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CANINE DIROFILARIASIS AMONG IMPORTED DOGS IN UPPER EGYPT

(With 1 Table and 3 Figures)

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مرض ديروفيلاريا الكلاب فى الكلاب المستورده بمصر العليا

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سجل البحث إصابة الكلاب المستوردة من سلالة الشبرد الالمانيه بديدان الديروفيلاريا بمحافظة أسيوط بمصر العليا. ولقد تم الكشف عن الإصابة بهذه الديدان فى المسحات الدموية بعدد ٨ من ١٩ كلبا تم فحصهم مسجلا نسبة إصابة ٤٢,١%، حيث ظهرت الأعراض الإكلينيكية على عدد ستة كلاب بينما لم تظهر الأعراض الإكلينيكية على الأثنين الباقين. وكانت الأعراض الإكلينيكية فى صورة تعب وإجهاد شديد بعد عمل أى تمرين خفيف مع نحافة شديدة وقى وكحة شوهدت فى ثلاثة كلاب فقط والذين كانوا يعانون أيضا من إصابات فى الجلد والعينين. هذا وقد واضحة صورة الدم أن جميع الكلاب المصابة تعاني من ارتفاع فى نسبة خلايا الازينوفيل حيث تراوحت نسب هذه الخلايا ما بين ٢٢ إلى ٣٦%. ويعتقد أن الكلاب الضالة المصابة بهذه الديدان هى مصدر العدوى للكلاب المستوردة. ويقترح البحث أن انتقال العدوى بديدان الديروفيلاريا يحدث بواسطة حشرات الناموس المحلية والتي توجد بكثرة فى المناطق القريبة من نهر النيل خاصة فى فصل الصيف. ولقد أوصت هذه الدراسة برعاية الكلاب التى من سلالات أجنبية والمستوردة إلى مصر داخل منازل تغطى فتحاتها بأسلاك عازلة لحشرات الناموس خاصة بالليل وكذلك إعطاء هذه الكلاب جرعات وقائية بصفة دورية ضد الإصابة بديدان الفلاريا.

SUMMARY

Dirofilariasis was reported among imported German Shepherd dogs in Assiut Governorate, Upper Egypt. Microfilariae of *D. immitis* were detected in blood films of 8 out of 19 examined dogs, constituting a total

filarial incidence of 42.1%. Six of them were clinically ill and the other two dogs were asymptotically infected. All clinically diseased dogs were tired, even collapsed, after mild exercise. Severe debility, vomition and cough were noticed also in three of them which were suffering from skin and ocular lesions. Blood of all infected dogs had a high eosinophilia ranged from 22 to 36 %. Stray infested dogs are incriminated as a source of infection to the imported non-infested dogs. We suggested the transmission of *D. immitis* by local mosquito vectors which were found in high population in areas near to the River Nile especially in summer season. The present study concluded that all imported dogs of foreign breeds into Egypt should be housed in insects proof houses especially at night and should be given annually a prophylactic doses of antifilarial compounds.

Key Words: *Canine dirofilariasis-Imported dogs-Dirofilaria immitis-Microfilarid-Eosinophilia.*

INTRODUCTION

Filariasis in mammals is caused by filarial nematodes of the families Filariidae. *Dirofilaria immitis* is widely distributed throughout the world both in tropics and subtropics, and is an important pathogen for dogs (Losos, 1986). It is mainly parasite of domestic dog. It occurs in all breeds and it would appear that all breeds are equally susceptible (Retnasabapathy and San, 1976)

Filarial worms are transmitted by biting arthropods, either ectoparasites or free-flying. Ecological environmental factors rather than phylogenetic properties govern the rate of development and transmission (Losos, 1986). Microfilariae of *Dirofilaria immitis* occurred in the peripheral blood of dogs, direct examination of a drop of blood was preferred in routine practice (Otto and Bauman, 1959). A definitive diagnosis of heartworm disease in dogs, however, is simplified by demonstrating *Dirofilaria* larvae in circulating blood (Palumbo and Perri, 1972). Wong *et al.* (1973) suggested that persistent eosinophilia especially with the presence of serum antibodies to microfilariae of *D. immitis* should lead one to suspect occult dirofilariasis.

The live fifth stage of juvenile worm *Dirofilaria immitis* have the ability to remigrate through tissue into the pulmonary arteries of the host (Hayasaki, 1996). It is suggested that alteration of endothelial cell function by filarial parasites may be an important component in the pathology associated with filariasis (Mupanomunda *et al.*, 1997). Heartworm infection alters histamine-induced constriction responses of pulmonary artery and vein (Maksimowich *et al.*, 1997).

A high prevalence (17 %) of occult filariasis was detected using a serological test in Northern Italy. The prevalence seemed to be affected significantly ($p < 0.01$) by age and degree of outdoor activity (Poglayen *et al.*, 1996). The prevalence of dirofilariasis was generally lower in indoor-kept dogs than in those kept outdoors (Oda *et al.*, 1996). A high prevalence of *Dirofilaria immitis* infection in dogs was observed in six cities in Mexico. Higher prevalences were found in cities with warmer climates (Samano *et al.*, 1996). Capelli *et al.* (1996) studied the host-parasite relationship in canine heartworm infection among stray dogs in a hyperendemic area of Italy. The authors reported the presence of high prevalence (67%) of infection. The authors added that the major risk was in late July and August. In addition the prevalences increased ($p < 0.01$) in dogs from 1-5 years old, and in shepherd and hunting dogs when compared to other breeds.

Canine dirofilariasis was detected previously in 12 out of 40 dogs by Stein and Lawton (1973). The incidence of canine heartworm *Dirofilaria immitis* was 25.8% in Malaysia (Retnasabapathy and San, 1976). Dirofilariasis is still a common and important parasite of dogs in the Sydney region, Austria (Bidgood and Collins, 1996). Clemente (1996) found that the prevalence of canine dirofilariosis is very high in Madeira Island, Spain. Labarthe *et al.* (1997) suggested that heartworm is widespread in the State of Rio de Janeiro in Brazil.

Dog heartworm is a common disease in canines throughout most of the world countries, It is caused by a nematode parasite known as *Dirofilaria immitis* which is commonly found in the pulmonary arteries and right ventricle of infested dogs. It was reported previously in the United States by Otto and Bauman (1959); Healy and Kagan (1960); Walters *et al.* (1981). High prevalences of heartworm infection among dogs were observed in Malaysia (Retnasabapathy and Son, 1976); in Italy (Poglayen *et al.*, 1996; Capelli *et al.*, 1996; Rossi *et al.*, 1996); in Mexico (Samano *et*

al., 1996); in Madeira Island, Spain (Clemente, 1996); in Sydney (Bidgood and Collins, 1996); in Japan (Oda *et al.*, 1996); in Brazil (Labarthe *et al.*, 1997). Canine heartworm infection was reported by JeongChee *et al.* (1996) among German shepherd dogs in South Korea. Canine dirofilariasis was detected in Munich, Germany among dogs imported from Italy, Greece, Corsica and Spain (Zahler *et al.*, 1997). The present study reported canine dirofilariasis among imported German shepherd dogs in Upper Egypt.

MATERIALS and METHODS

Nineteen imported German shepherd male dogs from 5 to 8 years old were examined for filarial infections in Upper Egypt. These dogs were imported since 3-4 years from Germany with very good health and they were free from infectious diseases. They were used as police dogs to help the Egyptian security against pumps, drugs,.....etc., in the security unit at Assiut Governorate, Upper Egypt.

A complete history of each dog was obtained from the police men, including age, sex, breed, length of residence in Assiut security unit, travel history, housing, feeding, and working patterns. None of the surveyed dogs have previously been tested or treated prophylactically for heartworm disease.

Clinical complain:

The history of the disease cleared that 6 dogs had decreased appetite and showed loss in body weight, in addition to cough and vomiting in four of them. These four dogs showed also rapid respiration even at rest and one of them was dead since 2 weeks without clear cause. In February 1998, we visited the farm and clinical examinations of all dogs were done and blood samples were obtained from all dogs (totally 19 dogs). The epidemiological factors and the surrounding environmental conditions were also studied.

Laboratory examinations:

Blood samples were taken from the cephalic vein of the 19 surveyed dogs. One dog was dead before blood sampling. Blood samples

were used for hematological examinations, which included total white blood cells count / mm³ blood and differential leukocytic count. Blood samples were also used for preparation of Giemsa stained-blood films which were used for detection of microfilariae.

RESULTS

Epidemiological study:

In February 1998, we visited the place where the imported dogs are housed in Assiut security unit. We noticed that the dogs are kept outdoors during day times and in non-insect proof houses at nights. All imported dogs are housed just at the River Nile. High insects populations are usually present in such places near by the River Nile especially during the hot months of the summer season.

Clinical findings

Clinical examinations of all dogs in the farm revealed that 6 dogs were clinically ill suffering from recurrent fever (40-41 °C) and very rapid respiration even at rest. The same dogs showed depression, decreased appetite and loss of body weight. Severe debility, vomition and cough were noticed in three of them which had also skin and ocular lesions. All clinically diseased dogs were tired, even collapsed, after mild exercise. The other 13 dogs showed no clinical signs.

Laboratory diagnosis

Microfilariae were detected in 8 out of 19 examined dogs, constituting a total filarial incidence of 42.1 %. All microfilariae (photos 1 and 2) were diagnosed as microfilariae of *Dirofilaria immitis* according to their shape which characterized by a tapered cranial end, straight caudal end and straight body shape as described previously by Otto and Bauman (1959); Sawyer and Weinstein (1963); Stein and Lawton (1973).

Haemtological examinations

The results of haematological examinations were showed in table (1).

Table 1: Total and differential leukocytic count in the 6 dogs infected with *Dirofilaria immitis*.

Dog No.	Age (in Years)	WBCs count	Differential leukocytic count (%)					
			Neutro	Lympho	Mono	Eosino	Baso	Band cells
1	5	10.4	42	15	4	34	0	5
3	5	12.3	49	14	2	32	0	3
4	6	9.5	51	17	1	27	0	4
5	5	9.7	50	18	3	25	1	3
7	6	14.2	46	16	2	31	0	5
14	5	15.2	44	13	1	36	0	6
17	5	12.3	53	14	2	28	1	2
19	7	15.1	60	12	1	22	0	3

Neutro = neutrophils
Eosino = eosinophils

Lympho = lymphocytes
Baso = basophils

Mono = monocytes

DISCUSSION

This study reported heartworm infection (*Dirofilaria immitis*) among imported German shepherd dogs in Assiut city, Upper Egypt. A definitive diagnosis of heartworm disease in dogs, however, is simplified by demonstrating *Dirofilaria* larvae in circulating blood (Palumbo and Perri, 1972). Microfilariae of *Dirofilaria immitis* were detected in blood films of 8 dogs with an incidence of 42.1%. Six of them were clinically ill and the other two dogs were asymptotically infected.

Our epidemiological observations indicated that the imported dogs are housed just at the River Nile, they kept outdoors at day times and in non-insect proof houses at nights. High prevalences of canine dirofilariasis were more in outdoors-kept dogs than in those kept indoor (Poglayen *et al.*, 1996; Oda *et al.*, 1996). Stray *D. immitis* infested-dogs in Assiut City are incriminated as a source of infection to the imported dogs. Heartworm is expected to be quite frequent in places where mosquitoes are abundant. Losos (1986) mentioned that filarial worms are transmitted by biting arthropods, either ectoparasites or free-flying ones. We suggested that the transmission of *Dirofilaria immitis* by local mosquito vectors which are present in high population in areas near to the River Nile especially at night during the hot months of the summer season. These findings agreed with Samano *et al.* (1996) who reported a high

prevalence of *Dirofilaria immitis* infection in dogs in six cities in Mexico with higher prevalences in cities with warmer climates.

The clinical examination revealed that the main clinical manifestations were recurrent fever, decreased appetite and loss of body weight. The diseased dogs were dull, depressed, tired even at rest and collapsed after mild exercise. These clinical symptoms were in agreement with those reported by Losos (1986); Ishihara *et al.* (1978). Severe debility, cough and sometimes vomition were noticed in the three severely affected dogs. They were inactive, fatigue easily and showed exercise intolerance. In radiographic evaluation of canine heartworm disease, pulmonary oedema was only found in dogs with very severe clinical signs (SangKi, 1995). In the present investigations, we noticed also that dogs with severe clinical signs had nodular lesions on their skin, in addition to the presence of inflammatory lesions in their eyes with continuous lachrimation. Thses findings agreed with Scott (1979) and Guterbock *et al.* (1981).

In our clinical study, complications such as haemoglobinurea and ascitis were not observed. Ishihara *et al.* (1978) found that, in serious cases of filariasis, there may be no haemoglobinurea despite the presence of intravascular haemolysis, depending on the severity of haemolysis and the capacity of the related factors to dispose of haemoglobin.

In concerning to haematological examination, we found that all *Dirofilaria immitis* infected dogs had a high eosinophilia ranged from 22 to 36 %. Persistent eosinophilia especially with the presence of serum antibodies to microfilariae of *D. immitis* should lead one to suspect occult dirofilariasis (Wong *et al.*, 1973)

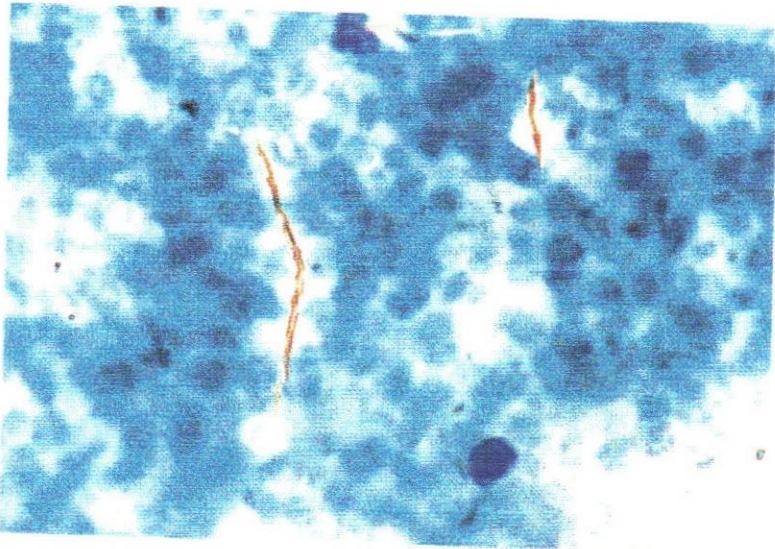
The present study concluded that all imported dogs of foreign breeds into Egypt should be housed in insects proof houses especially at night and should be given annually prophylactic doses of antifilarial compounds.

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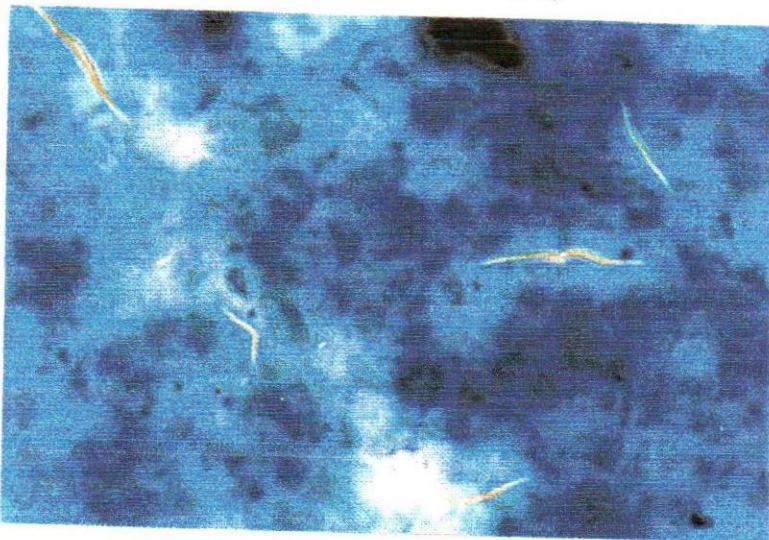
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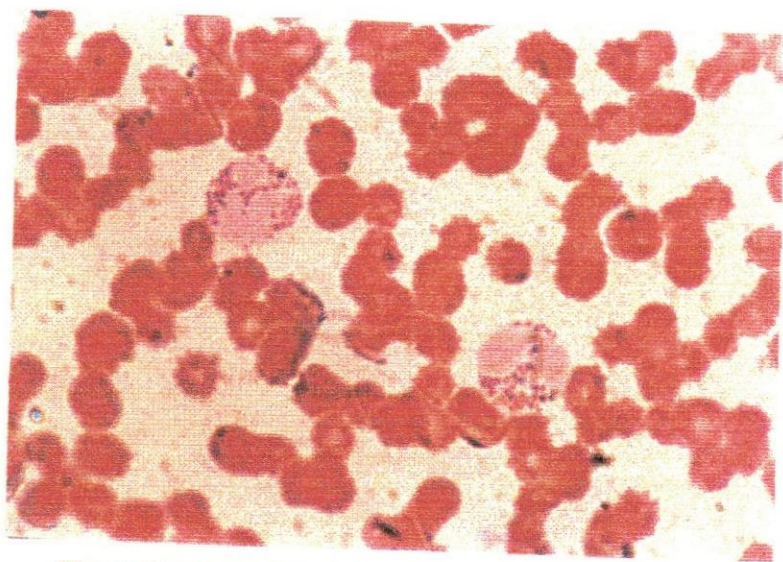
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**Fig. 1: Microfilariae of *D. immitis* in Giemsa stained blood film
(Oil immersion lense x100)**



**Fig. 2: Blood film of heavy infested dog (dog No. 5)
(Oil immersion lense x100)**



**Fig. 3: Eosinophilia in dogs infested with *D. immitis*.
(Oil immersion lense x100)**

