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Detection of *Schistosoma mansoni* infection in adult residents in Gezira state, Sudan

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Abstract: Schistosomiasis is a parasitic infectious disease caused by some species of the genus Schistosoma e.g. *S. haematobium, S. mansoni and S. japonicum*. The disease is widespread in Sudan, particularly in Gezira state, central of Sudan. A community-based study was contacted to measure Problem Magnitude of *Schistosoma mansoni* infection in adult residents in Surhan, a village of Gezira state. We examined stool samples of 381 people aged 18 years and over using direct microscopy examination. The sample size was determined using statistical equation and study population were selected by simple random sampling. The overall prevalence of *Schistosoma mansoni*, the causative agent of intestinal schistosomiasis was 13.1%. The prevalence in males was 16.9% while in females was 10% the odds ratio was Odds ratio (OR) 1.8155 with 95% confidence interval (CI) between 0.9941 and 3.3155. Age group from 32 – 45 years bearing a highest burden of the infection (9.9%) (P value =0.01). The prevalence of intestinal schistosomiasis was 17.2% in people who were going in contact with canal water, and the risk factor (RR) was 2.4053, 95% confidence interval between 1.2720 and 4.5483. The study concluded that, the intestinal schistosomiasis was still a public health problem and affected productive ages due to interplay with canal water.
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Key word: intestinal, schistosomiasis, *S. mansoni,* prevalence, Gezira.

Introduction

Schistosomiasis is a parasitic infectious disease caused by some species of the genus Schistosoma e.g. *S. haematobium, S. mansoni* and *S. japonicum* and the vectors are specific species of water snails. The World Health Organization estimation showed that over 250 million people are infected with schistosomiasis across the world [1]. About 90% of these cases occur in Sub-Saharan African countries [2]. Approximately 700 million people are at risk of schistosomiasis in 78 endemic countries due to their contact with infested water [3]. In Sudan, Schistosomiasis is known as a second major public health problem, after malaria, it infects 5824000, and kills 9450 people every year [4]. However, there are 2 million cases and 8 million people at risk of intestinal worms [5]. Because of the expansion of water resource projects and irrigated agricultural projects in Sudan, some serious water-borne diseases, particularly schistosomiasis has increased and become a health problem in areas where these projects are established [6].

Materials and Methods

Study design and area:

A cross-sectional community-based study was conducted among community members at Surhan Village Gezira State, the middle of Sudan and it is located between Blue Nile and White Nile, where the biggest irrigated agricultural project. This agricultural project creates suitable conditions for spread of schistosomiasis.

Study population and sampling

The reference population was all residents in Surhan village. According to last census, the total population of the Surhan about 8000. The inclusion criteria of selected study population were any 18 years old and over in addition to he/she is a resident in Surhan village for at least 3 months before the study as Centers for Disease Control and Prevention (CDC) mentioned the incubation period of the disease is ranging from 14 to 84 days. Using a statistical equation, the sample size was 381, they were selected proportionally over the blocks and

hence over the different households by simple random sample technique.

Stool examination and data collection method:

The microscopic examination of faecal samples was implemented to detect eggs of *S. mansoni*. All microscopic specimens containing the eggs of *S. mansoni* were considered positive, whereas the absence of the eggs means negative result (Khalid et al, 2018). In addition to laboratory examination, we recorded age and sex of participants and their contact with canal water in the area.

Statistical analysis

The collected data was analyzed using Statistical Package for Social Sciences (SPSS) version 16, the association between different variable was checked using Chi^2, p value, Odds Ratio (OR) and Relative Risk (RR).

Results

The present study included 381 people aged 18 years old and above, 172 (45.14%) of them were males and 209 (54.86%) were females. The overall prevalence of *Schistosoma mansoni*, the causative agent of intestinal schistosomiasis was 13.1% as shown in table 1. In table 2, we displayed the variables i.e., sex, age and contact with canal water, the prevalence in males was 16.9% while in females was 10%, the odds ratio was Odds ratio (OR) 1.8155 with 95% confidence interval (CI) between 0.9941 and 3.3155. Age group from 32 – 45 years bearing a highest burden of the infection (9.9%) (P value =0.01). The prevalence of intestinal schistosomiasis was 17.2% in people who were going in contact with canal water, and the risk factor (RR) was 2.4053, 95% confidence interval between 1.2720 and 4.5483.

Table 1: Overall prevalence of intestinal schistosomiasis in Surhan village, Gezira state, Sudan (n=381)

Lab examination	Frequency	Percentage
Positive	50	13.1
Negative	331	86.9
Total	381	100.0

Table 2: Parameters of intestinal schistosomiasis infection in Surhan village, Gezira state, Sudan (n=381)

Variable	Number of examined people	Prevalence %	Statistical test
Sex			
Male	172 (45.14%)	16.9	Odds ratio (OR) 1.8155 95% CI = 0.9941 – 3.3155
Female	209 (54.86%)	10	
Age (years)			
18-31	137 (36%)	19.7	X^2=8.225 P value =0.01
32-45	151 (39.6%)	9.9	
>45	93 (24.4)	8.6	
Contact with canal water			
yes	227 (59.6%)	17.2	Relative risk = 2.4053 CI = 1.2720 – 4.5483
No	154 (40.4%)	7.1	

Discussion

Endemicity of schitosomiasis in Sudan is known from decades ago, particularly in Gezira state, central of Sudan [7] [8]. The disease is the second endemic one in Sudan with more than 9000 cases and close to one thousand deaths annually [4]. Unfortunately, the risk factors are widespread i.e., lack of sanitary latrines, presence of canals, swimming and bad habits of defecation and urination, are still frequent in endemic areas especially in the major irrigated agricultural project in the Gezira area between the Blue and White Nile Rivers [9] [10] [11]. Although most of studies on schistosomiasis in Sudan targeted children, because there are a vulnerable group and due to their swimming, urination and defecation habits; the disease affects adults also considerably. Our present study targeted people over 18 years old to measure the magnitude among them. It has been found that the overall prevalence of intestinal schistosomiasis in target population is 13.1%. This is not surprising, if we compared it with the study carried out among villagers in Gezira state during the year 2005 where the prevalence of *S. mansoni* infection was 68.5% [12]. Also, the prevalence of intestinal schistosomiasis measured in another study among residents of the Rural River Basin Area in White Nile State, Sudan, was 36.3% [13]. There are not only children are being in contact with water bodies such as canals, but also the adults in Gezira state have frequent contact with canal water as they are farmers and workers in the agricultural project and need to enter the water from time to time to perform their job and usually do not wearing protective boots. In a study conducted in Gezira, which it covered all age groups, the prevalence of intestinal schistosomiasis was 5.5% in Almanagil locality where our study area is a part of it [14].

It is clearly visible as in several studies too, schistosomiasis mostly affects males, it might be due to their abundant outdoor activities and work in agriculture, irrigation, fishing, swimming and so on. In our study, the prevalence in males was 16.9% while in females was 10%, the odds ratio was Odds ratio (OR) 1.8155 with 95% confidence interval (CI) between 0.9941 and 3.3155. In a study carried out in Tanzania, the prevalence of S. mansoni was 31% in males versus 15% in females [15]. Another study in Gezira, *S. mansoni* infection in males more than in females (9.3% versus 3.1) [14]. So, the difference is due to difference in gender norms not a biological difference, as they are both susceptible to schistosomiasis from a biological stand point of view.

Age group from 32 – 45 years bearing a highest burden of the infection (9.9%) (P value =0.01). Up to 17.2% was the percentage of the infection among people who were going in contact with canal water continuously, and the relative risk (RR) was 2.4053, 95% confidence interval between 1.2720 and 4.5483. By reviewing so many previous schistosomiasis-related studies, we found that authors usually target the children especially school- age children, but the exposure risk of schistosomiasis extend to include farmers and workers in agricultural projects, who are usually adult people and their contact with water is so necessary.

Conclusion

Schistosomiasis is still a public health problem in Gezira state, central Sudan. The prevalence was considerable high in adult people as well as children as adults also exposed to the risk of infection due to their job in agriculture and irrigation without wearing productive equipment e.g., boots. The disease mostly affects males than females. Contact with canal water in term of swimming, irrigating, cutting grass etc., is a potential risk of schistosomiasis infection.

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