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Faecal Examination in *Schistosoma mansoni* Patients in New Halfa City- Eastern Sudan

Tayseer Elamin Mohamed Elfaki*¹, Waleed Dafalla Suliman Abass² and Ahmed Bakheet Abd Alla³

*¹ College of Medical Laboratory Science, Sudan University of Science and Technology, Khartoum, Sudan,

² Al_ Waleed Medical Complex- Jeddah, Saudi Arabia, E mail: abas.waleed@yahoo.com

³ College of Medical Laboratory Science, Sudan University of Science and Technology, Khartoum, Sudan, Email: ahmed.hassanab@sustech.edu

Corresponding Author: Email: tayseer@sustech.edu

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ABSTRACT

The study aimed to examine *S. mansoni* in faeces among intestinal schistosomiasis patients in New Halfa city. A cross-sectional study was carried out during the period from December 2010 to June 2011. A total number of 100 subjects (35 males and 65 females, age between 6-60 years old, mean age was 19 ± 13 years) were included in this study. Faeces samples were taken from all subjects. Parasitological data were obtained and recorded. Sixty out of 100 (60%) faecal specimens were positive for *Schistosoma mansoni* [22 (22%) were males and 38 (38%) were females] when examined by direct wet preparation and Kato-Katz technique. Kato-Katz technique determined the intensity of infection, 9 out of 60 (15%) were severe, 19 (31.7%) were moderate and 32 (53.3%) were mild infection. Direct wet preparation method and Kato-Katz technique showed similar results in detecting *S. mansoni* in faeces samples and the significant value was less than 0.05. This study indicates that the study area is highly endemic for *S.mansoni* as reflected by the high prevalence rate of infection.

Keywords: Faecal examination, *S. mansoni*, New Halfa city.

المستخلص:

هدفت الدراسة إلى فحص *S.mansoni* في البراز لدى المرضى المصابين بالبلهارسيا المعوية في مدينة حلفا الجديدة. الدراسة المستعرضة نفذت خلال الفترة ما بين شهر ديسمبر 2010م إلى يونيو 2011م. تضمنت هذه الدراسة 100 شخص (35 من الذكور و 65 من الإناث) يتراوح متوسط أعمارهم بين 6-60 سنة. و قد تم أخذ عينات براز من جميع الأشخاص المضمنين في الدراسة. كما تم الحصول على البيانات الطفيلية وتم تسجيلها. تم فحص عينات البراز لتشخيص البلهارسيا المعوية بواسطة استخدام طريقة التحضير الرطب و تقنية الكاتو كاتز، 60 شخص (22%) ذكور و 38 (38%) إناث مصابين و 40 شخص أصحاء. وعند استخدام تقنية الكاتو كاتز لتحديد شدة الإصابة، أظهرت الدراسة أن 9 أشخاص (15%) كانت

إصابتهم طفيفة و 19 شخص (31.7%) كانت إصابتهم متوسطة و 32 شخص (53.3%) كانت إصابتهم شديدة. أظهرت طريقة التحضير الرطب و تقنية الكاتو كاتز نتائج مماثلة في التعرف على *S. mansoni* في البراز و القيمة المعنوية أقل من القيمة الاحتمالية 0.05. توصى هذه الدراسة ان عدوى البلهارسيا المعوية مستوطنة بدرجة عالية في المنطقة كما وضح بمعدل الانتشار العالى للمرض.

INTRODUCTION

Schistosomiasis is a parasitic disease caused by blood flukes (trematodes) of the genus *Schistosoma*. An estimated 700 million people are at risk of infection in 76 countries considered endemic. Transmission is interrupted in some countries. More than 207 million people are infected with schistosomiasis; 85% live in Africa. After malaria, and intestinal helminthiasis, schistosomiasis is the third most devastating tropical disease in the world ⁽¹⁾. Sometimes referred to as bilharzias, bilharziasis, or snail fever. Schistosomiasis was discovered by Theodore Bilharz, German surgeon working in Cairo, who first identified the etiological agent, *Schistosoma hematobium* in 1851 ⁽²⁾. Schistosomiasis is characterized by focal epidemiology and over dispersed population distribution, with higher infection rates in children than in adults. Complex immune mechanisms lead to the slow acquisition of immune resistance, though innate factors also play a part. Acute schistosomiasis, a feverish syndrome is mostly seen in travelers after primary infection. Chronic schistosomal disease affects mainly individuals with longstanding infections in poor rural area. Immunopathological reactions against schistosome eggs trapped in the tissues lead to inflammatory and obstructive disease in the urinary system (*Schistosoma haematobium*) or intestinal disease hepatosplenic inflammation, and liver fibrosis (*Schistosoma mansoni* and *Schistosoma japonicum*)⁽³⁾. The diagnostic standard is microscopic demonstration of eggs in the faecal

specimen and Kato-Katz technique for determining the intensity of infection ⁽⁴⁾. Praziquantel is the drug treatment of choice. Vaccines are not yet available. Great advances have been made in the control of the disease ⁽³⁾. The main objectives of this study were to examine *S. mansoni* in the faeces samples among intestinalschistosomiasis patients in New Halfa city, to detect the intensity of infection by using Kato-Katz technique and to compare between wet preparation method and Kato-Katz technique in detecting the infection.

MATERIALS and METHODS

Study area

This study was carried out in New Halfa City in eastern Sudan, during the period from December 2010 to June 2011. It is an agricultural area, 500 km from Khartoum and 450 meter above sea level and located around 15° N 35° E ⁽⁵⁾.

General characteristics of the studied population and ethical clearance

The study was conducted on 100 subjects from New Halfa City with an age ranging between 6-60 years old and the mean age of 19 ± 13 years, 35 of them were males (35%) and 65 were females (65%). The surveyed populations were categorized into six age groups: (1-10), (11-20), (21-30), (31-40), (41-50) and (51-60) year. The frequency of each age group was 41 (41%), 33 (33%), 17 (17%), 4 (4%), 2 (2%) and 3 (3%) of the total population respectively. Ethical clearance for this study was obtained from College of Medical Laboratory Science- Sudan University of Science and Technology, Ministry of Health-Kassala StateDepartment of Preventive

MedicineOffice of theanti-bilharzia and intestinal worms,New Halfa city and an informed consent was obtained from all subjects included in this study.

Sampling

A total of 100 questionnaires were administered. A total of 100 stool samples were collected, from those filled the questionnaire.

Design of questionnaire

The design of questionnaire include gender, age, observation of blood and mucus in the stool, visit to water bodies (risk factor), history to previous infection and previous treatment, presence of latrines in the houses, source of drinking water and a simple knowledge on the sign and symptoms of the diseases and also employs the activities that put an individual at the risk of infection.

Parasitological investigations

1- Direct wet preparation

For detection of *S. mansoni* in faecal specimens, 100 samples were examined by direct wet preparation as described by WHO (1993)⁽⁶⁾. Three slides were prepared for each stool specimen.

2- Kato-Katz technique

Kato-Katz technique was used for the quantitative assessment of eggs in 1 gram of stool as described by Berhe *et al.* (2004)⁽⁷⁾. The intensity of infection was obtained by counting the number of *S. mansoni* eggs per gram (epg) of stool. Results were expressed as (≤ 50 epg)

presented as mild infection, (51-200 epg) as moderate infection, (201-300 epg) as severe infection and (≥ 400 epg) as hyper infection.

Statistical analysis

Data were analyzed using Statistical Package for Social Sciences (SPSS) under windows, version 15.0. Chi square test, Independent Samples Test and One way ANOVA test statistical analysis was performed and the *p* values of less than 0.05 were considered statistically significant.Data were presented in tables using Excel after analysis using SPSS.

RESULTS

Overall prevalence of *S. mansoni* infection using direct wet preparation and Kato- Katz technique according to gender

A total of 100 stool samples were examined for *S. mansoni* eggs. Out of these, 60 (60%) were found to be positive when detected by using direct wet preparation and Kato-Katz technique. From the 60 positive cases, 22 (22%) were males and 38 (38%) were females (Table 1). Within these 60 positive cases, 32 (53.3%) were mild infection, 19 (31.7%) were moderate infection and 9 (15%) were severe infection and 3 (2.7%) were hyper infection. The differences in prevalence according to gender was found to be statistically significant ($p=0.000$).

Table 1:Overall prevalence of *S. mansoni* infection using direct wet preparation and Kato-Katz technique according to gender

<i>S. mansoni</i>	Gender		Total
	Male	Female	
Direct wet preparation	22	38	60
Kato-Katz technique	22	38	60

Overall prevalence of *S. mansoni* infection using direct wet preparation according to age groups

The positive cases within each age group were 27 (27%), 19 (19%), 7 (7%), 4 (4%), 1 (1%) and 2 (2%) respectively

when using direct wet preparation (Table 2). The differences in prevalence

according to age groups was highly significant (p=0.000).

Table 2: Overall prevalence of *S. mansoni* infection using direct wet preparation according to age groups

	Age groups (year)					
	1-10	11-20	21-30	31-40	41-50	51-60
<i>S. mansoni</i> (+ve)	27	19	7	4	1	2

Prevalence of *S. mansoni* among population with mucus and blood in their stool

Out of 60, 6 (10%) have blood and mucus in their stool while 54 (90%) have no blood and mucus in their stool (Table 3). Chi-square test was used to

determine the relationship between intensity of infection and presence of blood and mucus in their stool (Table 4). The relation between intensity of infection and presence of mucus and blood in stool was insignificant (p=0.371).

Table 3: Prevalence of *S. mansoni* among population with mucus and blood in their stool

Blood and mucus in stool	<i>S. mansoni</i> (+ve)	Percentage
Presence	6	10
Absence	54	90
Total	60	100.0

Table 4: Relationship between intensity of infection and presence of blood and mucus in their stool

Blood and mucus in stool	Intensity of infection			Total
	Mild	Moderate	Severe	
Present	3	1	2	6
Absent	29	18	7	54
Total	32	19	9	60

Relationship between intensity of infection and age groups of patients

Chi-square test was used to determine the relationship between intensity of infection and age groups of study

subjects (Table 5). The relationship between intensity of infection and age groups of study subjects was insignificant (p=0.441).

Table 5: Relationship between intensity of infection and age groups of study subjects

Age groups (years)	Intensity	Mild	Moderate	Severe	Total
1-10		13	11	3	27
11-20		12	5	2	19
21-30		3	3	1	7
31-40		2	0	2	4
41-50		1	0	0	1
51-60		1	0	1	2

Prevalence of *S. mansoni* according to knowledge about the disease

Out of 100, 65 (65%) have knowledge about disease while 35 (35%) have no knowledge about disease (Table 6).

Table 6: Prevalence of *S. mansoni* according to knowledge about the disease

Knowledge about disease	Frequency	Percentage
Yes	65	65
No	35	35
Total	100	100.0

Overall prevalence of *S. mansoni* according to duration of previous infection

Out of 60, 49 (49%) previously infected for (1-11 month), 49 (49%) were found to be positive for *S. mansoni* by direct wet preparation, 6 (6%) of previously

infected for (12-23 month), 6 (%) were positive, 5 (5%) of previously infected for (24-35 month), 5 (5%) was found to be positive (Table 7). The relation between recent infection and the duration of previous infection was significant (p=0.000).

Table 7: Overall prevalence of *S. mansoni* according to duration of previous infection

Previous infection	Recent infection with <i>S. mansoni</i>	
	Duration (month)	<i>S. mansoni</i> (+ve)
1-11	49	49
12-23	6	6
24-35	5	5

According to questionnaire and information which had taken from the study subjects, the majority were farmers with low level of education. All of them have history of water contact. The source of drinking water was water canal and donkey car and this water was used for all domestic purposes. All of them have no latrines in their house.

DISCUSSION

This study was conducted to examine *S. mansoni* in faeces among intestinal schistosomiasis patients in New Halfa city. For detection of *S. mansoni*, each stool sample was examined using direct wet mount by three slides preparation and Kato-Katz technique. The two methods were showed highly significant differences (p=0.000). Examination of stool samples by Kato-Katz smears is

the standard method recommended by the World Health Organization (WHO) for the field diagnosis of intestinal schistosomiasis ⁽⁶⁾. Therefore, Kato technique must be used routinely for stool examinations in laboratories and field work especially for *S. mansoni* because of highly relative sensitivity and ability to detect very mild infections ⁽⁶⁾. This study showed that no association between presence of mucus and blood in stool and intensity of infection (p=0.371) and no association between intensity of infection and age groups of patients (p=0.441). Although, New Halfa city is considered as an endemic area of *S. mansoni* infection due to the presence of many irrigation canals heavily infested with snails of *S. mansoni*, the intensity of *S. mansoni* infection showed

9 severe cases (15%) while 19 were moderate (31.7%) and (65%) have 32 were mild (53.3%). This possibly due to the fact that the parasite induces some degrees of immunity to newly invading cercariae⁽⁸⁾. The results of this study showed that, out of 100, 65 about infection with *S.mansoni* while 35 (35%) have no knowledge about infection although the majority of them with low level education which might be due to the fact that they are living in endemic area with *S.mansoni* and health education program applied. The sources of drinking water are water canal and donkey car and this water was used for all domestic purposes due to absence of water pipes. All of them have no latrines in their houses due to poverty of population.

CONCLUSIONS

This study concluded that direct wet preparation method and Kato-Katz technique showed similar results in detecting *S. mansoni* in faeces samples.

RECOMMENDATIONS

The results of the present study recommended:

1. Direct wet preparation method and Kato-Katz technique should be done in the laboratory for intestinal schistosomiasis patients.
2. Detection of egg of *S.mansoni* by direct wet preparation technique needs more than one preparation from each sample.
3. Kato-Katz technique should be used as the best method for detection of *S. mansoni* intensity.

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