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Urogenital Schistosomiasis in Likomba Community, Fako Division, South West Region, Cameroon

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Urogenital Schistosomasis (US) is the second most neglected tropical disease to malaria. It is estimated that about 600-700 million people Worldwide are at risk of contracting this disease. In Cameroon more than 5million people are at the risk of infection. Clinical manifestations of US include haematuria, dysuria, lower abdominal pain and bladder cancer. Praziquantel is the drug of choice.
Objectives: The objective of this study was to determine the prevalence and risk factors of Urogenital Schistosomiais in Likomba community in Fako Division.
Methods: A community based cross- sectional study was carried out from February till March 2020. A structured questionnaire was administered to 363 participants through a convenient sampling technique. We obtained information on socio-demographic data, clinical history of the participants, knowledge of the disease and other risk factors associated with Urogenital Schistosomiasis. Urine samples were collected to detect *Schistosoma haematobium* eggs using the centrifugation technique. Data was collected and analyzed using statistical package for social science (SPSS) version 24.

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Results: Out of the 363 participants a total of 101 tested positive to *Schistosoma haematobium* infection having and overall prevalence of 27.8%. The most infected age group ranged from 5 - 13 years which had a prevalence of 49.5% while the least infected age group found within ≥ 47 years had a prevalence of 9.9%. The prevalence of US in females was 63.4% which was higher than that of males 36.6%, this difference was not statistically significant (P>0.05).The risk factors associated with US included; the availability of tap water (P<0.05), the source of drinking (P<0.05), number of times they go the stream (Ndongo) (P<0.005) and various sites of taking their bath (P>0.05).
Conclusion: This study revealed that US is still very prevalent among the inhabitants of Likomba community, therefore there is a need for the government and community health workers to re-inforce health education, ensure the provision of adequate pipe born water and campaign strategies which will educate and significantly help reduce the prevalence of the disease in this area.

Keywords: Prevalence; urogenital schistosomiasis; neglected tropical disease; risks factors; likomba community.

1. INTRODUCTION

Schistosomiasis also known as bilharziasis is a water borne parasitic disease caused by blood-dwelling flukes of the genus *Schistosoma* [1]. It is also one of the most neglected tropical disease (NTDs) in terms of public health affecting more than 200 million people and is second to malaria in terms of public health importance killing an estimated number of about 280,000 people yearly in Africa alone [2]. The infection is more prevalent in poor communities without portable water and adequate sanitation which are the characteristic of most developing countries in Africa, Asia and South America. In many of the affected areas schistosomiasis is more common in children below 14 years, an estimate of 600-700 million people worldwide are at risk of having the disease because they live in countries where the organism is more prevalent [3]. School children, adolescents and young adults have been found to have the highest prevalence and morbidity rate due to schistosomiasis [4]. Thus the negative impacts caused by untreated infections demoralize both the social and economic development on school performance amongst infected children in endemic areas [5]. Globally schistosomiasis is reported in 78 countries, according to an estimate from the World Health Organization (WHO) 206.5 million people required treatment in 2016 [6].

People get infected when the cercariae shed by the infected *Bulinus* snail penetrates the host skin during bathing ,washing of clothes, fishing or agricultural work involving contact with contaminated water [7]. The most important manifestations of urogenital schitosomiais infections include, hematuria, dysuria, nutritional deficiencies, lession of the bladder, kidney failure, elevated risk of bladder cancer, child growth retardation and impairment of cognitive development in infected individuals [8]. The microscopic findings of *Schistosoma haematobium* eggs is the definitive diagnosis of urogenital schistosomiasis [9]. The basic means of preventing schistosomiasis infection is avoiding contact with fresh water infested with the schistosome parasite because swimming or any other aquatic activities in this water exposes the skin to possible penetration by the cercariae. Praziquantel is the drug of choice [10]. In Cameroon, more than 5 million people are at risk of schistosome infection, and it is estimated that 2 million are infected and mainly children and pupils between the ages of 3–60 years make up the most vulnerable groups, followed by fishermen and farmers [11].

This study aims at determining the knowledge, prevalence and risk factors of urogenital schistosomiasis in Likomba community, a riverine area with a population of all age groups.

1.1 Study Area and Populations

This study was a cross –sectional, community based study carried out in the Likomba community found in Fako Division in the South West Region of Cameroon . Having a population of about 21,000 inhabitants, with more than 12 quarters there is a stream flowing through it known as “Ndongo” which is the main source for bathing, swimming, laundry and other household activities for some residents of this area. Their main occupation is farming since a majority of the inhabitants are Cameroon Development Co-operation (CDC) workers.

The study population consisted of 363 participants with ages ranging from 5 to 70 years

who have been in the locality for atleast two (2) months.

1.2 Inclusion Criteria

Children whose parents or guardians assented and signed the consent form and all those whose age ranged from 5 to 70 years were included in the study.

1.3 Exclusion Criteria

All those whose parents did not give assent were excluded and participant's below 5 years were excluded and old people above 65years. Also females who were on their menses were excluded from the study.

1.4 Calculation of Sample Size

The sample size of 363 was calculated from the Lorentz formula:

$$n = \frac{Z^2 \times p(1-p)}{d^2}$$

Where,

n =sample size
Z =constant =1.96
p =pre-estimated prevalence (38 %) obtained from a study carried out by Anguh *et al*., in the Tiko Health District, 2018 [12].
d = precision of the events of interest = 0.05

$$n = \frac{(1.96)^2 \times 0.38(1-0.38)}{(0.05)^2} = 363\ participants$$

A total of 363 participants were actively enrolled for this study by convenient sampling.

2. METHODOLOGY

One week before collection, the objectives and plan for this study were explained to the various quarters heads and "town cryers'' in other to get their cooperation during the conduction of this study. The various "town cryers" informed the inhabitants where they gathered at a fixed place, and received explanation about the objectives of our survey. Participants were recruited using a convenient sampling technique before signing a written informed consent form.Questionnaire which included assessments of demographic characteristics (Age, sex, educational level and others) were coded and filled for each participant's in a face- to –face interview. Furthermore a coded wide mouth, sterile screw urine container was given to each participant and the procedure on collecting a terminally voided urine in the morning period between 10am and midday was explained to the various participants. Urine was collected and placed inside a well-sealed cold dark container and then taken to the Limbe Regional Hospital Laboratory for analyses.

We placed 10mls of each urine sample into different centrifuge tubes and with the use of a centrifuge machine (Hermle Z 200) it was centrifuged at 2000rpm for 10minutes.The supernatant was then discarded and the sediment placed on clean glass side, and covered with a slip. It was then observed microscopically for the presence of *S. haematobium* eggs using the 10X and 40X lens objective.

2.1 Data Analysis

Data was entered and analyzed using the Statistical Package for the Social Sciences version 24. Chi –square test was carried on the categorical data with p-values < 0.05 considered statistically significant.

3. RESULTS

3.1 Socio-demographic Characteristics and Prevalence of the Study Population

The ages of our study participants ranged between 5 to 70 years respectively with a mean (± standard deviation) age of 25.50(±12.63). A majority of the participants were women 234 (64.5%) and most of the study participants were found within the age group of 5 and 13 years (36.6%) (Table 1). Most were unemployed 213(58.7%) and secondary school children 111(30.6%).

Out of the 363 participants 101(7.8%) tested positive for urogenital schistosomiasis.

Those who tested positive for urogenital schistosomiasis, fell within the age group of 5-13 years (49.5%) which was statistically significant *(p<0.05).* Most females (63.4%) harboured urogenital schistosomiasis compared to males but the difference was not statistically significant (P> 0.05).

Most participants with primary level education significantly tested positive to urogenital schistosomiais 39 (38.6%) (P< 0.05) .Even though most unemployed participants tested positive to urogenital schistosomiasis 46 (45.5%)

results were not statistically different from employed participants (P> 0.05) (Table 1).

3.2 Prevalence of Urogenital Schistosomiasis with Respect to Clinical History

Out of the 363 study participants, 45 (12.4%) presented with blood in their urine (haematuria), 68 (18.7%) with pain during urination and 44 (12.1%) with abdominal pain. Urogenital schistosomasis was present in 15 (14.9%) participants presented with bloody urine (haematuria), 25(24.8%) participants who experienced pain and 14 (13.9%) amongst those who presented with abdominal pains. However, no significant association was observed between US with respect to clinical history (Table 2).

3.3 Assessment of Risk Factors Associated with Urogenital Schistosomiasis Infection in Likomba Community

The predisposing risk factors associated with urogenital schistosomiasis were lack of potable water whereby 73(72.3%) of those infected had no access to potable water (P< 0.05). Participants whose source of their drinking water was from the stream (Ndongo) were most exposed to Urogenital Schistosomiasis giving a prevalence rate of 50.7% which was statistically significant compared to those who had springs and bore holes (P< 0.05).

Participants who were in contact with the stream (Ndongo) more than once daily had a higher risk of testing positive to Urogenital Schistosomiasis giving a prevalence of 63.4% compared to their counterpart and this was statistically significant (P< 0.05). The site of bath be it at home or in the stream showed no major difference as per infection with urogenital schistosomiasis (P>0.05) (Table 3).

3.4 Relationship between Participant's Knowledge on Urogenital Schistosomiasis and *Schistosoma haematobium* Infection

Out of the 363 participants 165 (45.5%) had never heard of Schistosomiasis, 184 (50.7%) know how Schistosomiasis is contracted with slightly half of the study participants agreeing that they know how Schistosomiasis is transmitted and prevented from one person to another (50.1% and 50.4% respectively) (Table 4). No association was found between any knowledge of Schistosomiasis and *Schistosoma haematobium* infection (p > 0.05) (Table 4).

4. DISCUSSION

Our study revealed that out of 363 participants, 101 tested positive for schistosomiasis giving an overall prevalence rate of 27.8%. This value is slightly lower than 38% reported by Anguh et al., 2018 [12]. The discrepancy in prevalence when compared to each other may be due to the fact that Anyuh et al., work concerned the entire population of Tiko Health District including Likomba whereas our study focused only on the inhabitants of Likomba community thereby giving it a low prevalence. Also still in Cameroon a similar study was carried out in Munyenge with a prevalence rate of 78% by Ntonifor et al., 2015 [13]. However this prevalence was higher when compared to our study reason being that Munyenge is characterized by flowing streams habouring the intermediate host which readily infect the population as they come in contact with the infected steam [13].

Furthermore our prevalence was higher than that reported by Angora et al.,2019 ,whose prevalence was 14.1% in Sikensi Cote d'Ivoire [14] and Herbert et al .,2010 whose prevalence was 0.25% in Nigeria [15]. This low prevalence could be due to improved attention given to this disease by the government of these countries in terms of sensitization and distribution of the drug praziquantel.

In our study the prevalence of urogenital schistosomiasis appears to be statistically associated with children of age group of 3 to13 years (49.5%).This finding is in agreement to the study of Njunda et al.,2017 [16]. The reason being that children are playful and ignorantly go to bath, swim and play in the infected stream (Ndongo) thus exposing them to cercariae which is the infective stage of *Schistosoma haematobium* and also children have a weak immune system because they are young and have not been frequently exposed to the infection. Meanwhile those participant whose age ranges from 25-35 years in this present study had a prevalence rate of (10.9%). The low prevalence in our for this age group is in agreement with the study carried out by Njunda et al., 2017 [16]. This could be attributed to the fact that as adults grow older they become more aware and begin following basic rules of hygiene thus limiting their contact with the infected stream (Ndongo).The adults in addition must have developed some immunity due to repeated exposure to the parasite.

Table 1. Prevalence of Urogenital Schistosomiasis with respect to sociodemographic factors

Socio-demographic Data		Total no. examined per category (%)	Total no. of positive cases per category (%)	x^2-value	*p-value*
Age group					
	5-13	133(36.7%)	50 (49.5%)	104.25	0.001
	14-24	80(22.1%)	18 (17.8%)		
	25-35	83 (22.9%)	11 (10.9%)		
	36-46	39 (10.8%)	12 (11.9%)		
	≥ 47	28 (7.7%)	10 (9.9%)		
Gender					
	Male	129 (35.5)	37 (36.6)	0.1	0.81
	Female	234(64.5)	64 (63.4)		
Level of education					
	Uneducated	15 (4.1)	12 (11.9)	33.0	0.001
	Primary education	110 (30.3)	39 (38.6)		
	Secondary education	111 (30.6)	21 (20.8)		
	High school education	76 (20.9)	22 (20.8)		
	University	51 (14.0)	7 (6.9)		
Employment status					
	Unemployed	213 (58.7)	46 (45.5)	8.99	0.29
	Self employed	122 (33.6)	25 (24.8)		
	Civil servant	20 (5.5)	24 (23.8)		
	Private sector	8 (2.2)	6 (5.9)		

Table 2. Prevalence of Urogenital Schistosomiasis with respect to Clinical History of the study population

Clinical features		Total no. examined per category n=363	Total no. of positive cases per category n=101	x^2-value	*p-value*
Macroscopic Blood in urine (Heamaturia)					
	Yes	45 (12.4)	15 (14.9)	0.77	0.37
	No	318 (87.6)	86 (85.1)		
Pain during urination					
	Yes	68 (18.7)	25 (24.8)	3.33	0.06
	No	295 (81.3)	76 (75.2		
Abdominal pain					
	Yes	44 (12.2)	14 (13.9)	00.39	0.52
	No	319 (87.8)	87 (86.1)		

Table 3. Predisposing risk factors of Urogenital Schistosomiasis in Likomba community

Risk Factors		Total no. examined per category n (%) N=363	Total no. of Positive cases per category n (%) N=101	x^2-value	*p-value*
Availability of tap water	Yes	192 (53.0%)	28 (27.7%)	36.0	0.01
	No	171 (47.1%)	73 (72.3%)		
Source of drinking water	Borehole	69 (40.4%)	18 (24.7%)	17.39	0.01
	Spring	42 (24.6%)	18 (24.7%)		
	Stream	60 (35.1%)	37 (50.1%)		
Site of bath	Home	175 (48.2%)	50 (49.5%)	0.33	0.56
	Stream	188 (51.7%)	51 (50.5%)		
Daily contact with stream (Ndongo)	Once	207 (57.2%)	37(36.6%)	24.15	0.01
	More than once	156(42.8%)	64(63.4%)		

Table 4. Relationship between Participants knowledge on Urogenital Schistosomiasis and Schistosoma haematobium infection

Questions		Total no. examined per category n (%) N=363	Total no. of positive cases per category n(%) N=101	x^2	*p-value*
Have you ever heard of Schistosomiasis	Yes	198 (54.4%)	49 (48.5%)	0.48	0. 48
	No	165 (45.5%)	52 (51.5%)		
Do you know how Schistosomiasis is contracted	Yes	184 (50.7%)	49 (48.5%)	0.02	0.88
	No	178 (49.0%)	52 (51.5%)		
Do you know how Schistosomiasis is transmitted	Yes	182 (50.1%)	57 (56.4%)	2.5	0.11
	No	180 (49.6%)	44 (43.6%)		
Do you know how Schistosomiasis is prevented	Yes	183 (50.4%)	47 (46.5%)	2.5	0.1
	No	179 (49.3%)	54 (53.5%)		

Equally in our study no significant association was observed amongst males and females, more females were infected than males giving a prevalence of 63.4%, this finding is in agreement to the study of Ndamukong et al., [17]. This shows that the frequency of exposure or contact with an infected water body rather than gender determines the rate of transmission and consequently prevalence of infection. Morever females are more in contact with the stream either through washing of cloths, household utensils and fetching water. By contrast a higher prevalence was observed in males reported by Njunda et al., 2017 [16]. In our study macroscopic haematuria, pain during urination and abdominal pain were identify as the most common symptoms of US but these observations were not significant.

Socioeconomic factors were significantly associated with the occurrence of US (P<0.05). From our study a significant relationship was observed between level of education and US, which is in agreement with Houmson et al.,2012 [18]. It shows that the more educated a parent is, the more he or she can better understand the preventive measures and better explain them to their children. From our study there was a significant association between employment status with US (P<0.05) , thus participants who works in the private sector were the least infected 6 (5.9%).This may be due to engagement in activities that exposed them to less contact with cercariae infected water. Meanwhile participants who were unemployed 44 (45.5%) were heavily infected, probably indicative of their frequency of going to the stream (Ndongo) thus contributing to the transmission of the disease.

The significant risk factors of the disease are the availability of tap water, source of drinking water and daily contact with the stream (Ndongo) (P<0.05, thus the establishment of safe water is an essential pre-requisite of US control in endemic areas .Since the prevention of schistosomiasis is achieved by reducing contact with cercariae infected water. The average number of times individuals visited the stream (Ndongo) was examined and it was observed that subjects who visits the water more than once a daily turn to be more infected. Also no association was observed between the participant's knowledge on US and schistosomiasis (P>0.05) which indicate that other factors such as poverty and the voluntarily refusal of not going to the hospital when ill are likely to contribute to the contraction of US. Thus results from this study indicated that the study area is endemic for urogenital schistosomiais, since the prevalence of our study is above the maximum prevalence limit of urogenital schistosomiasis as recommended by World Health Organisation [19].

5. CONCLUSION

The prevalence of urogenital schistosomiasis in Likomba was 27.8% slightly higher than that found in other African countries due to improved attention given to this disease by the government of these countries in terms of sensitization and distribution of the drug praziquantel. Children found within the age group of 3 to13 years were at a great risk of contracting the disease 49.5% which was in agreement to other studies carried within and out of Cameroon. More females were infected than males which agreed and disagreed with similar studies pointing to the fact that the frequency of exposure or contact with an infected water body rather than gender determines the rate of transmission and consequently prevalence of infection. Socioeconomic factors were significantly associated with the occurrence of US (P<0.05) like level of education and employment status. The significant risk factors of the disease were the availability of tap water, source of drinking water and daily contact with the stream (Ndongo) (P<0.05).

CONSENT

As per international standard or university standard, Participants' written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

Ethical approval of the study was obtained from the Institutional Review Board of the Faculty of Heath Sciences, University of Buea. Administrative authorization was sought from the Regional delegation of Public Health for the South West Region, Buea Cameroon; Divisional Officer of Tiko sub-division; District Medical Officer of Tiko; Director of Limbe Regional Hospital and the Chief of the Likomba community.

Confidentiality codes were used on the study participants. Participation was strictly voluntary and any participant was free at any time to withdraw from the study without any consequences. All data collected were stored and analysed in a restricted computer.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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