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Prevalence and Intensity of *Schistosoma haematobium* among Residents of Gwong and Kabong in Jos North Local Government Area, Plateau State, Nigeria

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Abstract: Schistosomiasis which causes a great pathological effects in human especially during teenage years is still a major public health problem with deepen economic consequences particularly in endemic areas. This study was conducted to determine the level of *Schistosoma haematobium* infection among the residence of Gwong and Kabong areas, Plateau State. A total of two hundred and forty two urine samples were examined for *S. haematobium* ova using the Sedimentation Method. Of all the samples examined, 5 (2.07%) all from Gwong area were infected. Male had a high prevalence and mean intensity of ova compared with female. Infection was observed only in age groups 10-14 and 35-39 years. The prevalence was highest among those that obtained water from rivers/stream than in those who used well water while there was no infection among those that obtained water from borehole. The study showed that there was no significant difference ($p>0.05$) between infection and the study area, sex, age and occupation. However, there was a significant ($p<0.05$) relation between the infection and the source of water. Though there was low prevalence and intensity of *S. haematobium* in the study areas, there is need to intensified integrated control measures to reduce or completely eradicate the disease.

Key words: *Schistosoma haematobium*, prevalence, intensity, Gwong/Kabong, Jos, Nigeria

INTRODUCTION

Schistosomiasis (bilharzias or snail fever) is a human disease syndrome caused by infection from one of several species of parasitic trematodes (fluke) of the genus *Schistosoma*. It is second only to malaria in human impact among tropical diseases and the third (after malaria and intestinal helminthiasis) most devastating prevalent parasitic disease in the world, being a major source of morbidity and mortality for developing countries in Africa, South America, the Caribbean, the middle East and Asia.

According to WHO, >207 million people, 85% who live in Africa are infected with schistosomiasis and estimated 700 million people are at risk of infection in 76 countries where the disease is considered endemic as their agricultural work, domestic chores and recreational activities expose them to infested water. Despite the complications that may occur, mortality appears to be low in that with 200 million cases, there are an estimated 14,000 deaths per year. *Schistosoma haematobium* causes urinary schstosomiasis which results in substantial pathological effects in the bladder, ureter and kidney of infected individuals (Poggensee *et al*., 1999) and appendicitis (Doudier *et al*., 2004). Arinola and Salimonu (2003) reported that the untreated urinary schistosomiasis subject serum factor is inhibitory to leucocyte bactericidal activity by stimulatory to inflammation. Percentage migratory index of leucocytes from apparently health subjects was reduced in the presence of pooled untreated urinary schistosomiasis subjects' serum.

Low prevalence 14 (6.4%) infection of *Schistosoma haematobium* was reported out of 218 school children before treatment with praziquantel tablets in Langai community, Mangu LGA, Plateau State (Banwat *et al*., 2011). Joseph *et al*. (2010) reported an incidence of 110 (14.5%) out of 744 pupils from 10 different primary schools in Maiduguri metropolitan council while Ekpo *et al*. (2010) reported a higher prevalence 97 (58.1%) of urinary schistosomiasis among 167 preschool children in a rural community near Abeokuta, Nigeria.

The increase in dams, reservoirs and other irrigation systems created by the Ministry of Agriculture and water resources through their water projects further increase the epidemiological factors. The present study was

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conducted to determine the current status of urinary schistosomiasis among the residents of Gwong and Kabong communities in Jos North LGA, Plateau State, Nigeria.

MATERIALS AND METHODS

Study area: The study was conducted in Jos, Plateau State, Nigeria. Plateau State is located in the Northern Guinea Savanna vegetation belt covering 8600 km^2 with an average altitude of 1280 m. It lies between latitude 9°55'07"N and longitude 8°53'54" E. The climate is the semi-temperate with temperatures ranging from 18°C (64.4°F) to 25°C (77.0°F). The city of Jos receives about 1,400 mm (55.1 in) of rainfall annually (http://en.wikipedia.org/wiki/Jos_Plateau). The study was carried out in Gwong and Kabong districts of Jos North Local Government Area of Plateau State, Nigeria. There are rivers and streams in the study sites. Laminga dam is located some kilometers away from Gwong where the people had contact with water for recreational activities. The residents of the study sites were farmers, students, civil servants, house wives and traders.

Ethical clearance/study subjects: Before the commencement of the study consent was obtained from the traditional heads of the areas. An official ethical clearance was obtained from the Our Lady of Apostle (OLA) hospital Jos and Primary Health Care (PHC) clinics Nabor Gwong where the samples were collected. People of the communities' were contacted through the assistant of the health workers, community and religious leaders and enlightened on the importance of the study. Volunteers in Kabong area were told to go to OLA hospital while those in Gwong to PHC clinics Nabor where their urine samples were collected. Information related to age, sex, occupation, source of water supply was obtained from each subjects. A total of 242 comprising of 74 males and 164 subjects age 0 to >50 years were used in the study.

Collection of urine samples: Urine samples were collected in May and June 2008 between 10 a.m. and 1 p.m. corresponding to the period of maximum egg output in urine. A clean dry screw capped specimen bottle was given to each subject on the day of collection to avoid specimens outside the specified period. The bottles were labeled with corresponding numbers so the result would not be exchanged.

Subjects were instructed to include the last drops of urine as these were known to contain the highest number of eggs (Cheesbrough, 1987). The samples were taken to the laboratory, Department of Zoology or OLA hospital for examination.

Examination of urine: The sedimentation method described by Olusegun *et al*. (2011) was used. Each urine sample was thoroughly mixed after which a 10 mL aliquot was transferred into a centrifuge tube and spun at 5000 rpm for 5 min. The supernatant was decanted while a drop of the sediment was placed on a clean grease free slide and covered with a cover slip after which it was examined under the microscope using the x10 and x40 objectives. The number of eggs were counted and recorded as eggs/10 mL/urine.

Statistical analysis: Data obtained were analyzed using χ^2-test where $p<0.05$ was considered significant.

RESULTS

Of the 242 subjects examined, 5 (2.07%) were infected with *Schistosoma haematabuim* (Table 1). From the two areas, subjects from Gwong had the prevalence of 3.94% while there was no infection in subjects from Kabong. There was no significant difference ($p>0.05$) in the prevalence of urinary schistosomiasis between the two communities. Out of the five infected, 3 (3.85%) were male while 2 (1.22%) were females (Table 2).

Statistical analysis showed that there was no significant difference ($p>0.05$) in the prevalence of infection between males and females. The infection was showed in age group 10-14 and 35-39 (Table 3) with almost similar percentage infection (4.88 and 4.17, respectively).

The intensity was higher in age 10-14 with mean of 28.25±6.34 ova/10 mL while low quantity of 26 ova/10 mL was observed in the only infected person of age 35-39. There was no significant difference ($p>0.05$) in the prevalence of infection according to age groups. The prevalence of infection in relation to occupation showed that student had the highest 4 (3.70%) infection followed by house wives 1 (2.17%) (Table 4). However, there was no significant difference ($p>0.05$) in the

Table 1: Prevalence of *Schistosoma haematobium* among the inhabitants of the study areas

Study area	Number examined	Number infected	Percentage infection
Gwong	127	5	3.94
Kabong	115	0	0.00
Total	242	5	2.07

Cal. = 3.819; Tab. at df 1 = 3.841; $p>0.05$

Table 2: *Schistosoma haematobium* infection among the inhabitants in relation to sex

Sex	Number examined	Number (%) infected	Mean egg count/ 10 mL±SEM
Female	164	2 (1.22)	21.5±4.50
Male	78	3 (3.85)	32.0±7.23
Total	242	5 (2.07)	27.8±4.93

Cal. = 1.713; Tab. at df 1 = 3.841; $p>0.05$; SEM = Standard Error of the Mean

Table 3: Prevalence *Schistosoma haematobium* among the inhabitants according to age

Age group in years	Number examined	Number (%) infected	Mean egg count/ 10 mL±SEM
0-4	0	0	0
5-9	0	0	0
10-14	82	4 (4.88)	28.25±6.34
15-19	16	0	0
20-24	12	0	0
25-29	42	0	0
30-34	39	0	0
35-39	24	1 (4.17)	26±00
40-44	11	0	0
45-49	14	0	0
50 and above	02	0	0
Total	242	5 (2.07)	27.8±4.93

Cal. = 6.296; Tab. at df 10 = 18.307; p>0.05; SEM = Standard Error of the Mean

Table 4: *Schistosoma haematobium* infection in relation to occupation

Occupation	Number examined	Number (%) infected	Mean egg count/ 10 mL±SEM
Civil servant	20	0	0
Farmer	11	0	0
House wives	46	1 (2.17)	26±0
Student	108	4 (3.7)	28.25±6.34
Trader (Business)	57	0	0
Total	242	5 (2.07)	27.8±4.93

Cal. = 3.17; Tab. at df 4 = 9.488; p>0.05; SEM = Standard Error of the Mean

Table 5: Prevalence of *Schistosoma haematobium* in relation to source of water

Source of water	Number examined	Number (%) infected	Mean egg count/ 10 mL±SEM
Borehole/ tap	14	0	0
River/ stream	66	4 (6.06)	28.25±6.34
Well	162	1 (0.62)	26±0
Total	242	5 (2.07)	27.8±4.93

Cal. = 6.73; Tab. at df 2 = 5.991; p<0.05; SEM = Standard Error of the Mean

infection of *S. haematobium* between the occupational groups. The infection according to sources of water is shown in Table 5. A higher prevalence was observed among subjects that obtained their water from the streams 4 (6.06%) followed by those that used well water 1 (0.62%) while there was no infection among those that obtained water from bore hole. There was a significant difference (p<0.05) between *S. haematobium* infection and sources of water.

DISCUSSION

The low prevalence of 2.07% of *Schistosoma haematobium* observed in this study conforms to the 0.33% reported by Okpala *et al.* (2004) among pupils in Apata and Laranto areas in Jos. Akinboye *et al.* (2011) reported 5.5% of urinary schistosomiasis among secondary schools students in Ibadan. Banwat *et al.* (2011) reported a prevalence of 6.4% in school children in Langai community, Mangu LGA of Plateau State. The low prevalence of *S. haematobium* in this study is not consistent with Ekpo *et al.* (2010) who reported 58.1% prevalence among preschool children in a community near Abeokuta. Similarly Ugbomoiko *et al.* (2010) reported a prevalence of 62% in two peri-urban communities in South-Western Nigeria. Biu *et al.* (2009) reported a prevalence of 24.3% infection among school children in Konduga LGA, North Eastern Nigeria. The low prevalence of *S. heamatobium* observed in this study could probably be attributed to reduction in water contact activities which could have resulted from the availability of alternative sources of water and other recreational sites such as playgrounds. The low prevalence might be an indication of the level of awareness about the disease in the study areas. Health education is a very effective means of improving knowledge about urinary schistosomiasis and has the potential to reduce the prevalence of the disease (Jamda *et al.*, 2007).

The prevalence of 2.07% observed in Gwong compared with the 0% infection in Kabong could be attributed to closeness to open water sources and also being out-skirts of the city where some residents still disposed their stool indiscriminately. This agrees with Kapito-Tembo *et al.* (2009) who reported higher infection (14.4%) in rural areas compared to the urban areas (3.6%) in Blantyre, Malawi and also that the location and proximity of school to open water source amongst other risk factors were significantly associated with urinary schistosomiasis infection. Subjects who live close to the bodies of water or irrigation canals were more exposed and therefore more vulnerable to *S. heamatobium* infections than these who lived further from the water (Ugbomoiko *et al.*, 2010; Abdullahi *et al.*, 2011).

The insignificantly higher prevalence and intensity of *S. haematobium* in male than female is consistent with Biu *et al.* (2009), Ugbomoiko *et al.* (2010) and Banwat *et al.* (2011). Deribe *et al.* (2011) reported a significantly high prevalence in males 61.7% compared with females 52.1% among Alsofia and Abuselala communities in South Darfur State, South Western region of North Sudan. However, it varies with Ekpo *et al.* (2010), Nkegbe (2010) who separately reported insignificantly higher prevalence in female than male. The highest mean egg count recorded in male than female is consistent with Adeoye *et al.* (2008) who reported low level of infection of <50 eggs/10 m in 73.8% of school children in Ibadan, Oyo-State, Nigeria. Ombugadu (2011) reported a highest mean egg count of 38.6 eggs/10 mL in male than 18.2 eggs/10 mL in female. The mean intensity of eggs count in this study is at variance with Abubakar *et al.* (2006) who reported higher intensity of 13.5 eggs/10 mL in female than 11.3 eggs/10 mL observed in male. The higher prevalence and intensity observed among male compared with females could be attributed to the diverse outdoors activities engaged by males which exposed them to cercariae infected water. The high prevalence among the age group 10-14 years in this study agrees with the finding of Dakul *et al.* (2001) who reported the highest prevalence 65.8% among the age group 10-14 years in Lankaku-Namu district, Quan'an pan LGA, Plateau State. Sarkinfada *et al.* (2009) reported the highest prevalence of 57.4% in age group 10-14 in Danjarima community, kumbotso LGA, Kano State while no infection was observed in age group 35-39 years which varies with 4.17% observed among age group 35-39 years in the study.

Joseph *et al.* (2010) and Akinboye *et al.* (2011) in their separate research reported higher prevalence of 15.0% in Maiduguri and 12.5% in Ibadan, respectively among school children of age group 12-15 years. However, this result does not agree with Okoli *et al.* (2006) who reported the highest prevalence of 22.2% in the 21-30 years age cohort in Ohaji/Egbema LGAs Imo state, Nigeria. In another study, Ombugadu (2001) reported the peak prevalence of 40.2 and 28.6% in male and female, respectively between the age group of 21-25 years. The high prevalence and intensity in the age group 10-14 might be due to higher water contact activities of the boys and those within age group 10-14 years during outside activities such as errands, washing and bathing/swimming.

The prevalence and intensity observed among school children and house wives could be attributed to frequent water contact since these groups engage in activities that involve frequent contact with water. The high prevalence of *S. haematobium* in school children recorded in this study agrees with Nmorsi *et al.* (2005) who reported 73.1% infection among school children in Ikpeshi Akoko-Edo LGA, Edo State. Ombugadu (2011) reported highest prevalence of 22% among those that engage in fishing followed by farmers and student with 19.5 and 16.3%, respectively among Udege community, Nasarawa LGA, Nasarawa State, Nigeria. This result opposed Olusegun *et al.* (2011) who reported the highest prevalence of 0.70% in artisan while there was no infection among students and house life in HIV-positive patients attended the University of Benin Teaching Hospital Benin City Edo State, Nigeria. A high prevalence of 65 and 38.9% in fishermen and civil servant, respectively was reported among school pupils in shelleng town, Adamawa State, Nigeria (Pukuma *et al.*, 2006).

The high prevalence among those who obtained water from river/stream followed by well is in agreement with Okpala *et al.* (2004) who reported 2.23 and 0.52% infection among school pupils who had their water from river/stream and well, respectively. This contradicts Olusegun *et al.* (2011) who observed that all the 0.33% out of 2000 HIV-positive patients who infected with urinary schistosomiasis had their water from bore hole.

The high prevalence among those that used river/stream and well could be attributed to the openness of this water to sources of contamination. Some of the well were not always covered and children mostly seen fetching it without standard hygiene.

CONCLUSION

In this study there was low prevalence of schistosomiasis in the study area compared with studies in other areas. However, there should be constant surveillance of the disease to reduce if not possible to completely eliminate it. Safe drinking water and recreational activities should be provided in communities to reduce the rate of contact with infected water. Health education should be carried out in schools, community and other public gatherings to enlighten those that have not known and to remind those that might have forgotten about the epidemiology of the disease.

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