Short note

Prevalence of schistosomiasis among pupils of Barber Locality schools, River Nile State, Sudan

Suleman Elkamil Ahmed **Hamid**[*], Abdelbary Ahmed Mohamed **Ali**

Department of Health Education, Faculty of Public Health, Shendi University, Shendi, Sudan
[*]*slmanlma@hotmail.com*

Abstract

A cross-sectional descriptive study was carried out among pupils of Barber Locality schools in River Nile State, Sudan, from 2018 to 2020, to evaluate the prevalence of schistosomiasis infection. 422 samples of both urine and faces were examined. The overall prevalence of infection of *S. haematobium* was 7.3%; however there was no infection of *S. mansoni*. The prevalence of the disease infection across the locality was: 15% in Albauga Unit, 10.9% in West Barber Unit, 5.3% in Abidiya/ Farouq Unit, 4.2% in Barber City Unit and 3.9% in South Barber Unit. A relation found between the disease infection and the participants gender (P = 0.04), whereas the prevalence was high among males, 10.57% while for females was 4.2%. In conclusion, implementing effective control strategies such as health education programs, early diagnosis and mass treatment is crucial to reduce the disease infection.

Keywords: Schistosomaisis, prevalence, pupils, Barber Locality, Sudan.

Introduction

Schistosomiasis is endemic in subtropical and tropical areas; it's focally distribution, since transmission depends on specific snail hosts and human activities leading to contamination of water and infection [1]. Schistosomiasis is acquired when free-swimming parasitic larvae (cercariae) penetrate the skin of people exposed to infest freshwater. The clinical picture of schistosomiasis includes an early phase characterized by a dermatitis in the area where the cercariae penetrate the skin; a systemic acute phase caused by the migration of the juvenile worms (schistosomula) through the circulatory system; and finally, and most notably, an organ-specific chronic phase produced by the eggs laid by adult female *Schistosoma* spp. in the mucosa of the urogenital tract and the intestine. In such organs, acute inflammation progressively becomes chronic, and hyperaemia, abnormal growths such as polyps and internal haemorrhage are gradually replaced by fibrosis and thickening of the tissues. Bladder cancer is a late- stage consequence of *S. haematobium* infection, while embolization of eggs from the intestine to the liver through the portal system is typical of infection with the other *Schistosoma*, and is responsible for progressive liver fibrosis, portal hypertension and ascites [1,2].

The World Health Organization estimates that schistosomiasis and geohelmiths represent more than 40% of the global disease burden caused by all tropical diseases, excluding malaria [3].

Schistosomiasis is the third most devastating tropical disease globally (after malaria and

intestinal helminthiases) and is a major cause of morbidity and mortality for developing countries in Africa, South America, the Caribbean, the Middle East and Asia [4]. Almost 300.000 people die annually from schistosomiasis in Africa alone [5]. Approximately 90% of the 250 million people infected worldwide live in Sub-Saharan Africa where *S. mansoni* is the prevalent species [5]. About 10 million women in Africa are infected during pregnancy [6]. Zoonotic transmission is possible with these species, because the parasite infects not only humans but also wild rodents [7,8]. *S. haematobium* infection is a significant cause of clinical morbidity and disability in the endemic countries of Africa and the Middle East, where more than 110 million people are infected [9].

Schistosomiasis is transmitted in all of Sudan's 18 states. An estimated 5.8 million people in the country-around 15% of the total population-require treatment; the majority of those infected are children [10]. *S. haematobium* prevalence of infection across states: Gezira (0.5-30%), Khartoum (10-24.9%), White Nile (12-46%), and River Nile (25-49.9%) [11]. While prevalence of infection for *S. mansoni*: Gezira (2.2-75%), Khartoum (0-39.9%) and White Nile (4.6-24.9%) [11].

This study was conducted to determine the prevalence of schistosomiasis among pupils of Barber Locality schools, River Nile State, Sudan from year 2018 to 2020.

Materials and methods

Study area

Barbar city is one of the oldest metropolises in Sudan, its 100 kilometers on the banks of the Nile River from the local borders Atbara south to the local borders Abouhmd north and bordered on the east of the Red Sea State and from the west and the northern state being the great Nile River divided into eastern and western. Climate is semi-desert. The population after the calculation of growth of the year 2015 was (195.690) [12].

Study population

A descriptive cross-sectional community in Barber locality, River Nile State was conducted from 2018 to 2020, which in each cluster a simple sample based was used. The population was school age child (117 basic schools).

Ethical concern

This study was conducted after the approval of Ministry of Health, Department of Schistosomiasis Control and Ministry of Education in the State. Samples were taken from school children after their agreement to participate in the study.

Sampling

422 samples of each urine and feces were taken using cluster sampling method; every unit of the administrative units represents a cluster, then simple random sample used for each cluster.

The following formula was used for estimation of the sample size:

$$N = \frac{Z2\ PQ}{e2}$$

N = target sample size, Z= confidence degree (z = 1.96), P = proportion of previous study, according to not proportion study the proportion will be (50%), Q = complement of previous proportion (1-P), and E = error allowable (0.05%)

A questionnaire was prepared for data collection. Diagnosis of urinary schistosomiasis was conducted using the centrifugation concentration technique, 10 ml urinary of each selected children; one slide prepared from each sample and then examined by light microscope [13]. For the intestinal schistosomiasis, feces samples were placed in the hole of the template to be completely filled; thereafter the template was carefully removed as the cylinder of feces left on the slide. The fecal material was covered with a pre-soaked cellophane strip. the microscope slide was inverted and the fecal sample was firmly press against the cellophane strip on a smooth hard surface. The slide was removed gently sliding it sideways to avoid separating the cellophane strip. Slide with the cellophane were placed upwards and the smear was examined in a systematic manner [14].

Data analysis

Data was analyzed using Statistical Package for Social Sciences (SPSS version 15.0).

Results and discussion

In this study, the overall prevalence of *S. haematobium* was 7.3%, however, there was no infection concerning S. *mansoni* (Table 1). This result is similar to a previous study [13]. Tow snails species were identified, *Bulinus truncatus* (41.3%), the intermediate host of *S. haematobium*, and the other was *Melanoides tuberculata* (58.7%)).

The prevalence of *S. haematobium* was high in Albauga administrative unit, while the lowest in the South Barber unit (Table 1), this result agree with a previous study in the River Nile State [13,15] .

Table 1. Diagnosis results for schistosomiasis infection in Barber Locality

Area	Sample type	No. examined	No. positive	Prevalence %
Barber Locality	urine	422	31	7.3
	stool	422	0	100
Albauga Unit	Urine	80	12	15
	stool	80	0	0
Rural Unit west of Barber	urine	55	6	10.9
	stool	55	0	100
Barber City Unit	urine	71	3	4.2
	stool	71	0	0
Al Farouq Unit	urine	114	6	5.3
	stool	114	0	0
Rural unit south of Barber	urine	102	4	3.9
	stool	102	0	0

The study found that there was strong relationship (P = 0.04) between the disease infection and the participants gender, whereas the prevalence was high among males (11%) comparing to females (3.7%), this result agrees with some previous studies [13,16].

The study recommended enhancing health education programs for the population in the study area, especially for school children; providing early diagnosis and mass treatment for at- risk groups.

Acknowledgments

We wish to express our unlimited gratitude and thanks to the community of Barber Locality for their cooperation.

References

[1] World Health Organization 2017. Working to overcome the global impact of neglected tropical diseases: first WHO report on neglected tropical diseases.

[2] David L. Heyman 2004. Control of communicable diseases manual. American Public Health Association.

[3] World Health Organization 2006. Schistosomiasis and soil-transmitted helminth infections-preliminary estimates of the number of children treated with albendazole or mebendazole.

[4] World Health Organization 2013. Tropical Disease Research (TDR). Accessed from http://www. who.int/tdr/en.

[5] van der Werf MJ, de Vlas SJ, Brooker S, Looman CW, Nagelkerke NJ, et al. 2003. Quantification of clinical morbidity associated with schistosome infection in sub-Saharan Africa. *Acta Trop* 86: 125–139.

[6] Friedman JF, Mital P, Kanzaria H, Olds RG, Kurtis J. 2007. Schistosomiasis and Pregnancy. *Trends Pathol* 23: 159–164.

[7] Theron A. 1984. Early and late shedding patterns of *Schistosoma mansoni* cercariae: ecological significance in transmission to human and murine hosts. *J Parasitol* 70: 653–655.

[8] Theron A, Sire C, Rognon A, Prugnolle F, Durand P. 2004. Molecular ecology of *Schistosoma mansoni* transmission inferred from the genetic composition of larval and adult infra populations within intermediate and definitive hosts. *Parasitol* 129: 571–585.

[9] Gentile R, Costa-Neto SF, Gonçalves MM, Bonecker ST, Fernandes FA, et al. 2006. An ecological field study of the water-rat *Nectomys squamipes* as a wild reservoir indicator of *Schistosoma mansoni* transmission in an endemic area. *Mem. Inst. Oswaldo Cruz* 101 (suppl 1).

[10]World Health Organization 2005. Communicable disease tool kit for SUDAN: Communicable disease profile.

[11]Website:http://www.emro.who.int/sdn/sudan-events/launch2013-schistosomiasis.html, accessed on19 November 2017.

[12] https://ar.wikipedia.org/wiki 12\11\2018

[13] Hussein AA, Adam D, Alkamil S, Adam BA. 2019. Epidemiological schistosomiasis among people in Almatama locality River Nile State. *J Clin Res HIV AIDS Prev* 3: 1–6.

[14] Hashim Y. 2010. Some factors affecting schistosome intermediate host in Barber Locality, River Nile State, Sudan.

[15] Mustafa A, Hammad M. 2015. Assessment of risk factors of urinary schistosomiasis at school age children in Alzaidab, River Nile State, Sudan.

[16] Endriss Y, Escher E, Rohr B, Rohr H, Weiss N. 2005. Methods in parasitology, Swiss Tropical Institute, Basel.