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PREVALENCE OF URINARY SCHISTOSOMIASIS IN COMBONI AND TOKLOKPO JUNIOR HIGH SCHOOLS (JHS) AT SOGAKOPE

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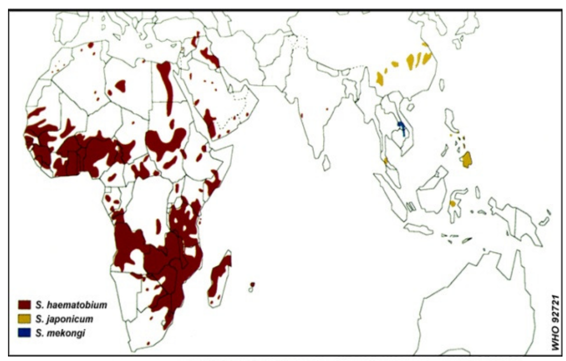
ABSTRACT
Schistosomiasis remains an important parasitic disease worldwide. The level of prevalence of schistosomiasis in the Sogakope district is essentially due to the frequent exposure of the inhabitants to water bodies such as the Lake Volta and other lakes. This research investigated the prevalence of schistosomiasis in Toklokpo (about two kilometres from the bank of the Volta River) and Comboni (situated along the bank of the river Volta) in the Sogakope district. A total of 150 samples of urine were taken: Seventy-five from Toklokpo JHS and 75 from Comboni JHS. Each of the 75 samples was selected randomly from boys and girls. The urine samples were processed by the centrifugal sedimentation technique. The total prevalence of urinary schistosomiasis in the study area was 26%. The prevalence rates of urinary schistosomiasis in the two schools were 12.6% and 13.3% for Comboni JHS and Toklokpo JHS respectively. The highest prevalence occurred in the males between 10-11 years age group. For both sexes, Toklokpo Junior High School recorded higher prevalence of the disease numerically .It is recommended that urgent measure is taken to curb the menace.

INTRODUCTION
Schistosomiasis is water borne disease, caused by a parasitic trematode worm. Infection with S. *mansoni,* S. *haematobium* and S *japonicum* cause illness in humans. Although schistosomiasis is not found in the United States, over 200 million people are infected worldwide (1)

Schistosomes belong to the kingdom Animalia, Phylum Platyhelminthes, Class Trematoda, Subclass Digenea, Order Strigeata, Family Schistosomatidae and Genus *S*chistosoma (2) .Members of this family are dioecious and parasitic in the blood vascular system of vertebrates. A general feature for the family is that, the mature female is more slender than the male and it is normally carried within a ventral groove called the gynaecophoric canal which is formed by ventrally flexed, lateral out growth of the male body (3)

Schistosomiasis has been recognized since the Egyptian Pharaohs. The worms responsible for the disease were eventually discovered in 1851 by Theodore Bilharz, working at the Kasrel-Aini hospital in Cairo. In a letter to Prof. Th. Von Siebold he describes his new discovery made during a post – mortem examination (4)

Fig 1 Distribution of schistosomiasis worldwide



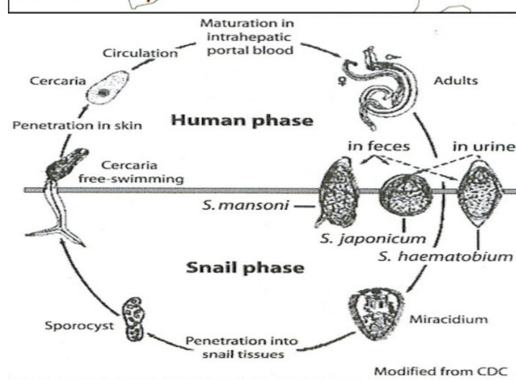


Fig 2: Life cycle of schistosomiasis (7)

Fi g 3 Snail intermediate host of S. haematobium, *Bulinus* species

Schistosome eggs have been recovered from both Chinese and Egyptian mummies showing that the infection was present in early civilizations of mankind. This was first noted as early as 1910 by Sir Armand Ruffer (4) who found calcified eggs in the kidneys of two mummies of the twentieth dynasty. It is estimated that about 200 million schistosomiasis cases occur in tropical countries every year (1) .Urinary schistosomiasis affects 66 million children throughout 54 countries. In some villages around Lake Volta in Ghana over 90% of the children are infected by the disease (4).

The main forms of human schistosomiasis are caused by five species of the flat worm or blood flukes, namely *S. mansoni*, *S. japonicum, S.mekongi* and *S.intercalatum* cause intestinal schistosomiasis *and* S. *haematobium* which causes urinary Schistosomiasis. The disease is transmitted by specific aquatic or amphibious snails (Family, Planorbidae) in a wide variety of fresh water habitats (5)
Schistosomes undergo an alternation of generations with sexual reproduction taking place in the The life cycle of this parasite involves many steps. Adult worms in humans reside in mesenteric venules in various locations which at times seem to be specific for each species. For instance, *S. mansoni* occurs more often in the superior mesenteric veins and *S. japonicum* more frequently in the inferior mesenteric veins so it is not possible to state equivocally that one species only occurs in one location. *Schistosoma haematobium* most often occurs in the venal plexus of the bladder, but it can also be found in the rectal venules. The females (size 7-20mm; males slightly smaller) deposit eggs in the small venules of the portal and perivesical system. The eggs are moved progressively toward the lumen of the intestine (*S. mansoni* and *S. japanicum*) and of the bladder and ureters (*S. haematobium*), and are eliminated with faeces and urine, respectively. Under optimal conditions the eggs hatch and release *cercariae,* which

It was noted by Sir Patrick Manson, Physician to the Seamen's Hospital in Greenwich, that the eggs passed in the urine from schistosomiasis patients all had a terminal spine, while only those found in the faeces had a lateral spine. He then went on to speculate that "possibly" there are two species of bilharzias, one with lateral spine ova and the other with a terminal spine (1)
Schistosoma *haematobium* is endemic in 54 countries, mainly in Africa and in the Eastern Mediterranean (1). It is also found in several Indian Ocean islands and small islands off the coast of East and West Africa (Fig. 1). In some areas the distribution of S. *haematobium* overlaps with S. *mansoni* causing double infections (1) *S. mansoni* is found in parts of South America and the Caribbean, Africa and the Middle East. *S. japonicum* is found in the far East. S. *mekongi* and S. *intercalatun* are found mainly in South East Asia and Central West Africa (1)

Life cycle

definitive host (man and other mammals) and asexual reproduction in the intermediate snail host (Fig. 2). swim and penetrate specific snail intermediate host. The stages in the snail include two generations of *sporocys*ts and the production of *cercariae.* Upon release from the snail, the infective cercariae swim, penetrate the skin of the human host, and migrate through several tissues and stages to their residence in the veins. Human contact with water is thus necessary for infection by schistosomiasis. Various animals serve as reservoirs for *S. japanicum*.

The snail host (Fig. 3) of *S. haematobium* belongs to the genus *Bulinus* species (8). . Schistosomiasis ranks among the major public health problems in the tropics and sub-tropics. The disease is caused by the parasite *Schistosoma*, a fluke with a lifecycle including man as the definitive host and a fresh water snail as the intermediate host. Two hundred million people are infected worldwide (1) The main forms of human schistosomiasis are caused by five species of the flat worm or blood fluke which is transmitted by specific aquatic or amphibious snails (Family, Planorbidae) in a wide variety of fresh water habitats (5).

In some endemic areas the rate of symptomatic infections are lower in females than in males (4). These may reflect lifestyle differences between male and female regarding the likelihood of bathing or drinking from contaminated streams or irrigation ditches (4)

In Ghana, previous studies show that people living along the banks of the Volta Lake are prone to schistosomiasis infection, since they depend on the water for their subsistence (4). Sogakope is a busy and important commercial town along the Volta Lake in the South Tongu District of the Volta Region. Toklokpo and Comboni are two suburbs both of Sogakope and are settlements along the Volta Lake. The aim of the study is to determine the prevalence of schistosomiasis infection in male and female students The specific objectives of the study were to:

1 Estimate the prevalence of *S. haematobium* in school children at Comboni and Toklokpo JHS.

The prevalence and severity of schistosoma infection vary with age. Children and adolescents are affected most often and are infected most heavily. Infections peak in individuals aged 10-19 years (4) In some areas, the prevalence in this group may approach 100 per cent. In a person older than 19 years, the prevalence of active larvae and egg counts slowly decline in populations living in endemic areas (2). These declines in active infection may reflect that individuals have an increasing host immune response or decreasing exposure to contaminated water as they age.

Toklokpo, is about three kilometres east of Comboni. Toklokpo has other sources of water such as stagnant water and waters from Lake Aka. Comboni however depends only the Volta lake. Though it is known that those living along the lake have a higher prevalence rate of the worm, no study has been done in the Sogakope District to ascertain the level of prevalence, this therefore calls for the study.

in Comboni and Toklokpo Junior High School at (JHS) Sogakope.

2 Determine differences in the prevalence rate between the schools with reference to their ages and sexes.

MATERIALS AND METHODS

Study Area

A field survey was carried out in two communities (Toklokpo and Comboni) both of Sogakope in the south Tongu district in the Volta region of Ghana. Both are settlements along the Volta Lake. Toklokpo, however, is about three kilometres eastward from the lake. The Volta lake supplies piped-borne water and supports irrigation and fishing activities of the two communities. The economic activities of both communities are mainly farming and fishing. The communities comprised mostly of Ewes. See fig 4

Fig 4 Study Communities

Collection and Analysis of Urine Specimen

Seventy-five boys and 75 girls between the ages of ten and nineteen years were randomly selected from each of the two schools. Urine samples were collected from each child by means of 600ml well labelled specimen bottles. Each urine specimen was collected between the hours of 11.00 and 14.00 GMT and taken to laboratory in Winchesters for analysis (10). To avoid the miracidia of schistosoma hatching from the eggs, the samples were kept in a dark container (7).

For each urine sample, reagent strip analysis (urine chemistry) was first performed to detect microhaematuria. An Ames urine test strip was dipped in each urine sample. Excess urine was drained off and the strip was left for 60 seconds after which colour reaction was compared with the standard. Results were recorded for glucose, blood, pH and protein.

After the urine chemistry, microscopy as described by (9) was carried out. The rest of the urine in the centrifuge tubes were taken through the process of sedimentation. The centrifuge tube was inverted to allow for the uniform mixing of the urine. Urine samples of the same volume were then centrifuged at 250rpm for 5minutes. After the centrifugation, urine deposits at the bottom of centrifuge tube were examined microscopically using the x10 objective for identification and x40 objective for detail view of ova objectives for the characteristic eggs. Infected students were marked as positive.

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The following materials are used for Collection and Analyses of Urine Specimen for Schistosoma haematobium ova

- A clean dry container of about 600 ml to collect urine sample from the school children
- Wax pencil and water proof black markers for labelling.
- A bag to carry empty container to the field.
- Winchesters to transport urine samples from the field to the laboratory
- Disposable latex gloves for protection against infection
- Laboratory coat also for protection against infection and other external agents
- Centrifuge, D-78532 (Heltich Tultlingen) for centrifuging and concentration of schistosoma ova
- Microscope (Olympus CH_3O) with 10X and 40X objectives for observation of schistosoma ova
- Pasteur Pipette for pipetting samples
- Work Sheets for record keeping
- Microscope slide (76mmX26mm) for sample preparation and observation
- Microscope Cover slips (22mmX22mm) for observation
- Test tube racks for holding test tubes.

Prevalence of infection

Analysis of results obtained from laboratory, diagnosis involved the determination of prevalence and intensity of *S. haematobium* infection. The prevalence of infection refers to the proportion of subjects who are infected at a point in time and this is usually expressed as a percentage. In calculating the prevalence of infection among the students, the formula below was used according (1); $\Pr evalance = \frac{Number\ of\ subjects\ testing\ positive}{Number\ of\ subjects\ investigat\ ed} \times 100$

Table 1 Prevalence of urinary schistosomiasis by age and sex in Comboni JHS

	NUMBER EXAMINED			NUMBER WITH OVA			%PREVALENCE		
Age/yr	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
10-11	0	0	0	0	0	0	0	0	0
12-13	8	12	20	2	1	3	25	8.3	15.0
14-15	16	16	32	1	2	3	6.3	12.5	9.4
16-17	9	6	15	1	1	2	11.1	16.7	13.3
18-19	5	3	8	0	0	0	0	0	0.0
Total	38	37	75	4	4	8	10.5	10.8	10.7

RESULTS

Total Prevalence

The total prevalence of urinary schistosomiasis in the study area was 26%. Figure 5 below represents the percentage prevalence of schistosomiasis infection by ages and sexes in Comboni and Toklokpo Junior Secondary Schools. The prevalence rates of urinary schistosomiasis in the two schools were 12.6% and 13.3% for Comboni JHS and Toklokpo JHS respectively. The highest prevalence occurred in the males between 10-11 years age group.

Prevalence at Comboni and Toklokpo Junior Secondary Schools.

Figure 6 shows the percentage prevalence of urinary schistosomiasis in Comboni and Toklokpo Junior High Schools. For both sexes, Toklokpo Junior High School recorded a higher numerical prevalence of the disease. Males between 10-11 year group of Toklokpo Junior High School recorded the highest prevalence. There was at least one male positive in all the age groups for Toklokpo Junior High School. Though numerically, prevalence rate is higher in Toklokpo than Comboni, the difference is statistically insignificant. See tables below.

Table 2 Prevalence of urinary schistosomiasis by age and sex in Toklokpo J.H.S

	NUMBER EXAMINED			NUMBER WITH OVA			%PREVALENCE		
Age/yr	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**	**Male**	**Female**	**Total**
10-11	1	3	4	1	0	1	100.0	0.0	2.5
12-13	9	14	23	1	1	2	11.0	7.1	8.7
14-15	15	9	24	3	4	7	20.0	44.4	29.2
16-17	4	10	14	2	2	4	50.0	20.0	28.6
18-19	8	2	10	1	0	1	12.5	0	0.0
Total	37	38	75	8	7	15	21.6	18.4	20.7

Table 3 Paired Samples Test

Prevalence Rate	**Mean**	**t**	**Sig**
Pair 1 % male prevalence in Comboni - % female Prevalence in Comboni	0.98	0.24	0.83
Pair 2 % male prevalence at Toklokpo – female Prevalence at Toklokpo	24.40	1.2	0.31
Pair 3 % Total male prevalence in Both Schools – Total female Prevalence in both Schools	12.69	1.18	0.27

Table 4 Statistics

Prevalence rate	**Mean**	**Std. Dev**
% male in Comboni	8.48	0.35
% Female in Comboni7	.50	7.46
% Male in Toklokpo	38.70	37.71
% female in Toklokpo	14.30	18.70
Total % male in two schools	23.59	30.55
Total % female in two schools	10.90	13.90

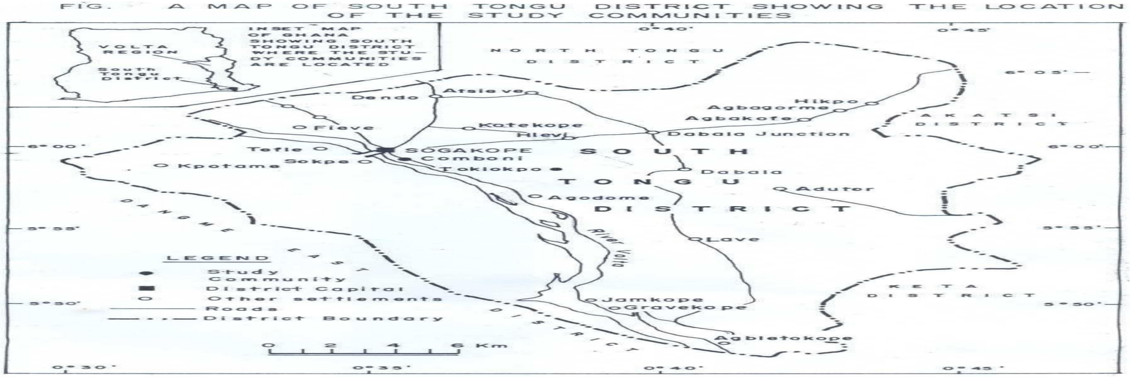
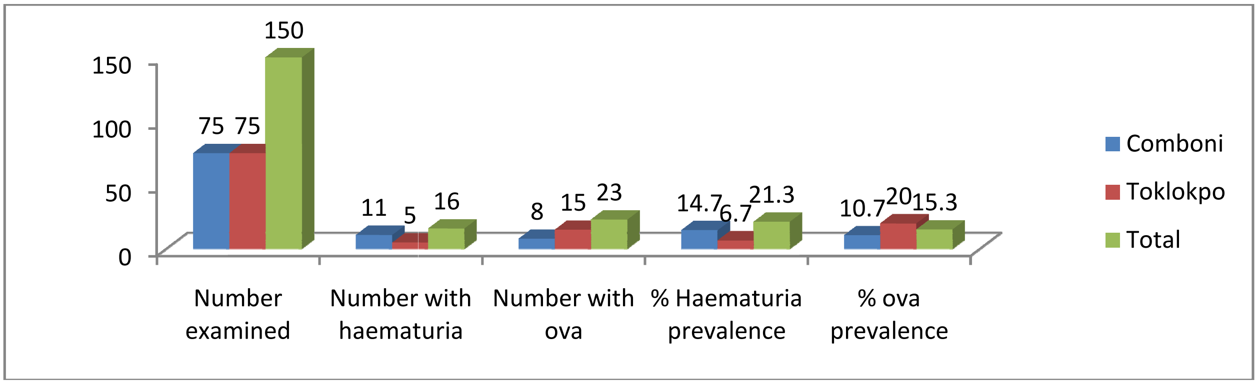


FIG. A MAP OF SOUTH TONGU DISTRICT SHOWING THE LOCATION OF THE STUDY COMMUNITIES

Fig 4 Study Communities



Generally there was a rise in infection in young ones followed by a decrease in older people for both sexes. Infections peaked in individuals aged 14-15 years. Infections found in the 11-15 years age group are similar to the findings of Adeoye (11) that the prevalence of infection reduced to lower levels is in conformity with other reports. In persons older than 19 years, the prevalence of egg counts slowly decline in populations living in endemic areas[2] .These declines in active infection may suggest that individuals have an increasing host immune response or decreasing exposure to contaminated water as they age

Fig. 5 Percentage prevalence of urinary schistosomiasis by age and sex in the Toklokpo and Comboni JHS

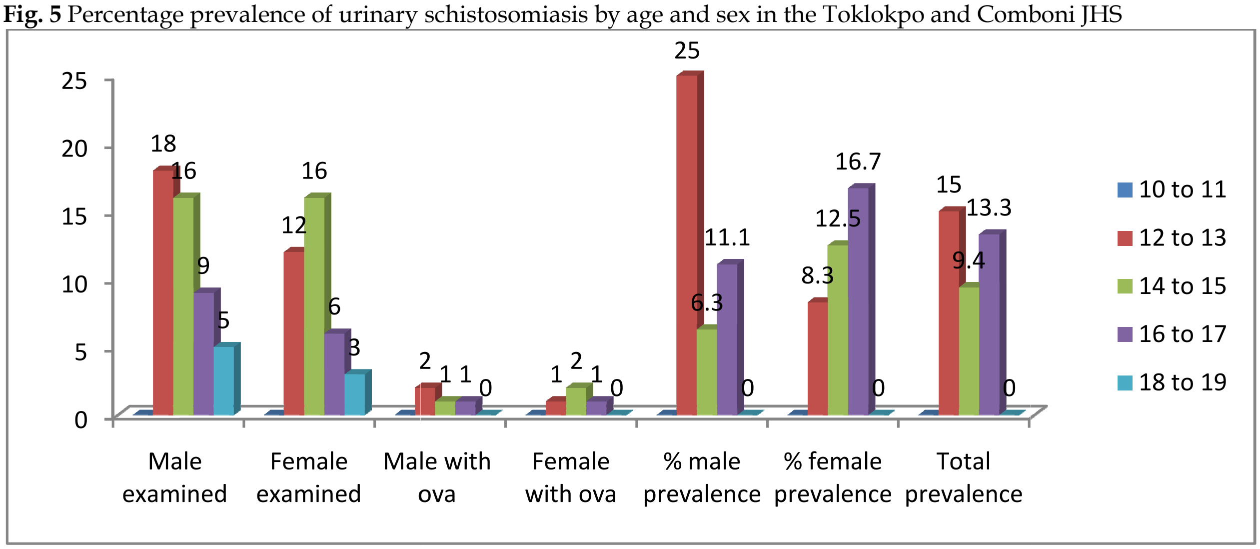


Fig. 5 Percentage prevalence of urinary schistosomiasis by age and sex in the Toklokpo and Comboni JHS

DISCUSSION

The numerical differences in prevalence rate of urinary schistosomiasis between the two schools could be attributed to the frequency of contact with infected water bodies which was higher at Toklokpo JHS than at Comboni JHS, as this is the only means by which the infection could be acquired. Activities of the communities include fishing, swimming, washing and bathing. Majority of these activities took place in the shallower portion of the water bodies usually referred to as the water contact site. As intermediate host snails of schistosomiasis are common at these sites, it is expected that cercarial densities would be higher here. It is also expected that communities that live closer to the water body would have a greater frequency of contact (10).

Numerical differences in prevalence exist between the various age groups in the individual community and the two communities pulled together as shown in Fig 6 but statistically no difference exists between the two communities in terms of means. This could be due to the fact that pupils with ages ranging from, 10-19 years would have different lifestyle relating to swimming, fishing, washing, bathing and fetching and have different frequencies of contact with the water body.

The numerical prevalence was also higher in males than in females but statistically no difference exists between them. This augments the findings from the lgwun River basin in Bauchi in Anambra State and in the Republic of Mail which indicated that sex was not significant in the distribution of infection (11) Rather the diffrences could be due to variation in behaviour regarding water use and contact. Persons who have greater contact with the breeding foci have higher prevalence of the disease, irrespective of the sex of the individual. In contrast, observations in other parts of Nigeria and Zimbabwe revealed a higher prevalence and intensity of infection in males than females.The difference was attributed to difference in social habits (11). Cardinal among these was the higher tendency among males to swim, play and engage in other activities in the river and other water bodies, besides the domestic activity of washing and collection of water which expose both sexes to infection. He argued that the higher prevalence and intensity rates observed in males in most endemic areas are not due to sex *per se* but to the greater opportunities afforded to males for exposure and that when females assume typical male roles, their risk and prevalence of infection increases. Check Tables 1-4.

Urinary schistosomiasis has been recognized as an important public health problem in the Sogakope schools (Comboni and Toklokpo) and this call for active intervention. Therefore urgent control measures with emphasis on the regular surveillance and public health interventions, such as access to safe water, improved sanitation, immunizations, education, health communication and access to medical care with appropriate case management should be put in place by Government of Ghana and Donor agencies in order to help control the menace in school children. Village-based health workers should be used in providing free diagnosis and treatment through primary health facilities of the local government. There should be adequate health education for the Sogakope people on the disease, feasible control strategies as well as other preventive measures. This will increase their knowledge on schistosomiasis, consequently modifying their attitudes and behavioural practices related to urinary schistosomiasis transmission and other diseases and also, a mass chemotherapy involving every individual in these two schools as well as the surrounding communities should be carried out. And finally prevalence of intestinal schistosomiasis should also be determined in the two schools to reduce the infection rate in order to produce healthy people in the area for a sound mind is the healthy body.

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