Epidemiological survey: schistosoma haematobium in schoolchildren of White Nile areas, Khartoum 2012

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Background

Schistosomiasis is one of the neglected tropical diseases, according to World Health Organization (WHO), there are more than 200 million cases, 93% of which occur in Sub-Saharan Africa. There are 2 major forms; two-thirds of which result from Schistosoma haematobium infection. The aims of this study were to determine the prevalence of S. haematobium infection, and to evaluate the knowledge, attitude and practice among schoolchildren of White Nile areas inside Khartoum.

Patients and Methods

A descriptive cross sectional basic school based study carried out over a period of 5 months from September 2011 till February 2012. A total of 300 schoolchildren were randomly selected and surveyed, of which,
180 were males and 120 were females. Sedimentation technique was applied to examine urine samples, and self-administered questionnaires targeting the knowledge and attitude of schoolchildren were used.

**Results**

The prevalence of Schistosoma haematobium infection is (16%). Males were infected five folds more likely than females. The most affected age group was 11-13 years in males, and 8-10 years in females. Heavy infection intensity was reported in (41.7%). There was a significant strong association between heavy intensity of infection and both gross haematuria, and UTI (p< 0.01). Microscopic haematuria is three folds more common than gross haematuria. (22.8%) and (21.1%) had correct knowledge about the diagnosis and treatment, whilst only (11%) knew the correct measures to control S. haematobium infection. Using treatment was the predominant correct attitude (28.9%). Moreover, (51.7%) of participants declared being in contact with rivers. The risk of having heavy intensity of the infection is approximately equal in both groups of (poor) knowledge and (good) knowledge [OR1.15- CI; 95% (1.125-0.978)].

**Conclusion**

Schoolchildren in White Nile areas inside Khartoum should be covered by mass chemotherapy once every 2 years according to WHO guidelines. Furthermore, epidemiological studies should be conducted targeting the urbanization of urinary schistosomiasis.

**Keywords:** Schistosomiasis, schistosoma haematobium, prevalence, knowledge, attitude, practice.

**Introduction**

Schistosomiasis is one of the devastating neglected tropical diseases. Despite the numbers they affect, and their health and social consequences, these diseases attract less than 1% of the total health funding of the developing world. It is the third most devastating tropical disease in the world after malaria and intestinal helminthiasis\(^1\). Worldwide, S. haematobium infects more than 200 millions\(^2\). The total number of Disability Adjusted Life Years (DALY) lost to schistosomiasis is 1.532 million per year\(^3\). In the Sudan, 17.5 million are at risk, while 7 million people are infected with a shift from S. mansoni to S. haematobium in the most endemic areas\(^4\).

Primary schoolchildren are particularly vulnerable to schistosomiasis because of their habit of playing in water, where they may contract the infection. As such, they are the ideal target group to investigate the prevalence of schistosomiasis, and the data collected from this age group can be used to assess not only whether schistosomiasis threatens the health of schoolchildren, but also the need for community intervention\(^5,8\).

Nevertheless, S. haematobium has no demarcation borders, thereby, it can occur where intermediate hosts exist. The White Nile is wider and flows slower than the Blue Nile; this triggers an appropriate environment for schistosomiasis habitat and spread of the disease.

The aims of this study are:

1. To determine the prevalence of Schistosoma haematobium infection among schoolchildren of White Nile areas inside Khartoum.
2. To evaluate the knowledge, attitude and practice of schoolchildren towards Schistosomiasis.

**Patients and Methods**

This was a descriptive cross sectional basic school based study, done over a period of five months (from September 2011-February 2012), in Alazzouzab, Alamab, Alshajarah which were selected by multistage sampling. Six primary schools were selected randomly; 3 for males and 3 for females. 300 schoolchildren were involved from ages 7-16 years; from them 180 students were males, while 120 students were females, according to the ratio of males to females in the selected
The selected students were asked for urine samples, and given questionnaires to assess their knowledge, attitude, and practice regarding the disease. The urine samples were collected in clean labeled containers that were coded with numbers similar to questionnaires’ code number, students were asked for midstream and terminal urine. These samples were collected between 10am and 2pm because of the high concentration of egg at that time \(^9\), and then they were examined by urine sedimentation test. Any sample contained less than 50 ova/10ml was considered as a light infection; however, if the figure was equal to or more than 50 ova/10ml, it was considered as heavy infection, according to WHO guidelines \(^10\). The questionnaires were defined on three likert scales (scoring system); more corrected answers represented good, fair and poor perceived respectively. Data was analyzed by SPSS version 18.

**Results**

The prevalence of Schistosoma haematobium is (16%). The ratio of infected males to females is 5:1. The most affected age group in males was 11-13 years, while it was 8-10 years in females (Fig 1).

The overall positive knowledge was reported in approximately two thirds of participants, with the apices of knowledge in the diagnosis, and treatment of S. haematobium (Fig 2).

The overall positive attitude was seen in (52%). The predominant positive attitude was toward 'using the treatment'; while the most frequent negative attitude was 'not to follow-up after treatment' (Fig 3).
More than half of the participants (51.8%) admitted practicing regular swimming in the White Nile River.

The risk of having heavy intensity of the infection is approximately equal in both groups of (poor) knowledge and (good) knowledge [OR1.15- CI; 95% (1.125-0.978)].

**Discussion**

The prevalence of *S. haematobium* infection among schoolchildren in White Nile areas inside Khartoum is high (16%), it constitutes a serious public health problem that calls for urgent attention. According to WHO new guideline, such prevalence requires mass chemotherapy once every 2 years (11).

In contrast, many published studies showed much lower prevalence (12-15). Perhaps this discrepancy could be attributed to the divergence in the degree of exposure to infection as well as the variation in the ecological conditions necessary for the breeding of the snail intermediate host as supported by Magnussen P et al (16).

The age and sex-related patterns of distribution of urinary schistosomiasis has been widely reported (14, 17, 18, 19, and 20). In this study, males’ schoolchildren were reported as five-folds more likely to be infected than females; the most logical explanation is that they are more exposed to infected water than females. A considerable body of research argued that male children are more involved in agricultural activities than females, moreover, they are not bound to social constrains as they may swim and bath outdoors more freely (19,20). It's worth noting that younger female schoolchildren, in this study, have higher infection rates, compared to older ages.

Microscopic haematuria is detected in three-folds of the urine specimens in comparison to gross haematuria (visible bloody urine). Epidemiological studies that depend on questionnaires surveys in determining the prevalence of the disease, may give false-negative results. This view is supported by the paper 'Self-diagnosis as a possible basis for treating urinary Schistosomiasis' (21).

In this study, schoolchildren had good knowledge regarding *S. haematobium* mode of transmission, intermediate host and diagnosis. This could be explained by the fact that schistosomiasis (as a topic) has been introduced in their school curriculum. A study done in Mali showed different result, it showed that schoolchildren have insufficient knowledge (22) perhaps it is due to the lack of adequate health education programs targeting schoolchildren.

Despite their fair knowledge of the different mode of transmission of the disease, more than 50% had a direct and frequent contact with the White Nile River. This is because schoolchildren tend to simulate their peers in the community (17).

Although urinary schistosomiasis is generally considered as a rural phenomenon, infections have been reported within urban settings as demonstrated in this study. There is a need to encourage collaborations between Ministry of Health and Ministry of Education to reduce the burden and control of emerged urinary schistosomiasis by regular preventive chemotherapy programs, together with health education, to reach the lowest prevalence at a reasonable pace and cost.

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