Surveillance ofbancroftianfilariasis in some foci in Sohag, Middle Egypt

Refaat MA Khalifa*, Amal M Ahmed, Mohamed AA Taha***, Nasr Eldeen MM Ali***, HaithamKA Abd El Samea*****

Medical Parasitology Departments, Faculty of Medicine, Assiut*, Sohag**, Alazhar (Assiut Branch) *** Universities

Abstract

Bancroftianfilariasis (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 anti BF 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 BF inTema, El-Maragha, Akhmeem and Girga districts in Sohag Governorate. Finger prick thick blood films were collected from 500 clinically suspected individuals representing different sexes and ages from May 2015 to February 2017.Fourpatients (0.8%) were suffering from BF; threewere microfilariaemicwhile one chronic case was detected with severe chronic elephantiasis that was amicrofilaraemic but was confirmed serologicallyby by a private laboratory. It was concluded thatBF is still endemic in three districts (Tema, El-maragha and Girga); although in few sporadic 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*Culexpipiense*intermediate host.

Key words:Bancroftianfilariasis, prevalence, Sohag Governorate, Upper Egypt

Introduction

BF is a debilitating disease that has plagued Egypt since the time of the pharaohs. Today, the disease is prevalent mainly in the Nile Delta region of the country. WHO strategy for the elimination of lymphatic filariasis comprises two main components – stopping transmission of the parasite via Mass Drug dministration campaigns and home-based care for those who already have the disease (WHO, 2004). It is a chronic, debilitating vector-borne disease that affects about 68 million people in 73 countries in tropical and subtropical areas of Asia, Africa, the Western Pacific and some areas of the Americas. The disease is transmitted by female*Culex,Anopheles* and *Mansonia* mosquitoes (Bockarie and Molyneux, 2009).

In communities where BF is endemic, all ages are affected. While the infection may be acquired during childhood its visible manifestations may occur later in life, causing temporary or permanent disability. The disease has a major social and economic impact with an estimated annual loss of $1 billion and impairing economic activity up to 88% (Melrose, 2002).

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 acute attacks, which are extremely painful. The vast majority of infected people are asymptomatic, but virtually all of them have subclinical lymphatic damage (WHO, 2017).

Bancroftianfilaiasisisis the second most common vector-borne parasitic disease after malaria, it is found in over 80 tropical and subtropical

countries. WHO estimates that 120 million people are infected with the parasite with one billion at risk. These figures are certain to be revised upwards because global prevalence mapping has not yet been completed (Ottesen, 2000).

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 (WHO, 2004).

BF was recently detecttedfrom culicine mosquitoes in Sohag Governorate through the use of thoracic muscle dissection and PCR estimation (Khalifa*et al.,* 2013) who concluded that only *Culexpipiens*was the vector of the disease in Tema and El-Maraghah districts. Moreover (Dyab*et al.*, 2015) using Simple and Multiplex PCR for filarial xenomonitoring of mosquitoes in the nearby AssiutGovernorate 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 was still endemic foci for the disease. Hence, the aim of the present work is to detect the prevalence of BFthrough midnight thick blood films in individuals with suspected clinical manifestations in 4 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 the Faculty. As well; a written sheet was done for every individual demonstrating name, gender, age, occupation, locality and residence.The present study was conducted during the period from 2013 to 2017 in Tema, El-Maragha, Akhmeem and GirgaDistricts,Sohag Governorate, Upper Egypt which was chosen as a study area because of two reasons: 1st: it was not surveyed for BFsince 1987 through the study of Ebraheem (1987). 2nd: it contains suitable breeding places of *Culexpipiens* mosquitos which were found harboring the infective stagein 2 districts in Sohag Governorate (Khalifa*et al.,* 2013).

Using clinical examination in the Medical Units serving the examined localities where the patients were collected; 500 individuals were enrolled in the study as they were suffering from non-pitting lower limb edema with or without inguinal lymphadenopathy and enlargement.

Thick mid-night blood films were prepared from 155 persons from Tema district; 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, while from Ekhmeem district 95 cases; 45 females and 50 male. 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 317 males (63.4%), 183 females and from a variety of occupations (65 farmers, 76 skilled workers, 87 unskilled workers, 70 non-workers, 108 employers and 94 house wives. Regarding residence; 371individuals (74.2%) were from rural areas and 129 individuals (25.8%) were from urban areas. Giemsa stained thick blood films were prepared through finger prick; examined microscopically for BF microfilariae.

Results

Three patients were found infected with microfilariae of *W.bancrofti* out of 500 individuals (0.6%) while one chronic amicrofilaraemiccase was detected with severe elephantiasis but was confirmed serologically by private laboratory (overall prevalence of infection 0.8%). Results in relation to age, sex, occupation, residence and social conditions are shown in tables 1-5.

Table (1): Positive cases according to age

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): Positive cases according to sex

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

Table (3): Positive cases according to occupation

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): Positive cases according to residence

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): Positive cases according to social conditions

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

In the present study four cases were encountered: two cases from Girga city; the first was 37 years old male employer living in rural area suffering from chronic elephantiasis; while the second was 45 years old male farmer living in rural area suffering from acute BF. One case from EL Maraga city; a 49 years old male farmer living in urban area and one case from Tema city; a 53 years old female housewife living in rural area; both suffering from acute BF.

Discussion

As late as 1990, when it was already known that there were foci of filariasis with high levels of endemicity in Egypt (Khalil 1939, 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 (Shabrawy*et al.*, 1965).

In the present study by clinical examination and thick blood film examination the prevalence of BF in Sohag Governorate was estimated to be 0.8%. This result is a little higher than that estimated by Ebraheem (1987) (0.58%) from Sohag Governorate which indicates that the situation of the disease is still more or less the same as it was since 30 years ago. However, the result is much less than that estimated by Fahmy*et al.*, (1977) (5.6%) from the neighboring Governorate (Assiut) who documented that the incidence of the disease in Upper Egypt was on the increase enhanced by extending industrialization and urbanize-tion. However, the ratio in the same Governorate decreased in 2004 to reach as little as 1.9% (about two and a half folds the present result) as estimated by Mahmoud (2004) which may be due to application of appropriate antifilariasis control programs.

The decreased ratio of infection in Sohag can be explained by lacking of rain falling which lead to decrease of collection of water and decrease of the prevalence of the vectors, use of insecticides which decrease mosquito's bites and increase of urbanized areas and use of elimination programs of BF. 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 preparedonly at night- (between 10 and 2 pm) (Gaur *et al.*, 2007).

In the present study the prevalence of BFincreased gradually with age, which agrees with findings from other parts as Nigeria (Udonsi., 1986, Anosikeand Onwuliri, 1994) and Ghana (Dunyo*et al.*, 1996)' probably because 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 yeasr old age class(Shenoy, , 2003). The present authors believe that the relation between age and incidence of

bancroftianfilariasis is more dependent on the efficiency of the mosquitoes in transmitting the inaction which is hindered by their inability to introduce the L3 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 (Mohamed *et al.*, 1994). 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 and this observation agrees with the study of Martha *et al.* (2000).

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

Generally speaking, BF has been endemic in Egypt for centuries (Michel *et al.*, 1996). However, 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) (Michael *et al.*, 2004). The plan called for mass drug administration (MDA) in all known filariasis-endemic areas (Addis and Brady, 2007 and Elewa*et al.*, 2011) with yearly cycles of single dose diethylecarbamazine (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 (Ramzy*et al.*, 2006) who suggested that after five rounds of MDA, filariasis is likely to have been eliminated in most endemic localities in Egypt. However, Eassa*et al.*(2007)studied the autoantibodies in 15 microfilaraemic and 15 amicrofilaraemic patients enrolled from El-Marsafa village in Qualiobya Governorate and, El-Shazly*et al.* (2008)was able to enroll 54 male patients with asymptomatic cases of BF from still endemic Egyptian Governorates (Damietta, Sharkia, Gharbia and Dakahlia) who were treated with Ivermectin and AlbendaxzolewhileMoussa*et al.*(2008)detected 27 cases from 61 serum samples from males and females from El-Korain villageSharkyia Governorate; 10 filaraemic and 17 with filarial lymphedema.Moustafa*et al.* (2014) determined the status of of BF 5 years after the cessation of MDA in three sentinel villages in Menofiya Governorate by the ICT and CELISA and found that all 1321 children were ICT negative but 27 were antibody positive> They concluded that the CELISA antibody kits needs more standardization and development to be useful under field conditions and hence BF is no longer a public health problem in these villages and other villages under similar epidemiological conditions. More recently, Moustafa*et al.* (2017) underwent a molecular xenomonitoring and transmission assessment of BF elimination in two villages in the same Governorate which revealed that all primary school children and mosquito pools collected frtom both villages were 100% negative and concluded that similar studies should be performed in different areas all around Egypt to evaluate the success of the programme. In accordance the present study was

done and we concuded that the still endemic foci in Sohag Governorate calls for more future BF surveys in the same and other districts and other Egyptian Governoratesand more application of MDA campaigns against the disease in still endemic areas aiming at BF near future elimination.

References

1. Addis, D., Brady, M. (2007): Morbidity management in the Global Programme to eliminate Lymphatic Filariasis: a review of the scientific literature. Filaria J., 6 (2):1-19.
2. Anosike JC, Onwuliri COE. (1994); Studies on filariasis in Bauchi State, Nigeria II.The prevalence of human filariasis in Darazo Local Government Area.*ApplParasitol*; *35:* 242–50.
3. Bockarie, M.J., Taylor, M.J. Gyapong JO. (2009): Current practices in the management of lymphatic filariasis. Expert Rev Anti Infect Ther., 7:595–605.
4. Dunyo, S., Appawu, M., Nkrumah Fk., *et al.,* (1996): Lymphatic filariasis on the coast of Ghana. *Trans R Soc Trop Med Hyg, 90:* 634–8.
5. Dyab, AK, Galal, LA, Mahmoud AE and Mokhtar, Y. (2015): Xenomonitoring of different nematodes using single and multiplex PCR in mosquitoes from Assiut Governorate, Egypt. Korean J. Parasitol.,35 (1): 77-83.
6. Eassa, A., El-Badry, A., Farrag, N. *et al.,* (2007): Autoantobodies in bancroftianfilariasis in an endemic location in Egypt: Association with clinical findings. Kasr El-Aini Med. J., 13 (1): 23-30.
7. Ebraheem, M. E. (1987): *Studies on filariasis and the role played by mosquiteos in its transmission in SohagGovernorate.*M Sc. Thesis in Zoology (Parasitology, Assiut University.
8. El-Shazly, A., Sakr, T., El-Bayoumy, A. *et al.,* (2008): Treatment oof asymptomatic bancroftianfilariasis. J. Med Sci., 29 (2): 931-43.
9. Etewa, S., Mattar, M., Metwally, A. *et al.,* (2011): Evaluation of immunodiagnostic tests for detection of bancroftianfilariasis in some endemic areas in Egypt. G. Med. Sci.,, 32 (2): 875-90.
10. Fahmy,M., Arafa, M., Mandour, A. and Makhlouf, L.(1977); Bancroftianfilariasis in Assiut Area, Upper Egypt. J. Egypt. Soc. Parasitol., 7 (1): 3-9.
11. Gaur, R.L., Dixit, S., Sahoo, M.K., Khanna, M., Singh, S., Murthy, P.K (2007): Anti-filarial activity of novel formulations of albendazole against experimental brugianfilariasis. Parasitology.PMID 12076624.
12. Khalifa, RMA, El-Nadi, NA, Ahmed AM and Hassan, FA. (2013): Histological and PCR xenomontoring of culicine mosquitoes for filarial infestation in Sohag Governorate, Upper Egypt. J. Egypt. Soc. Parasitol.,43 (3): 591-600.
13. halil, M. (1939): The role of Arabic countries and Egypt in the discovery of elephantiasis and filariasis. J Egypt Med Assoc, 22: 86-106
14. Mahmoud, AE, (2004): *Parasitological studies on filariasis in AssiutGovernorate.*MD Thesis, Med Parasitology, Fac. Of Medicine, Assiut University.
15. Martha AR, Rebecca SC, Claudio GC, Ellen MA, Javier SA, Calos C, Allen WH, Allen JM (2000). The Epidemiology of malaria in an Epidermic area of the Peruvian Amazon.*Am. J. Trop. Med andHyg.*62(27): 241 – 256.
16. Melrose, W.D (2002): "Lymphatic filariasis: New insights into an old disease". Int J Parasitol 32 (8): 947–60. doi:10.1016/S0020-7519(02)00062-
17. ichael, E., Bandy, D., and Grenfell, B. (1996): Reassissingthe global

prevalence and distribution of lymphatic filariasis. Parasitol., 112: 409-28.

18. Michael, E., Malecela-Lazaro, M., Simonsin, P. *et al.,* (2004): Mathematical modeling and control ofllymphaticfilariasis.Lancet Infect. Dis. 4: 223-34.

19. Mohamed, N., Safar, E., Fawzy, A. *et al*, (1994): Study of the present status of filariasis in an endemic area in Giza Governorate, Egypt. J. Egypt. Soc. Parasitol., 24 (1): 127-135.

20. Moussa, H., Mahgoub, A. and El-Gammal, N., (2008): Evaluation of a new rapid IgG4 detection test (WB Rapid) for diagnosis of bancroftianfilariasis from endemic areas in Egypt. G. Med. Sci., 29 (1): 325-43.

21. Moustafa, M., Thabbet, H.,El-Setouhy, M. andHamdy, D.(2014): Surveillance of lymphatic filariasis 5 years after stopping mass drug administration in Menoufiya Governorate, Egypt. Eastern Mediterranean Health Journal (EMHJ),20 (5): 195-99.

22. Moustafa, M., Salamah, M., Thabet, H. *et al.,* (2017): Molecular xenomonitoring (MX) and transmission assessment survey (TAS) of lymphatic filariasis elimination in two villages, Menoufyia Governorate, Egypt. Eur. J.Clin. Microbiol. Infect. Dis., 36 (1): 11-50.

23. Ottesen, E.A (2000): The global programme to eliminate lymphatic filariasis. Trop. Med. Int. Health; 5: 591-4.

24. Ramzy, R., El Setuhy, M., Helmy, H. *et al.,* (2006): Effect of yearly mass drug administration with diethylecarbamazine and albendazole on bancroftianfilariasis in Egypt: a comprehensive assessment. Lancet, 367:992-99.

25. Shabrawy, A., Mahdi, A., Naguib, K, and Moharram, A. (1965): Incidence of filariasis in Egypt.J. Egypt. Pub. Health Assoc., 11 (4): 267-282.

26. Shenoy RK. (2003): Filariasis in children. Indian J Lymphol, 1: 7–13.

27. Udonsi, J.K., (1985). The status of human filariasis in relation to clinical signs in endemic areas of Niger Delta.*Ann Trop Med Parasitol* 1986; *80:* 425–32.

28. World Health Organization(2004): Report on the mid-term assessment of microfilaraemia reduction in sentinel sites of 13 countries of the Global Programme to Eliminate Lymphatic Filariasis. WklyEpidemiol Rec 79:358–365.

29. World Health Organization (2017): Weekly epidemiological record: Summary oof global update on preventive chemotherapy implementation in 2016: crossing the billion. 2017: 589-608.