



ปรสิตภายนอกของสุนัขเลี้ยงในพื้นที่ชนบทของจังหวัดเชียงราย ทางภาคเหนือของประเทศไทย

Ectoparasite Infestation of Domestic Dogs in Rural Areas of Chiang Rai Province, Northern Thailand

พิสิษฐ์ สุนทรารวิชูร^{1*} เก่ง เจียมกิจวัฒนา² และ งานนิตย์ ราชกิจ²

บทคัดย่อ

ปรสิตภายนอกหล่ายชนิดของสุนัขเลี้ยงมีความสำคัญต่อทางด้านสาธารณสุข โดยเฉพาะอย่างยิ่งพาก เห็บ หมัด และเหา โดยสามารถนำเข้าโรคไปสู่มนุษย์และสัตว์เลี้ยงได้ การศึกษาครั้งนี้เพื่อสำรวจปรสิตภายนอกในสุนัขเลี้ยงจาก 8 ตำบลของอำเภอเมืองเชียงราย จังหวัดเชียงราย ประเทศไทยในระหว่างเดือนมิถุนายนและตุลาคม พ.ศ. 2554 ปรสิตภายนอกทั้งหมดที่เก็บได้ทั้งหมดมีจำนวน 1,498 ตัวอย่าง ซึ่งพบปรสิตภายนอก 3 ชนิด ได้แก่ *Rhipicephalus sanguineus* (เห็บแข็งคิดเป็นร้อยละ 64.55) *Ctenocephalides felis orientis* (หมัดคิดเป็นร้อยละ 33.85) และ *Heterodoxus spiniger* (เหง้าคิดเป็นร้อยละ 1.60) ความชุกทั้งหมดของปรสิตภายนอกที่พบในสุนัขเลี้ยงคิดเป็นร้อยละ 91.25 พื้นที่พบมีความชุกมากที่สุดคือ ตำบลแม่ข้าวต้มและตำบลหัวยสัก คิดเป็นร้อยละ 100 และพื้นที่มีความชุกต่ำสุดพบในตำบลเวียง คิดเป็นร้อยละ 80 จำนวนสุนัขที่ตรวจพบเห็บ *Rhipicephalus sanguineus* คิดเป็นร้อยละ 81.25 (130/146 ตัว) สำหรับจำนวนสุนัขที่ตรวจพบหมัด *Ctenocephalides felis orientis* คิดเป็นร้อยละ 53.13 (85/146 ตัว) และจำนวนสุนัขที่ตรวจพบเหง้า *Heterodoxus spiniger* คิดเป็นร้อยละ 2.50 (4/146 ตัว) ค่าเฉลี่ยความหนาแน่นทั้งหมดของชนิดปรสิตภายนอกเท่ากับ 10.26 ต่อไฮสต์หนึ่งตัว ซึ่งพบค่าเฉลี่ยความหนาแน่นของเห็บ *Rhipicephalus sanguineus* เท่ากับ 7.44 เหง้า *Heterodoxus spiniger* เท่ากับ 6.00 และหมัด *Ctenocephalides felis orientis* เท่ากับ 5.96 ต่อไฮสต์หนึ่งตัว ผลการศึกษาในครั้งนี้แสดงให้เห็นว่าส่วนใหญ่นั้นพบปรสิตภายนอก *Rhipicephalus sanguineus* และ *Ctenocephalides felis orientis* อาศัยอยู่ร่วมกันบนตัวสุนัขเลี้ยง (คิดเป็นร้อยละ 46.57 ของจำนวนสุนัขที่พบ 68 ตัว) ปรสิตภายนอกทั้งสองชนิดนี้อาจเป็นพาหะที่มีความสำคัญในการถ่ายทอดเชื้อโรคจากสุนัขเลี้ยงมาสู่คนและสัตว์ชนิดอื่นในพื้นที่มีความชุกสูง

¹ สาขาวิชาสาธารณสุขศาสตร์ คณะวิทยาศาสตร์และเทคโนโลยี มหาวิทยาลัยราชภัฏรำไพพรรณี อ.เมือง จ.เชียงราย 24000

² คณะสาธารณสุขศาสตร์ วิทยาลัยเชียงราย อ.เมืองเชียงราย จ.เชียงราย 57000

*Corresponding Author, E-mail: pisitsuntaravitun@hotmail.com

ABSTRACT

Several ectoparasites on domestic dogs are considered important to public health, particularly fleas, ticks and lice can also transmit pathogens to humans and domestic animals. In this study, a survey of ectoparasite infestation on domestic dogs from eight sub-districts of Mueang Chiang Rai District, Chiang Rai Province, Thailand was performed between June and October 2011. A total of 1,498 ectoparasites belong to three species including *Rhipicephalus sanguineus* (hard tick: 64.55%), *Ctenocephalides felis orientis* (flea: 33.85%), and *Heterodoxus spiniger* (chewing lice: 1.60%). Prevalence of ectoparasite infestation on domestic dogs was 91.25% with the highest prevalence found in Mae Khao Tom and Huai Sak areas (100%) and the lowest in Wiang area (80%). The number of dogs infested were 81.25% ($n = 130/146$) for *Rhipicephalus sanguineus*, 53.13% ($n = 85/146$) for *Ctenocephalides felis orientis*, and 2.50% ($n = 4/146$) for *Heterodoxus spiniger*. The Mean density of ectoparasites per host was 10.26% with the majority being *Rhipicephalus sanguineus* (7.44%) followed by *Heterodoxus spiniger* (6.00) and *Ctenocephalides felis orientis* (5.96). The results demonstrated that the mixed infestations of *Rhipicephalus sanguineus* and *Ctenocephalides felis orientis* (46.57%, $n=68$) were mostly found in domestic dogs. Both species are the major ectoparasites vector of pathogens transmission from domestic dogs to human and other animals in high prevalence areas.

คำสำคัญ: ความชุก ปรสิตภายนอก สุนัขเลี้ยง จังหวัดเชียงราย

Keywords: Prevalence, Ectoparasites, Domestic dogs, Chiang Rai province

Introduction

Ectoparasites may live permanently on their host, or they may occupy the host's nest and immediate environment of the host periodically (Tesfaye and Chanie, 2011). The ectoparasites are generally associated to dermatitis and affect animals to different degrees according to the nutrition status of the host, its immunological condition and ectoparasites intensity. In extreme cases, the ectoparasites can lead to death in infested animal (Tesfaye and Chanie, 2011). In addition,

some species of arthropods play an important role in causing clinical disorders and are responsible for the transmission of many pathogens affecting domestic animals and humans, including several species of bacteria, viruses, protozoa, and helminths (Hopla et al., 1994; Rust and Dryden, 1997; Jongejan and Uilenberg, 2004). Some ectoparasites are vectors of a wide range of important zoonotic diseases worldwide, such as borreliosis, bartonellosis, ehrlichiosis, rickettsiosis, anaplasmosis, yersiniosis, tularemia,

coxiellosis, and tick-borne encephalitis (Day, 2011). In many countries, the prevalence rates of ectoparasitic infestation on dogs was been reported worldwide. These reports show the difference between prevalence rates and the various species of ectoparasites on dogs in each geographical area. In Thailand, the most frequent infestation of ectoparasites species on dogs are 1) hard ticks, *Rhipicephalus sanguineus* (Sangvaranond et al., 1990a, 2000; Nithikathkul et al., 2002, 2005, Nuchjangreed and Somprasong, 2007; Changbunjong et al., 2009) and *Boophilus microplus* (Nithikathkul et al., 2002; Nuchjangreed and Somprasong 2007) 2) fleas, *Ctenocephalides canis* (Sangvaranond et al., 1990b; Nithikathkul et al., 2005; Nuchjangreed and Somprasong, 2007), *Ctenocephalides felis felis* (Sangvaranond et al., 1990b, 2000) *Ctenocephalides felis orientis* (Sangvaranond et al., 1990b, 2000; Changbunjong et al., 2009) and *Echidnophaga gallinacean* (Changbunjong et al., 2009) and 3) lice, *Heterodoxus spiniger* (Sangvaranond et al., 1990a, 2000; Changbunjong et al., 2009) and *Trichodectes canis* (Sangvaranond et al., 1990a).

The prevalence of ectoparasite infestation on dogs has been reported in many provinces of Thailand, but not yet reported on domestic dogs in Chiang Rai

Province. Therefore, the present study was to investigate the prevalence and density of ectoparasites found on domestic dogs in 8 sub-district of Mueang Chiang Rai District, Chiang Rai Province, Thailand.

Materials and Methods

This research was conducted with a purposive sampling in rural communities and villages in 8 sub-districts, including Huai Chomphu, Huai Sak, Mae Khao Tom, Mae Yao, Pa O Don Chai, Rim Kok, San Sai and Wiang of Mueang Chiang Rai District, Chiang Rai Province between June and October 2012 (Figure 1). Twenty domestic dogs in each area were random sampling for ectoparasite examination, one dog from each household. A total of 160 specimens of domestic dogs (of various ages, breeds and both sexes) were collected by hand picking from all parts of dogs body over a 15- minute period. The ectoparasites were separated and preserved in collecting tube with 70% alcohol and transported to the parasitology laboratory at the Chiang Rai Colleges. Slides preparation for species identification of ectoparasites was made by follow the protocol of Jittapalapong et al. (2008). The species identification of ectoparasites was examined under light microscope.



Figure 1 Map showing of study area of 8 Sub-district, Mueang Chiang Rai District, Chiang Rai Province, Thailand.

Results

A total of 1,498 ectoparasites were collected from 160 domestic dogs in the eighth areas of Mueang District, Chiang Rai Province. Overall prevalence rate of ectoparasitic infestation in domestic dogs was 91.25% (146/160) of which 55.48% (81/146) in female and 44.52% (65/146) for male dogs. The highest prevalence rates of ectoparasites in domestic dogs was 100% (20/20) in Mae Khao Tom and Huai Sak areas while the lowest prevalence rate of 80% (16/20) was found in Wiang area (Table 1). The number of domestic dogs with ectoparasite infestation were 81.25% (n = 130) by *R. sanguineus*, 53.13% (n = 85) by *C. felis orientis*, and 2.50%

(n = 4) by *H. spiniger* (Table 1). The highest density of ectoparasites in domestic dogs 13.05 (n = 261) in Mae Khao Tom area while the lowest was of 7.81 (n=125) in Wiang area. The densities of *R. sanguineus*, *H. spiniger* and *C. felis orientis* infestations in domestic dogs were 7.44 ± 5.12 S.D., 6.00 ± 3.65 S.D. and 5.96 ± 0.96 S.D., respectively (Table 1). The densities of ectoparasitic infestation was between males and females dogs were 9.71 ± 6.20 S.D. and 10.92 ± 6.63 S.D., respectively.

The high frequently recovered ectoparasites species were *R. sanguineous* (64.55%, n=967), *C. felis orientis* (33.85%, n=507) and *H. spiniger* (1.60%, n=24) (Table 1).

Furthermore, the prevalence rate of ectoparasitic infestation in domestic dogs separated by species and types of ectoparasites were 51.37% (n=75) for single infestations, 47.26% (n=69) for double infestations and 1.37% (n=2) for triple infestations (Table 2). Mixed infestations of *R. sanguineus* and *C. felis orientis* (46.57%, n=68) were mostly found in domestic dogs infested by ectoparasites and the high abundant species of single infestation were *R. sanguineous* (40.41%, n=59), and *C. felis orientis* (10.27%, n=15) (Table 2). The stages of *R. sanguineus* were 72 nymphs (7.45%) and 895 adults (53.87% male and 38.68% female), while *Ct. felis orientis* was 507 adults (16.57% male and 83.43% female) and *H. spiniger* was 24 adults (41.67% male and 58.33% female).

Table 1 Prevalence of ectoparasitic infestations on domestic dogs in 8 sub-districts of Chiang Rai Province.

Study area	NDE	Prevalence and density of ectoparasites species						Total	
		<i>R. sanguineus</i>	<i>C. felis orientis</i>	<i>H. spiniger</i>	NDI(%)	NE(D)	NDI(%)	NE(D)	
Huai Chomphu	20	18(90)	149(8.28±4.63)	11(55)	64(5.82±3.41)	1(0.05)	5(5±1.12)	18(90)	218(12.11±4.46)
Huai Sak	20	17(85)	132(7.76±4.96)	13(65)	60(4.62±3.11)	1(0.05)	5(5±1.12)	20(100)	197(9.85±4.28)
Mae Khao Tom	20	19(95)	159(8.37±5.02)	13(65)	96(7.38±4.40)	1(0.05)	6(6±1.34)	20(100)	261(13.05±4.99)
Mae Yao	20	18(90)	120(6.67±5.79)	9(45)	66(7.33±4.43)	0(0)	0(0±0.00)	19(95)	186(9.79±4.82)
Pa O Don Chai	20	13(65)	82(6.31±4.30)	11(55)	60(5.45±3.32)	0(0)	0(0±0.00)	17(85)	142(8.35±3.55)
Rim Kok	20	18(90)	141(7.83±4.76)	11(55)	74(6.73±3.91)	1(0.05)	8(8±1.79)	19(95)	223(11.74±4.56)
San Sai	20	13(65)	97(7.46±5.97)	10(50)	49(4.90±3.03)	0(0)	0(0±0.00)	17(85)	146(8.59±4.29)
Wiang	20	14(70)	87(6.21±4.67)	7(35)	38(5.43±3.23)	0(0)	0(0±0.00)	16(80)	125(7.81±3.69)
Total	160	130(81.25)	967(7.44±5.12)	85(53.13)	507(5.96±3.65)	4(2.50)	24(6±0.96)	146(91.25)	1,498(10.26±6.58)

Note: NDE= No. of examined dogs, NDI= No. of infested dogs, NE= No. of ectoparasites, D=Density in mean±S.D.

Table 2 Number and percentage of domestic dogs separated by species and type of ectoparasitic infestation.

Type of infestation	No. of infested dogs (%)
single infestation	
<i>R. sanguineus</i>	59 (40.41)
<i>C. felis orientis</i>	15 (10.27)
<i>H. spiniger</i>	1 (0.69)
double infestation	
<i>R. sanguineus + C. felis orientis</i>	68 (46.57)
<i>R. sanguineus + H. spiniger</i>	1 (0.69)
<i>C. felis orientis + H. spiniger</i>	0 (0.00)
triple infestation	
<i>R. sanguineus + C. felis orientis + H. spiniger</i>	2 (1.37)
Total	146 (100)

Conclusion and Discussion

From this study, the prevalence of ectoparasites species *R. sanguineus* and *C. felis orientis* are the most common species found in all areas whereas *H. spiniger* was abundant in some areas. From the previous reports, the difference of ectoparasitic infestation in each area may be due to epidemiological factors, such as animal immunity, seasonal variation and geographical location in each the study areas (Nithikathkul et al., 2002, 2005). The brown dog tick, *R. sanguineus* was found as the most commonly abundance on domestic dogs. This is similar to the previous surveys conducted in Bangkok Province (58.97%) (Sangvaranond et al., 2000), Samut Prakan Province (46%) (Nithikathkul et al., 2002), Khon Kaen Province (74.20%) (Nithikathkul et al., 2005), and Chon Buri Province (77.40%) of Thailand (Nuchjangreed and Somprasong, 2007) where the most dominant species of all ectoparasites were found on dogs. Consequently, this finding support the reported by Dantas-Torres (2010) indicated that the domestic dogs is the main host of *R. sanguineus* from both urban and rural enviroments of tropical, subtropical and some temperate climates in the world and a well-recognized vector of several pathogens affecting dogs and occasionally humans. Generally, the flea was the second dominated of ectoparasite infestations on domestic dogs. The cat flea, *C. felis orientis* was the only one

species of flea found on domestic dogs in the present surveys similar to the findings of Changbunjong et al. (2009) which reported that *C. felis orientis* (86.20%) dominated species of fleas on dogs in Tak Province in Thailand, and also finding of Sangvaranond et al. (2000) which reported that the most common of fleas species found on stray dogs were *C. felis orientis* (7.05%) and *C. felis felis* (1.92%), respectively. In some other survey, *C. canis* is reported to be the most abundant species of flea found on dogs in Khon Kaen Province (25.80%) (Nithikathkul et al., 2005), Chon Buri Province (11.70%) (Nuchjangreed and Somprasong, 2007) of Thailand. However, the most prevalent flea species found globally in domestic dogs is the *C. felis*, and the *C. canis* also occurs globally, but in lower rates than the cat flea (Dobler and Pfeffer, 2011). The chewing louse, *H. spiniger* was the only louse species found on domestic dogs in 4 of the 8 sub-district investigated. This study showed that a very low prevalence of domestic dogs infestation with lice species similar to finding previous survey by Sangvaranond et al. (2000) in Bangkok Province (1.92%) and Changbunjong et al.(2009) in Tak Province (7.40%) of Thailand, who reported that *H. spiniger* is rarely found infested on dogs in the selected study areas.

The results of this study demonstrate that the high prevalence rates of ectoparasites were recorded on dogs in Thailand. One

reason for this prevalence might be that the study area mainly located in rural areas. Generally, mixed infestation of *R. sanguineus* and *Ctenocephalides felis orientis* were the mostly found in domestic dogs infested in this areas. These species might be that the main vector of pathogens transmission from domestic dogs to other animals in high prevalence areas, particularly the increasing incidence and prevalence of zoonotic infection to human. Future studies should be educated about pathogens infection in ectoparasites on animals surrounding human residential areas.

Acknowledgements

The authors are grateful to all the dog owners who provided samples. We also wish to thank the public health students of Chaing Rai College for sample collections in the fieldwork.

References

Changbunjong, T., Buddhirongawatr, R., Suwanpakdee, S., Siengsanee, J., Yongyuttawichai, P., Cheewajorn, K., Jangjaras, J., Sangloung, C. and Ratanakorn, P. (2009). A survey of ectoparasitic arthropods on domestic animals in Tak Province, Thailand. Southeast Asian J Trop Med Public Health. 40(3): 435-442.

Dantas-Torres, F. (2010). Biology and ecology of the brown dog tick, *Rhipicephalus sanguineus*. Parasit Vectors. 3: 26.

Day, M.J. (2011). One health: the importance of companion animal vector-borne diseases. Parasit Vectors. 4: 49.

Dobler, G. and Pfeffer, M. (2011). Fleas as parasites of the family Canidae. Parasit Vectors. 4: 139.

Hopla, C.E., Durden, L.A. and Keirans, J.E. (1994). Ectoparasites and classification. Rev Sci Tech. 13(4): 985-1017.

Jittapalapong, S., Sangvaranond, A., Inpankaew, T., Pinyopanuwat, N., Chimnoi, W., Kengradomkij, C. and Wongnakphet, S. (2008). Ectoparasites of stray cats in Bangkok metropolitan areas, Thailand. Kasetsart J (Nat Sci). 42(5): 71-75.

Jongejan, F. and Uilenberg, G. (2004). The global importance of ticks. Parasitology. 129(Suppl S1): S3-14.

Nithikathkul, C., Polseela, R., Iamsa-ard, J., Wongsawad, C. and Jittapalapong, S. (2005). A study of ectoparasites of *Canis lupus familiaris* in Mueang district, Khon Kaen, Thailand. Southeast Asian J Trop Med Public Health. 36(Suppl 4): 149-151.

Nithikathkul, C., Polseela, P., Changsap, B. and Leemingsawat, S. (2002). Ixodid ticks on domestic animals in Samut Prakan Province, Thailand. Southeast Asian J Trop Med Public Health. 33(Suppl 3): 41-44.

Nuchjangreed, C. and Somprasong, W. (2007). Ectoparasite species found on domestic dogs from Patta Ya District, Chon Buri Province, Thailand. Southeast Asian J Trop Med Public Health. 38(Suppl 1): 203-207.

Rust, M.K. and Dryden, M.W. (1997). The biology, ecology, and management of the cat flea. Annu Rev Entomol. 42: 451-473.

Sangvaranond, A., Singhchai, C. and Chimnoi, W. (2000). Ectoparasites (lice, fleas, ticks and ear mites)

of stray dogs in Bangkok metropolitan area. Sangvaranond, A. (1990b). Studies on ectoparasites of domesticated dogs and cats in Thailand (Flea). *Kasetsart Vet.* 9(2): 69-84.

Kasetsart Vet. 10(1): 1-12.

Sangvaranond, A. (1990a). Studies on ectoparasites of domesticated dogs and cats in Thailand (Lice and ticks). *Kasetsart Vet.* 9(1): 1-18.

Tesfaye, A. and Chanie, M. (2011). Ectoparasites are major skin diseases of dogs in Gondar, Amhara National Regional State, Ethiopia. *Int J Anim Vet Adv.* 3(5): 392-396.

