

Schistosomiasis in School Going Children in Newly Established Transmission Site of Chifubu Area of Ndola Town, Zambia

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Abstract:

Background: Schistosomiasis is a very severe and overwhelming parasitic infection especially in developing countries. Recent reports of schistosomiasis have been reported in Chifubu township of Ndola district. However, no study has been conducted in area about this phenomenon. The main objective of this study was to establish the transmission pattern of schistosomiasis in Chifubu area of Ndola Town.

Methods: A cross sectional survey that used non laboratory methods in the diagnosis of schistosomiasis was conducted among 390 school going children at selected government schools.

Results: More than half (53.6%) of the participants were females. The prevalence of schistosomiasis was 22.6%. Swimming was the most popular exposure related behaviour. The knowledge about the disease was found to be 61.8% while its transmission was 41.3%.

Conclusions: This study has shown that contact with water bodies is a major contributor to schistosomiasis prevalence. We recommend researchers and disease control managers in the country, through inter-sectorial collaboration, to devise new control strategies and periodic disease surveillance programmes.

Keywords: Knowledge; Prevalence; Schistosomiasis; Ndola district.

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Introduction

Schistosomiasis is a disease whose causative agent is a trematode called *Schistosoma*. There are several species of *Schistosoma* but three are classified to have great human clinical importance and are found in Africa. These include *Schistosoma hematobium* (causative agent of urinary schistosomiasis), *Schistosoma mansoni* (causative agent of intestinal schistosomiasis) and *Schistosoma japonicum* (another causative agent of intestinal schistosomiasis). Although individual species may have preferred primary sites of infestation often the intestines where they generally do little damage these organisms may disseminate to

vital organs (for example, the brain, lungs, or liver) where they can cause severe damage (Harvey *et al.*, 2007).

Schistosoma hematobium has a greater distribution in Zambia (Siziya *et al.*, 1993). According to the centres for disease control and prevention (CDC, 2012), schistosomiasis worldwide infects over 200 million people and its effects are only second to malaria as the most severe and overwhelming parasitic disease. It is classified under the neglected tropical diseases (NTDs). In 2011-2013 high prevalence of urinary schistosomiasis was noted in Chongwe (88.0%), Luangwa (80.8%), Mufumbwe (53.9%), Kasempa (55.1%), Chama (53.2%) and Milenge Districts (55.3%), (MoH/CNTD, 2013). On the Copperbelt Province, however, urinary schistosomiasis was relatively low (ranging 0.0-12.8%); the highest having been reported in Mpongwe District (MoH/CNTD, 2013).

In Ndola District, February of 2014, health indicators aggregate 1 (HIA1) reported confirmed cases of a case in point, there were no cases of schistosomiasis detected during the 2011-2013 survey in the 20 schools that were sampled (Ndola District Health Office, 2014). Thus, Ndola was classified among the low risk areas for both forms of the schistosomiasis, that is, urinary and intestinal schistosomiasis (MoH/CNTD, 2013). At various clinics, in February of 2014, health indicators aggregate 1 (HIA1) particularly, Chipokota mayamba and Twapia Clinics within the Ndola District reported confirmed cases of urinary schistosomiasis. Additionally, suspected cases were reported at Malasha Primary school in Chifubu.

It is important to study schistosomiasis to understand the disease burden and the community's knowledge of the disease. This will help come up with more effective ways of eliminating schistosomiasis in these communities by providing early interventions, diagnosis and treatment of the disease. And this in turn will help reduce disease burden thereby, reducing morbidity and mortality in the school going children.

Methods

The study was carried out at selected schools in Chifubu compound of Ndola City. These schools included of Fibobe Primary School, Mawilo Primary School, Saint Bonaventure Primary School, Malasha Basic School and Chifubu A Basic School.

This was a cross sectional survey that used non laboratory methods to diagnose schistosomiasis. Sample size was calculated using Epi info version 7.1.5.2 and was 390. These are the parameters; population size 3802, expected frequency 50%, confidence limit 5%, design effect 1.0 and clusters 1. Getting confidence level 95%. Sample size 349. Considering non respondents sample size divided 0.9 (90% non-respondents) giving 387.

Pupils were randomly selected using random sampling tables at the selected government schools. Children aged between the 9 and 14 years, both male and female whose parents had signed a written informed consent were included in the study while all those children below 9 years old and above 14 years of age, those whose parents had not given consent and those who simply refused to participate were excluded. Two questionnaires were used to collect data.

All work was performed according to the guidelines for human participation in clinical research stated by the Ministry of Health of Zambia under the ethics committee. Ethics approval was sought and granted from Tropical Disease Research Centre IRB registration number 00002911, FWA number 00003729 to conduct the study. Permission was sought

from the school management for enrolment into the study. Objectives of the study were first explained to the parents of the participating pupils before being enrolled in the study and an informed consent form was signed. Privacy, confidentiality and anonymity were adhered to throughout the study as only the researchers were allowed to view the collected study materials.

Descriptive statistics were used. Data was analysed by descriptive statistics using SPSS (Statistical Package for Social Scientists) 20.0 software.

Results

The tables below show the results from the questionnaires used in this research.

Table 1. Distribution of Participants by Demographic Factors

Factor	N (%)
Gender	
Male	181 (46.4)
Female	209 (53.6)
Total	100
Age Group	
9	57 (14.6)
10	74 (19.0)
11	80 (20.5)
12	80 (20.5)
13	63 (16.2)
14	36 (9.2)
Total	100

Table 1 shows that more (53.6%) females were enrolled into the study as compared to the males and also the majority of the participants were between 11 and 12 years of age.

Table 2. Prevalence of Schistosomiasis in the Schools

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
School	Number interviewed	No. positive for "blood in urine"	Percent (%) "blood in urine"	No. positive for "schistosomiasis"	Percent (%) "schistosomiasis"
Fibobe Primary School	110	16	14.5	18	16.3
Mawilo Primary School	65	3	4.6	26	40
Saint Bonaventure Primary School	40	2	5	2	5
Malasha Basic School	150	23	15.3	32	21.3
Chifubu A Basic School	25	4	16	10	40
Total	390	48	12.3	88	22.6

Table 2 shows the prevalence of children with blood in urine as well as positive for schistosomiasis using the WHO questionnaire for the diagnosis of schistosomiasis.

Table 3. Knowledge of Disease, Exposure and Transmission

Knowledge of disease	N (%)
Yes	241 (61.8)
No	149 (38.2)
Total	390 (100)
Knowledge of disease transmission	
Yes	161 (66.8)
No	80 (33.2)
Total	241 (100)
Contact with streams or other water bodies	
Yes	62 (15.9)
No	328 (84.1)
Total	390 (100)
Activities involving the water contact	
Fishing	8 (12.9)
Swimming	24 (38.7)
Fetching water	3 (4.8)
Moulding clay	10 (16.1)
Two or more of the above activities	17 (27.4)
Total	62 (100)
Number of times in a week the contact with water is	
1-2	46 (74.2)
3-4	7 (11.3)
5 and above	9 (14.5)
Total	62 (100)
How many had been treated for Schistosomiasis before	
Yes	11 (17.7)
No	51 (82.3)
Total	62 (100)

Table 3 summarises the disease knowledge, transmission and exposure related behaviour.

Discussion

Schistosomiasis being an NTD can be chronic, disabling, and physically disfiguring infection that is found mostly among poor rural dwellers and some urban population. Studies have revealed that the NTDs are more prominent in sub-Saharan African communities (Hotez and Kamath, 2009). Human contact with waters infested with the infective stages of *Shistosoma* is the major cause (World Health organisation, WHO, 2018).

Our study has demonstrated that 41% of study participants were school going children aged 11 and 12 years old, an age group that is most susceptible to infections by schistosomiasis. This finding is similar to study participants found in a study by Ekpo and others that estimated the number of school aged children at risk of urinary schistosomiasis in Ogun State as the highest risk group in Nigeria (Ekpo *et al.*, 2008). Our study has identified contact with

water when children go for swimming as the cause for acquisition of schistosomiasis. This finding is similar to what WHO in 2014 attributed to where it was found that contact with infected water is a vital factor in transmission of infection. It was postulated that children get exposed to infection during activities such as laundry, plate washing, and water fetching for domestic use and bathing. Other activities such as fishing and farming are also risk factors for transmission of the disease (WHO, 2014). In addition, Steinmann *et al.*, (2006) estimated that 76% of the sub-Saharan population live close to various open water bodies which are infested with the intermediate snail host necessary for the transmission of the disease. The schistosome parasite requires an avenue where in there is direct contact between the molluscan intermediate snail and the final human host for transmission of schistosomiasis to take place (Brooker, 2007).

Although different factors lead to exposure schistosomiasis, in Chifubu the major cause of contact with water was found to be for leisure purposes. Contrary to a study conducted in Edo State of Nigeria where it was found that awareness of disease among the children was very poor and a few of them believed that the blood in their urine was associated with the river but did not regard it as a disease and would rather go to the river to play with their mates, participants in our study had good knowledge about the disease and its transmission (Rukeme *et al.*, 2017). Chifubu area is a low income area with multiple streams which provides for a good habitat for the intermediate host and predisposes children to infection with schistosomiasis because most of their recreational activities are carried out nearby or in the streams. This view is to a similar study conducted in Ogun State that estimated a population of school aged children (5–14 years) at risk of urinary schistosomiasis to be 0.80 million as at year 2002, it was appreciated that environmental factors when combined with host/parasite were suitable for infection transmission. It was also suggested that 98.99% of school children in the State were living in schistosomiasis suitability area and therefore at risk of urinary schistosomiasis (Ekpo *et al.*, 2008).

Conclusions

This study has shown that contact with water bodies is a major contributor to schistosomiasis prevalence. We recommend researchers and disease control managers in the country, through inter-sectorial collaboration, to devise new control strategies and periodic disease surveillance programmes.

Authors' contributions

PK contributions to conception, design, collected data, analysis and interpretation of data. VM and EK drafting the manuscript and revising it critically for important intellectual content.

Conflict of interests: None.

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