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# A study on filariosis 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 Khozestan provinces (2, 7, 8, 9, 10, 11, 12).

In this research, filariosis 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.

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## 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

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

| No. of dogs | Infection | | | | | |
|---|---|---|---|---|---|---|
| | *D. immitis* | | *D. reconditum* | | 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 filariosis and the sex of dogs were shown in (Table 2). 15.69% of the male dogs were infected to filariosis 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 | | | | | |
|---|---|---|---|---|---|---|---|
| | | *D. immitis* | | *D. reconditum* | | 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 filariosis 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 filariosis 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 filariosis 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 | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *D. immitis* | | *D. reconditum* | | 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 Gheshlagh | 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 *D. immitis* | 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 ± S. E. | 4470.6 ± 1243.54 | 1.67 ± 0.21 | 1.47 ± 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 Ghias 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 میکروفیلرهای آن در خون محیطی یافت می‌شود. در بررسی حاضر نمونه خونی از ورید سفالیک یا صافن ۱۲۲ قلاده سگ اخذ شده و نمونه‌ها به روش نات اصلاح شده از لحاظ حضور میکروفیلرهای خونی مورد بررسی قرار گرفتند. سپس در سگهای آلوده تعداد میکروفیلرهای موجود در هر میلی‌لیتر خون شمارش و کرمهای موجود در قلب پس از کالبد گشایی جدا شدند. از تعداد ۱۲۲ قلاده سگ مورد آزمایش، در ۱۸ نمونه حضور میکروفیلرهای خونی مشاهده گردید (۱۴/۷۵درصد) که در پانزده نمونه میکروفیلر دیروفیلاریا ایمیتیس (۱۲/۲۹درصد)، دو نمونه دیپتالونما رکوندیتوم (۱/۶۴درصد) و یک نمونه آلودگی مختلط (۰/۸۲درصد) تشخیص داده شد. آلودگی با عواملی از قبیل سن، جنس و مناطق جغرافیایی ارتباط معنی‌داری نداشت اما میزان آن بطور معنی‌داری در روستاهای نه حصار و غیاث آباد نسبت به سایر روستاهای بالاتر بود. میانگین تعداد میکروفیلرهای موجود در هر میلی‌لیتر خون سگهای مبتلا به دیروفیلاریوزیس ۱۲۴۳/۵۴ ±۴۴۷۰/۶ بود و میانگین تعداد کرمهای بالغ جداه شده از قلب نیز در سگهای آلوده ۰/۲۹ ±۳/۱۳ 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، دیپتالونما رکوندیتوم، گرمسار، ایران

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