

CHAPTER IV

DISCUSSIONS

The total prevalence of 18% of *Dirofilaria immitis* demonstrates that dogs in the periurban areas of Chiang Mai are at high risk of infection. The infection rate of 26% of dogs, which never had received any anti-heartworm preventive medication, in particular underlines the importance of dirofilariosis. This prevalence agrees with the prevalence of 24% established for stray dogs in the same area by Choochote et al. (1992). The total prevalence of 18% of *Dirofilaria immitis* demonstrates that dogs in the periurban areas of Chiang Mai are at high risk of infection. Considering that the proportion of young dogs in this study was nearly 50%, the true population prevalence for dirofilariosis very likely will be still higher than estimated here, as young dogs in this study had a significantly lower prevalence than older dogs. The fact though those not all diseased animals are presented at veterinary clinics has to be considered. The magnitude of this “submission bias” is unknown. Likewise the limited sensitivity of microfilaria testing to diagnose dirofilariosis and the occult infection also affect the prevalence determined.

Housing, in agreement with results from the literature, was found to be a risk factor for infection. Dogs housed outdoors are more likely exposed to vectors transmitting the agent (Theis et al., 1999). It seems plausible that dogs that are kept outdoors are more often and more intensively exposed to transmitting mosquitoes than dogs kept indoors. In Thailand, these results indicated that most of the dogs have high

high risk to expose to the agent since housing pattern for the dogs in Thailand do not prevent mosquitoes.

The monthly prevalence of dirofilariasis do suggest a seasonal pattern of infection, with peak prevalence occurring during the Thailand summer months of February to April of a year. Statistically significant difference between prevalence in summer versus rainy season and summer versus winter season could be established. This pattern would suggest that dogs increasingly become infected with larvae transmitted from mosquitoes around May to October, the rainy season in Thailand, as microfilaria take at least 190 days to enter the blood stream after infection of dogs with the infective stage larvae (Schrey, 1998). Whether this pattern is truly seasonal or rather/also an effect of different submission rates of sick dogs to the hospital cannot be answered at this stage.

Accepting that risk of infection is truly increased in the rainy season, dog owners could be advised to keep their dogs indoors during this period. A study on the seasonal abundance and infection rates of the mosquito vector population would help to substantiate the seasonal increased risk of infection and thus provide additional rationale for the establishment of an effective disease control program.

In the incidence study, The incidence rate value of 0.043 animals per animal-months means 100 animals of the same area with similar management pattern would get 4% *D. immitis* infection in one months. The finding confirms high endemic situation of the disease in the northern area of Thailand. Because the climate pattern of the northeastern part and central Thailand especially the rainy season are not much difference from the northern zone, this incidence rate could be applied to those areas as well.

finding. The witness test was 92% sensitivity when more than 2 adult female worms were present and the sensitivity decreasing to 69 % when 1-2 female worms were present. That caused under estimation when the dog had low worm burden. The low sensitivity of the serologic test was however substituted by pararely testing with haematocrite centrifuge technique so that the diagnosis of positive dogs could be valid for the purpose of the study.

The season specific incidence rate: - since the microfilaria take around 6.5-7 months in the body before achieve the maturation, the timing that infected with L3 could trace back and calculated the incidence rate (at the time which received L3) as follow; rainy, winter and summer incidence rate (IR) of 0.069, 0.035 and 0.027 animals per animal-months reflected the seasonal influence on the infection rates. The speed of contracting *D. immitis* in rainy season is 2 times and 2.6 times more rapidly than in winter and summer period; and in winter was 1.3 times faster than in summer. In general the incidence rate ratio (IRR) between the within and out of rainy season of 2.2 means that the chance to be infected in rainy season is about 2 times higher than in other time of the year. The variability of the infection affected by season could be explained by the temperature effect on the parasite development in the mosquitoes as reported in the temperate area; or by increasing exposure to the vector as the number of the mosquitoes rising up during the rainy period. The latter should be well explainable in Thailand. The lowest temperature, which prevents the development of the parasite larvae, is 17 degree Celsius, where as the lowest temperature during the cold period in the Chiang Mai province was 16 degree Celsius averagely (1990-1999). The most number of mosquitoes prevailing in the rainy season

was recorded as the other mosquitoes borne disease such as Dengue fever occurred mostly during the rainy season as well.

Seasonality confirmed both by prevalence and incidence study: The prevalence study revealed peak of prevalence found in summer period which might be reflect that dogs were mostly infected during the previous rainy months. The prevalence ratio (PR) between summer and rainy, summer and winter were $31.03/13.76=2.3$ and $31.03/13.93= 2.2$ respectively. These values were quite similar to those IRR of 2.2, which also reflected about 2 times more probability of dogs being infected in the rainy period than other seasons. Results from both studies confirmed each other and underline the factor of rainy season as the main spreading period of *D.immitis* infection in northern Thailand. The seasonality pattern found in this study would contribute significantly to the formulation of dirofilariosis control program, whenever needed.

Recommended strategic control program for dogs and clinical application of the finding : the results of the study show that the incidence of heartworm infection is about 2 times higher in rainy period than otherseason. Eventhough the regular dirofilariosis prevention is safely recommended throughout the year, heartworm preventive measure for dogs should be emphasized particularly during the rainy season. Due to the pathologic effect of the parasite causing to the heart and its high endemic occurrence it could be foreseen that dogs rearing outdoor and do not receive any preventive medication would have much more shorter lifespan than their potential. If the zoonotic potential of the worm turn out to be important as mentioned in the USA, the high endemic level of dirofilariosis in dogs revealed in this study would regard the animal as a main reservoir. From the overall incidence density of

.043 per animal-month, in other words it implies that a dog would get *D.immitis* infected at about 2.5 year. Base on this finding veterinarian could predict that their patient who is more than 2.5 year old and never attain any heartworm prevention measure is most likely infected. Together with the clinical sign of circulatory insufficiency, especially in old dog, with non-heartworm prevention history the disease should not be looked over in the diagnostic procedure.

The finding of eosinophilia in the infected dogs is not surprising and agreed with other reports. The result of no difference in blood picture of infected dog with and without intestinal helminthosis indicates that eosinophilia is most likely caused by *D.immitis* in this study. This can be explainable by the activity of cell-mediated immunity against the worm.