

Epidemiological Survey of Urinary Schistosomiasis in Khartoum City and New Halfa City- Sudan

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Abstract: This study was conducted to determine the epidemiological survey of urinary schistosomiasis in Khartoum City and New Halfa City- Sudan. For this purpose, a cross-sectional study was carried out during the period from June to September 2011. Participants in this study included 770, 475 (61.7%) were males and 295 (38.3%) were females. The age of the study subjects included in the present study ranges between 4-85 years, mean age was 23 years and the age was divided into 5 groups: 4-12, 13-19, 20-45, 46-60 and 61-85 years old. Urine samples were collected from all subjects. Parasitological and epidemiological data were obtained and recorded. The urine samples were examined to detect the eggs of *Schistosoma haematobium* by using sedimentation technique. Out of 770, 3 (0.4%) were found positive for *Schistosoma haematobium* in El Kalakla area in Khartoum and no positive cases reported from New Halfa city. The present study reflected that the relation between *S. haematobium* infection and presence of haematuria was insignificant ($p=0.761$). The study showed that the relation between infection and knowledge about an infection was insignificant ($p=0.319$). The study indicated that the prevalence of *S. haematobium* in the study area was low (0.4%).

Keywords— Epidemiological; Survey; *Schistosoma haematobium*; Sedimentation Technique

1. INTRODUCTION

Infections of *Schistosoma* spp. have been well documented during classic epidemiology. The parasite exhibit market age dependency in infection patterns [1]. Prevalence of schistosomiasis infections increases throughout childhood to relatively stable plateau or show a slight decrease in adulthood [1]. Schistosomiasis is the major health risk in the rural areas of China and Egypt and other developing countries [2]. The majority of people in endemic areas have only light infections with symptoms, the impact of urinary schistosomiasis on economic condition and the general health situation should never be underestimated. The disease also substantially affects children's growth and school performance [2]. The age groups 5-19 years have been identified as the target population for nationwide control in Nigeria [3]. Urinary schistosomiasis caused by *S. haematobium*. Initial toxic and allergic symptoms are marked, but the bladder and ureter are typically involved with hyperaemia, terminal haematuria, dysuria and frequency of micturition, papules, papillomata and ulceration [4]. Obstruction of ureteral openings or of the neck of the bladder may lead to back pressure and a predisposition to ascending bacterial infection. The subsequent involvement of ureters and kidneys is similar to that seen in urinary tract obstruction from any source [5]. The uterine cervix is the most common site of *S. haematobium* infection in women, and granulomatous inflammation of the cervix is a common manifestation [6]. In males, heavy infections may involve the urethra, prostate, seminal vesicles, and even the spermatic cord and penis [5]. The objective of the present study was to

determine the epidemiological survey of urinary schistosomiasis in Khartoum City and New Halfa City- Sudan.

2. Materials and methods

2.1 Study design:

It is a cross-sectional study.

2.2 Study area and study period:

The study was performed in El kalakla area in Khartoum State and different villages (Tiba, Tabark allah, AlQadesia, AlGamhoria and AlWehda) in New Halfa city in the eastern Sudan (figure 1), during the period between June to September 2011.

2.3 Study population:

The study populations included in this study were the school children in El kalakla area in Khartoum State and inhabitants of Al Qadesia, Tiba, Tabark allah, AlGamhoria and Alwehda villages in New Halfa, males and females with different ages and occupations, suffering from schistosomiasis were recruited to the study.

2.4 Sample size:

From targeted population, 719 urine samples (200 from school children and 519 from population in New Halfa) were collected. From healthy persons in Khartoum state, 50 urine samples collected as control. One urine sample was collected as case study.

2.5 Sample collection:

The number of ova in the urine varies throughout the day, being highest in samples obtained 10 hours and 14 hours (in the afternoon). The urine specimens were collected between these times and consist of single, terminal urine (last drops)

of at least 15 ml. In this study, all urine samples were collected and examined macroscopically for color (haematuria) and protein (proteinuria).

2.6 Data collection:

Designed and previously prepared questionnaires were filled by participants.

3. Methods

3.1 Sedimentation technique by centrifugation:

A suitable amount of terminal urine (10 ml) was collected into a clean dry container. Samples were collected around midday. The testing had been carried out before hatching of miracidia from the eggs and to avoid hatching the sample was kept in the dark. 10 ml of urine transferred into a conical centrifugation tube and centrifuged at a medium speed of approximately 500 rpm for 3 minutes. The supernatant discarded and the sediment was mixed and then transferred to slides and covered with cover glass. The preparation was examined microscopically; using the x10 objective lens for search and the x40 will be then used for identification [7].

3.2 Data analysis:

Data was analyzed using Statistical Package of Social Sciences (SPSS) for windows, version 15 and the p values of less than 0.05 were considered statistically significant. Data presented in graphs using Microsoft Excel and PRISM 5 programme (Graph Pad Software, Inc., Jolla, USA).

3.3 Ethical consideration:

Approval of the study was taken from the College of Medical Laboratory Science-Sudan University of Science and Technology. Permission for the samples collection was taken from study subjects or their gardeners after explaining the study purpose. Ethical clearance will also be taken from Ministry of Health-Kassala State, Department of Preventive Medicine Office of the anti-bilharzia and intestinal worms New Halfa City.

4. Results

The age of the study subjects included in the present study ranges between 4-85 years, mean age was 23 years and the age was divided into 5 groups: 4-12, 13-19, 20-45, 46-60 and 61-85 year (table 1). Male: Female ratio was 475:295 (61.7% and 38.3% respectively) (table 2). Study subjects were peoples from endemic area 719 (93.1%), control was 50 (6.5%) and case (known pathology) was 1 (0.1%) (figure 2), within these surveyed population 107 (13.9%) from El Kalakla Al Goba area, 93 (12.1%) from El Kalakla Al Teraiaa in Khartoum state, 88 (11.4%) from Tiba village, 58 (7.5%) from Al Gamhoria village, 161 (20.9%) from Al Wehda village, 152 (19.7%) from Tabark Allah village, 60 (7.8%) from Al Qadesia village in New Halfa scheme in New Halfa city and 51 (6.6%) from Khartoum city (table 3). For detection of *S. haematobium* eggs, 770 (200 from school children in El Kalakla area in Khartoum state, 519 from inhabitants of Al Qadesia, Tiba, Tabark Allah, Al Gamhoria and Al Wehda village, one of the endemic areas in New Halfa scheme in New Halfa city, 50 as control from Khartoum and one as case study) urine samples were collected, within these samples, 3 (0.4%) from El Kalakla area were found positive by sedimentation technique and no positive cases reported from New Halfa (figure 3). Out of 770 surveyed populations, 23 (3.0%) had blood in urine, among those, no one was positive to *S. haematobium* (figure 4). The relation between *S. haematobium* infection and presence of blood in their urine was insignificant (p value was more than 0.05, $p=0.761$). Out of 770 surveyed populations, 579 (75.2%) had knowledge about an infection, among those, 3 (0.4%) were found to be positive for *S. haematobium* by sedimentation technique, 191 (24.8%) had no Knowledge about an infection, among those, no one was found to be positive (figure 5). The relation between infection and knowledge about an infection was insignificant (p value was more than 0.05, $p=0.319$).

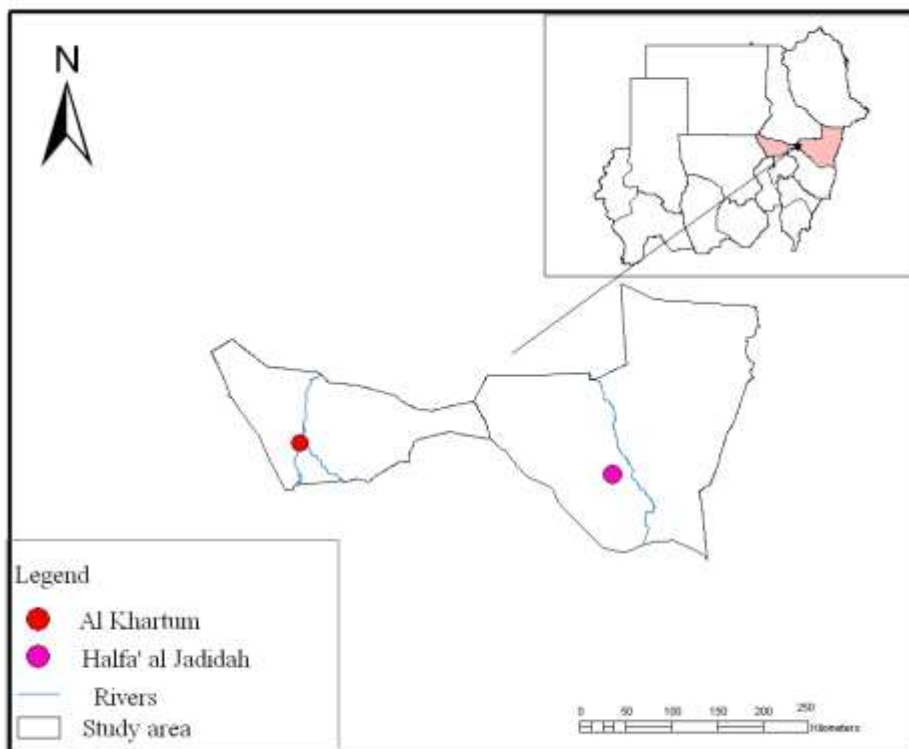


Figure 1: A map of Khartoum State and New Halfa City (Remote Sensing Authority, 2012)

Table 1: Frequency of age-groups

Age groups (years)	Frequency	Percentage (%)
4-12	332	43.1
13-19	145	18.8
20-45	183	23.8
46-60	60	7.8
61-85	50	6.5
Total	770	100.0

Table 2: Frequency of gender

Gender	Frequency	Percentage (%)
Male	475	61.7
Female	295	38.3
Total	770	100.0

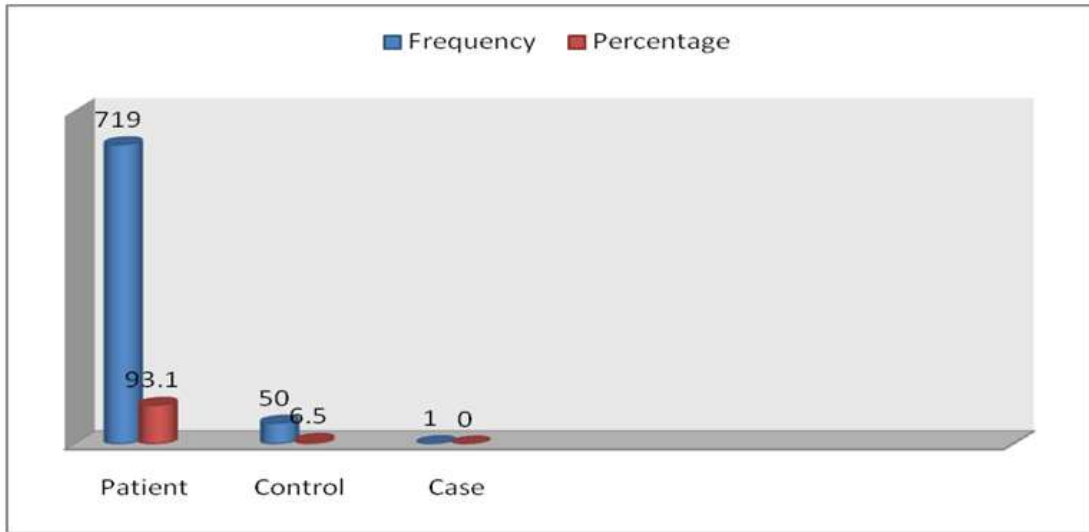


Figure 2: Frequency of study groups

Table 3: Frequency of city/villages

City/villages	Frequency	Percentage (%)
Al Kalakla Al Goba	107	13.9
Al Kalakla Al Teraiaa	93	12.1
Tiba	88	11.4
AlGamhoria	58	7.5
AlWehda	161	20.9
Tabark Allah	152	19.7
AlQadesia	60	7.8
Khartoum	51	6.6
Total	770	100.0

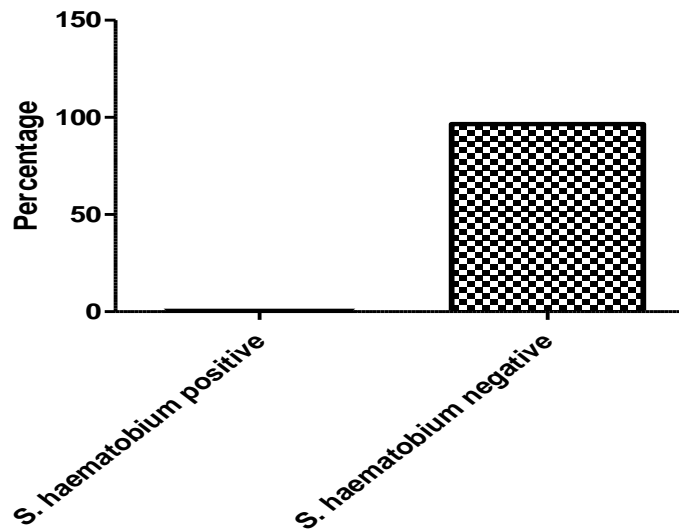


Figure 3: Overall prevalence of *S. haematobium* in the study area by sedimentation technique

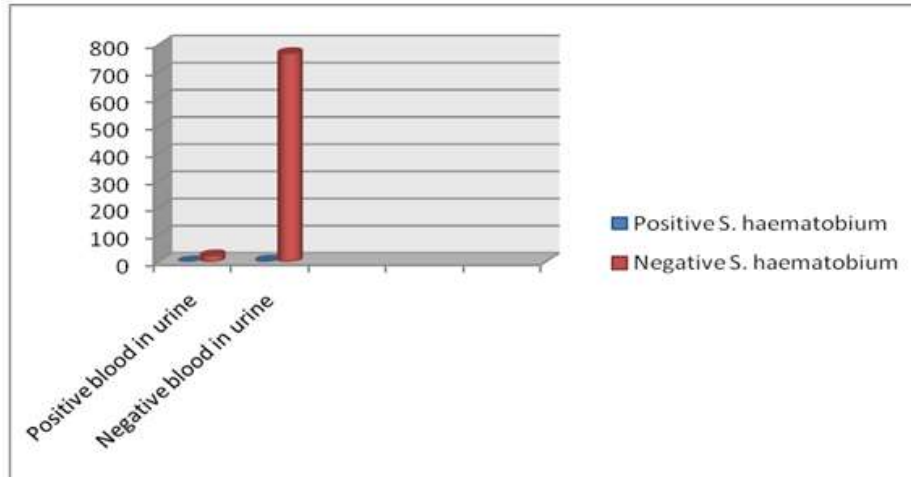


Figure 4: Overall prevalence of *S. haematobium* in the study area according to presence of blood in their urine by sedimentation technique

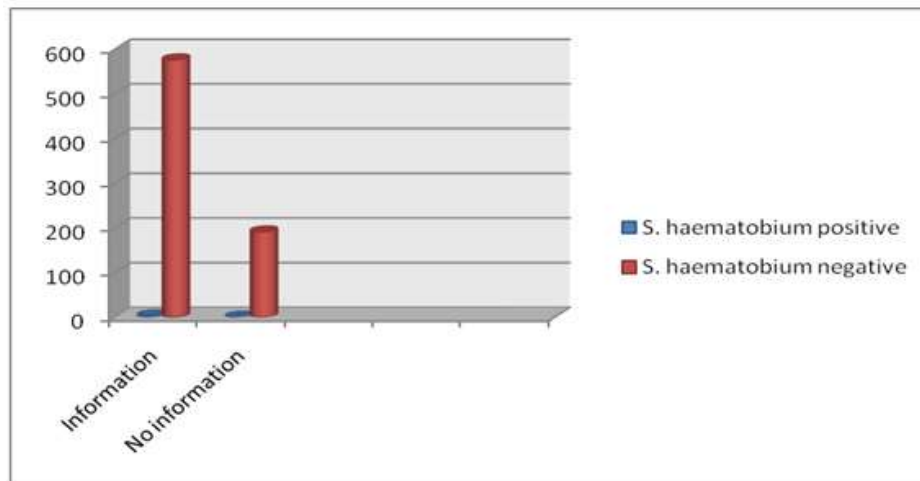


Figure 5: Overall prevalence of *S. haematobium* according to knowledge (information) about an infection in the study area by sedimentation technique

5. Discussion

In the present study we have shown that the prevalence of *S. haematobium* was 0.4 % in El Kalakla area in Khartoum state and no positive cases reported from New Halfa city. This finding was lower than the finding from the study done by Elfaki and Elhassan (2015) [8] who reported the prevalence of *S. haematobium* was 31%. Also this finding was lower than a 35% rate obtained by Elfaki *et al.* (2015) [9] and lower than a 35% and a 65% rates obtained by Elfaki *et al.* (2015) [10] and Nmorsi *et al.* (2005) [11] respectively. The results obtained during this study, revealed that all positive cases of schistosomiasis were prevalent and intense in boys, no case in girls, these findings were in agreement with the findings of Elfaki and Elhassan (2015) [8] who reported the prevalence of *S. haematobium* was higher in

boys than in the girls. The present study reflected that prevalence was more in older children, these findings were similar to findings from the study done by Elfaki *et al.* (2015) [10]. The age and gender factors are well known and are associated with the number and type of water contacts. It has been shown that boys are more exposed than girls because they take more baths [12], and that the level of infection increases with age because schistosomiasis is a chronic infection and children have repeated exposures [13]. The current study demonstrated that the relation between *S. haematobium* infection and presence of blood in their urine (haematuria) was insignificant (p value was more than 0.05, $p=0.761$), these findings were in disagreement with the findings of Elfaki *et al.* (2015) [10] who reported that there

was association between intensity of infection and presence of haematuria. The study showed that the relation between infection and knowledge about an infection was insignificant (p value was more than 0.05, $p=0.319$), these findings were in agreement with the findings of Elfaki *et al.* (2015) [10].

6. Conclusion

The study concluded that the prevalence rate of *Schistosoma haematobium* in the study area was 0.4%. The difference in rates was found to be statistically insignificant according to haematuria and knowledge about the disease.

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