Case Report

Dermatitis due to Mixed *Demodex* and *Sarcoptes* Mites in Dogs

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In dogs, dermatitis due to mixed mite infestation is rare. During the five-year period of study, two dogs were identified suffering from dermatitis due to mixed *Demodex* and *Sarcoptes* mites. Upon clinical examination dogs had primary and secondary skin lesions on face, around the ears, chin, neck, fore limbs and lateral abdomen. Microscopic examination of skin scrapings revealed *Demodex* and *Sarcoptes* mites. Both dogs were treated with daily oral ivermectin at 100 to 400 µg/kg body weight as incremental doses, external application of amitraz and supportive treatments with topical antimicrobial shampoo. After completion of forty-two days of therapy, dogs were recovered from the dermatitis.

1. Introduction

Canine demodicosis is a dermatologic disease that occurs when mites colonize the hair follicles and sebaceous glands [1]. *Demodex canis* was the main causative agent of canine demodicosis and it is characterized by the presence of large numbers of *Demodex* mites. The three recognized canine *Demodex* mites are *Demodex canis*, *Demodex injai*, and *Demodex cornei* [2–4]. Scabies is a transmissible and zoonotic ectoparasitic skin infection caused by tiny mites of the species *Sarcoptes scabiei*. It is transmitted readily among the animals, often even throughout an entire household, by skin to skin contact. The parasite commonly affects young dogs and dogs with poor nutrition but can affect healthy dogs that are exposed to the mites [5]. Literatures related to the individual types of mange mites in different animals were available from the last decade. There are no reports about the mixed infection of *Demodex* and *Sarcoptes* in dogs. This paper reports the rare occurrence of mixed demodectic and sarcoptic mange in dogs and their therapy.

2. Materials and Methods

Present case reports were recorded at College Hospital of College of Veterinary Science, Tirupati and Teaching Veterinary Clinical Complex, Proddatur during the five-years period from January 2009 to January 2014 of clinical study on dermatological cases. Dogs with dermatological problems were regularly screened for the ectoparasites and underlying factors for development of dermatological illness at major Veterinary Hospitals in four different districts of Andhra Pradesh. Superficial and deep skin scrapings, tape impression smears and hair plucks were collected from the affected dogs for laboratory examination. Scrapings were collected with scalpel blade dipped in liquid paraffin and collection of scrapings was continued until there was slight ooze of blood from dermal capillaries. Material was suspended in a few drops of liquid paraffin on a microscopic slide, a coverslip was applied and the preparation was examined under low and high magnifications (10X, 40X) of microscope. The acetate tape impression smears were used to investigate

FIGURE 1: Dog with lesions at face and neck regions (Case 1).

FIGURE 2: Dog with chronic generalized dermatitis (Case 2).

superficial mites [6]. Out of 1200 dogs examined with dermatological problems during the study two dogs were found to be affected with mixed demodectic and sarcoptic mange mites. From the two dogs blood was collected in 10% EDTA coated vials. Blood was processed for packed cell volume (PCV), haemoglobin (Hb), total leucocyte count (TLC), total erythrocyte count (TEC) and stained peripheral blood smears were for differential count (DLC) to know about the haematological abnormalities and to screen for any other infections.

Case 1. A three-month-old German Shepherd dog was presented with a history of skin lesions associated with pruritus from one month. Upon clinical examination, dog exhibited papules, pustules, erythema, alopecia, erosions on the face, around the eyes, ears, chin and neck regions (Figure 1).

Case 2. A three-year-old mongrel (local breed) dog was brought with a history of skin lesions associated with pruritus from one week onwards. Dog was recently kept at dog care center for about two weeks. Mild lesions were detected on the ears, face, nasolabial area, chin, neck, flank, abdominal skin, elbow and legs. Upon clinical examination, dog exhibited papules, pustules, erythema, alopecia, hyperpigmentation, erosions, lichenification and cellulitis. Distribution of lesions was observed on face, around the ears and overall the body (Figure 2).

FIGURE 3: Scraping containing *Demodex* mites (40X).

FIGURE 4: Scraping containing sarcoptic mites (40X).

3. Results and Discussion

Skin scrapings collected from the two dogs revealed different stages of *Demodex* mites along with *Sarcoptes* mites (Figures 3 and 4). Hair pluck examination revealed 3 to 6 number of *Demodex* mites around the hair follicle. Based on the history, lesions and laboratory findings, the present condition was diagnosed as generalized dermatitis due to two different types of mites. Both the dogs were treated with oral ivermectin at 100 to 400 $\mu\text{g}/\text{kg}$ body weight as incremental doses and they were kept on observation for any adverse symptoms [7]. Treatment was continued till two consequent negative skin scrapings were obtained at an interval of two weeks. External application was advised with amitraz (2 mL in 1 liter of water) twice a week as topical application followed by bath with benzyl peroxide shampoo up to the recovery period.

Both the dogs were subjected to scoring for relevant clinical signs of demodectic and sarcoptic mange (papules, pustules, erythema, pruritus, alopecia, hyperpigmentation and crusting). Clinical dermatological assessments (severity of the lesions and recovery degree) were made on days 0, 7, 14, 21, 28, 42, and 56 after therapy. Parasitological examination was conducted to test the response to the therapy. The data were recorded on the presence or absence of live mites. Efficacy of therapy was assessed based on the reversal of symptoms and parasitological examination. Response to therapy was graded as excellent, good, fair, and poor by assessing the clinical symptoms and lesions [8].

TABLE 1: Therapeutic response to ivermectin in both the dogs.

Posttreatment evaluation days	Case 1					Case 2				
	<i>Demodex</i>		<i>Sarcoptes</i>		Clinical response	<i>Demodex</i>		<i>Sarcoptes</i>		Clinical response
	Live	Dead	Live	Dead		Live	Dead	Live	Dead	
0th day	+++	Nil	+++	Nil	...	++++	Nil	++	Nil	...
7th day	++	+	+	++	F	++	+	+	++	F
14th day	+	++	Nil	+	F	++	++	+	+++	F
21st day	+	+++	Nil	Nil	G	+	++	Nil	Nil	F
28th day	Nil	+	Nil	Nil	E	Nil	+	Nil	Nil	G
42nd day	Nil	Nil	Nil	Nil	E	Nil	Nil	Nil	Nil	E

Clinical response:

E: excellent, complete remission of clinical signs of dermatitis and point of recovery,

G: good, most primary lesions have resolved but mild secondary lesions such as erythema, crusts, and scales are still evident,

F: fair, some response to treatment but primary and secondary lesions are still evident.

Complete clinical response was recorded in Table 1. One week after therapy, scales had disappeared and dogs had mild pruritus. Two weeks after treatment, the number of mites gradually decreased and the dogs were free from pruritus, erythema, erosions, and ulcers. One month after treatment, the general skin condition was improved; absence of pruritus was noticed and number of mites was also decreased. Complete disappearance of mites and regrowth of hair were noticed after forty two days of therapy. Haematological abnormalities included reduced total erythrocyte count ($6.2 \pm 0.10 \times 10^6/\text{cumm}$), haemoglobin concentration ($11.2 \pm 0.27\%$), leukocytosis ($1220 \pm 850/\text{cumm}$), neutrophilia ($9420 \pm 1221/\text{cumm}$), and eosinophilia ($1200 \pm 782/\text{cumm}$). Haematological abnormalities recorded in this study were in agreement with the previous studies on dogs with different types of mange [9, 10]. The anaemia due to loss of skin proteins and leukocytosis might be due to allergic reaction caused by mites or their products of inflammatory reactions [11].

In previous studies sarcoptic mange, mange due to two types of demodicosis, was reported in individual dogs [5, 12, 13]. Different types of mange mites were treated with oral ivermectin at different dose rates in dogs and cats [7, 11]. According to the authors' knowledge this is the first attempt to report and treat the mixed infection in dogs. Life cycle of *Sarcoptes scabiei* presumes that development from egg to adult may require 9–13 days and maturation of the egg takes 3–4 days, following which the larva hatches from the egg [14]. It is also known that survival on the host is up to 10 days or lesser. Avermectin compounds have no ovicidal activity on the eggs of mites and repetition of the treatment was advised to dogs with sarcoptic mange to prevent recurrence of this condition [15]. Therapy continued till two consequent negative skin scrapings and showed the ability to kill adult mites, besides killing any larvae hatching from eggs, as well as to prevent reinfection of mites of the host. To control recurrence of infection, once a week house premises were also sprayed with amitraz (4 mL in 1 liter of water).

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this paper.

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