Graduate College Journal – NU
Vol.19 -2024, No. (7)
ISSN: 1858-6228, http://www.neelain .edu.sd

مجلة الدراسات العليا - جامعة النيلين
المجلد (19) –2024، العدد (7)
الرقم الدولي الموحد للدوريات: 1858-6228

Prevalence of Urinary Schistosomiasis infection among schoolchildren in four villages in the White Nile State/ (Sudan) during the period from (2019 to 2021)

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Abstract

Background: Urinary Schistosomiasis is caused by a type of blood fluke called Schistosoma haematobium, which inhabit rural areas where there are agricultural irrigation cannels and shallow water habitat. **Objective:** the aim of this study is to calculate the prevalence of urinary Schistosomiasis among schoolchildren in four villages in the White Nile State, Sudan. **Material and Methods**: 400 schoolchildren were selected from the four Villages; namely: Wakara, Alandraba, Abo Shatain and Alabasia in White Nile State, by using simple random sample technique, 10 ml of fresh urine were collected from each participant, sent to laboratory, samples were centrifuged and sediment examined under the microscope. **Results**: The results revealed that the overall prevalence of *S. haematobium* infection in the four villageswas 20%, and in each village, it was as follows: 10% for Wakara, 19% for Alandraba, 30% for Abo Shatain, and 21% among schoolchildren of Alabasia village. Also the results showed the prevalence was higher among males (26%) compared to females (20%), and the prevalence according to age group find that the age group (10 -14) had the highest prevalence (55%). **Conclusion**: The study area may be a focal points for *Schistosomia haematobium* infection, rapid intervention and follow-up fromhealth authorities is required in these villages where urinary schistosomiasis is wide spread and requires further studies and researches in this field.

Key words: Urinary Schistosomiasis, *Schistosomia haematobium*, schoolchildren, Sudan

Introduction

Urinary schistosomiasis is a chronic water-dependent parasitic disease caused by the Trematodes *Schistosoma haematobium* (*S. haematobium*){1}. It is the one of most devastating prevalent neglected tropical parasitic diseases (NTDs) due to the high morbidity and mortality rate among susceptible population in developing countries particularly in Africa{2}. In endemic tropical and subtropical countries, the disease remains as a major public health problem. The high prevalence of schistosomiasis placed it as second most important parasitic disease with public health problem after malaria, in the 74 endemic countries, an estimated of 250 million people are infected while approximately 700 million people are at risk of getting the infection {3}. In Africa and Middle East S. haematobium is widespread with more than 110 million infected people, In addition, S.haematobium is the cause of nearly two-thirds of schistosomiasis cases resulted in long-term and severe complications. {4}.

Schistosomiasis in Sudan

In the early nineties, Sudanese patients with schistosomiasis were thought to be infected with this unknown disease and caught it when had been in Egypt. In this context, during investigation of outbreak of cases of *Kala-azar* in eastern and south eastern Sudan in 1909 and by what was called 'The Kala-azar Commission' the investigators encountered by many cases of hitherto unknown 'Bilharziosis' in the region of Singa governed by the so called Blue Nile Province. The report of the commission mentioning this finding was considered to be the first report to acknowledge the presence of the disease in the Sudan.{3}

The worms *S.haematobium* and *S.mansoni* were endemic throughout all populated areas of Sudan except the province of the Red Sea. Recently, *S. haematobium* is predominant in the north and the west of Sudan, while *S. mansoni* is prevalent in the east.{4} . However, the risk of acquiring the infection of *S. haematobium* is widespread in the different regions of the country.{5}, {6}. And schoolchildren are the most vulnerable group at the higher risk of *S. haematobium* infection.{7}.

Schistosomiasis in the White Nile:

According to White Nile State Schistosomiasis control program authority the prevalence of *Schistosoma haematobium* is higher than the prevalence of *Schistosoma mansoni* infections in whole the White Nile State. The prevalence of schistosomiasis (*S. haematobium and S. mansoni*) among student in the White Nile State was studied by Ismail and others and the result reveals that the Number of students was found to be infected by *S. haematobium* and *S. mansoni* were 45.0% and 5.9%, respectively {8}.

Objective:

The purpose of this study was to determine the prevalence of *Schistosoma haematobium* in four villages namely: Wakara, Alandraba, Abo Shatain and Alabasia in White Nile State in the White Nile State, Sudan.

Material and methods:

Study design:

This observational cross – sectional, Epidemiological study was conducted to determine the prevalence of *Schistosoma haematobium* among schoolchildren in the study area.

Study area and population

This study was carried out in four localities in the White Nile State, namely: Al-dowiem, El Qeteena, Kosti and El Jabaleen. Al –doweim and Kosti localities are located on the west bank of the White Nile, and El Qeteena and El Jabaleen localities are on its east bank. Four villages were selected for the conduct of this study, namely: Wakara, Alandraba, Abo Shatain and Alabasia in White Nile State Alandraba, Abo Shatain, Wakara and Alabasia.

Alandraba lies about 74 km southern of Rabak, Abo Shatain is about 10 km to the southern of Alkua, Wakara6 Km to the south of Al-doweim and Alabasia10 km southern of Kosti. The study population was selected due to the fact that the children are the most frequent group to come into contact with contaminated water for many purposes.

Sampling technique:

Schoolchildren of all ages and gender in classes (from the 1st basic level to the 8th basic level) were equally represented in urine sample collection. However, urine samples were collected during the period from January and February 2019 and 2021, between 11:00 am and 2:00p.

Sample size:

400 schoolchildren were enrolled in this study, the urine samples were collected from pupils from all villages as detailed in Table (1). The sample size was detected according to Schistosomiasis Control Program protocol (100) schoolchildren from every school.

Table 1: Number of schoolchildren selected for examination:

Village	Number of pupils: boys (B) and girl (G)	
	B	G
Wakara	50	50
Alandraba (mixed)	50	50
Abo Shatain (mixed)	50	50
Alabasia	50	50
Total	400	

Microscopic examination:

The 10 ml of urine sample of each specimen was centrifuged and the sediment was placed in slide glass and cover with cover glass and then examined under the microscope according to the sedimentation method, described by Olusegum and others {9}.

Ethical Considerations:

The study approved from Ethical committee of the faculty Board Council, Faculty of Medicine, Al-Neelain University, and a written consent was gained from the schools directors and teachers whom responsible from schoolchildren.

Data analysis: The data obtained was treated by using computer (Excel and SPSS) programs. Analysis of variance (T. test) on the SPSS software package (version 20) was used to test for significance between study villages.

The results:

The overall prevalence of *S. haematobium* infection among schoolchildren in all study villages is shown in Figures (1), and the results according to gender reveal that the prevalence of infection among male is higher than female figure (2)

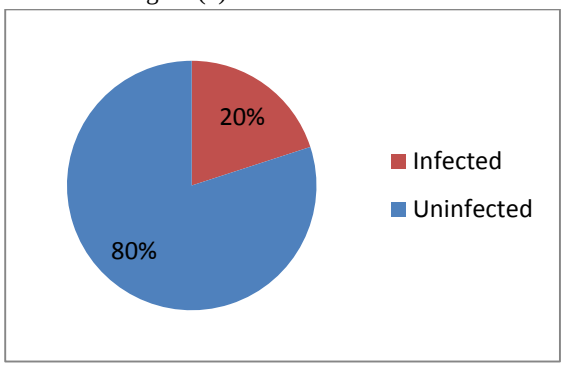

Figure 1: Overall prevalence of *S. haematobium* among schoolchildren in study villages.

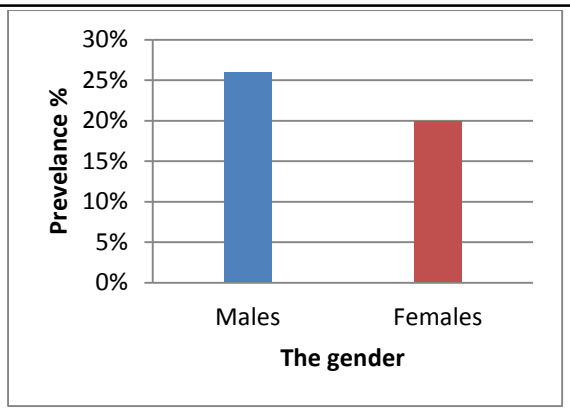

Figure 2: The prevalence of *S. haematobium* according to gender in study villages.

The status of each village

For each village, the prevalence of *S. haematobium* among schoolchildren is shown in Figures (3). However, comparison of prevalence among villages of Alandraba, Abo Shatain and Alabasia showed a significant difference in the prevalence of infection (P< 0.05).

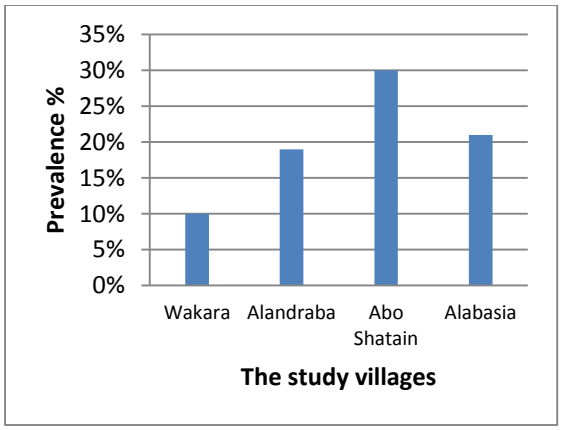

Figure 3: Prevalence of *S. haematobium* among Schoolchildren of each village

Prevalence among age groups

The results show the distribution of prevalence of *S. haematobium* among age groups of schoolchildren examine according to age group.

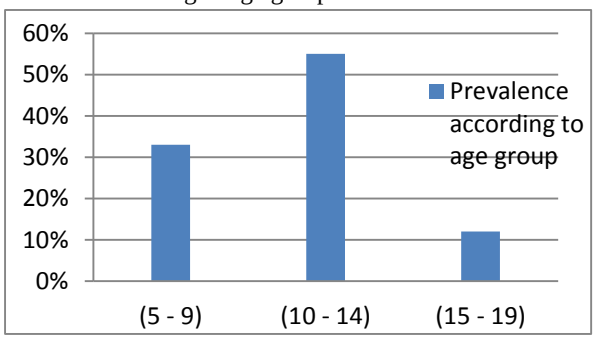

Figure 4: Distribution of prevalence of *S. haematobium* among age group of schoolchildren in study villages.

Discussion:

This study intended to determine the prevalence of urinary schistosomiasis among schoolchildren in four villages in the White Nile state Sudan, prior to this study two similar studies Stated by Ismail; Ahmed and others {10},{8}, then they indicated that the prevalence rates of *S. haematobium* were exhibiting fluctuating patterns among school age children, the prevalence rates of these studies were 21.4% and 45% respectively, while in the present study it reached 20%. These results taken together indicate that *S. haematobium* infections remained at high levels exceeding 20%. However, the maintenance of these higher rates of infection in this state is probably due to the fact that its location serves as a crossing point for the movement of infected individuals to and from endemic bordering Upper Nile region {11}, South Darfur{6}, and South Kordofan {12} , In these areas the prevalence rates had reached even higher levels of 73% and 56%, and 23.7%, respectively. Added to contribution of infected individuals moving from nearby endemic areas in securing additional source of the parasite, the infected local population of the study villages themselves together with presence of the intermediate host in nearby water contact sites will sustain the transmission of the disease among the whole population of the study villages.

However, the prevalence rate nearly as high as those mentioned in nearby regions was elicited in this study by the age group of (10-14) years old of the present study where it reached 55%. The finding that this group to have the highest rate agreed with the outcome of epidemiological study of *S. haematobium* conducted in the Odau Community in the Niger Delta Area of Nigeria {13}, where the highest level of 93.0 % was shown by the age group of 10 – 14 years old children. Similarly, a higher prevalence rate of 70% was shown by this age group in the Volta Region of Ghana {14}.

According to sexes, the males school aged children of this study had the higher prevalence rates (26%) compared to females schoolchildren (20%) and these variable rates between the two sexes agree with those reported among school pupils in White Nile State reach 24.3% and 14.7% among males and females respectively{15).

Perhaps these differential rates of prevalence between females and males in this study and of the other studies conducted elsewhere might be due to local traditional cultures where males in some places, in the absence of safe pipe-borne water supply, perform domestic and work activities involving prolonged contact with infected water such as agriculture, fishing, washing clothes and fetching drinking water {16}, {17}.

Conclusion and recommendations:

The result of this study concludes that, *Schistosomia haematobium* infection is prevalent among schoolchildren in the study area, In this matter to fight urinary schistosomiasis in the study area additional studies and rapid intervention through Mass treatment and health education must be done, as well as building of public toilets, and entertainment means such as equipping foot ball yards, constructing swimming pools, and equipping clubs with display screens.

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