

Bancroftian Filariasis Still Endemic in Some Foci in Sohag Governorate, Upper Egypt

Refaat MA Khalifa^{1,*}, Amal M Ahmed², Mohamed AA Taha³, Nasr Eldeen MM Ali³, Haitham KA Abd El Samea³

¹Medical Parasitology Department, Faculty of Medicine, Assiut University

²Medical Parasitology Department, Faculty of Medicine, Sohag University

³Medical Parasitology Department, Faculty of Medicine, Alazhar University (Assiut Branch)

Abstract

Bancroftian filariasis (BF) is a debilitating disease that has plagued Egypt since the time of the pharaohs. Egypt is the first large endemic country in the world to reach the five-year mark in its national campaign. Now that the mass treatments are completed, a follow-up epidemiological assessment will reveal whether this large-scale, pioneering campaign has been successful in finally eliminating the disease. Hence the aim of the present work was to detect the prevalence of bancroftian filariasis in Tema, El-Maragha, Akhmeem and Girga districts in Sohag Governorate, Upper Egypt. Finger prick thick blood films were randomly collected from 500 clinically suspected individuals representing different sexes and ages suffering from lower limb non-pitting edema and/or inguinal lymphadenitis from May 2015 to February 2017. Three patients (0.6%) were infected with microfilariae of *Wuchereria bancrofti* while one chronic case was detected with severe chronic elephantiasis that was amicrofilaraemic but was confirmed serologically. Results were discussed in regards of age, gender, occupation, locality and residence. It was concluded that bancroftian filariasis is still endemic in three districts (Tema, El-maragha and Girga). Although in sporadic few cases, the problem should be taken seriously as one microfilaramic patient could be a patent reservoir for spreading of the disease through infecting the prevailing *Culex pipiens* mosquito intermediate host.

Corresponding author: Refaat MA Khalifa, Medical Parasitology Department , Faculty of Medicine, Assiut University, Email: rkhalifa_eg@yahoo.com

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Introduction

Bancroftian filariasis (BF) is a debilitating disease that has plagued Egypt since the time of the pharaohs. Today, the disease is still endemic in some foci mainly in the Nile Delta region of the country. WHO's strategy for the elimination of lymphatic filariasis comprises two main components – stopping transmission of the parasite via mass drug administration campaigns, and home-based care for those who already have the disease [1].

Microfilariae laid by females in lymphatics are carried by lymph to the blood; circulating with nocturnal periodicity into peripheral blood by night. Different culicine (*Culex*, *Aedes*) and Anopheline mosquitoes are intermediate hosts. In their stomach microfilariae lose their sheath, migrate through the gut wall to the thoracic muscles where they moult twice, first into rhabditiform larvae then infective filariform larvae. The latter migrate across the head of mosquito to the labium which when bites man; the infective larvae are dropped on the skin; find their way into his body from the site of the bite or by active penetration. After about one year incubation period, the adults settle in the regional lymph nodes, particularly the inguinal lymph nodes [2]

Filarial infection can cause a variety of clinical manifestations, including lymphoedema of the limbs, genital disease (hydrocele, chylocele, and swelling of the scrotum and penis) and recurrent painful acute attacks. The vast majority of infected people are asymptomatic, but virtually all of them have subclinical lymphatic damage [3].

Egypt is the first large endemic country in the world to reach the five-year mark in its national campaign. Now that the mass treatments are completed, a follow-up epidemiological assessment will reveal whether this large-scale, pioneering campaign has been successful in finally eliminating lymphatic filariasis [1].

W. bancrofti microfilariae were recently detected from culicine mosquitoes in Sohag Governorate through the use of thoracic muscle dissection and PCR estimation [4] concluding that only *Culex pipiens* was the vector of the disease in Tema and El-Maraghah districts. Moreover [5] using simple and Multiplex PCR for filarial xenomonitoring of mosquitoes in the nearby Assiut Governorate found that 8/100 pools were positive for *W.*

bancrofti (0.33%) and concluded that El-Nikhela and El-Motiaa villages and Sahel Selim district were still endemic foci for the disease. Hence, the aim of the present work was to detect the prevalence of bancroftian filariasis through midnight thick blood films in individuals with suspected clinical manifestations in four districts in Sohag Governorate (Tema, El-Maragha, Akhmeem and Girga).

Material and Methods

Initially a written consent was taken from all patients participating in the research as well as an approval of the ethics committee of scientific research in Faculty of Medicine, Sohag University. As well; a written sheet was done for every individual demonstrating name, gender, age, occupation, locality and residence and indicating that all of them were not subjected to blood transfusion before.

Study area: The present study was conducted during the period from 2013 to 2017 in Sohag city; Upper Egypt; located 467 kilometer to the South of Cairo and 92 kilometers to the South of Assiut city. Sohag city has a desert-like climate with temperature day range 21-38 °C, average night degree 4-22°C; very rare rain fall confined to winter season and relative humidity average annually 43.7% and monthly 30.5%. It was chosen as a study area because of two reasons: 1st: It was not surveyed for human bancroftian filariasis since 1987 [6]. 2nd: It contains suitable breeding places of *Culex pipiens* mosquitos, the intermediate host of bancroftian filariasis in Egypt [4]. The study was done in Tema, El-Maragha, Akhmeem and Girga Districts; the culicine mosquitoes of first two districts were proved by thoracic muscle dissection and PCR test to be infested with microfilariae of *Wuchereria bancrofti* [4].

Study methods: Through clinical examination in the Medical Units serving the examined localities where the patients were randomly collected; 500 individuals; 317 males (63.4%), 183 females (36.6%) were enrolled in the study as they were suffering from non-pitting lower limb edema with or without inguinal lymph nodes lymphadenopathy. Giemsa stained thick mid-night blood films were prepared from finger pricks from 155 persons (78 males and 77 females) from El-Maragha district; 145 persons (74 males and 71 females) from Girga district; 105 persons (56 males and 49 females) from Tema district and 95persons (50 males and 45 females) from

Ekhmeem district. The age groups were variable between 10 to more than 50 years old (10<30; 86, 30<40; 123, 40<50 179 and >50 112). Samples were collected from a variety of occupations (65 farmers, 76 skilled workers, 87 unskilled workers, 70 non-workers, 108 employers and 94 house wives. Regarding residence; 371 individuals (74.2%) were from rural areas and 129 individuals (25.8%) were from urban areas. Prepared films were examined by ordinary microscope (x40 and x100) taking care to examine all the fields in a zigzag manner [7].

Results

Using thick blood film examination, three patients were found infected with microfilariae of *Wuchereria bancrofti* out of 500 individuals (0.6%) while one chronic case was detected with severe elephantiasis with no microfilaraemia but was confirmed serologically as positive for *W. bancrofti* in a private laboratory (overall prevalence of infection 0.8%).

BF positive cases were as follows: regarding age; 1/123 (0.8%) in age 30-<40, 2/179 (1.1%) in age 40- <50 and 1/112 (0.9%) in age > 50 (table 1). Regarding gender 3/317 (0.9%) were males while 1/183

(0.5%) were females (table 2), Regarding occupation 2/65 (3.1%) farmers, 1/108 (0.9%) employers and 1/94 (1.1%) housewives (table 3).Regarding residence; 1/155 (0.6%) from Tema, 1/145 (0.7%) from El-Maragha and 2/103 (1.9%) from Girga (table 4).Regarding social conditions; 3/68 (0.8%) from rural areas and 1/125 (0.8%) from urban areas (table 5).

Discussion

As late as 1990, when it was already known that there were foci of filariasis with high levels of endemicity in Egypt [8], the general belief still prevailed that filariasis was a disease of little public health importance in the country. This opinion was held also by many physicians who no longer included filariasis in their differential diagnostic considerations [9].

In the present study using clinical examination and thick blood film examination; the prevalence of BF in Sohag Governorate was estimated to be 0.8%. The present result is a little higher than that estimated from Sohag in 1987 [6] (0.58%) from the same Governorate which indicates that the situation of the disease is still more or less the same as it was since more than 30 years ago. However, the result is much less than that

Table 1. A total estimate of positive cases of *W. bancrofti* according to age as demonstrated by thick blood film test

Positive cases	Age (years)							
	< 30 (n= 86)		30 - < 40 (n=123)		40 - < 50 (n= 179)		≥ 50 (n= 112)	
	No.	%	No.	%	No.	%	No.	%
Positive	0	0	1	0.8	2	1.1	1	0.9
Negative	86	100.0	122	99.2	177	98.9	111	99.1

Table 2. A total estimate of positive cases of *W. bancrofti* according to sex as demonstrated by thick blood film test

Positive cases	Sex			
	Males (n= 317)		Females (n= 183)	
	No.	%	No.	%
Positive	3	0.9	1	0.5
Negative	314	99.1	182	99.5

Table 3. A total estimate of positive cases of *W. bancrofti* according to occupation as demonstrated by thick blood film test

Positive cases	Occupation											
	Farmer (n= 65)		Skilled worker (n= 76)		Unskilled worker (n= 87)		Non worker (n= 70)		Employer (n= 108)		Housewife (n= 94)	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Positive	2	3.1	0	0.0	0	0.0	0	0.0	1	0.9	1	1.1
Negative	63	96.9	76	100.0	87	100.0	70	100.0	107	99.1	93	98.9

Table 4. A total estimate of positive cases of *W. bancrofti* according to residence as demonstrated by thick blood film test

Positive cases	Place of residence							
	Tema (n= 155)		El-Maragha (n= 145)		Ekhmeem (n= 95)		Girga (n= 105)	
	No.	%	No.	%	No.	%	No.	%
Positive	1	0.6	1	0.7	0	0.0	2	1.9
Negative	154	99.4	144	99.3	95	100.0	103	98.1

Table 5. A total estimate of positive cases of *W. bancrofti* according to social conditions as demonstrated by thick blood film test

Positive cases	Residence			
	Rural (n= 371)		Urban (n= 129)	
	No.	%	No.	%
Positive	3	0.8	1	0.8
Negative	368	99.2	128	99.2

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estimated from the neighboring Governorate (Assiut) [10] (5.6%) who documented that the incidence of the disease in Upper Egypt was on the increase enhanced by extending industrialization and urbanization. However, the ratio in Assiut Governorate decreased in 2004 [11] to reach as little as 1.9% (about two and a half folds the present result) which may be due to application of appropriate antifilaria control programs.

The decreased ratio of infection in Sohag can be explained by lacking of rain falling which lead to decrease of water collections and decrease of vectors prevalence, use of insecticides which decrease mosquito bites, increase of urbanized areas and use of elimination programs of bancroftian filariasis.

Routine diagnosis of lymphatic filariasis is difficult as the only inexpensive and feasible method at individual and community levels is through examination of thick blood smears which has to be prepared only at night- (between 10 and 2 pm) [12]

In the present study the prevalence of bancroftian filariasis increased gradually with age, which agrees with findings from other parts as Niger and Nigeria [13, 14] and Ghana [15]. Probably adults present a greater surface area to biting female mosquitoes. Although people including children, are continually exposed to infection, the rate of gain of infection exhibits a convex age profile peaking in the 16– 20 year old age class [16].

The present authors believe that the relation between age and incidence of bancroftian filariasis is more dependent on the efficiency of the mosquitoes in transmitting the infection which is hindered by their inability to introduce the infective larvae directly into the bite wound, as well as the mosquito preference of the chosen host.

In the present study only one out of 182 female patients (0.5%) and three out of 314 male patients (0.9%) were found suffering from acute or chronic BF. In this connection it is interesting that in Giza Governorate all the estimated BF cases were males [17]. The higher infection rate among the male subjects than that among female subjects suggests their high level of exposure to the vectors especially through farming and other behavioral practices that could make

them to be more prone to infection than females [18].

In the present study it was found that three (0.8%) BF cases have been found in rural areas while only one case (0.8%) in an urban area. This ratio is not equal as appearing as the cases that were collected from rural area were about 1/3 of cases that were collected from urban areas.

Generally speaking, BF has been endemic in Egypt for centuries [19]. The Egyptian Ministry of Health and Population has initiated a national programme to eliminate the disease in September, 2000 which was based on WHO's strategy for global elimination of lymphatic filariasis (GPELF) [20]. The plan called for mass drug administration (MDA) in all known filariasis-endemic areas [21] with yearly cycles of single dose diethylcarbamazine (6 mg/kg body weight) and albendazole (fixed dose of 400 mg). This MDA greatly affected variables related to infection (microfilaraemia and circulating filarial antigenaemia prevalence rate) and rates of transmission and after five rounds of MDA, filariasis was likely to have been eliminated in most endemic localities in Egypt [22]. However, in a study in 2007 [23] the autoantibodies in 15 microfilaraemic and 15 amicrofilaraemic patients enrolled from the Marsafa village in Qualiobyia Governorate were studied and in 2008, another study [24] enrolled 54 male patients with asymptomatic cases of BF from still endemic Egyptian governorates (Damietta, Sharkia, Gharbia and Dakahlia) who were treated with Ivermectin and Albendazole and 10 filaraemic cases in El-Korain village (Sharkia Governorate) were enrolled by [25]. Moreover, all the primary school entrants were investigated by ICT and 152 and 167 mosquito pools by PCR for BF from 2 villages in Menoufyia Governorate, Egypt after the 13th round of MDA [26] and it was concluded that the disease seems no longer to be a problem in that area while after 5 years of stopping MDA [27] concluded that BF is no longer a public health problem in the 2 villages and other villages with similar epidemiological condition in Mnoufiya Governorate, Lower Egypt.

Conclusion

Bancroftian filariasis is still endemic in three districts in Sohag Governorate (Tema, El- maragha and Girga). Although in sporadic cases, the problem should be taken seriously as one microfilaraemic patient could be a patent reservoir for spreading of the disease through

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infecting the prevalent *Culex pipiens* intermediate host. Moreover, regular future medical campaigns against the disease in the affected districts is highly recommended.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Author Contribution

Refaat Khalifa: Idea and planning the design of the study.

Amal Ahmed: Collection and Clinical examination of patients and helping in blood samples examination and manuscript writing.

Mohamed Taha: Helping in blood samples examination and results writing.

Nasr Eldeen Ali: Helping in blood samples examination and collection of references and discussion writing.

IHaitham Abd El Samea: Helping in blood samples examination and revising the final manuscript.

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