



MITE INFESTATIONS ON DOGS IN SELECTED AREAS IN COLOMBO DISTRICT: PREVALENCE AND RISK GROUPS

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Mite infestations in dogs, commonly known as mange, are caused by microscopic parasites that burrow into the skin, leading to intense itching, alopecia, scaly dandruff skin and ear irritation. Different species of mites can infest dogs, with symptoms that are species-specific. In this study, we determined the prevalence of mite infestation on dogs (n=75) and risk groups of mite-infested domestic (n= 58) and stray (n= 17) dogs in the Colombo District. The skin scraping collected was placed in vials containing 90% of ethanol. Using two cotton swabs, ear exudate samples were obtained from both ears for the microscopic diagnosis of the mites. More females (57.1%) were infested than male (33.3%; $\chi^2=4.2092$; $p=0.040$) dogs. Similarly, more domestic dogs (55.1%) had the infestation than stray (17.6%) dogs ($\chi^2=4.8381$; $p=0.006$). Whereas there was no difference ($\chi^2=0.902$; $p=0.168$) between the prevalence rate among puppies (71.4%) and adult dogs (44.1%). Total of six species of mites were found: the highest being *Demodex canis* (22.7%), followed by *Sarcoptes scabiei* (12%), *Otodectes cynotis* (2.7%), *Cheyletiella* sp. (6.7%), Histomatidae mite (2.7%) and an unidentified mite (8%) as well. The overall prevalence of mite infestation was found to be 46.7%. Different mite species were found in various parts of the body, including the external ear, neck area, dorsum, tail, and abdomen. Mites were more prevalent on the dorsum containing five out of the six mite species recorded except for the Histomatidae mite. It was revealed that the sex and the “ownership” of the dogs are significantly associated with the mite infestations. The control interventions therefore should target the risk groups identified and any underlying risk factors that could be contributing to the prevalence of the dogs. Discovery of *Sarcoptes scabiei*, zoonotic mite, poses a severe threat to the humans associated with the dog population in the study site.

Keywords: Mites on Dogs, Prevalence, Risk Groups, acarines

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INTRODUCTION

Mites, a part of the subclass Acari within the arachnid class, are divided into two main groups: Acariformes and Parasitiformes (Alexander, 2023). The Acariformes group includes the Superorder Acariformes, which is further divided into the Orders Trombidiformes and Sarcoptiformes. Order Trombidiformes includes predatory mites, plant feeders, and parasitic mites (Enrera *et al.*, 2023; Friedl *et al.*, 2023). Mites infesting dogs can be of different species causing different skin ailments; Canine Scabies/Sarcoptic Mange cause alopecia, itchy skin, red skin, Mite otoacariasis/Otodectic Mange cause discomfort in ears, Walking Dandruff/Cheyletiellosis can cause dandruff like flaky skin, Canine Demodicosis and Trombiculosis (Dryden, 2022). Out of the infestations, the commonest are Scabies/Sarcoptic Mange and Canine Demodicosis (Dryden, 2022). Mite infestations are not localized in distribution but vary according to the species of the mite and the environmental factors in the geographical area (Bochkov *et al.*, 2014, Fentanew *et al.*, 2015). Moreover, the management practices or good veterinary care influences the burden and the diversity of mites on domesticated animals especially in dogs (Ali *et al.*, 2021).

Different regions in the world report different mite prevalence among dogs. In the Asian region a majority of the studies reports a high prevalence of *Demodex canis* and *Sarcoptes* (Bangladesh: Ali *et al.*, 2021; Nepal: Shrestha *et al.*, 2015). Previous studies report age, gender, and dog ownership as significant risk factors depending on the unique conditions in each dog population (Bangladesh: Ali *et al.*, 2021; Nepal: Shrestha *et al.*, 2015). The mite infections in Sri Lanka are rarely reported or studied in both animals and humans. A study conducted by Rathnayaka and Rajapaksha (2019) on Kandy and Kurunegala have identified the external parasites causing dermatitis based on breed and the coat colour of 90 dogs. External parasites identified were *Demodex canis*, *Sarcoptes scabiei*, *Cheyletiella yasguri*, *Rhipicephalus sanguineus* and *Ctenocephalides canis*. Understanding the prevalence, identifying mite species, recognizing clinical signs, and exploring treatment options are crucial for managing mite infestations. Thus, the main aim of the study was to study the prevalence and risk indicators/groups of mite infestation on dogs in the Colombo district. To design sustainable management techniques, it is essential to comprehend population dynamics, mite transmission dynamics, and environmental control measures.

METHODOLOGY

The study was conducted by visiting veterinary care centers, households and public communities such as university, temples etc. in selected areas of Colombo District. First, the collection site of the dog was decided and looked for any scaly skin, scabs, alopecia or any signs of mites and it was recorded in an information sheet. If one or more symptoms were seen in dogs, hair from the identified site is removed using a pair of scissors. A scraping of skin was carried out in the direction of hair growth until visible bleeding. The scraping with minute hairs was collected to a sample vial and will be labelled. Scrapings from different body parts/scabs would be collected into different vials and it will be labelled accordingly. Scrapings were obtained from between toes separately into sample vials. Dogs which did not present symptoms of mites were also examined behind the ears, in between toes, along the vertebral column, near the eye and hair samples were collected using swabs and cellophane tapes. Using two



cotton swabs, ear exudate samples were obtained from both ears to check for mite otoacariasis. The collected swabs were carefully placed in vials containing 90% Ethanol. Also, the sticky tape method was practiced by pressing the sticky side of tape to hair and skin repeatedly covering a wide area and pasting it on a clean glass slide. If different areas are seen affected, several samples from different areas were collected. All collected samples were brought to the Research Laboratory, Department of Zoology, Faculty of Natural Sciences, OUSL, Nawala and were stored at 4 °C until the identification. The mites were identified according to the methods described by Nayak *et al.* in 1997 by placing them under the dissecting microscope.

RESULTS AND DISCUSSION

Among the 75 dogs examined, 17 were stray dogs and 58 were domestic dogs. Out of them, 33 were male dogs, and 42 were female dogs. The majority of them (57.3%) were mixed races, except for stray dogs.

Out of the 75 samples collected, 35 dogs were positive for mite infestations, giving an overall prevalence of 46.7%. Six mite species were detected. *Demodex canis*, *Cheyletiella* sp., *Otodectes cynotis*, *Sarcoptes scabiei* mite of Family Histomatidae, and an unidentified mite. *Demodex canis* showed the highest prevalence (22.7%) among the seven species of mites, while the Histomatid mite showed the lowest prevalence (2.7%) (Table 2). Of the tested dogs, 38.6% of the dogs were having single infestations while 8.0% were having mixed infestations. Among the mixed infestations, *Demodex canis* was a common occurrence (Table 1). The result of the study indicates a higher prevalence even though it was statistically significant.

Table 1 Overall prevalence of mite infestation on dogs

| Mite species | Infested Dogs | |
|--------------------------|---------------|----------------|
| | Number | Prevalence (%) |
| <i>Demodex canis</i> | 17 | 22.7 |
| <i>Cheyletiella</i> sp. | 5 | 6.7 |
| <i>Sarcoptes scabiei</i> | 9 | 12.0 |
| <i>Otodectes cynotis</i> | 3 | 4.0 |
| Histomatid mite | 2 | 2.7 |
| Unidentified Mite | 6 | 8.0 |
| Overall | 35 | 46.7 |

65 out of the 75 dogs had at least one of the following symptoms: itching, redness, skin lesions, scaly skin, and dandruff-like flakes, alopecia and ear. All 30 out of 35 infested dogs were showing at least one symptom listed above and 5 out of 10 dogs that did not show any of the above symptoms have been observed to be positive for mite infestation.

A previous study in South Asia have primarily identified two dominant species of mites affecting dogs which was *Demodex canis* and *Sarcoptes scabiei* (Ali *et al.*, 2011). This study has shown a higher diversity, with six distinct mite species-infesting dogs. One of the key explanations for the significant difference in species diversity is that previous studies only looked at stray dogs, whereas this study was focused primarily on domestic dogs. In the current study, the majority of the stray dogs were having *Demodex canis* (17.6%) followed by *Sarcoptes scabiei* (5.9%) similar to the previous studies.



Table 2 Symptoms Profile for different types of mites encountered.

| Species of mite | Percentage of infested dogs (n) | | | | | |
|--------------------------|---------------------------------|----------|--------------|---------------------------|----------|----------------|
| | Itching | Redness | Skin lesions | Scaly skin, and dandruff- | Alopecia | Ear irritation |
| <i>Demodex canis</i> | 52.9 (9) | 23.5 (4) | 0 | 41.2 (7) | 29.4 (5) | 5.8 (1) |
| <i>Cheyletiella sp.</i> | 80.0 (4) | 0 | 20.0 (1) | 80.0 (4) | 20.0 (1) | 20.0 (1) |
| <i>Sarcoptes scabiei</i> | 55.5 (5) | 22.2 (2) | 0 | 33.3 (3) | 55.5 (5) | 0 |
| <i>Otodectes cynotis</i> | 33.3 (1) | 33.3 (1) | 66.7 (2) | 66.7 (2) | 33.3 (1) | 0 |
| Histomatid mite | 50.0 (2) | 0 | 0 | 0 | 0 | 50.0 (2) |
| Unidentified mite | 66.6 (4) | 33.3 (2) | 16.6 (1) | 16.6 (1) | 33.3 (2) | 33.3 (2) |

*Percentages are given considering the total infested dogs for each species of mites.

In this study, the prevalence of *Demodex canis* was found to be 22.7%. Studies done by Ali *et al.*, in Bangladesh (2011) and Shrestha *et al.*, in Nepal (2015) found that the prevalence of *Demodex canis* were 29.1% and 35.4% respectively. A study conducted in Kurunegala and Kandy, Sri Lanka has shown a 31.5% of *Demodex canis* (Rathnayaka & Rajapaksha, 2019) with the symptoms of itchy skin, hair loss, and scaly skin, were shown in this study as well (Ficher, 2023). However, symptoms such as skin redness, alopecia, and dandruff-like flakes were also observed during the current study. This could be attributed to the fact that some dogs have multiple mite infestations or possibly due to secondary bacterial or fungal infections (Novak and Meyer, 2009). The second most prevalent species in the current study was *Sarcoptes scabiei* (12%) which is contradictory to the study by Ali *et al.* (2011), which had the highest prevalence (50%) of *S. scabiei*. In addition, the study conducted by Rathnayaka and Rajapaksha (2019) reported a prevalence of 80.5% of *S. scabiei*. The differences between the current and previous studies may be due to epidemiological factors, including weather, seasonal variations, geographical location, sample collection technique. Typical symptoms of scabiei mange are itchy skin, red skin, scaly skin, and alopecia.

Domestic dogs (55.1%), females (57.1%) and puppies (71.4%) were identified with more mite infestations during study. Sex and the “ownership” of the dogs are significantly associated with the mite infestations. Domestic dogs ($p=0.006$) and Female dogs ($p=0.04$) were significantly more prone to the mite infestations. The age of the dogs however was not significantly related.

A significantly higher numbers of domestic dogs were having mite infestations, implying that these animals could be more susceptible for mite infestations than the stray dogs. Stray dogs often face a more challenging and varied environment, exposing them to a wider range of pathogens that could stimulate a robust immune response. Their lifestyle, characterized by outdoor living and greater independence, may lead to the development of a more resilient immune system (Temizkan & Sonmez, 2022). Fewer treatments are targeted mite infestations in Sri Lanka, most infestations are misdiagnosed as bacterial or fungal infestations and are treated accordingly (Personal communication with vet surgeon). Furthermore, significantly more female dogs were found to be infested with mites. Hormonal influences or low immunity due to various reasons may be a causative for the higher prevalence among female dogs (Personal communication with the Veterinarian). However, previous reports indicate in some dog populations male dogs were having significantly higher mite infestations (Shrestha *et al.*, 2015, Ali *et al.*, 2011).

Among age groups, puppies (<1 year) have shown a higher prevalence (71.4%) than adult (>1 year) dogs (44.1%). Puppies, with their immature immune systems, are generally more susceptible to various



infections and parasites, including mites. Additionally, their playful and exploratory behaviour may increase exposure to environments where mites are prevalent. Furthermore, the immune response of adult dogs is likely to be more robust due to prior exposure to different pathogens, providing them with a level of resistance against mite infestations.

Understanding biological and ecological aspects of these infestations will help develop evidence-based treatments and improve dog population health. The study also highlights a knowledge gap in dog mite infestations, requiring vets' education on pet health issues.

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