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A Study on the Epidemiology of Urinary Schistosomiasis in Shongom Local Government Area, Gombe State-Nigeria

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Abstract:
This study was carried out to determine the prevalence of Urinary Schistosomiasis in Shongom LGA, Gombe State between July and November 2013. Six hundred urine samples were examined microscopically for Schistosoma haematobium eggs using the sedimentation method. The overall result showed (27.3%) prevalence of infection in the study area. Kulishin ward had the highest (40.2%) infection rate and Kushi ward had the least (19.6%) for males. Bangunji ward had the highest (30.2%) infection rate and Kushi ward had the lowest (5.5%) infection rate for females. Infection rate in relation to Gender showed that males (32.3%) were more infected than their females (16.6%) counterparts. There was significant difference between infection and gender ($p < 0.05$). High infection rate (38.4%) was observed in age groups 12-17 years old and 42-above had no infection. There was significant difference between infection and Age groups ($p < 0.05$). The high prevalence (40.8%) in age group 12-17 years and (33.3%) in 18-23 years was found in males and females respectively. Kulishin ward had high (37%) infection rate while Kushi ward had the least (17.0%) infection rate and there was a significant difference between infection and Ward ($p < 0.05$). Students were the most infected (40.0%) and civil servant had no infection. There was significant difference between infection and the peoples' Occupation ($p < 0.05$). The prevalence was highest (37.0%) among those that people that used water from Dam/stream/borehole, the least (25.3%) infection was those that used stream/borehole. There was significant difference between infection and sources of water supply ($p < 0.05$). There was high prevalence urinary Schistosomiasis among the study subjects in the study area. For this reason, there is need for integrated control measures such as snails, hygiene and mass drug administration to reduce the effect of the disease.

Keywords: *Urinary Schistosomiasis, Shongom, Gombe, Nigeria.*

1. Introduction

Schistosomiasis is a chronic water-borne parasitic disease caused by blood flukes (trematode worms) of the genus *Schistosoma*. It is also called Bilharziasis [named after a German Pathologist, Theodore Bilharzia who first identified the parasite in Egypt in 1851 (WHO, 2001)]. The disease is second to malaria as a health problem in Africa. Over 243 million people in 78 countries and territories in the world are affected by the disease, occurring mostly in the tropical and subtropical areas, especially in poor communities without access to safe drinking water and adequate sanitation. It is estimated that at least 90% of those requiring treatment for Schistosomiasis live in Africa (WHO, 2013). It is a rural disease but can also be found in the urban area due to rural-urban migration. The disease is the most prevalent of the water-borne parasitic diseases and one of the greatest risks to health in rural areas of developing countries. Human become infected by the penetration of the larval stage, cercaria, through the unbroken skin. Schistosomiasis in Africa is a very serious public health problem and it is endemic in Nigeria with an estimated 11 million Nigerians infected (WHO, 2009). There is no work done on the epidemiology and prevalence of urinary schistosomiasis in Shongom Local Government Area, Gombe state. Therefore, it is based on this background that this study was designed to determine the prevalence of urinary schistosomiasis among the inhabitants of Shongom LGA.

2. Methodology

2.1. Description of the Study Area

Shongom is a Local Government Area of Gombe State, Nigeria. Its headquarters are in the town of Boh in the North of the local government area. It is one of the 11 Local Government Areas of the state located in the southern part of the between latitudes 10^0 39" North, 90^0 East and 11^0 13" West. It is part of the Sahelian region and has an area 922km^2.

The Local Government Area has 10 wards namely: Bangunji, Boh, Burak, Filiya, Gundale, Gwandum, Kulishin, Kushi, Lalaipido, and Lapan. The settlement and population is separated from each other by farmlands and several streams which are mostly close to settlements. The study area, perhaps represents a rain bow coalition of many tribes with Tangale being the dominant tribe, others are Pero people and Chonge (Kushi, Burak, Bangunji) then, Fulani herdsmen and Igbo traders forming the minority.

The relief of the area provides uplands, hills and mountains that give rise to streams and the vegetation is that of savannah. It occupies a fertile land which receives much rainfall and they use the land for growing of sorghum, Maize, rice, cotton, cassava, okra and vegetables. There are many streams, ponds and few earth dams for domestic, recreational and agricultural purposes mostly in the dry season. Most of the inhabitants go to the streams that overflow their banks during the rainy season though some may dry up in the dry season, ponds and dams, especially children and teenagers to wade, swim and for fishing purposes, of which large proportion of these children become infected and re-infected (Cheesebrough, 2005).

The climate of area is close to sub-tropical with the monthly temperature ranging 20^0C and 32^0C and a relative humidity of 10% to 45%. The annual rainfall is about 80mm to 727mm. The rainy season starts from April to October and the dry season from November to March. Rainfall is very high in August and September; the dry, cold and dusty harmattan usually starts from November to February.

2.2. Preliminary Survey

The prevalence of urinary Schistosomiasis was determined by selecting 5 villages in each of the 6 wards and 20 people randomly cutting across all ages, giving a total number of 600 samples. With the co-operation of village heads, opinion and group leaders, the aim of the study was explained to the people in detail (WHO, 1993). This was to seek and obtain their consents. Mode and sources of transmission, effect and control measures of the disease was emphasized to them. At the beginning of the study consent was obtained from the District heads of the study area. An official ethical clearance was obtained from General Hospital Kaltungo and the Primary Health Care Department, Shongom Local Government Area.

2.3. Laboratory Analysis and Microscopic Examination.

Twenty millilitres of the urine sample collected from each person was allowed to stand for 30 minutes for Schistosome eggs to settle to the bottom of the plastic containers by ordinary sedimentation method (Olusegun *et al.*, 2011). The supernatant was gently decanted until almost 10 millilitres was left. The 10 millilitres was mixed and turned inside a clean centrifuge tube, and centrifuged at 500-1000 revolution per minute for 5 minutes. The supernatant was gently decanted off to leave only the deposits. Using a clean Pasteur pipette, a drop of the sediment was placed on a clean grease-free microscope slide and a cover slip was gently lowered on it, avoiding air bubbles. Then, it was viewed under ×10 and ×40 microscope objectives respectively, for the characteristics terminal spine of *Schistosoma haematobium* eggs (Cheesebrough, 2005).

3. Results

The result of this study shows that out of the 600 urine samples examined from six (6) wards in Shongom LGA, Gombe State, the overall number of people infected with *Schistosoma haematobium* eggs was 164 (27.3%).

Overall distribution of urinary Schistosomiasis among the wards (Table 1) indicates that Kulishin ward 37 (40.2%) had the highest infection rate while Kushi ward 16 (19.6%) was found to be the least infected for males. Bangunji ward 13 (30.2%) were more infected and Kushi ward 1(5.3%) had the least infection rate for females.

Table 2 shows the prevalence of infections in relation to gender, which indicated that 132 (32.3%) were males while 32(16.8%) were females and there was a significant difference in infection between sexes ($p<0.05$) .

The highest prevalence rate of infection was recorded among subjects belonging to ages 12-17, 68 (38.4%) years old, while the least rate of infection was observed in those within age bracket 30-35, 4(13.3%) years old (Table 3). Others were 6-11 years old with prevalence rate 61 (22.5%), 18-23 years old had the prevalence infection rate 22 (31.9%), 24-29 years old had 7 (22.6%) 36-41 years old with 2(22.2%). Age group 42- above had no infection. Statistical analysis shows that there was significant difference in infection between age group ($p <0.05$) (Appendix II). The distribution of age group and gender among inhabitants of the study area shows that high infection rate (40.8%) was found in age group 12-17 years old and (16.6%) in age group 6-11 years old in males and females respectively (Table 4).

Table 5 shows the prevalence of *Schistosoma haematobium* in the urine samples amongst the six wards; in each ward one hundred (100) urine samples were examined. Kulishin ward 37 (37.0%) had the highest prevalence rate of infection, followed by Gwandum ward 31 (31.0%) prevalence rate, Bangunji ward had 30 (30.0%), Burak ward had the prevalence rate 26 (26.0%), while Lapan ward had prevalence infection rate 23 (23.0%). Kushi ward had the least infection rate 17 (17.0%). Chi square analysis shows that there was significant difference in infection between the wards ($p<0.05$)

Distribution of urinary Schistosomiasis by occupation, revealed that Students 54 (40.0%) were the most affected followed by Unemployed 7 (35.0%) while Farmers 10 (17.2%) had the least infection rate. Civil servants had no infection (Table 6) Chi square analysis shows that there was significant difference between infection and the peoples' occupation ($p < 0.05$)

Table 7 shows that the prevalence of infection in relation to sources of water supply in the study area. Those that used Dam/stream/borehole had the highest infection rate, 37 (37.0%) followed by those that used Stream/borehole 26 (26.0%) while those who used Pond/stream/borehole as their source of water supply had the lowest infection 101 (25.3%). There was a significant difference in infection between sources of water supply ($p < 0.05$)

Gender	Wards											
	Burak		Bangunji		Kushi		Lapan		Kulishin		Gwandum	
	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected
Male	42	14(33.3)	57	17(29.8)	81	16(19.8)	67	18(26.9)	92	37(40.2)	70	28(40.0)
Female	58	12(20.7)	43	13(30.2)	19	1(5.3)	33	5(15.2)	8	0	30	3(10.0)
Total	**100**	**26**	**100**	**30**	**100**	**17**	**100**	**23**	**100**	**37**	**100**	**31**

Table 1: Gender-Related Urinary Schistosomiasis among Study Subjects in the Study Wards.

Gender	Number Examined	Number (%) Infected	Number(%)not Infected
Male	409	132(32.3)	277(67.8)
Female	191	32(16.8)	159(83.3)
Total	**600**	**164(27.33)**	**436(72.67)**

Table 2: Prevalence of Urinary Schistosomiasis in relation to Gender.

Age group	Number Examined	Number (%) Infected	Number(%)not Infected
6 – 11	271	61(22.5)	210(77.5)
12 – 17	177	68(38.4)	109(61.6)
18 – 23	69	22(31.9)	47(68.1)
24 – 29	31	7(22.6)	24(77.4)
30 – 35	30	4(13.3)	26(86.7)
36 – 41	9	2(22.2)	7(77.8)
42 – above	13	0	13(1.00)
Total	**600**	**164(27.33)**	**436(72.67)**

Table 3: Distribution of Urinary Schistosomiasis among Study Subjects in relation to Age groups.

Age group	Male		Female	
	Number Examined	Number (%) Infected	Number Examined	Number (%) Infected
6 – 11	169	45 (26.6)	99	16 (16.2)
12 – 17	147	60 (40.8)	36	4 (11.1)
18 – 23	45	15 (33.3)	23	7 (30.4)
24 – 29	19	4 (21.1)	12	4 (33.3)
30 – 35	14	0	16	3 (18.8)
36 – 41	9	2 (22.2)	2	0
42- above	6	0	3	0
Total	**409**	**130**	**191**	**34**

Table 4: Age group and Gender distribution of Urinary Schistosomiasis in the Study Area.

Ward	Number Examined	Number (%) Infected	Number (%) not Infected
Burak	100	26(26.0)	74(74.0)
Bangunji	100	30(30.0)	70(70.0)
Kushi	100	17(17.0)	83(83.0)
Lapan	100	23(23.0)	77(77.0)
Kulishin	100	37(37.0)	63(63.0)
Gwandum	100	31(31.0)	69(69.0)
Total	**600**	**164(27.33)**	**436(72.67)**

Table 5: Urinary Schistosomiasis among Wards in the Study Area.

Occupation	Number Examined	Number (%) Infected	Number (%) not Infected
Farmer	58	10(17.2)	48(82.6)
Civil servant	3	0	3(1.0)
Housewife	44	11(25.0)	33(75.0)
Student	135	54(40.0)	81(60.0)
Pupil	340	82(24.1)	258(75.9)
Unemployed	20	7(35.0)	13(65.0)
Total	**600**	**164(27.33)**	**437(72.67)**

Table 6: Urinary Schistosomiasis among Study Subjects in relation to occupation.

Source of Water supply	Number Examined	Number (%) Infected	Number (%) not Infected
Stream/Borehole	100	26(26.00)	74(74.00)
Stream/Pond/Borehole	400	101(25.25)	299(74.75)
Dam/Stream/Borehole	100	37(37.00)	63(63.00)
Total	**600**	**164(27.33)**	**436(72.67)**

Table 7: Urinary Schistosomiasis in relation to Sources of Water supply.

4. Discussion

The results of this survey showed urinary Schistosomiasis infection was prevalent in the study area with an overall prevalence of (27.3%) with males (32.3%) which were more infected than females (16.6%), this result agrees with Nale *et al.,* (2002) who reported a prevalence of 19.4% in male which was significantly highly than prevalence observed in females (3.11%). The high prevalence observed among males compared to females could be attributed to many outdoor activities engaged by males which exposed them to infected water.

The prevalence of the infection in difference wards despite the similarities of the local relief and climatic condition of the area where wards are located, which could be attributed to closeness or distance of the villages from water bodies that were infested with snail intermediate host (Okon *et. al.,* 2007). Subjects who live close to the bodies of water or irrigation canals were more exposed and therefore, more vulnerable to *Schistosoma haematobium* than those who lived further from the water (Ugbomoiko *et al.,* 2010, Abdullahi *et al.,* 2011) Kulishin ward had (37.0%) because of their closeness to a water reservoir, Gwandum ward had (31.0%), Bangunji ward had (30.0%), Burak ward had (26.0%), Lapan ward had (23.0%), Kushi ward which was the least had infection rate (17.0%).

The infections rate in the study area varied according to their ages, where age group 12-17 years had the highest infection rate (38.4%), followed by age group 18-23 years (31.9%). This might be attributed to frequent water contact since these age groups engaged in activities that involve frequent contact with water. Nnoruka (2000) reported in Mayo Belwa, Adamawa state a prevalence rate of *Schistosoma haematobium* in children between the range of 11-13 years among such age groups. In Zuru Kebbi state the

highest prevalence was among age group 11-15 years (Daniel, 2001). Joseph *et al.* 2010 and Akinboye *et al.,* (2011) in their separate works showed higher prevalence of 15.0% in Maiduguri and 12.5% in Ibadan, respectively among school children of age group 12-15 years. However , the result of this study agrees with Okoli *et al.,* (2006) who reported the highest prevalence of 22.2% in the 21-30 years cohort in Ohaji/Egbema LGAs, Imo state Nigeria. The high prevalence (40.8%) in age group 12-17 years and (33.32010%) in 24-29 years was found in males and females respectively, this result agrees with (Ombugadu (2001) who reported peak prevalence of 40.2 and 28.6% in male and female respectively between age group of 21-25 years.

The no infection rate in those aged 42-above could be probably that they were mature and cannot venture going near such water bodies. This agrees with Dawet *et al.,* (2012) who reported no infection among age groups 40 – above, the low prevalence in aged people may be due to progressive increase in the level of naturally acquired immunity against *Schistosoma haematobium* and less water contact (Agbolade and Oeiba, 1996). More so, people in such age group find alternative means of recreation as they mature and become more conscious of their social and reproductive development (Fajewanyomi and Afolabi, 1994). The study supports a number of previous reports that have consistently shown *Schistosoma haematobium* infection endemicity in Nigeria is on the increase particularly in the rural areas (Okoli *et al.,* 1999).

Occupation has influences on the prevalence of infection which Students had the highest peak of infection (40.0%), followed by Unemployed (35.0%), Housewives had prevalence rate (25.0%). This could be partly due to the constant exposure to contaminated water bodies in which they go out to wade and wash or some Students after school hours do go to their parents' farms and for the Unemployed engaged in self-sustaining works such as farming and fishing to earn a living, where they contact the disease. This does not agree with Olusegun *et al.,* (2011) who reported the highest prevalence of 0.70% in artisan while there was no infection among students and housewives in HIV-positive patients attending University of Benin Teaching Hospital, Benin city, Edo state Nigeria.

Civil servants had no infection in this study, this contradicts (Pukuma *et al.,* 2006) who reported a high prevalence 38.9% among civil servant in Shelleng town, Adamawa state. The non infection of Civil servants in this study could be associated with the fact that they neither go to farms nor go to ponds, streams for their domestic and recreational activities and may find an alternative means of recreation.

In this present study those that used Dam/stream/borehole (37.0%) were more infected, followed by those that used Stream/borehole (26.0%) as their sources of water supply, this could be that the subjects in the study area collected water from borehole for drinking and other domestic activities but engaged in water contact activities with infected water bodies which might probably exposed them to infection. Such water contact activities as reported by Chigozie *et al.,* (2007) as engagement in agricultural, recreational activities and fishing. This agrees with Olusegun *et al.,* (2011) who observed that all the 0.33% out of 2000 HIV-positive patients who were infected with urinary Schistosomiasis had their water from borehole.

5. Conclusion

In conclusion, this study has indicated high prevalence of urinary Schistosomiasis infection among people in the study area. Therefore, routine surveillance, diagnosis and treatment of the disease should be done by community-based Organisations to reduce the menace. The infection recorded could probably be due to reasons such as unhealthy environment, poverty, socio-cultural practices, lack of adequate health care facilities and ignorance. It has been observed that people in the study area were ignorant of the mode of transmission of this disease, improper sanitation increase contamination of the environment and so infecting host.

The overall number of people infected with *Schistosoma haematobium* ova was (27.3%) in this study area. The prevalence infection rate may be higher since it was only possible to obtain a single sample from each person, and very light infections might have been missed. Engels (1997) suggested duplicate samples on three or more days increase the chances of finding ova.

6. Recommendations

Prevention of urinary Schistosomiasis includes basically the destruction of intermediate snail hosts and infective stage (cercariae) with molluscicides (Nwagu, 1998) and larvicides respectively, and also by biological methods. The control of snail intermediate host would, in no doubt reduce the rate of transmission, thereby reduction in prevalence of infections.

Workshops, seminars and control campaign programmes should be organized to train village heads who in turn educate their subjects on the mode of transmission, control strategies and dangers of the disease. Health education is a very effective means of improving knowledge about urinary Schistosomiasis and has the potential to reduce the prevalence the disease (Jamda *et al.,* (2007)

Subjects in the study area should be educated by the Local government health workers on the proper means of waste disposal and construction of sanitary latrines in their homes so as to reduce the act of urinating in the open surroundings. The communities in the study area should embark on a monthly environmental sanitation.

There should be provision of recreational centre's in the communities to reduce the rate of contact with infected water, and village heads and opinion leaders should discourage on some of the socio-cultural practices (like urinating in the open surrounding and bathing in stagnant or slow moving water) that may expose them to infection.

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Annexure

Figure 1: Children and fishermen in slow-moving water body where they get infected with the disease
Source: Study Area