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## Prevalence and species distribution of ectoparasite of domestic dogs in jimma town, Oromia regional state, southwest Ethiopia

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**Abstract**

This study investigated the prevalence and the species composition of ectoparasites of dogs in Jimma town, southwest Ethiopia from December 2017 to March 2018. Physical examinations were undergone in 384 dogs and laboratory identification was employed on the ectoparasites. Of the 384 dogs examined, 365 (95.05%) were infested with one or more of ticks, lice or fleas. Overall a total of seven different species of flea were recorded in the dogs. The most prevalent ectoparasite identified was *Ctenocephalides felis* (79.69%) followed by *Ctenocephalides canis* (71.35%) while the other species collected and identified were *Rhipicephalus sanguine* (10.42%), *Linognathus setosus* (7.81%), *Pulex irritans* (4.17%), *Trichodectus canis* (2.6%), and *Ambylomma* spp. (2.6%). The present study showed no statistical significant difference ( $p > 0.05$ ) in the prevalence of ectoparasites between young and adult dogs. However, statistically significant difference ( $p < 0.05$ ) was observed in the prevalence of ectoparasites between male and female dogs. This study revealed that ectoparasites are the major challenges for the dogs in the study area which warrants serious attention.

**Keywords:** Dogs, fleas, jimma, lice, prevalence, ticks

**Introduction**

Domestic dogs are thought to be historic because, they are the earliest tame mammal and have lived with a person as a companion in all eras on the earth [1]. Ectoparasite infestation of dogs is very common, in a variable form and quantity, worldwide and these dogs harbor ectoparasites which are under a wide variety of arthropods which belong taxonomically to subclass Acari (ticks and mites) and class Insecta (fleas, sucking and chewing lice, mosquitoes, flies and phlebotomes [2].

The presence of ectoparasites on canines will have a negative and direct effect on the animal's health [3]. Ticks, fleas, and lice are danger to domestic dogs and cats in many countries of the world, their feeding habit have numerous effects on their hosts [4] and the extent of lesion may additionally vary based on the species infesting, immunity of the host and parasite intensity to cause effects [5], particularly skin illnesses [6-8].

In places where dogs lived with their owners, ectoparasites act as reservoirs and transmitter of zoonotic sicknesses [9], which could be potential risk to humans and other animals [7, 8, 10]. Ectoparasites can transmit zoonotic pathogens through indirect touch with animal secretions and excretions, infected water and food, and through direct contact with the animal, i.e. they inoculate numerous pathogens to the alternative animal or human host [11]. Additionally, they can live without problems indifferent environmental conditions with longer survival periods without feeding [12].

Ticks causes direct impact due to their blood feeding habit, act as vectors for lots of pathologic agents and cause disease and might additionally be responsible for tick paralysis because of poisonous injections [13]. Ticks may also be liable for transmission of infectious diseases like borreliosis, rickettsiosis, babesiosis [7]. *Rhipicephalus sanguineus* infests domestic dogs in all degrees of developmental stage. Sometimes ticks which have a preference to other animals as a chance may additionally parasitize home dogs, for instance each of the adult and immature stages of *Rhipicephalus appendiculatus* ideally parasitize farm animals, wild bovid, and goats; however, all cycles of development may additionally infest dogs [14].

Among species of fleas *Pulex irritans*, *Leptosylla segnis* (rat fleas), *Ctenocephalides canis* and

*Ctenocephalides felis* are the most typically reported species of fleas from dog and cat [15]. The impact of flea bite to the pet encompass pruritus, flea allergy dermatitis (FAD) and other skin lesions and can serve as intermediate host for nematodes, *Acanthocheilonema Reconditum*, and the canine tapeworm, *Dipylidium caninum*, each of which can parasitize humans [16]. Furthermore, fleas were implicated in the transmission of the etiologic agent of cat scratch zoonoses [17].

Lice are reason for skin pruritis that's more intense with chewing lice or Mallophaga, which include *Heterodoxus spiniger* and *Trichodectus canis*, than with bloodsucking lice or Anoplura. Mallophaga feeds on skin debris of host and move through the hair, while Anoplura is attached to the skin as they suck blood which often results in lesions such as crusts, alopecia, and excoriations. Severe infestation with Anoplura can bring about anemia, specifically in younger animals [18]. Because of its serious effect on dogs, other animals and human being, ectoparasitic infestations of dogs have received an attention internationally [19].

Although there are large numbers of dogs in Ethiopia, very few studies have been conducted on the ectoparasites of these animals. Only few studies existed [20, 21, 33] on the prevalence and species composition of ectoparasites of dogs in Ethiopia. Thus, the current study was aimed to estimate the prevalence and species distributions of ticks, lice and fleas on domestic dogs in Jimma, Southwest Ethiopia

## Materials and Methods

**Study area description:** The study was conducted in Jimma town which is found in Oromia National Regional State. The town is located 352 km Southwest of Addis Ababa at latitude of about 7013' - 80 56' North and longitude of about 350-52' - 370 -37' East, and at an elevation ranging from 880 m to 3360 meter above sea level. The study area receives a mean annual rainfall of about 1530 millimeters that comes from the long and short rainy seasons. The mean annual minimum and maximum temperatures are 14.4 and 26.70C respectively with dominant warm and humid weather condition. The town has total human population of 159,009 of which 80,897 were males and 78,112 were females [22]. According to reports of Jimma Agricultural Office [23] the livestock population in Jimma zone is composed of 2,016,823 bovine, 942,908 ovine, 288,411 caprine, 74,574 horse, 49,489 donkey, 28,371 mules and 1,488,848 chickens with unknown number of dog and cat population.

**Study animals and design:** A cross-sectional study was carried out to investigate prevalence and species composition of ectoparasites of dogs in Jimma town, southwest Ethiopia from December 2017 to March 2018. The study animals were domestic dogs of both sexes found in the study area. Dogs up to one year of age were classified as young and those above one year of age as adults [24].

**Sampling technique, and specimen collection and identification:** Systemic random sampling technique was employed in carrying out the study based on examination of 384 dogs that were presented to an open air veterinary clinic found in Jimma University College of Agriculture and Veterinary Medicine (JUCAVM) compound during the study period.

Dogs were humanly captured and carefully handled and examined on the skin, in hair shaft ears and other locations for the presence of ectoparasites. For collection and removal of

ectoparasites, each dog was thoroughly examined by combing the entire body surface on a clear white paper according to previously described method [16]. To facilitate the extraction of ectoparasites, dogs were rubbed with a piece of cotton wool soaked in ether. The ectoparasites recovered were preserved in 70% alcohol for identification. All ectoparasite species were identified under a stereomicroscope on the basis of the identification keys described by Wall and Shearer [25].

**Data management and analysis:** The data collected were coded and entered into Microsoft Excel version 2010 spreadsheet. The data was then analyzed using a statistical software namely, Statistical Package for Social Science (SPSS) version 20. Dogs were grouped by age and sex to determine whether these factors were associated with ectoparasite infestation, using chi-square analysis. In all analysis differences were considered significant at  $p < 0.05$  level.

## Results

As indicated in Table 1, of the 384 dogs examined 365 (95.05%) were positive for one or more type of ectoparasites. Seven ectoparasite species were identified on the dogs during the study period. *Ctenocephalides felis* was the most prevalent (79.69%) ectoparasite followed by *Ctenocephalides canis* (71.35%). Among the tick species examined, *Rhipicephalus sanguine* was the most prevalent (10.42%). On the other hand, among the lice, *Linognathus setosus* was the most prevalent (7.81%).

**Table 1:** Ectoparasite species identified in dogs in the study area (n=384).

Ectoparasite species	Number positive	Prevalence (%)
<i>Ctenocephalides canis</i>	274	71.35
<i>Ctenocephalides felis</i>	306	79.69
<i>Pulex irritans</i>	16	4.17
<i>Amblyomma spp.</i>	10	2.6
<i>Rhipicephalus sanguines</i>	40	10.42
<i>Linognathus setosus</i>	30	7.81
<i>Trichodectus canis</i>	10	2.6
Total	365	90.05

Table 2 shows the prevalence of ectoparasites with respect to sex and age groups of dogs examined. With regard to sex, the present study showed that 320 (83.3%) male and 65 (12.2%) females were infested with one or more of the identified ectoparasites. The difference between male and female was statistically significant ( $p < 0.05$ ). The present study also revealed that the prevalence of ectoparasite was higher in adult 272 (70.83%) than young 93 (24.22%) dogs, nonetheless the difference was not statistically significant ( $p > 0.05$ ).

**Table 2:** Prevalence of ectoparasites in the different sex and age groups of dogs in the study area (n=384).

	Classification	Number positive	Prevalence (%)	P-value
Sex	Male	320	83.3	0.040
	Female	45	12.2	
Age	Young	93	24.22	0.770
	Adult	272	70.83	

## Discussion

The present study revealed an overall prevalence of ectoparasites 95.05% in dogs in Jimma. Such a high

prevalence may have a huge impact on the health and performance of the infested dogs [26]. In this study seven species ectoparasites were collected and identified from dogs found in Jimma town, which may indicate ectoparasites are major challenges of the dogs' health in the area. The present finding was in close agreement with studies conducted in Ethiopia [20, 21, 26] and elsewhere in the world [4, 27, 28]. However, it is higher than other previous studies conducted in Iran [29, 30] Greece [31], and Southern Italy [4]. These discrepancies might be attributed to difference in environmental and management conditions, and geographic location [32].

Fleas were the most prevalent ectoparasites in dogs which agree with previous studies in the country such as from Gonder [33] and Hawassa [26]. It was also in agreement with the reports of studies carried out elsewhere in the world such as from Greece [34], Costa Rica [3], and Southern Italy [4]. *Ctenocephalides felis*, *Ctenocephalides canis*, and *Pulex irritans* were the most commonly occurring flea species in dogs [4, 28, 33] which is in agreement with the present study. However, *C. canis* was reported as the dominant species [15, 27, 31]. The observation of higher prevalence of *C. felis* than *C. canis* is due to the higher adaptability of this species to various environments in the world as described by Soulsby [16].

Among the tick species, *Rhipicephalus sanguineus* was the most prevalent species (10.42%) followed by *Amblyomma species* (2.6%). The current finding supported the result of the study by Elom *et al.* [36] whose finding in Nigeria indicated that *R. sanguineus* was higher in prevalence than *Amblyomma spp.* Similarly, Adamu *et al.* [37] detected this ectoparasite more than others. *R. sanguineus* was reported amongst most prevalent ticks in Brazil [12] and in Iran [38]; however, in Europe *Ixodes ricinus* and *Dermacentor reticulatus* are referred as the most prevalent ticks [39] and also a significantly decreased spread of *R. sanguineus* (6.25%) and (7.14%) were observed in Turkey [40] and in Iran [29], respectively. On the other hand a higher prevalence of infestation for *R. sanguineus* was reported in Albania [27] (23.8%), Iran [30] (29.39%), and Costa Rica [3] (18%). The highest prevalence (100%) for *R. sanguineus* in dogs was reported in northeast Brazil [39] which was very contradictory with the present finding; this difference might probably be attributed to variation in agro-ecology and management factors.

The prevalence of *Trichodectes canis* (13%) in this study was lower than what was previously reported as 41.3% [3]. However, it was higher than the finding of Chee *et al.* [41] (1%) in Korea. This might be due to differences in agro-ecology, diagnostic methods employed, and animal management [31].

The present study revealed a higher ectoparasites infestation in male than in females and the difference was statistically significant ( $p < 0.05$ ). This is in agreement with previous studies [29, 30, 41]. The lower prevalence in the female dogs could be attributable to behavioural factors specific to females such as less socializing during pregnancy rather than any sex predisposition. However, this is in contrast with the results in a study in Turkey, where infestation was more prevalent among females because for their confinement in certain heavily infested areas which makes the dogs prone to frequent re-infestations [40]. The current study showed no statistical significance difference ( $p > 0.05$ ) in the prevalence of ectoparasite between age group of dogs which is in contrast with Mosallanejad *et al.* [29] who reported a higher prevalence of infestation in younger dogs which has been attributed to the

lack of acquired immunity in puppies compared to adult dogs.

## Conclusions

This study demonstrated that Ectoparasitosis is higher in dog population particularly fleas which requires serious control strategy. The relative frequency and prevalence of these ectoparasites in the area may have problem for animals and humans at this point, hence, regular checking of parasites is an important concern to control the arthropods and arthropods-borne diseases. Veterinary centers should be established in the study areas to enable dogs have access to regular veterinary diagnosis and treatments. In addition, an in-depth study on seasonal prevalence and distribution of ectoparasites of dogs should be conducted to implement control measures

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