

## PREVALENCE OF SCHISTOSOMIASIS AMONG PATIENTS ATTENDING QENA GENERAL HOSPITAL OVER THE YEARS 2011 AND 2012

By

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### Abstract

Schistosomiasis is a public health problem in Egypt. To detect the prevalence of schistosomiasis in Qena Governorate, 1601 urine and stool samples of patients attending Qena General Hospital were examined of whom 1601 patients had urinary symptoms and 893 patients had dysentery and bloody stool. Sheets were filled out on each patient. Also, a total of 7590 *Bulinus truncatus* and *Biomphalaria alexandrina* snails were collected from water bodies in Qena Governorate. The overall prevalence of *S. haematobium* was 13.9%; with maximum among 6-18 year-old age group and higher in males than in females. Risk factors for *S. haematobium* infection were this age group; particularly males. However, males swim and play in water bodies and women wash cloths and utensils there, and children swimming or playing in canals. The *S. haematobium* peak of infection was in winter correlated with the highest prevalence in Dandara City, Qena City, Awlad-Amr and El Hijarat. *S. mansoni* were negative in the examined individuals. The infective rate among snails was 1.82% in *B. truncatus* and 0.0% among *B. alexandrina* and *M. tuberculata*.

**Key words:** Qena Governorate, Schistosomiasis, Snails intermediate hosts, Parasitologic examination.

### Introduction

Human schistosomiasis--or bilharzia--is a parasitic disease caused by trematode flukes of the genus *Schistosoma*. By conservative estimates, at least 230 million people worldwide are infected with *Schistosoma* spp. Adult schistosome worms colonise human blood vessels for years, successfully evading the immune system while excreting hundreds to thousands of eggs daily, which must either leave the body in excreta or become trapped in nearby tissues. Trapped eggs induce a distinct immune-mediated granulomatous response that causes local and systemic pathological effects ranging from anaemia, growth stunting, impaired cognition, and decreased physical fitness, to organ-specific effects such as severe hepatosplenism, periportal fibrosis with portal hypertension, and urogenital inflammation and scarring (Colley et al, 2014). Schistosomiasis is the third most devastating tropical disease in the world, being a major source of morbidity and mortality for developing

countries in Africa, South America, the Caribbean, the Middle East, and Asia (WHO, 2010).

In Egypt, both urinary and intestinal schistosomiasis coexists. *Schistosoma haematobium* was widely spread throughout the Nile valley while *S. mansoni* was confined to the Nile delta and extended somewhat to Upper Egypt (Hussein, et al, 2005).

An increase in the prevalence of schistosomiasis in Egypt, as a result of the Aswan High Dam, has for long time been predicted because of reclamation of land and conversion of annual flooding (basin irrigation) into perennial irrigation in Upper Egypt. Other reasons for the increase in schistosomiasis transmission due the ecological changes as a consequence of the High Dam were enhancing the transmission of the disease. In addition to the abundance of the snail intermediate host in the Nile, the absence of silt and decrease in water current velocity in the Nile Delta would have given higher chance for the miracidia to come in

contact with the snails and for the cercariae to infect humans (Lotfy *et al*, 2011).

The study aimed to identify the prevalence and incidence of schistosomiasis among outpatients attended Qena General Hospital over two years, 2011 and 2012, and to examine the snails' infectivity of the main vectors; *Bulinus truncatus* and *Biomphilaria alexandrina*.

### Subjects, Materials and Methods

This study was done on 1601 patients attending to Qena General Hospital from January 2011 to December 2012, all with history of water contact (irrigation or swimming or washing utensils), of whom 1601 were suspected to have urinary bilharziasis as indicated by terminal haematuria with or without dysuria. Sheets were filled out on each patient. Urine samples were examined directly or by Nucleopore techniques (Shaker *et al*, 1994).

Also, stool samples were collected from 893/1601 patients suffering from dysentery and bloody stool and examined by direct smear and Kato Katz technique (Abomadyan *et al*, 2004).

A total of 7590 different snails were collected from the River Nile at Gena City and irrigation canals and identified as *Bulinus*

*truncatus*, and *Biomphilaria alexandrina* according to Biocca (1980). *B. truncatus* snails were trapped from water bodies of different localities in Dandara, El-Tramsa, Gabalaw, and Awlad Amr.

Larval Trematode: Cercariae were recovered from the snails, which were placed in fresh water in Petri dishes. Non-shedding snails were kept in the laboratory and re-examined weekly to verify natural infectivity (Yousif *et al*, 1998). Then, all snails were dissected and the fleshy parts were microscopically examined. Snails shedding cercariae and those presenting infection by Mollusca larval stages were recorded. The recovered cercariae were classified (Yousif *et al*, 2013).

Statistical analysis: Data were computerized and analyzed using Statistical Package for Social Science (SPSS) version 16.1. The associations between categorical variables were tested by non-parametric tests as Chi square  $X^2$  test and level of significance was set at p value less than 0.05 levels and 0.001. Associations and comparisons were included if there were difference between infection by *S. haematobium* egg with sexes, age groups, residence and/or seasonal variation.

### Results

The prevalence of positive *S. haematobium* was 1348/1601 with a rate of 84.6%. Details are given in tables (1, 2, 3, 4, 5 & 6) and figures (1, 2, 3 & 4).

Table 1: Prevalence of urinary schistosomiasis regarding sexes from January 2011 to December 2012

Sex	<i>S. haematobium</i> negative		<i>S. haematobium</i> positive		Chi-Square
	Frequency	Percent	Frequency	Percent	
Male	228	90.1	1168	86.6	$X^2 = 885.997$ DF=1 P=0.000
Female	25	9.9	180	13.4	
Total	253	100.0	1348	100.0	

Table 2: Prevalence of urinary schistosomiasis regarding age groups over two years

Age group	<i>S. haematobium</i> negative		<i>S. haematobium</i> positive		Chi-Square
< 5 years	2	0.8	27	2	
5 to <18	171	67.6	954	70.8	
18 to <25	49	19.4	251	18.6	
More than 25	31	12.3	116	8.6	
Total	253	100	1348	100	

Table 3: Prevalence of urinary schistosomiasis regarding residence over two years

Residence	<i>S. haemtobium</i> negative		<i>S. haemtobium</i> positive		Chi-Square
	No.	%	No.	%	
Awlad-Amr	71	28.1	226	19.7	X <sup>2</sup> =2184.352 DF= 11 P=0.003
Dandara	79	31.2	355	26.3	
Ganalaw	2	0.8	38	2.8	
Ghawasa	-	-	7	0.5	
Hijarat	39	15.4	151	0.5	
Homidat	-	-	10	0.7	
Karm Omran	-	-	10	0.7	
Maana	1	0.4	12	0.9	
Mahrosa	-	-	16	1.2	
Qena City	41	16.2	350	26.0	
El-Tramsa	11	4.3	74	5.5	
Twairat	9	3.6	59	4.4	
Total	253	100.0	1348	100.0	

Table 4: Prevalence of urinary schistosomiasis regarding seasonal variation over two years

Season	<i>S. haemtobium</i> negative		<i>S. haemtobium</i> positive		Chi-Square
	No.	%	No.	%	
Winter	80	31.6	415	30.8	X <sup>2</sup> =84.034
Spring	69	27.3	406	30.1	DF=3
Summer	42	16.6	225	16.7	P=0.007
Autumn	62	24.5	302	22.4	
Total	253	100.0	1348	100.0	

Table 5: Snails examined, number infected and percentage

Type of snails	Snails examined	Snails infected	Infection %
<i>Bulinus truncatus</i>	1700	32	1.88%
<i>Biomphalaria alexandrina</i>	5890	0	0 %

Table 6: Number of Infected *Bulinus truncatus* according to their sizes

Snail size	Small sized		Medium sized		Large sized	
	Infected	Not	Infected	Not	Infected	Not
Snail numbers	890	19	570	11	240	2

## Discussion

Human infections with the parasites, especially schistosomes represent a significant segment of the global burden of illness. The schistosomes share the major biological and epidemiological features of macro-parasites (Chistulo *et al*, 2000). *Schistosoma haematobium* documented in Ancient Egyptian mummies as well as mummies from each of the ancient cultures of Peru, the American Southwest, and the Aleutian Islands (Clarke *et al*, 2014).

In the present study, *S. haematobium* was 13.9%. Generally, in Qena Governorate the prevalence varied between 3.8 % (Scott, 1937), to 4% (Wright, 1973), to 28.7 % in three villages in Qus district (Mansour *et al*,

1981), up to an average of 37.1% (ranged from 23.9% to 64 %) in six rural villages of (King *et al*, 1982). Again, Khoby *et al*. (2000) in a Ministry of Health survey reported an incidence of 4.8% for urinary schistosomiasis, while Hammam *et al*. (2000) reported that the prevalence of *S. haematobium* infection among the villages ranged from 0 to 20.6% and in some villages prevalence exceeded of 60%.

In other Egyptian Governorates schistosomiasis *haematobium* showed different prevalence rates. It was 42% in Sohag (Wright, 1973), 27% in Beni-Suef, 4% in Aswan (Miller *et al*, 1981), 1% in Beheira (Mickelson *et al*, 1993), 53.7% in Giza (Talaat *et al*, 1999); 13.7% in Al-Fayoum, 8.9%

in Al-Menia and 5.21% in Assuit, 0.26 % in Gharbiya, 0.45% in Kafr El Sheikha, 0.44% in Al-Menoufia and 2% in Dakhalia, 0.08 in Al-Qalubiya (El Khoby *et al*, 2000), and 2.8 % in Gharbyia (El-Hawey *et al*, 2000). These variations in prevalence may be attributed to human habitats, the changes in the irrigation system and to prevalence of the intermediate host prevalence due to epidemiological pictures.

In the present study, the prevalence of *S. haematobium* infection was higher in males than females, and this agreed with the study of Hammam *et al.* (2000) in Qena Governorate and El Khoby *et al.* (2000) in nine Egyptian governorates as they found that males had higher infection rates than females in all age groups and also similar phenomenon was reported in Giza Governorate (Talaat *et al*, 1999). No doubt, males due to the cultural and behavioral practices especially in Upper Egypt are associated more with working in farms, dealing with animals at the water ranks and canal swimming.

In the present study, age-stratified intensity of infection peaked at the 6 to 18 year old age groups followed by 19 to 25 years; which was explained by the more water contact for irrigation, swimming and washing utensils in females, with marked reduction below five years and above 25 years. The low rate of infection below five years may be explained by low frequency of water contact at this age by swimming or farming, and low infection rates above 25 years is explained by immunity.

The overall prevalence of infection in school children and early adolescence (6-18 years old) was 60.8 % based on the examination of one urine sample. There is significant relationship between the prevalence of schistosomiasis and age ( $P = .048$ ), which agreed with the study done by Barakat *et al.* (1995), Nooman *et al.* (2000) Hammam *et al.* (2000), El Khoby *et al.* (1991; 2000), El Baz *et al.* (2003), Othman (2013) and Othman *et al.* (2014)

The highest rate of infection was mainly in 5 major sites belonging to Qena district which were Dandara, followed by Qena city, then Awlad Amr then Al Hijarat then Tramsa, and finally Twarat, but this not agree with result obtained by Abdel-Nasser and Bin-Dajem (2008), from their study Qena city and Tramsa had the highest rate of infection. This is because the present study done on other areas that not included in the previous study. There is significant relationship between the prevalence of schistosomiasis and residence in the current study ( $P = .0001$ ).

In the present study, there was a significant association between intensity of infection and the seasonal variation as follows: the number of diagnosed infected cases was the highest during winter, then during autumn, followed by spring with the least degree of diagnosed infected persons during summer. This was attributed to the prepatent period of *S. haematobium* infection from time of exposure to the appearance of complains which agreed with data collected about snails in Qena Governorate by Abdel-Nasser and Bin-Dajem (2008) who found that the seasonal variation of the snails showed that the snail numbers peak in **winter** and autumn, and decrease in summer. There was monthly fluctuation of the number of diagnosed infected individuals as follows, December had the highest rate in diagnosis of infection followed by February then March then April then January, October, and November then May. Infection markedly decreased during June, July, August, September with the least number of infected individuals at August (which are the months of exposure in Egypt) and this explained by the time of infection until the time of occurrence of clinical manifestation of infection (formerly as the time needed for the life cycle to be completed in humans where the cercariae reach maturity and start laying eggs) which appear in urine mostly with the terminal haematuria.

In the present study no cases with *S. mansoni* infection were diagnosed, which agreed with the results of Scott (1973) who did not find *S. mansoni*. Medhat *et al.* (1993) reported schistosomiasis *mansoni* in two villages in Assiut Governorate spreading from Lower to Middle and Upper Egypt. They concluded that *B. alexandrina*, which was present in some of the waterways for at least 15 years, were infected by local inhabitants returning from Iraq or by cattle traders or military recruits from the Nile Delta. Talaat *et al.* (1999) reported high prevalence of *S. mansoni* in a village in Giza and declared that an urgent need to include training programs for *S. mansoni* surveillance in the primary health care facilities of and to educate villagers to request examinations for *S. mansoni* as well as for *S. haematobium* infection. El Khoby *et al.* (2000) reported a prevalence of 0.44 %.

In the present study, 32 out of 1700 *B. truncatus* (1.8%) were shedding schistosome cercariae, Dandara and El-Tramsa. This is explain high intensity of infection in these 2 sites especially Dandara as it ranked the first district with higher infection rate of *S. haematobium*. King *et al.* (1982) found 9 out of 4,312 *B. truncatus* infected with schistosomes (0.21%). Also, Abdel-Nasser and Bin-Dajem (2008) in Qena Governorate reported 1.7% infected *B. truncatus*.

### Conclusion

The present findings showed the situation of urinary schistosomiasis and snails intermediate hosts infectivity in some areas of Qena Governorate in Upper Egypt. The results obtained will be helpful in the development of simultaneous control of schistosomiasis snails and diagnosis of schistosomiasis infection at least in school aged children as well as to give information about this water-borne infectious disease and its risky complications.

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### Explanation of figures

Figure 1: Prevalence of urinary schistosomiasis regarding sexes over two years (2011 & 2012).

Figure 2: Prevalence of urinary schistosomiasis regarding age groups over two years.

Figure 3: Prevalence of urinary schistosomiasis regarding residence over two years

Figure 4: Prevalence of urinary schistosomiasis regarding seasonal variation over two years.

Figure 5: A- *Bulinus truncatus*, B- *Biomphalaria alexandrina*

