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Prevalence of Schistosomiasis Infection among Young Children Aged 5 to 17 Years in Kilosa District, Tanzania: A 3 Year Retrospective Review

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Abstract

This study was aimed at determining the prevalence of schistosomiasis in children aged 5-17 years in Kilosa district over a 3 year period. A retrospective study using records of laboratory data from laboratory record books of the selected health facilities in four wards in Kilosa district. Samples of urine and stool submitted by young children to the laboratories of health facilities between 2014 and 2016 were recorded.

A total of 702 samples were collected from the laboratory records books involving their age, sex and schistosome species. Of the 702 individuals, 541 were examined for urinary schistosomiasis and 161 for intestinal schistosomiasis; 31 (5.7%) were infected with *S. haematobium* and 11 (6.8%) with *S. mansoni* respectively.

However, the overall prevalence of schistosomiasis was 6.27% in the study area. Males had prevalence for *S. haematobium* was 1.00% and *S. mansoni* was 2.35% while females had prevalence for *S. haematobium* was 3.96% and *S. mansoni* was 1.00%. Children of age group 13-17 years were infected with both species, *S. haematobium* was 5.11% and *S. mansoni* was 1.99%. Ruhembe ward had highest prevalence in both species, *S. haematobium* was 8.62% and *S. mansoni* was 5.17% respectively. The findings confirm that schistosomiasis is a public health problem in the district.

Keywords: Schistosomiasis; *S. haematobium; S. mansoni*; Prevalence; Children

Introduction

Human schistosomiasis also called bilhazia, is a freshwater snail transmitted disease caused by infection from one of the several species of parasitic trematodes of the genus schistosoma, which lives in the bloodstream of human. It is second to malaria in human impact among tropical diseases and the third (after malaria and intestinal helminthiasis) in global parasitism. Schistosomiasis is the most devastating prevalent parasitic disease due to morbidity and mortality for developing countries in Africa, South America, the Caribbean, the Middle East and Asia [1]. The World Health Organization (WHO) regards the disease as a neglected tropical disease, with an estimated 732 million persons being vulnerable to infection worldwide in renowned transmission areas. The WHO further estimated that schistosome infections and geohelminths accounts for over 40% of the world tropical disease burden with exclusion of malaria. Prevalence of schistosomiasis, at present is still high in sub-Saharan Africa. Approximately 120 million individuals in sub-saharan africa have schistosomiasis-related symptoms while about 20 million undergo hardship as a result of chronic presentations of the disease. The distribution of the disease is focal and often restricted to areas with peculiar ecology which favors its transmission. The disease is associated with considerable morbidity and mortality in the developing world [2].

Schistosoma mansoni is the chief cause of clinical abnormalities such as hepatomegaly, spleenomegaly and periportal fibrosis in various sub-saharan Africa countries. A study in northern Ethiopia in Alamata district revealed an alarming 73.9% prevalence of schistosoma infection, with presentation of 3.7% hepatomegaly, 7.4% spleenomegaly and 12.3% periportal fibrosis. Schistosomiasis due to *S. mansoni* is on top of the list of the causes of pulmonary hypertension worldwide, especially in areas where schistosomiasis is endemic. A survey of school children aged 5-19 years in Mbita and some Islands close to Lake Victoria in Kenya revealed that the communities were highly endemic for *S. mansoni* infection with prevalence as high as 60.5% [3-5]. An investigative study of in-school and not in-school children aged 6-15 years living in communities along the Tono Irrigation Canal in North Ghana revealed a prevalence of 33.2% of *S. haematobium* infection and a 19.8% for *S. mansoni*. It was also observed that there was higher infection rate in male children compared to their female counterparts, which might be due to longer period of contact with contaminated water.

A nation-wide survey of the prevalence of Schistosoma infections and soil helminthes in school children from Mozambique reported a prevalence of 47.0% *S. haematobium* infection and 1.0% *S. mansoni* infection. Further observation from this study showed that infection increases with age, the age group 10-14 years having the highest prevalence of *S. haematobium* infection [4]. It was also observed that across the districts, male children had higher prevalence compared to their female counterparts. The high prevalence of schistosomiasis was attributed to inadequate water supply in the districts, poor sanitation, and a low level of socioeconomic development in most parts of Mozambique. A study done at Barombi Kotto focus, South West Cameroun, revealed an alarming 69.17% prevalence of *S.haematobium* infection confirming high endemicity in the area. It was noted that

most lakes in the area were habitats for the *B. globosus* intermediate host required for disease transmission. A study carried out in Agboville, Coted'Ivoire among school-aged children showed a very high prevalence of 85.3% and 53.8% for *S. haematobium* and *S. mansoni* respectively [6-9].

In Tanzania both the urogenital and intestinal forms of the disease are endemic in all administrative regions. The Schistosoma haematobium, is widespread, and transmission tends to coincide with the rainy season. As the number and level of water bodies increase, female Bulinus snails lay large numbers of eggs that mature and start shedding cercariae shortly after the rainy season [10]. The intestinal parasite, *S. mansoni*, is more focally endemic, and its transmission follows a similar pattern. Year-round transmission of both forms of schistosomiasis occurs in permanent water bodies along the shores of Lake Victoria, in irrigation schemes, and near hydroelectric dams [11,12]. The prevalence of schistosomiasis countrywide is 53.3%. Children of age group 5-17 years are usually highly vulnerable group and represent infection status in the population. These children tend to wash and bath in canal or pond water infested with the parasites. The aim of this study was to determine the prevalence of schistomiasis infection among young children aged between 5-17 years in Kilosa district, Morogoro region, Tanzania over a period between 2014 and 2016 [13-15].

Methodology

Study area

Kilosa district is one of the Districts in Morogoro Region. It lies within longitudes 36'30" and 37'30"E and latitudes 5'55" and 7'53"S. and at an altitude of 511 m above sea level has an estimated land area of 12,394 km^2. It has a population of 438,175 people of these 219,797 females and 218,378 males this is according to population census of 2012.

Study design

A retrospective study using laboratory record results of urine and stool samples from health facilities of four wards in the district between 2014 and 2016.

The study population comprised young children aged from 5 years to 17 years old who went to the health facilities and their urine and stool samples were examined and recorded in the laboratory books.

Sampling technique

The study area was obtained by multistage cluster sampling from the districts of Morogoro region. Kilosa district was randomly selected through picking a paper with written names of the 6 districts of the region. The 7 divisions in Kilosa district were written on papers and Ruaha division was randomly selected. Then the same procedure was carried out to get the 4 wards (Ruaha, Ruhembe, Kidodi, Mikumi) from a total of 5 wards in the division. Health facilities in the selected villages were selected basing to their accessibility.

Data collection tools and procedures

Laboratory records from January through December 2014, 2015 and 2016 years were obtained from each health facility involved in the study. Only urine and stool sample results records of individuals with age range 5-17 years were recorded from the record books.

Data analysis

The data obtained were analysed using Statistical Package for Social Sciences (SPSS) version 20) into simple percentiles.

Ethical issues

The proposal of the study was approved by the St. Francis University College of Health and Allied Sciences Ethical Committee. A letter was written to the District Executive Director (DED) of Kilosa district then to the District Medical Officer (DMO) of Kilosa, permission was granted to go to the local authority leaders and in-charges of health facilities which were involved in the studyConfidentiality and privacy were considered as no names were recorded. Information obtained were used for research purpose only.

Results

Socio-demographic characteristics of the sample population in Kilosa district

A total of 702 samples of urine and stool were submitted to the laboratories involved in the study. The individuals of the age group 5-8 years were 183 (26.07%), 9-12 years were 167 (23.79%) and 13-17 years were 352 (50.14%). Among the individuals, 432 (61.54%) were female and 270 (38.46%) were male. Distribution from the wards, Ruhembe 116 (16.52%), Ruaha 311 (44.30%), Kidodi 0 (0%) and Mikumi 275 (39.17%) as shown (Table 1).

Age	No. examined	Percent (%)
5-8	183	26.07
9-12	167	23.79
13-17	352	50.14
Total	**702**	**100**
Sex		
Female	432	61.54
Male	270	38.46
Total	702	100
Ward		
Ruhembe	116	16.52
Ruaha	311	44.30
Kidodi	0	0
Mikumi	275	39.17
Total	702	100

Table 1: Socio-demographic distribution of the sample population in Kilosa district.

Prevalence of *Schistosoma haematobium* and *Schistosoma mansoni* among young children

Between 2014 and 2016 a total of 702 individuals were examined stool and urine, 541 (77.0%) were examined urine for *S. haematobium*

and 161 (22.93%) was stool for *S. mansoni*. Out of these 31 (5.73%) were infected with *S. haematobium* and 11 (6.83%) with *S. mansoni* species.

Sex distribution of *Schistosoma haematobium* and *Schistosoma mansoni* among young children

During the period 2014 through 2016 years a total of 702 individuals were examined for S. haematobium and S. mansoni species, 404 (57.55%) were female and 298 (42.45%) were male. The total individuals infected with *S. haematobium* and *S. mansoni* were 42. Females infected with *S. haematobium* were 16 (3.96%) and *S. mansoni* were 4 (1.00%). Males infected with *S. haematobium* were 15 (5.03%) and *S. mansoni* were 7 (2.35%) (Table 2).

Schistosoma sp.	Sex	No. examined	No. infected	Percent (%)
S.haematobium	Female	404	16	3.96
	Male	298	15	1.00
Total		702	31	73.81
S.mansoni	Female	404	4	1.00
	Male	298	7	2.35
Total		**702**	**11**	**26.19**

Table 2: Sex distribution of *Schistosoma haematobium* and *Schistosoma mansoni* among young children.

Age distribution of *Schistosoma haematobium* and *Schistosoma mansoni* among young children

The results of *S. haematobium* infection according to age distribution, 5-8 years was 6 (3.28%), 9-12 years was 7 (4.19%) and 13-17 years was 18 (5.11%). *S. mansoni* infection, 5-8 years was 3 (1.64%), 9-12 years was 1 (0.60%) and 13-17 years was 7 (1.99%) (Table 3).

Schistosoma sp.	Age	No. examined	No. infected	Percent (%)
S. haematobium	5-8	183	6	3.28
	9-12	167	7	4.19
	13-17	352	18	5.11
Total		702	31	12.58
S. mansoni	5-8	183	3	1.64
	9-12	167	1	0.60
	13-17	352	7	1.99
Total		**702**	**11**	**4.23**

Table 3: Age distribution of *Schistosoma haematobium* and *Schistosoma mansoni* among young children.

Distribution of *Schistosoma haematobium* and *Schistosoma mansoni* in wards

S. haematobium infection for each ward, Ruhembe ward was 10 (8.62%), Ruaha 8 (2.57%), Kidodi 0 (0%) and Mikumi 13 (4.73%). *S. mansoni* infection, Ruhembe 6 (5.17%), Ruaha 1 (0.32%), Kidodi 0 (0%) and Mikumi 4 (1.45%) as shown (Table 4).

Schistosoma sp.	Wards	No. examined	No. infected	Percent (%)
S. haematobium	Ruhembe	116	10	8.62
	Ruaha	311	8	2.57
	Kidodi	0	0	0

	Mikumi	275	13	4.73
Total		702	31	15.92
S. mansoni	Ruhembe	116	6	5.17
	Ruaha	311	1	0.32
	Kidodi	0	0	0
	Mikumi	275	4	1.45
Total		702	11	6.94

Table 4: Prevalence of *Schistosoma haematobium* and *Schistosoma mansoni* among young children by wards.

Discussion

Prevalence of urinary and intestinal schistosomiasis among young children continues to be a major public health concern in tropical countries especially in Tanzania. Schistosoma infection cause chronic infection which negatively affects all aspects of the children health, nutrition and learning. Schistosoma infection during childhood cause substantial growth retardation and anemia also cause structural abnormalities of urinary tract. The transmission cycle requires contamination of surface water by excreta or urine and fresh water snail as an intermediate host and human water contact.

In the present study, the prevalence of schistosomiasis infection in Kilosa district is 6.27% with rate of urinary schistosomiasis and intestinal schistosomiasis prevalence rate being 4.42% and 1.57% respectively. The present prevalence of schistosomiasis in Kilosa district has significantly decreased compared to the previous prevalence of 53.4%. The prevalence of *S. haematobium* in the present study is 4.41% it is lower compared to that reported in Mozambique with prevalence of 47.0% [16-18]. The prevalence of *S. mansoni* was observed to be lower than that reported in the nearby East African countries the prevalence in pre-school children was 44.3 and 16% respectively on the shores of Lake Albert and Lake Victoria in Uganda and 14% in Lake Victoria in Kenya.

In relation to sex, the prevalence of *S. mansoni* infection in male (2.35%) is higher than in females (1.00%) while the prevalence of *S. haematobium* in females (3.96%) is higher than in males (1.00%) [19-22]. The difference in prevalence rates may be influenced by peculiar ecological characteristics and level of contact of individuals with water bodies and the degree or exposure to infective schistosoma cercariae in different locations. The lower prevalence of *S. haematobium* (1.00%) in males in the present study is lower than the prevalence of 58.1% reported for pre-school children in Rural Community near Abeokuta, Nigeria.

The high prevalence of *S. haematobium* (5.11%) among the age group 13-17 years in this study is lower than the findings of Dakul et al. who reported the highest prevalence 65.8% among the age group 10-14 years in Lankaku-Namu district, Quan'an- Plateau State [23,24]. The prevalence observed in the present study for *S. mansoni* is lower than that reported in children aged 5-19 years in Mbita and some Islands close to Lake Victoria in Kenya which revealed high prevalence of *S. mansoni* 60.5%.

Prevalence of schistosoma infection among wards in Kilosa district involved in the present study, Ruhembe ward had highest prevalence of both *S. haematobium* (8.62%) and *S. mansoni* (5.17%) than the other three wards [25]. This could be attributed to the behavior of this population group living in this ward their repeated contact with contaminated water, lack of safe water for bathing, poor sanitation and low level of socio-economic development. It has been reported that increased water contact activities such as fishing, bathing and farming were associated with an increased risk of being infected with *S. haematobium* and *S. mansoni* species [26].

Conclusion

Schistosomiasis has been of great health concern globally and mostly in communities of sub-Saharan Africa including Tanzania. Although there is a mass drug administration program (MDAP) still the zero percent goal has not been achieved. This study has demonstrated that the overall prevalence of schistosomiasis in Kilosa district, Morogoro, Tanzania is 6.27% this shows that the problem still existing.

Appropriate intervention and health education for the community are required for the control and prevention of schistosomiasis in Kilosa district.

It is imperative to further conduct a more comprehensive epidemiological survey on urinary and intestinal schistosomiasis so as to identify all high risk factors for the infection.

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