

A study on filariasis of stray dogs in Garmsar

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Abstract: *Dirofilaria immitis* is located in the heart and releases their microfilaria in peripheral circulation. In this study, the blood samples from 122 dogs were taken from cephalic or saphen veins. Samples were examined by the modified Knot method. Then in infected dogs, all microfilaria in each ml. of blood were calculated and adult worms were isolated from heart and their sex was determined. Blood microfilaria were observed in 18 samples (14.75%), microfilaria of *Dirifilaria immitis* in 15 samples (12.29%), microfilaria of *Dipetalonema reconditum* in two samples (1.64%) and mixed infection in one sample (0.82%). The relationship between infection and sex, age and geographical regions was not significant but the rate of infection in Noh Hesar and Ghias Abad was significantly higher than that of other rural regions. The average of microfilaria in each ml. of blood in infected dogs was 4470.6 ± 1243.54 and average of isolated adult worms from heart was 3.13 ± 0.29 . Regarding the presence of infection in Garmsar and the probability infection in humans, the infection should be controlled by the removal of stray dogs and treatment of sheepdogs.

Key words: *Dirofilaria immitis*, *Dipetalonema reconditum*, Garmsar.

Introduction

Dirofilaria immitis or heartworm is more important than other filaria in dogs because it can cause some clinical signs (3). This worm lives in right ventricle, pulmonary artery and posterior vena cava and its microfilaria is found in the peripheral circulation (4). Infection to *Dirofilaria immitis* in carnivores specially dogs is worldwide and was reported from different regions of world (1, 6, 14, 16). *Dirofilaria immitis* was first reported from a dog in Iran in 1969 (15). Then infection to heartworm was reported from different areas of Iran including: Ardebil, Shiraz, Tehran, Tabriz, Tonekabon, Golestan and Khuzestan provinces (2, 7, 8, 9, 10, 11, 12).

In this research, filariasis of stray dogs in Garmsar was studied and the average number of microfilaria in the blood of the infected dogs and its correlation with

the adult worms in the heart was determined.

Materials and Methods

122 stray dogs from different geographical regions of Garmsar were trapped and after recording of necessary information including: age, sex and geographical regions of dogs, the blood samples (1 ml) were taken from cephalic or saphen veins, mixed with 9 ml formaldehyde 2% and shaken well for RBC hemolysis. In the laboratory, these samples were examined by the modified Knot method, centrifuged for 5 minutes in 1500 rpm. Gimsa or Methylene blue stain was added and the mixture was examined for the presence of microfilaria with photomicroscope. The differential diagnosis between microfilaria of *Dirofilaria immitis* and *Dipetalonema reconditum* was done regarding the morphological criteria (4, 5). In the infected dogs, all microfilaria were calculated in each ml. of blood circulation. The infected dogs were euthanized and necropsied, then the adult

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Table 1- Frequency and percentage of the blood filaria of dogs in Garmsar.

No. of dogs	Infection					
	<i>D. immitis</i>		<i>D. reconditum</i>		Mixed infection	
	No.	%	No.	%	No.	%
122	15	12.29	2	1.64	1	0.82

worms were isolated from the dogs' hearts and the sex of the isolated worms was determined.

Results

In the present study, blood microfilaria were observed in 18 samples (14.75%), microfilaria of *Dirofilaria immitis* in 15 samples (12.29%), microfilaria of *Dipetalonema reconditum* in two samples (1.64%) and mixed infection in one sample (0.82%) (Table 1).

The results concerning the relationship between the infection to blood filariasis and the sex of dogs were shown in (Table 2). 15.69% of the male dogs were infected to filariasis and only two female dogs were infected.

Table 2- Frequency and percentage of the blood filaria in Garmsar based on sex.

Sex	No. of dogs	Infection					
		<i>D. immitis</i>		<i>D. reconditum</i>		Mixed infection	
		No.	%	No.	%	No.	%
Male	102	14	13.73	1	0.98	1	0.98
Female	20	1	5	1	5	0	0

The highest rate of infection was shown in 3 year old age group (26.67%). But there is no significant relationship between the infection to filariasis and the age of dogs ($p=0.540$).

The study on the geographical distribution of the infection in Garmsar showed that the highest rate of filariasis was observed in the west of Garmsar (Table 3). But the statistical analysis did not show any relationship between the infection and geographical regions ($p=0.065$). But this analysis showed that the rate of filariasis in Noh Hesar and Ghiasabad is significantly higher than that of the other rural regions ($p=0.003$).

The average of microfilaria in each ml. of the

Table 3- Frequency and percentage of the blood filaria in Garmsar based on the geographical distribution.

Geographical regions		No. of dogs		Infection						Total	
				<i>D. immitis</i>		<i>D. reconditum</i>		Mixed infection			
		No.	%	No.	%	No.	%	No.	%	No.	%
North	Haji Abad	10	8.19	0	0	0	0	0	0	0	0
	Se Baradar	12	9.83	0	0	0	0	0	0	0	0
	Mele Bagh	4	3.28	1	6.67	0	0	0	0	1	25
West	Ghias Abad	18	14.75	6	40	1	50	1	100	8	44.44
	Hosein Abad	4	3.28	0	0	0	0	0	0	0	0
East	Kardavan	8	6.56	0	0	0	0	0	0	0	0
	Rikan	7	5.74	1	6.67	0	0	0	0	1	14.29
	Koshk	8	6.56	0	0	0	0	0	0	0	0
	Mahmood Abad	5	4.10	0	0	0	0	0	0	0	0
	Fand and Shahsefid	7	5.74	0	0	0	0	0	0	0	0
	Shah Bodagh	4	3.28	0	0	1	50	0	0	1	25
	Noh Hesar	2	1.64	2	13.33	0	0	0	0	2	100
Chahar Gheslugh	7	5.74	1	6.67	0	0	0	0	1	14.29	
South	Saroozan	5	4.10	1	6.67	0	0	0	0	1	20
	Lajran	18	14.75	2	13.33	0	0	0	0	2	11.11
	Ghaleno	3	2.46	1	6.67	0	0	0	0	1	33.33
Total		122	100	15	100	2	100	1	100	18	100



Table 4- No. of microfilaria in each ml. of the blood circulation and the adult worms in the heart of the infected dogs to *D. immitis* in Garmsar.

Dogs infected to <i>D. immitis</i>	No. of microfilaria in each ml. of blood	Adult worms in heart	
		Male	Female
1	1020	1	1
2	480	2	1
3	400	1	1
4	1750	1	1
5	8570	1	3
6	11520	2	3
7	5310	1	2
8	13065	2	2
9	1500	1	1
10	820	1	1
11	84	2	1
12	2380	3	1
13	7410	3	1
14	450	1	1
15	12300	3	2
Mean \pm S. E.	4470.6 \pm 1243.54	1.67 \pm 0.21	1.47 \pm 0.19

blood in the infected dogs was 4470.6 ± 1243.54 and the average of the isolated adult worms from the hearts of the infected animals was 3.13 ± 0.29 in which 1.67 ± 0.21 of them were male and 1.47 ± 0.19 were female (Table 4).

Discussion

The conducted studies in different regions of Iran show that the infection to *Dirofilaria immitis* or heart worm is prevalent in extensive areas of the country. The reports show the extensive climatic distribution of the infection to the above-mentioned nematode as follows: Ardebile (34.6%) (2), Tonekabon (15%) (10), Golestan province (18.18%) (11), Shiraz (9.5%) (7), Tabriz (4.8%) (9) and Tehran (1.4%) (8), also in wild carnivores (Khozestan province) (4). Meanwhile, the isolation of the adult worms from hydrocoel of a child of 5 years old shows that the infection to *Dirofilaria immitis* is zoonotic between humans and dogs (13). Due to the fact that Tehran and Garmsar are near to each other (90 km) and the infection was reported in Garmsar, the necessity of this study is felt.

This study shows that the infection to microfilaria exists in the blood of 14.75% of the stray dogs in Garmsar and the use of the diagnostic keys (4 and 5)

clears that 12.29% of them were infected to *Dirofilaria immitis*, 1.64% to *Dipetalonema reconditum* and 0.82% to the mixed infection. So the infection in Garmsar is similar to the obtained results of other studies in different regions of Iran and it was shown that the infection to *Dirofilaria immitis* in Iran is endemic. The rate of the infection to *Dipetalonema reconditum* in Garmsar is also low (1.64%) and is similar to that of other studies including: stray dogs in Mashhad (5.07%) (12) and sheepdogs in Tabriz (4.8%) (9). These findings show that the infection to this nematode is low in Iran.

The statistical analysis did not show any significant relationship between the infection to the blood filarial and the factors including: sex, age and geographical regions. These findings were also in line with those of other studies (2, 10, 11, 12), but Hatsushika *et al.*, showed that the infection in the male dogs (74.7%) was higher than that in the females (6). Meshgi *et al.*, (2002) reported that the highest rate of the infection to *Dirofilaria immitis* (66.7%) was observed in the age range of 9 years old and above. Also the highest rate of the infection to *Dipetalonema reconditum* was observed (9%) in the age range of 5-7 years old (9). The statistical analysis using the one way ANOVA method shows that the rate of the infection was significantly higher in Noh Hesar and Ghas Abad, the cause of which was probably related to the suitable ecological condition in these villages compared with the other rural regions which have dry and desert climatic conditions. Therefore, the condition is suitable for proliferation of flies as intermediated host for *Dirofilaria immitis*. Thus regarding the existing infection in Garmsar and the probable infection in humans, the infection should be controlled by the removal of the stray dogs and treatment of the sheep dogs.



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بررسی فیلاریوزیس سگهای ولگرد در شهرستان گرمسار

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کرم دیروفیلاریا ایمیتیس در قلب سگ جای گرفته و میکروفییلرهای آن در خون محیطی یافت می شود. در بررسی حاضر نمونه خونی از ورید سفالیک یا صافن ۱۲۲ قلاده سگ اخذ شده و نمونه ها به روش نانات اصلاح شده از لحاظ حضور میکروفییلرهای خونی مورد بررسی قرار گرفتند. سپس در سگهای آلوده تعداد میکروفییلرهای موجود در هر میلی لیتر خون شمارش و گرمهای موجود در قلب پس از کالبد گشایی جدا شدند. از تعداد ۱۲۲ قلاده سگ مورد آزمایش، در ۱۸ نمونه حضور میکروفییلرهای خونی مشاهده گردید (۱۴/۷۵ درصد) که در پانزده نمونه میکروفییلر دیروفیلاریا ایمیتیس (۱۲/۲۹ درصد)، دو نمونه دیپیتالونما ر کوندیتوم (۱/۶۴ درصد) و یک نمونه آلودگی مختلط (۰/۸۲ درصد) تشخیص داده شد. آلودگی با عواملی از قبیل سن، جنس و مناطق جغرافیایی ارتباط معنی داری نداشت اما میزان آن بطور معنی داری در روستاهای نه حصار و غیث آباد نسبت به سایر روستاهای بالاتر بود. میانگین تعداد میکروفییلرهای موجود در هر میلی لیتر خون سگهای مبتلا به دیروفیلاریوزیس $4470/6 \pm 1243/54$ بود و میانگین تعداد گرمهای بالغ جدا شده از قلب نیز در سگهای آلوده $2/13 \pm 0/29$ گزارش گردید. با توجه به اینکه آلودگی در سگهای ولگرد شهرستان گرمسار وجود دارد به منظور پیش گیری از گسترش آلودگی می بایست ضمن معدوم نمودن سگهای ولگرد با درمان سگهای آلوده خانگی، انگل فوق را کنترل نمود.

واژه‌های کلیدی: دیروفیلاریا ایمیتیس، دیپیتالونما ر کوندیتوم، گرمسار، ایران

