *S. haematobium*, were counted for each positive sample and the result was expressed as eggs/10ml of urine to represent the intensity.

Data Analysis: All the data obtained was analyzed using SPSS version 12. The relationship between the prevalence and intensity of the disease and various parameters obtained from the questionnaires such as village name, age, sex, occupation, and water contact activity of the respondents were analyzed. Chi-square and correlation analysis were used to compare the parameters. P value less than 0.05 were considered significant.

RESULTS

Out of 400 urine samples examined for *S. haematobium* eggs, 296 (74.0%) were found to be infected with mean intensity of 77.63 eggs /10ml of urine.

The sex specific prevalence showed that males had the highest infection rate of 81.7% while females had 68.6% prevalence, although statistical analysis indicated no significant difference between the sexes ($p > 0.05$). On the other hand, egg intensity correlated with sex with males being heavily infected, mean egg intensity of 183.28 eggs/10ml of urine while females had an intensity of 38.60 eggs/10ml of urine (Table 1).

TABLE 1. PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS WITH RESPECT TO GENDER

Sex	No examined	No +ve	Prevalence %	Mean Intensity
Male	164	132	81.7	139.36
Female	236	164	68.6	38.16
Total	400	296	74.0	77.63

Statistical analysis indicated the infection to be age specific ($p < 0.05$). The age group 10-19 years had the highest prevalence (86.8%) followed by 40-49 years (80.0%), then 0-9 years with 77.3%. The least prevalence of 50.0% occurred within the 50-59 years age group. Similarly, highest egg mean intensity of 102.71 eggs/10ml of urine was observed within 10-19 years age group while the least occurred within 30-39 years age group with 12.22 eggs/10ml of urine (Table 2). Statistical analysis indicated an inverse correlation between age group and the intensity of infection ($r = - 0.181$).

Occupational related prevalence showed that students were the highest infected (87.7%), followed by farmers (85.7%), traders (75.0%), housewives (58.7%) and civil servants (12.5%). Statistical analysis revealed a significant difference ($p< 0.05$) between civil servants and the other occupational groups but none between other groups ($p > 0.05$). The highest mean egg intensity was observed among the students (105.13 eggs/10ml of urine) while civil servants had least intensity (24.00 eggs/10ml of urine) (Table 4). The difference in mean egg intensity between occupational groups was significant ($p < 0.05$).

TABLE 2. PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS WITH RESPECT TO AGE GROUPS

Age	No examined	No +ve	Prevalence %	Mean Intensity
0-9	176	136	77.3	88.04
10-19	106	92	86.8	102.71
20-29	68	38	55.9	39.50
30-39	36	20	55.6	12.22
40-49	10	8	80.0	27.00
50-59	4	2	50.0	15.00
Total	400	296	74.0	77.63

TABLE 3. PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS WITH RESPECT TO OCCUPATION

Occupation	No examined	No +ve	Prevalence %	Mean Intensity
Students	162	142	87.7	105.13
Housewives	126	74	58.7	28.61
Traders	40	30	75.0	51.33
Farmers	56	48	85.7	75.41
Civil servants	16	2	12.5	24.00
Total	400	296	74.0	77.63

With respect to water contact activities the results showed a 100.0% prevalence observed in people who engaged in farming activities, followed by 90.0% for those people who engaged in fishing, then those that went to the river for washing 89.1%, bathing activities with prevalence rate of 85.7%, swimming 81.8%, drinking 67.0% and then finally 52.7% for those that went to the river to fetch water. Statistical analysis showed significant difference ($p< 0.05$) through the water contact activities. Those that went to the river for fishing had the highest mean egg intensity of 112.18 eggs/10ml of urine while the least intensity occurred among those that went to fetch water with 37.67 eggs/10ml of urine (Table 4). Mean egg intensity correlated with water contact activity ($r = 0.366$).

TABLE 4. PREVALENCE AND INTENSITY OF URINARY SCHISTOSOMIASIS WITH RESPECT TO WATER CONTACT ACTIVITIES

Occupation	No examined	No +ve	Prevalence %	Mean Intensity
Washing	55	49	89.1	83.97
Drinking	97	65	67.0	51.66
Fetching	110	58	52.7	37.67
Swimming	33	27	81.8	32.13
Bathing	49	42	85.7	90.91
Farming	44	44	100.0	93.17
Fishing	12	11	90.00	112.18
Total	400	296	74.00	77.63

DISCUSSION

The overall prevalence (74%) recorded in the study population is higher than what was reported in Zamfara State by earlier workers. Adamu & Galadima (1998) reported a prevalence of 50.9% in Bakolori, irrigation project area while Ladan *et al.,* (2011) reported a prevalence of 47% in selected villages near a dam site in Gusau Local Government Area, Zamfara State.

It appears that urinary schistosomiasis is particularly common in this area. It is possible that the prevalence recorded in the present study was an under-estimate of the true value, given that it was based on the results of the examination of just one urine sample per subject (WHO, 2002). The high rate of prevalence of urinary schistosomiasis in the study area reflects the higher level of exposure and dependence of the inhabitants of Abarma district on

the infected river. The mean egg output of 77.63/10ml urine observed in this study seem to be far lower than the 309.06 eggs/10ml urine reported by Ladan *et al.,* (2011) in Gusau, (same State where the present study was conducted) as well as the 114.2eggs/10ml urine reported by Ugbomoiko *et al.,* (2010) in two communities of Osogbo, Osun, Nigeria. However it conforms to the 73.93 eggs/10ml urine observed by Kanwai *et al*., (2011) in sedentary fulani settlements of Dumbi, Igabi LGA, Kaduna State, Nigeria. Majority of the infected subjects of the present study harboured moderate to heavy egg loads. This result clearly points to intense transmission and probability of high levels of morbidity. As put forward by King (2010), that severe urinary schistosomiasis adversely affects human performance, reduces physical and intellectual functions, and may cause renal dysfunction, bladder-outlet obstruction, bladder cancer and infertility.

In the present study both males and females are equally at risk of getting infected, as shown by lack of any significant difference between the sexes, contrary to the observations of Ugbomoiko *et al.* (2010) in Osun, Ladan *et al*., (2011) in Gusau and Nanvya *et al*., (2011) in Ndinjor district of Langtang North, Plateau State who reported significant association of urinary schistosomiasis with gender. The previous workers reported that females were less likely to be infected because of social restriction to water contact activities like swimming, bathing, fishing and farming. On the other hand, the lack of significant difference, observed in the present study, between the sexes was in conformity to the report of Abubakar *et al*., (2006) in Sokoto and Akinboye *et al*., (2011) in Ibadan, who found both sexes to be equally at risk. The observed non-difference between the sexes in the present study could be due to involvement of females in some water contact activities.

Egg intensity strongly correlated with gender, with the males being more heavily infected than females. This could be due to intense water contact activities by the males, as they may engage in all the water contact activities such as washing, drinking, swimming, fetching, farming, fishing among others.

In the present study, both prevalence and intensity of infection appeared to be intimately associated with age. Young adults and the elderly were less likely to be infected (and less likely to be heavily infected) than children of school-age. Similar trends have been recorded before in endemic settings, in Nigeria and elsewhere in Africa (Chandiwana *et al*., 1988; Amankwa *et al*., 1994; Ofoezie *et al*., 1997, 1998; Okoli & Odaibo, 1999; Aryeetey *et al*., 2000; Okoli & Iwuala, 2004; Yapi *et al*., 2005; Rudge *et al*., 2008). The fact that the school age group (10-19 years) had the highest prevalence and more heavily infected is not surprising. This is because it is this same population that is most commonly found in prolonged contact with water bodies for various reasons. The other age groups were either too young (0- 9 years) to be actively involved in water contact activities or too old (20 years +) for it. The high excretion of egg by the 10 – 19 years age bracket may also be attributed to increased worm burden and the high fecundity rate of schistosome parasites. The decreased egg output in the older/elderly individuals may be due to the possible development of concomitant immunity common to schistosomiasis.

Based on the occupation, civil servants were the least infected and are the group with the lowest egg output. This may be due to engagement in activities that expose them to less contact with cercariea infected water than the other occupations. Among the occupational groups, students and farmers were the most parasitized and heavily infected, probably indicative of their frequency of going to the river.

Specific activities carried out on the river, indicated the farmers and fishermen and those that go to the river to wash, bath and swim had the highest prevalence and egg output. This is not surprising because of the level of exposure and duration of contact to the source of infection, the river. Their different activities may probably make them to be intimately in contact with the river for longer periods of time, hence the heavy egg output and high rate of infection. Similar observations were reported by Udonsi (1990) and Akinboye *et al*., (2011), that water contact activities and traditional agricultural practices are factors which contribute to the transmission of the disease.

In conclusion, the present research found a high prevalence of urinary schistosomiasis in Abarma district Gusau, Zamfara State Nigeria. Infection was equal among sexes but different with age, occupation and water contact activity. Mean egg intensity of 77.63 egg/10ml urine was observed in the study area. Intensity of the disease associated with sex, age, occupation and water contact activity. Therefore, there is need for Gusau Local Government Chairman and Zamfara State Government to educate the inhabitants of Abarma Village on urinary schistosomiais and other related diseases and to mount successful control interventions in this area.

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