



Analyzed to View Trend of Microfilaria Intensity of *Brugia* spp. in Domestic Cats at Surat Thani Province

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ARTICLE INFO

Keywords:

domestic cats
microfilaria intensity
Brugia spp.

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Asia J Public Health 2015; 6(2): 58-62

ABSTRACT

Brugia spp. microfilariae in cats at Subdistricts 1 and 2, Sincharoen District, Surat Thani Province, were detected for 4 years (2010-2013) after completion of the National Program to Eliminate lymphatic filariasis (PELF) (2002-2006). The annual microfilaria positive rate was found in cats' venipuncture of 80% coverage to the number of cats each year, i.e., 5.67 (10/176), 3.26 (6/184), 3.78 (9/238) and 11.46 (25/218) found, respectively and 2 cats were found infected with 250 and 353 mcf. Most cats were found in the 2-4 years age group with a greater ratio of males than females (2:1). However, the important issues from these findings are whether new infections exist among other domestic cats or not and that they should be detected continuously. Even though the filarial species of *Brugia* spp. was not confirmed and compared with human filariasis, but this *Brugia malayi* can infect both humans and animals. However, the trend of infected cats with *Brugia* spp. was increasing. Filarial control measures should be strongly launched continuously.

INTRODUCTION

Elephantiasis (Lymphatic filariasis) affects over 120 million people in 73 countries throughout the tropics and subtropics of Asia, Africa, the Western Pacific, and parts of the Caribbean and South America¹. Over the last 10 years, research and understanding has expanded about the monitoring tools, new treatment tools and control strategies. The new strategy aims at transmission control through mass treatment programs². *Brugia malayi*, zoonotic infection is endemic in Asia, especially in the southern part of Thailand, where the microfilariae are transmitted to man. *B. malayi* can infect both humans and animals but *B. pahangi* can only infect animals,

especially domestic cats³. The best time for microfilarial density survey was determined⁴. Lymphatic filariasis is found in the southeastern coastal strip including Chumphon, Surat Thani, Nakhon Si Thammarat, Phatthalung, Pattani and Narathiwat⁵⁻⁷. In Thailand, a survey of human filariasis first revealed infection in Nakhon Si Thammarat, Phatthalung, Pattani, and Surat Thani Provinces. Twenty-one percent of individuals were infected with *B. malayi*, of whom 5.2% were symptomatic⁸. Phantana *et al.*⁶ reported 104 (4.1%) of 2,515 cats in 5 districts of Narathiwat, a southern province of Thailand, were infected with *Brugia* spp, 76 cases (3.0%) with *Dirofilaria repens*, and 2

cases (0.2%) with *D. immitis*. The mosquitoes *Mansonia* spp. are vectors of filarial transmission⁵⁻⁸. The control and surveillance of lymphatic filariasis by penetrating the blood of cats aged 4-6 years was conducted⁹⁻¹¹. The Global Program to Eliminate Lymphatic Filariasis (GPELF) employs a 2-drug mass drug administration (MDA) as the main elimination strategy so as to eliminate the human infections, but not other nonhuman reservoirs. If endemic for *B. malayi*, the transmission areas targeted by the National Program to Eliminate Lymphatic Filariasis (PELF) are established for geographical distribution of *B. malayi* whether or not animal reservoirs are present. Both elimination programs do not rely on vector control in transmission areas^{10,11}. However, the treatments of microfilaria in cats were detected and they were treated with Ivermectin injections 1,000 mcg/kg subcutaneous injection¹² by consecutive years. However after completing the PELF (2002–2006), the Center for Vector-borne Disease Control, no 11.3 continued surveillance of microfilaria intensity of *Brugia* spp in cats each year from 2010-2013.

MATERIALS AND METHODS

Between June and August 2010-2013 according to a survey of 179 cats, 215, 210 and 209 cases of the blood of cats 176, 187, 225 and 218 were venipunctured, respectively of which the highest parasitemia in cats were monitored as previously mentioned⁴. A volume of 60 microliters of blood as thick blood film with smooth oval 2x3cm size was then stained with Giemsa staining 1:20 (5%) for 10 minutes (Giemsa mixed 1 part to 19 parts with pH 7.2 buffer), then rinsed and let dry. The diagnosis of infection was performed using a microscope magnification lens

objective 10x on cats' blood slides. The detection of pathology in lymphatic filariasis from 10.30-14.30 hrs. was performed. The microfilariae in infected male and female cats were reported with the covering rates of 98.32, 85.58, 100 and 100%, respectively. The data were analyzed using mean and percentage.

RESULTS

Brugia malayi microfilariae in cats were detected. The annual microfilaria positive rate was found in cats each year (2010-2013). They were 5.67 (10/176), 3.26 (6/184), 3.78 (9/238) and 11.46 (25/218) found from 2010-2013, respectively (Table 1, Figure 1).

The number of infections, including 50 classified as from villages in 2010 to 2013 were based on microfilaria of species *Brugia* spp. Infection tended to peak in 2013 by Subdistricts 1 and 2 with infections of 13 and 12 cases, respectively (Table 2).

Over 4 years the 50 infected cats showed the highest number of microfilaria that were found and reported such as 5, 10, 2, 20 and 30 mcfs in each infected cat. We found 2 cats infected with 250 and 353 mcfs (Figure 2).

The mean age of cats with microfilaria intensity of *Brugia* spp. at Subdistricts 1 and 2, Sincharoen District, Surat Thani Province, from 2010 to 2013 was mostly between 2-4 years (Figure 3A), while the mean age among 2 villages (Subdistricts 1 and 2) were around 3-4 years (Figure 3B).

The percentage of male and female cats infected with microfilaria (*Brugia* spp.) in Sub-districts 1 and 2, Sincharoen District, Surat Thani Province, from 2010 to 2013 (Figure 4) was likely to find male cats increased (red line) while the female cats declined (Green line).

Table 1 Number and percentage of detected microfilaria *Brugia* spp. in cats at Subdistricts 1 and 2, Sincharoen District, Surat Thani Province in 2010-2013

Year	No. of cats	Coverage of blood collection (%)	No. of infected cats (%)
2010	179	176(98.32)	10 (5.67)
2011	215	184(85.58)	6 (3.26)
2012	238	238(100)	9 (3.78)
2013	218	218(100)	25 (11.46)
Total	850	816(96.00)	50 (6.13)

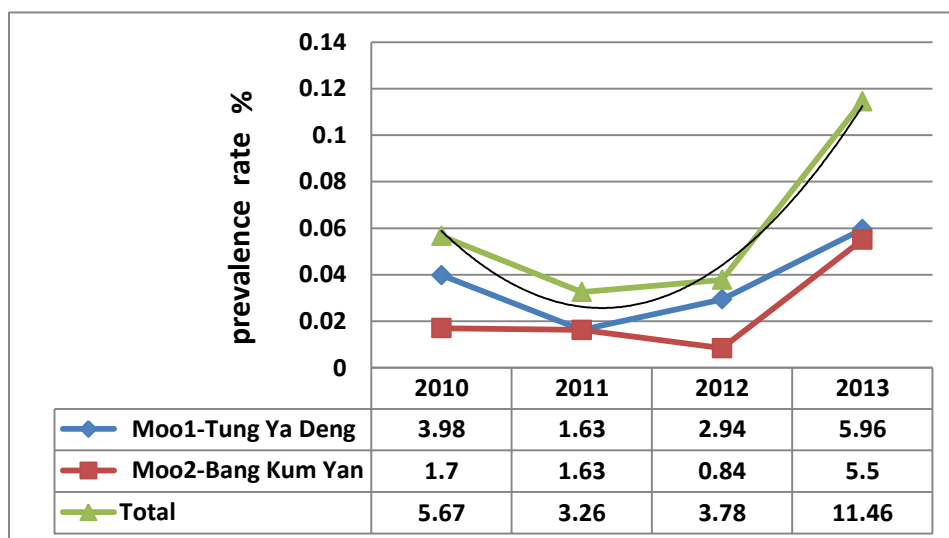


Figure 1 Annual microfilaria positive rate in the cats among Subdistricts 1 and 2, Sincharoen District, Surat Thani Province, 2010-2013

Table 2 Number of detected species of microfilaria *Brugia* spp., in cats, classified from 2010-2013 and village Subdistricts 1 and 2, Charoen Sin District, Surat Thani Province

Study areas	Year				Total cases (4 years)
	2010	2011	2012	2013	
Subdistrict 1-Tung Ya Dang	7	3	7	13	30
Subdistrict 2-Bang Kum Yan	3	3	2	12	20
Total	10	6	9	25	50

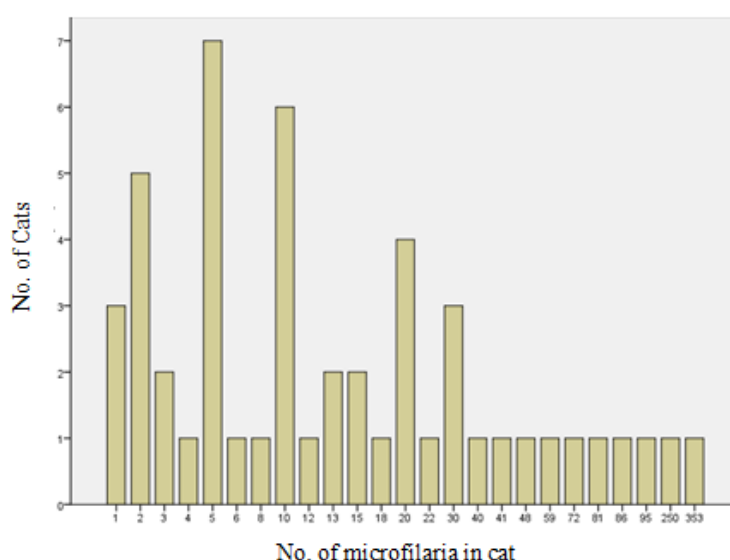


Figure 2 Cats and microfilaria intensity of *Brugia* spp., in cats at Subdistricts 1 and 2, Sincharoen District, Surat Thani Province, from 2010 to 2013

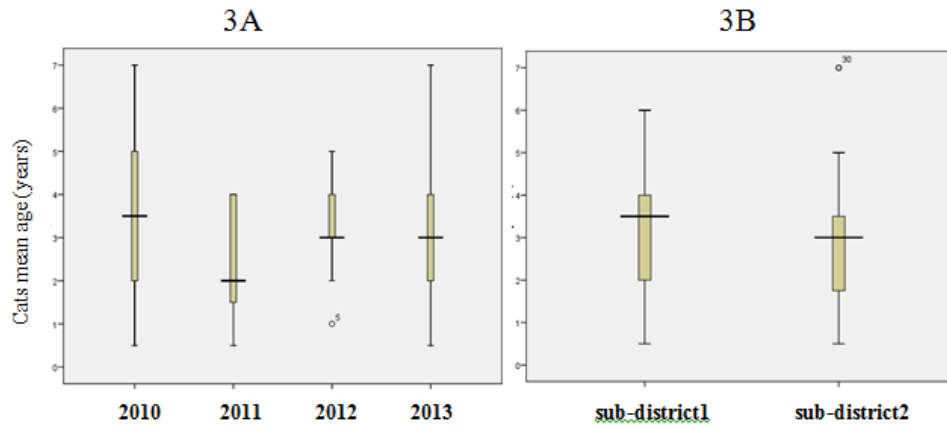


Figure 3 The mean age of cats with microfilaria intensity of *Brugia* spp. each year (3A) at Subdistricts 1 and 2 (3B), Sincharoen District, Surat Thani Province, from 2010 to 2013

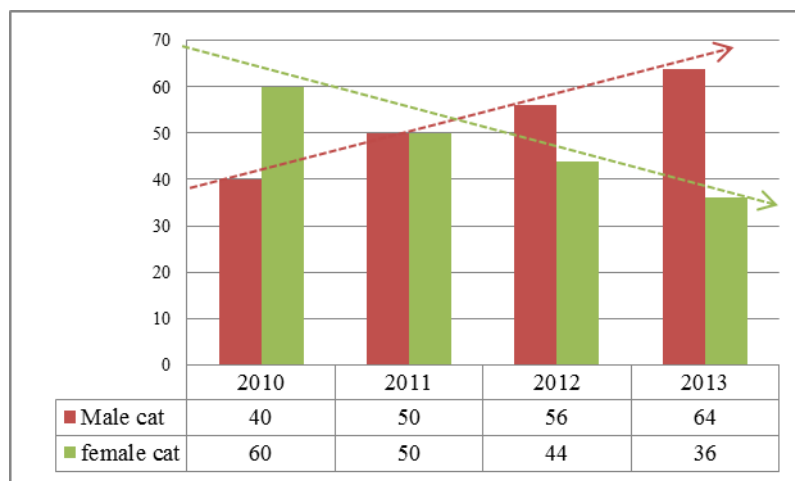


Figure 4 The percentage of male and female cats infected with microfilaria (*Brugia* spp.) Subdistricts 1 and 2, Sincharoen District, Surat Thani Province from 2010 to 2013

DISCUSSION AND CONCLUSION

Over 4 years of survey detection, a total of 50 cats were aged between 2-4 years and the infection rate in male cats was found higher than in female cats which occurred at about 2:1, while the average minimum detectable infection in cats was 1 mcf and the maximum finding was 353 mcf in 60mL volumetric blood. Each year, the microfilaria detected in cats were treated with Ivermectin 1,000 mcg/kg injection subcutaneously^{13,14} with consecutive years, according to a laboratory study showing that the drug dose can reduce infection density about 99% for 2 years¹². We found some cats had been re-infected. The results of this study revealed that the infections in cats were likely to increase. The environmental factors of mosquito breeding sites were found to be changed to be preferable for the *Mansonia* spp. mosquito vector, which can transmit the microfilaria in moderate to high density levels^{15,16}. The Department of

Disease Control, Ministry of Public Health, Thailand has launched various control and elimination programs annually but the filarial disease is still uncontrolled. The occasion of microfilaria infection in cats can be transmitted to man or directly transmitted to cats by infected mosquito vectors. However, the filarial disease in cats must be realized with the infected human cases. Cats' blood should be continuously collected by exploring all areas of epidemiology and treatment to break the cycle of infection. Although the control of filarial area in humans and in cats was still not successful, the detection of those infected with *Brugia malayi* is important and can be confirmed with higher technology detection methods in other animal species, necessary for the surveillance of filarial disease. The Division of Vector Control¹⁷ has monitored and researched other mosquito species and sustained efforts to eliminate the

transmission of filarial worms in humans and cats for the eradication of filarial disease.

ACKNOWLEDGEMENTS

The authors wish thank the staff of Disease Control 11.3.1, Phrasaeng District, Surat Thani Province, Thailand, who helped in the study areas, for their valuable time collecting samples. This work was partially supported for publication by the China Medical Board (CMB), Faculty of Public Health, Mahidol University, Bangkok, Thailand (UL).

REFERENCES

1. Michael E, Bundy DA, Grenfell BT. Re-assessing the global prevalence and distribution of lymphatic filariasis. *Parasitol* 1996; 112: 409-28.
2. Ottesen EA, Duke BO, Karam M, Behbehani K. Strategies and tools for the control/elimination of lymphatic filariasis. *Bull WHO* 1997; 75: 491-503.
3. Thammapaolo S. Current status of filariasis in Malaysia (translation). In: Marzbubi MI, Poovaneswasi S, eds. *Southeast Asian J Trop Med Public Health* 1993; 24(suppl2): 10-4.
4. Lek-Uthai U, Chansiri K, Yodmek S. Periodicity of *Brugia malayi* appearance in blood of domestic Thai cats in Surat Thani Province. *J Trop Med Parasitol* 2004; 27: 15-20.
5. Rattanarithikul R, Harrison BA, Panthusiri P, Peyton EL, Coleman RE. Illustrated keys to the mosquitoes of Thailand iii. genera *Aedeomyia*, *Ficalbia*, *Mimomyia*, *Hodgesia*, *Coquillettidia*, *Mansonia*, and *Uranotaenia*. *Southeast Asian J Trop Med Pub Health* 2006; 37 (Suppl1): 1-85.
6. Phantana S, Chutidumrong C, Chusattayanond W. *Brugia malayi* in a cat from Southeast, Thailand. *Trans Roy Soc Trop Med Hyg* 1987; 81: 173-4.
7. Sucharit S. Elephantiasis in Thailand. Bangkok: Krung Siam Printing, 1998.
8. Guptavanij P, Harinasuta C, Sucharit S, Vutiket S. Studies in sub periodic *Brugia malayi* in Southern Thailand. *Southeast Asian J Trop Med Pub Health* 1971(a); 2: 44-50.
9. WHA 50.29, Elimination of filariasis as a public health problem. Resolution 50.29 of the World Health Assembly, May 1997.
10. Ottesen EA, Duke BO, Karam M, Behbehani K. Strategies and tools for the control/elimination of lymphatic filariasis. *Bull World Health Organ* 1997; 75: 491-503.
11. World Health Organization. Monitoring and epidemiological assessment of the Programme to eliminate Lymphatic Filariasis at implementation unit level. 2005.
12. Chansiri G, Khawsak P, Phantana S, Sarataphan N, Chansiri K. The efficacy of a single-oral-dose administration of ivermectin and diethylcarbamazine on the treatment of feline *Brugia malayi*. *Southeast Asian J Trop Med Pub Health* 2005; 36: 1105-9.
13. Edwards G, Dingsdale A, Helsby N, Orme ML, Breckenridge A. The relative systemic availability of ivermectin after administration as capsule, tablet and oral solution. *Eur J Clin Pharma* 1988; 35: 681-4.
14. McTier TL, Shanks DJ, Watson P, McCall JW, Genchi C, Six RH, *et al.* Prevention of experimentally induced heartworm (*Dirofilaria immitis* infections) in dogs and cats with a single tropical application of selamectin. *Vet Parasitol* 2000; 91:259-68.
15. Chunhaswadikul B, Kedkaew J, Panad P. "Pru area" and disease transmission. *Comm Dis Bull* 1999; 15: 3-7.
16. Vector-Borne Disease Control region 11.3 Surat-thani Province, Thailand. *Entomological Monthly Report* 2013.
17. Department of Vector-Borne Disease Control, Ministry of Public Health. Manual for Filariasis Prevention and Control. Co-op and agriculture Community of Thailand Printing, 1st edition, 2013.