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Canine microfilariosis in and around Shivamogga, Karnataka: A Epidemiological study

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Abstract
An epidemiological study was conducted to determine prevalence of canine microfilariosis in and around Shivamogga, Karnataka for a period of one year from March-2018 to February-2019. A total of 101 blood samples were collected from dogs suspected for microfilariosis and were screened for microfilaria by modified Knott's method. Out of 101 samples screened, 4 samples were found positive for microfilaria with prevalence of 3.9 per cent. The species of microfilaria was identified as *D. repens* based on the morphology and micrometry. Age wise prevalence was found highest in 1-3 years old dogs. The infection was seen only in males and no female dogs found positive for microfilariae. The breed wise prevalence was found highest in Boxer breeds. During the present study, the highest prevalence was observed during winter season from January to February months. The infection was found more in dogs kept outdoor as well as near farm area compared house hold dogs.

Keywords: Epidemiology, Canine microfilariosis, *D. repens*, Shivamogga

Introduction
Microfilariosis in dogs is caused by several species of filarid nematodes *viz Dirofilaria immitis*, *D. repens*, *Acanthocheilonema* spp. *Brugia* spp. etc. Among these, *D. immitis* is the most pathogenic canine filarid nematode causes heartworm disease in dogs whereas, *D. repens* is responsible for subcutaneous dirofilariosis. Even though *D. repens* is considered as less pathogenic in dogs, the ability to infect humans makes it as zoonotic important parasite. Canine filariosis is reported from many countries including India. Most common filarial species reported in India are *D. immitis*, *D. repens*, *Acanthocheilonema* spp. and *Brugia* spp. They are distributed in various parts of India, mainly Kerala, Tamil Nadu, Karnataka, Orissa, West Bengal, Bihar, Uttar Pradesh and Maharashtra [1]. In general, it is believed that, *D. immitis* is mostly prevalent in north eastern India [2] while *D. repens* is confined to southern parts of the country [3, 4].
D. immitis and *D. repens* uses mosquitoes of several genera including *Culex*, *Aedes* and *Anopheles* as vectors. The distribution of *Dirofilaria* species is not determined by the availability of the vectors but rather by the ability of microfilariae to mature into infectious larvae in the mosquito vector, as maturation is temperature dependent. India has a wide range of climatic zones, from montane (cold, wet, pine) and semi-arid regions to the wet tropics, which make it suitable for a diverse range of vectors and pathogens of medical and veterinary importance, whose transmission and geographical distribution are closely linked to regional temperature, rainfall and humidity [5].
The prevalence of canine filariasis varies from one geographical area to other mainly because of differences in climatic conditions and distribution of vector. The risk factors for canine filariasis include age, gender, season, topography and housing conditions of the dogs. The adult worms of *D. repens* are commonly occur in the subcutaneous tissue causes subcutaneous dirofilariasis and are considered as moderate pathogenic. Most infections caused by *D. repens*, *Acanthocheilonema* spp. and *Brugia* spp. have minimal veterinary clinical significance, however all canine filariae can infect humans and remain important from a public health prospective [6]. Therefore, the present study was undertaken to ascertain the epidemiology of microfilariosis in dogs and its species identification, which is important for surveillance programme and therapeutic implications.

Materials and Methods
A total of 101 dogs presented to Teaching Veterinary Clinical Complex, Veterinary College,

Shivamogga (Malnad region of Karnataka located at 13°56′N 75°34′E and mean altitude of 569 m above sea level with an area of 70.01 km^2) were included in the present study. The blood samples were collected from the dogs suspected for microfilariosis for a period of one year from March-2018 to February-2019 in ethylene diamine tetra acetic acid (EDTA) from recurrent tarsal vein for screening. The samples were examined on the same day for detection of microfilariae by modified Knott's method as per Lindsay (1965). The detail history of dogs regarding age, sex, breed, topography and housing conditions were recorded. The Identification of Microfilaria was done as per the description by Soulsby (2005) and Bowman (2014). To study the age wise prevalence, different age groups were categorised as <1 year, 1-3 years, 3-5 years and > 5 years. The season wise prevalence was recorded in four seasons such as summer (March, April and May), South-west monsoon (June, July, August and September), North-east monsoon (October, December and November) and winter (January and February). The breed and gender wise prevalence was also studied during the present study.

Results and Discussion

Out of 101 blood samples screened for a period of one year from March-2018 to February-2019, 4 samples were found positive for microfilariae by modified Knott's method with prevalence of 3.9 per cent. Ananda and Placid (2007) reported 38.09 percent prevalence of canine microfilariosis in Mangalore region whereas, Radhika *et al.,* (2001) reported 7.95 percent prevalence of canine microfilariosis in Thrissur, Kerala region. The variation in prevalence rate may be due to the fact that, the study conducted in different period of time and in different geographical area because of difference in the distribution of the vector, topography, environment and average age of the study population. Although temperature is the main influencing factor for transmission of dirofilaria as per Brown *et al.* (2012), many other factors influence the transmission are precipitation, relative humidity, human and animal population density and socio economic status.

Morphologically, the microfilariae were unsheathed with blunt head and the tail was long, curved with hook like posterior end. The length and width of microfilaria were in the range of 309.9±11.10µm and 5.81±1.28µm respectively. Based on morphological features and morphometry, the microfilariae were identified as *Dirofilaria repens* as per the descriptions of Soulsby (2005) and Bowman (2014).

In the present study, out of 48 male dogs screened for microfilariae, 4 (8.33%) were found positive and no female dogs were found positive for microfilariae. The age wise prevalence was observed highest in 1-3 years age group (12.5%), followed by 3-5 years age group (6.25%), >5 years age group (3.03%) and dogs under one year of age were found negative for microfilaria (Table.1). The higher prevalence of microfilariosis in adult and male dogs recorded in the present study is in accordance with the previous studies [11, 13], who reported higher rate of microfilariosis in male and older dogs. This may be due to the exploratory life style of male dogs and increased exposure risk to mosquitoes in adult dogs. The least prevalence in young puppies may be due to the fact that approximately 10 months is required for L3 larvae to become adults and then to produce microfilariae.

The seasonal study revealed, highest prevalence of microfilariosis during winter (20%) followed by summer (7.89%) and no prevalence was observed in both south-west and north-east monsoon seasons (Table.1). In the present study, the higher prevalence was recorded during winter season, while Radhika *et al.* (2001) reported higher prevalence in summer whereas, Deepa and Alex (2011) reported highest in winter. This variation might be due to the fact that, the mosquito vector play a role in transmission of dirofilariasis and whose development and survival need favourable climate conditions *viz.* temperature, rainfall and humidity [5].

During the present study ten breeds of dogs were screened for microfilariosis. The breed-wise prevalence of microfilariosis was found highest in Boxer breed (100%), followed by Doberman (7.69%), Non-descript (3.44%), Labrador (2.94%) and no microfilaria were detected in other breeds including Golden Retriever, Rottweiler, Great Dane, Pit Bull, German Shepherd and American Terrier. Statistically there was a significant difference ($P< 0.05$) was observed between the breeds (Table. 2). The variations in the breed wise prevalence of microfilariosis may be due to the representation of these breeds in the study population was highest among those examined as reported by Bhattacharjee and Sarmah (2014).

During the study, it was also observed that, the dogs kept in outdoor conditions showed 4.93 percent positivity and no dogs kept indoor found positive for microfilariae. The topographical study revealed that, the dogs from near farm topography showed 7.01 percent positivity whereas, dogs from urban, near drainage and marshy topography were found negative for microfilariae (Table. 3). This might be due to more exposure of dogs to mosquito vector and keeping animals indoors may reduce the exposure risk to disease transmitting mosquitoes as reported by Walter (1996) and Theis *et al.,* (1999).

Table 1: Age wise, sex wise and season wise prevalence of microfilariosis in dogs

	Age (Years)				Sex		Season			
	<1	1-3	3-5	>5	Male	Female	Summer	South West monsoon	North East monsoon	Winter
Number of dogs examined	17	16	35	33	48	53	38	38	20	5
Number positive	0	2	1	1	4	0	3	0	0	1
Per cent Prevalence	0	12.50	6.25	3.03	8.33	0	7.89	0	0	20.00

Table 2: Breed wise prevalence of microfilariosis in dogs

Sl. No.	Breed	Number of dogs examined	Number positive	Per cent Prevalence	X^2 Value
1.	Non-descript	29	1	3.44	8.955*
2.	Labrador	34	1	2.94	
3.	Doberman	13	1	7.69	
4.	Boxer	1	1	100.00	
5.	Golden Retriever	6	0	0	
6.	Rottweiler	9	0	0	
7.	Great Dane	4	0	0	
8.	Pit bull	2	0	0	
9.	German Shepherd	2	0	0	
10.	American Terrier	1	0	0	

* - Significant at $p \leq 0.05$

Table 3: Topography and housing conditions wise prevalence of microfilariosis in dogs

	Topography				Housing conditions	
	Near drainage	Near farm	Urban	Marshy	Outdoor	Indoor
Number of dogs examined	4	57	38	2	81	20
Number positive	0	4	0	0	4	0
Per cent Prevalence	0	7.01	0	0	4.93	0

Conclusion

This is the first report on prevalence of canine microfilariosis in and around Shivamogga, Karnataka. During the present study, species of microfilaria identified was *D. repens* based on the morphology and micrometry. The highest prevalence of microfilariosis was observed in 1-3 years old male dogs, living near farm area and outdoor as well as during winter seasons.

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References

1. Ravindran R, Varghese S, Nair SN, Balan VM, Lakshmanan B, Ashruf RM *et al*. Canine Filarial Infections in a Human *Brugia malayi* Endemic Area of India. BioMed Research International, 2014, 1-9.
2. Bortharkur S, Sarmah KK, Rajakhowa TK, Das MR, Rahman S. *Dirofilaria immitis* infection in a dog. Journal of Veterinary Parasitology. 2006; 20:167-169.
3. Ananda KJ, D'Souza PE, Jagannath MS. Methods for identification of microfilaria of *Dirofilaria repens* and *Dipetalonema reconditum*. Journal of Veterinary Parasitology. 2006; 20:45-47.
4. Sabu L, Devada K, Subramanian H. Dirofilariosis in dogs and humans in Kerala. Indian Journal of Medical Research. 2005; 121(5):691-693.
5. Patz JA, Campbell-Lendrum D, Holloway T, Foley JA. Impact of regional climate change on human health. Nature. 2005; 438:310-317.
6. Irwin PJ, Jefferies R. Arthropod-transmitted diseases of companion animals in Southeast Asia. Trends in Parasitology. 2004; 20:27-34.
7. Lindsey JR. Identification of canine microfilariae. Journal of American Veterinary Medical Association. 1965; 146:1106-1114.
8. Soulsby EJL. Helminths, Arthropods and Protozoa of Domesticated animals. Edn 7, ELBS Bailliere Tindal, London, 2005.
9. Bowman DD. Georgis' Parasitology for Veterinarians. Edn 10, W.B. Saunders company, Sidney, 2014, 320-321.
10. Ananda KJ, D'souza PE. Prevalence of microfilariosis in dogs. Indian Veterinary Journal. 2007; 84:1204-1205.
11. Radhika R, Subramanian H, Saseendranath MR. Prevalence of *Dirofilaria repens* in Thrissur. Journal of Veterinary and Animal Sciences. 2001; 32:46-48.
12. Brown HE, Harrington LC, Kaufman PE, McKay T, Bowman DD, Nelson CT *et al*. Key factors influencing canine heartworm *Dirofilaria immitis* in the United States. Parasites & Vectors. 2012; 30(5):245.
13. Christopher IO, Abel-Danjuma. Prevalence and risk factors associated with *Dirofilaria immitis* infection in dogs in Makurdi, Benue State, Nigeria. Journal of Advanced Veterinary and Animal Research. 2016; 3(4):338-344.
14. Deepa C, Alex PC. Secondary determinants of microfilariosis in dogs-a retrospective study. Journal of Veterinary and Animal Sciences. 2011; 42:39-41.
15. Bhattacharjee K, Sarmah PC. Epidemiological aspects of *Dirofilaria immitis* infection in dogs from Assam of Northeast India. Asian Pacific Journal of Tropical Disease. 2014; 4(1):S255–S258.
16. Walter LL. Risk factor for heartworm infection in Northern California. Proceedings of the heartworm symposium 1995. Batavia (III): American Heartworm Society, 1996, 5-26.
17. Theis JH, Stevens F, Theodoropoulos G, Ziedins AC. Study on the prevalence and distribution of filariasis in dog from Los Angeles Country, California (1996-1998). Canine Practice. 1999; 24:8-16.