

# A survey of ectoparasite infestation in dogs in Tehran, Iran

Um levantamento da infestação de ectoparasitos em cães em Teerã, Irã

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## Abstract

This survey was conducted to identify and estimate the frequencies of ectoparasites of dogs in Tehran, Iran. A total of 143 dogs attended at the Small Animal Hospital of the Veterinary School, the University of Tehran, were examined for the presence of ectoparasites and dermatological lesions. Ectoparasite specimens and blood samples were sent to parasitology and hematology laboratories, respectively. Ticks were the most frequent ectoparasite (36.4%, 52/143), followed by fleas (29.4%, 42/143), mites (25.9%, 37/143), and lice (8.4%, 12/143). Mixed infestations with two or more ectoparasites were detected in eight dogs. *Rhipicephalus bursa* was the most frequent ectoparasite in spring and summer. Ectoparasitic infestations were recorded mainly in large breeds and juvenile animals. Eosinophilia was more observed in dogs infested with *Sarcoptes scabiei*. The most common clinical sign, skin pruritus, was associated with mite and lice infestations. These results indicate that the tick *R. bursa* was the most prominent species of ectoparasite found in the evaluated group, followed by *Ctenocephalides canis* and *S. scabiei* var *canis*.

**Keywords:** Ectoparasites, *Rhipicephalus bursa*, dogs, *Ctenocephalides canis*, *Sarcoptes scabiei*, Iran.

## Resumo

Esta pesquisa foi realizada para identificar e estimar a frequência de ectoparasitas de cães em Teerã, Irã. Um total de 143 cães, atendidos no Hospital de Pequenos Animais da Faculdade de Veterinária da Universidade de Teerã, foi examinado para a pesquisa de ectoparasitas e lesões cutâneas. Espécimes de ectoparasitos e amostras de sangue coletadas foram enviadas para exame em laboratório de parasitologia e hematologia, respectivamente. Os carrapatos foram os ectoparasitos mais frequentemente encontrados (36,4%, 52/143), seguidos por pulgas (29,4%, 42/143), sarnas (25,9%, 37/143) e piolhos (8,4%, 12/143). Infestações mistas com dois ou mais ectoparasitos foram observadas em oito cães. *Rhipicephalus bursa* foi o ectoparasito mais frequente na primavera e verão. Infestações de ectoparasitos foram registradas principalmente em raças maiores e animais jovens. Eosinofilia foi mais observado em cães infestados com *Sarcoptes scabiei*. O sinal clínico mais comum, prurido na pele, esteve associado às infestações por ácaros e piolhos. Estes resultados indicam o carrapato *R. bursa* como ectoparasito mais comum no grupo avaliado, seguido por *Ctenocephalides canis* e *S. scabiei* var *canis*.

**Palavras-chave:** Ectoparasitos, *Rhipicephalus bursa*, cães, *Ctenocephalides canis*, *Sarcoptes scabiei*, Irã.

## Introduction

Ectoparasites live on, feed on and inhabit the external body surfaces of vertebrates, including dogs (WALL; SHEARER, 2001). They have considerable pathogenicity and may even cause death, according to parasitism intensity, nutritional status and the host's immunological condition (SCOTT et al., 2001). They can also act as vectors for a wide variety of infectious agents such

as: *Babesia* spp., *Ehrlichia* spp., *Anaplasma* spp., *Rickettsia* spp., *Borrelia* spp. and *Yersinia pestis*, and/or as intermediate hosts of filarids and cestodes, which cause serious diseases in dogs and people in contact with them (LITTLE, 2009). In addition, canine sarcoptic mange and fleas can directly cause pruritic skin lesions in humans (HEWITT et al., 1971). It has been reported that various zoonotic vector-borne diseases are endemic in different parts of Iran, such as plague, murine typhus, endemic typhus fever, cutaneous and visceral leishmaniasis, tick-borne relapsing fever and Lyme disease (FAULDE, 2010).

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Identifying ectoparasites and understanding their distribution are fundamental for designing control programs and strategies. Despite the significant dog population in Tehran, information regarding ectoparasites on domestic dogs is still lacking (SHOORJEH et al., 2008; BAHRAMI; DELPISHEH, 2010; TAVASSOLI et al., 2010). This study was carried out to identify and estimate the frequencies of ectoparasites occurring on dogs in Tehran.

## Materials and Methods

Tehran lies at 35° 68' N and 51° 35' E and is at an altitude of 1191 meters above sea level. Its climate is largely defined by its geographical location, with the Alborz Mountains towering to its north and the central desert to the south. The city has a semi-arid, continental climate.

One hundred and forty-three dogs referred to the Small Animal Hospital of the Veterinary School, the University of Tehran, a reference center in Iran, were examined for the presence of ectoparasites in different seasons of the year (from September 2006 to September 2007). Information about age, sex, body weight, living environment, clinical signs and season were recorded. All the dogs were classified in one of two groups, juvenile ( $\leq 6$  months) or adult ( $> 6$  months), and in one of two categories, small breeds ( $\leq 10$  kg) or large breeds ( $> 10$  kg). They also were divided into outdoor and indoor, based on their access to the outdoor environment.

Ticks, fleas and lice were collected respectively by using forceps, combing or brushing. From dogs with dermatological lesions, four samples of deep skin scrapings were collected from the head, pinnae, thoracic-abdominal areas, and elbows or paws. The ectoparasite species were identified in accordance with the keys provided by Wall and Shearer (2001). After blood sample collection (in EDTA-coated tubes) from all the dogs by means of cephalic venipuncture, a complete blood cell count (CBC) was performed. A chi-square test was used to determine any significant associations between age, sex, body weight, season, hair shedding, pruritus and ectoparasite species ( $p \leq 0.05$ ). Furthermore, the Kolmogorov-Smirnov and independent t tests were applied to analyze the hematological parameters.

## Results

Among the 143 dogs examined, 52 (36.4%) were found to be infested with ticks (*Rhipicephalus bursa* and *Rhipicephalus sanguineus*),

while fleas (*Ctenocephalides canis* and *Pulex irritans*), mites (*Sarcoptes scabiei* var. *canis*, *Otodectes cynotis* and *Demodex canis*) and lice (*Trichodectes canis* and *Linognathus setosus*) were found on 42 (29.4%), 37 (25.9%), and 12 (8.4%) of the dogs, respectively. The most common ectoparasite species was the tick *R. bursa*, whereas *D. canis* was the parasite least frequently detected. Mixed infestations with two or more ectoparasites were detected on eight dogs (5.6%). In the spring and summer, ticks (45.6% and 51.7%), especially *R. bursa* (38.6% and 44.8%), were the most prevalent ectoparasitic species. During the fall, fleas were the most frequent parasites (55.6%), whereas mites (38.1%), especially *S. scabiei* var. *canis* (33.3%), prevailed in winter (Table 1). Ectoparasitic infestations were recorded on 82 male dogs (57.3%) and 61 female dogs (42.7%). *Rhipicephalus bursa* was the most abundant infesting species both on males (32.5%) and on females (24.6%). The least abundant ectoparasitic species found in this study were *L. setosus* on males (1.2%) and *D. canis* on females (1.6%).

Mites and ticks were the most frequently collected ectoparasites in 90 infested juvenile dogs (31.1%) and 53 infested adult dogs (47.2%), respectively. Flea and tick infestations were more common among outdoor animals (40.5%) than among indoor dogs (25.2%). Mite infestation was more frequent among indoor dogs. Large dog breeds were more frequently affected by all ectoparasites (ticks, fleas, mites and lice) than small breeds (67.1%, 96/143).

The most common clinical sign among the animals examined was pruritus (55.9%), followed by alopecia (30.8%). Pruritus was observed more among animals infested by mites (43.8%) and fleas (26.3%). Thirty infested dogs (20.9%) had eosinophilia and almost half of these were mite-infested. Low hematocrit levels were detected in forty infested dogs (27.9%).

## Discussion

In the present study, nine distinct species of ectoparasites were collected from dogs in Tehran, Iran (Table 1). The most common ones were ticks (*R. bursa*), fleas (*C. canis*) and mites (*S. scabiei* var. *canis*). These results are in agreement with those of González et al. (2004) in Argentina, Nithikathkul et al. (2005) in Thailand, Aldemir (2007) in Turkey and Ghosh et al. (2007) in Bangladesh, India and Pakistan.

*Ctenocephalides canis* was reported as the most prevalent flea species on dogs in countries such as Ireland (WALL et al., 1997), New Zealand (GUZMAN, 1984), Thailand (NUCHJANGREED;

**Table 1.** Ectoparasite species and frequency of infestations detected in dogs in Tehran according to season.

Seasons	Ectoparasite species																Total			
	Ticks				Fleas				Lice				Mites							
	<i>R. bursa</i>		<i>R. sanguineus</i>		<i>C. canis</i>		<i>P. irritans</i>		<i>T. canis</i>		<i>L. setosus</i>		<i>S. scabiei</i>		<i>O. cynotis</i>		<i>D. canis</i>			
	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%	#	%		
Spring	22	38.6	4	7.0	8	14.0	2	3.5	4	7.0	1	1.8	14	24.6	2	3.5	0	0	57	39.9
Summer	13	44.8	2	6.9	4	13.8	2	6.9	3	10.3	1	3.4	3	10.3	1	3.4	0	0	29	20.3
Fall	5	13.9	1	2.8	19	52.8	1	2.8	1	2.8	0	0	6	16.7	0	0	3	8.3	36	25.2
Winter	3	14.3	2	9.5	5	23.8	1	4.8	0	0	2	9.5	7	33.3	1	4.8	0	0	21	14.6
Total	43	30.1	9	6.3	36	25.2	6	4.2	8	5.6	4	2.8	30	21.0	4	2.8	0	2.1	143	100

Note: Symbols: (#) number of ectoparasites collected; (%) percentage.

SOMPRASONG, 2007), some area of England (EDWARDS, 1969) and Nigeria (AGBOLADE et al., 2008). Although *C. felis* was not found in this study, it was reported to be the most abundant flea in dogs of the Caspian Sea area of Iran (TAVASSOLI et al., 2010), Spain (GRACIA et al., 2008) and United State of America (HARMAN et al., 1987; DURDEN et al., 2005). These differences might be due to the dissimilar temperature and humidity in each geographical area, which affects the survival and reproduction of fleas.

Although previous studies reported that *R. sanguineus* was the most frequent tick species in dogs in two different areas of Iran, Ilam (BAHRAMI; DELPISHEH, 2010) and Shiraz (SHOORIJEH et al., 2008), the present study in Tehran found that the tick *R. bursa* was more frequent. This discrepancy is not easy to explain, but environmental and climatic factors as well as social and cultural factors relating to urban or rural ways of life might play a role. More studies are needed in order to understand the biology of these flea and tick species, as well as their geographical distribution trends.

Although ectoparasites were found on dogs throughout the year in Tehran, they were more prevalent in spring (Table 1), and there was a significant relationship between season and infestation ( $p = 0.03$ ). In detail, ticks were collected more frequently in spring and summer, fleas in autumn and mites in winter. These findings are similar to what was observed by other investigators in other countries (GONZÁLEZ et al., 2004; BECK et al., 2006; RINALDI et al., 2007; GRACIA et al., 2008; XHAXHIU et al., 2009). Ectoparasites require optimum temperature and humidity for growth, development, reproduction and survival, as well as access to food (WALL; SHEARER, 2001). The seasonal occurrence of ectoparasitic infestations may be associated with variations in these requirements across the seasons, although the seasonal abundance of ectoparasites may vary widely between geographical regions (DURDEN et al., 2005).

The results obtained indicated that ectoparasite infestations are more frequent in male than in female dogs. This is in agreement with Chee et al. (2008), who reported that males had higher prevalence of ectoparasites. Furthermore, the majority of the infestations were recorded in large breeds and outdoor animals. These findings may be related to the characteristics of the population studied, which consisted predominately of males and guard dogs. Contact with other stray dogs, wild canids (The Iranian Department of the Environment has reported that foxes, jackals and wolves exist around Tehran and some protected areas of Tehran province) and/or rodents can be considered important factors as well. Although the quantity of ectoparasites was higher among juvenile dogs, this difference was not statistically significant ( $p > 0.05$ ).

Pruritus, the major clinical sign, was more common in dogs infested with mites and fleas. A recent report showed that more than 29.7% of flea-infested dogs had pruritus (RINALDI et al., 2007). The variety of histamine-like compounds, enzymes, polypeptides and amino acids in the flea's saliva can induce type I, type IV and basophile hypersensitivity reactions (HALLIWELL et al., 1987), and therefore hypersensitivity reactions to flea saliva can be blamed for pruritus (GROSS; HALLIWELL, 1985; SCOTT et al., 2001). Feeding, burrowing and production of antigenic material by the mites can stimulate an inflammatory response (WALL;

SHEARER, 2001). Eosinophilia and low hematocrit levels were more frequently detected in cases of mite and tick infestations. Such blood alterations may have been caused by feeding behavior (blood-sucking) and antigen stimulation (WALL; SHEARER, 2001; SCHULTZE, 2010). However, there was no significant relationship between any of the ectoparasite infestations and the eosinophil count or hematocrit level. This is in accordance with Heukelbach et al. (2006) and Pilger et al. (2011) who reported that eosinophilia was not significantly associated with the presence of ectoparasites.

The present study provides new information about dog ectoparasite species, their seasonal occurrence, clinical signs and laboratory findings in Tehran, Iran. These results and the zoonotic importance of some of the ectoparasites warrant preventive and therapeutic programs to be used routinely all year round.

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