

# Diagnosis and Therapeutic Management of Canine Demodicosis in Saurashtra Region of Gujarat

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## ABSTRACT

Among 23 dogs positive with canine demodicosis, 18 were selected for study, and 6 healthy dogs were taken as control. The dogs were divided into 4 groups, each consisting of 6 animals. Group I served as control. Group II, III and IV were treatment groups. Dogs of group II were given a subcutaneous injection of ivermectin @ 0.2 mg/kg b.wt weekly up to 4 weeks in combination with topical application of amitraz 12.5% solution as 0.05% mixed in water. Dogs of group III were given safrone tablets PO for 10 days in combination with safrone oil topically for 15 days. Dogs of group IV were given a fluralaner tablet @ 25 mg/kg PO for a single dose. All the dogs were bathed with shampoo containing benzoyl peroxide at weekly interval, except dogs of group III, and were given cefpodoximeproxetil @ 10 mg/kg b.wt. and pheniramine maleate @ 1 mg/kg b.wt. PO bid for 5 days and vitabestderm syrup 5 mL PO bid. Serum interleukin (IL)-10 showed a significant or appreciable increase in demodectic animals compared to healthy animals. Mite count was reduced up to 100 % on 30<sup>th</sup> day post-treatment in dogs of group II and there was quite a reduction in mite count in dogs of group IV, while lowest reduction in mite count was noticed 30<sup>th</sup> day post-treatment in dogs of group III. So, it was concluded that a combination of injection of ivermectin subcutaneously and amitraz 12.5% solution diluted to 0.05% topically had the highest efficacy among 3 treatment protocols used for canine demodicosis.

**Keywords:** Amitraz, Canine, Demodicosis, Fluralaner, IL-10, Ivermectin, Trichography.

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## INTRODUCTION

Dermatological problems in dogs are one of the most commonly reported and hardest to resolve problems encountered by veterinarians in small animal medicine (Scott *et al.*, 2001). Therefore, dermatological afflictions need considerable attention with regards to its diagnosis and treatment. Demodicosis is a common but exigent, non-contagious parasitic dermatosis caused by over population of the host-specific follicular mites of various *Demodex* species (Ravera *et al.*, 2015). *Demodex canis* is an obligate parasite which is normally found in low numbers from skin of dogs as a part of normal cutaneous fauna. In dogs, though the *Demodex canis* is most common species, *Demodex injai* (long-bodied) and *Demodex cornei* (Short-bodied) have also been identified (Shipstone, 2000).

The gold standard method for diagnosis of demodicosis is the microscopic evaluation of material obtained by deep skin scrapping (Scott *et al.*, 2001). The immune system can play a major role in manifesting clinical signs of demodicosis in different forms (Singh and Dimri, 2014). An immune suppressor cytokine interleukin (IL) - 10 could be measured by serological diagnostic methods like ELISA or RT-PCR during the course of the disease for assessment of immunity status of demodectic dogs (Felix *et al.*, 2013).

Most commonly used therapies are amitraz (A formamide compound) rinse and macrocyclic lactones (Parwari *et al.*, 2022) Ivermectin and doramectin are choice of treatment as they are very effective with rare adverse effects as well

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as economically beneficial. A spot-on solution containing 10% moxidectin & 2.5% imidacloprid has a better success rate in dogs with less severe disease (Mueller *et al.*, 2009). A new class of ectoparasiticides called isoxazolines contains afoxolaner, fluralaner, sarolaner and lotilaner (Mctier *et al.*, 2016). Afoxolaner @ 2.5 mg/kg b.wt. and fluralaner @ 25 mg/kg b.wt. orally can show a better success rate in the

treatment of generalized demodicosis (Beugnet *et al.*, 2016). A shampoo containing benzoyl peroxide is most commonly recommended for its follicular flushing activity (Laago, 2008). There are meager clinical studies done in India about canine demodicosis, so this study was aimed to find out the factors that promote demodicosis in dogs and a better treatment protocol for managing canine demodicosis.

## MATERIALS AND METHODS

### Skin Scrapping and Selection of Animals

Samples were collected from dogs with skin lesions presented at Veterinary Clinical Complex, Kamdhenu University, Junagadh. A dog presented with a skin disease with clinical features like erythematous skin lesions, focal demarcated areas of alopecia, mainly the face, particularly periorcular areas and commissure of lips, and the forelegs, deep pyoderma, hyperpigmentation and lichenification of skin and presence of mites in deep skin scrapings etc was suspected for demodicosis,

The animal was first subjected to microscopic examination of deep skin scrapings (Ettinger and Feldmen, 2017), and the areas with lesions were also subjected for trichography by digesting plucked hairs with KOH on a slide and viewing under low-power magnification (5X or 10X) for presence of demodex mites. After confirmation, a total of 18 dogs were selected for further study and the other 6 dogs were taken as healthy control.

### Interleukin (IL) - 10 Estimation

Serum samples were collected from dogs positive for Demodex mites in skin scrapings at day 0 (i.e., first day of treatment on confirmation) and day 15<sup>th</sup> and 30<sup>th</sup> post-treatment for estimation of serum interleukin-10 by sandwich enzyme-linked immune sorbent assay using canine interleukin-10 ELISA kit (ECIL10, Invitrogen, Thermo scientific). All procedures were performed as per the manufacturer's instructions. Values of interleukin-10 were compared with that of an apparently healthy group of dogs.

### Therapeutic Management of Canine Demodicosis

Among the 23 dogs confirmed with demodicosis, a total of 18 dogs were further grouped into 3 major treatment protocols each having 6 dogs each and were compared with a healthy control group (n=6) (Table 1).

The dogs of all groups confirmed with demodicosis were given the following supportive treatment, i.e., bathed with shampoo containing benzoyl peroxide at weekly interval, except dogs of group III, and were given cefpodoximeproxetil @ 10 mg/kg b.wt. and pheniramine maleate @ 1 mg/kg b.wt. PO bid for 5 days and syrup vitabestderm 5 mL PO bid.

The results of skin scrapping and sera samples collected from dogs at day 0 (i.e. first day of treatment on confirmation) and after days 15 and 30 post-treatment were compared to

Table 1: Different treatment protocols used in different groups of demodectic dogs (n=6)

Group I	Control healthy dogs
Group II	Pour-on amitraz 12.5% solution diluted with water as 0.05% + s/c injection of ivermectin weekly up to 4 weeks
Group III	Safrone oil topically for 15 days + Safrone tablets orally for 10 days
Group IV	Fluralaner chewable tablets orally single dose

Table 2: serum IL-10 levels (ng/ml) recorded in control group and in different groups of demodectic dogs before and treatment

Groups	0 day	15th day	30th day
Group I (Control)	0.04A ± 0.01	--	--
Group II	0.35B ± 0.11y	0.13 ± 0.04x	0.03 ± 0.00x
Group III	0.26AB ± 0.10	0.16 ± 0.07	0.06 ± 0.01
Group IV	0.23AB ± 0.10	0.09 ± 0.03	0.04 ± 0.01

Means with superscript in upper case (A, B) differ significantly between groups, and those with lower case (x, y) within row between periods (P<0.05)

know the therapeutic efficacy of different drug combinations.

## RESULTS AND DISCUSSION

In the present study, two methods (microscopic examination of deep skin scrapings and trichography) were used to diagnose canine demodicosis. All 23 dogs with skin lesions showed presence of Demodex mites in deep skin scrapings, which suggested 100% sensitivity of deep skin scrapings examination. In contrast, only 12 cases showed the presence of Demodex mites in trichography, suggesting its sensitivity up to 52.17 % for the diagnosis of canine demodicosis. Saridomichekalis *et al.* (2007) compared the sensitivity of microscopic examination of DSS, trichography and exudate microscopy in dogs with demodicosis and stated that trichography could be more helpful in generalized and complicated cases than localized uncomplicated cases. They recorded 81.1% sensitivity of trichography in comparison of DSS. Suartha *et al.* (2018) also compared different techniques of diagnosis of demodicosis in dogs and concluded that scraping technique provides the best diagnostic value for the isolation of Demodex mites compared to trichography and taping.

There was a significant/appreciable increase in the mean values of IL-10 in all demodicosis affected groups as compared to healthy control group, and the mean values declined gradually towards normal or near normal by day 15<sup>th</sup> and 30<sup>th</sup> post-treatment with significant difference only in group II (Table 2). Felix *et al.* (2013) noted significant increase in the mean values of IL-10 in dogs with recurring demodicosis (0.26 ± 0.03 ng/mL, n=11) as compared to dogs with first time occurrence of demodicosis (0.02 ± 0.01 ng/mL, n=6) and healthy dogs (0.01 ± 0.02 ng/mL, n=9). Ferrer *et al.*



(2014) suggested that there would be higher IL-10 levels in dogs with relapsing or first-time demodicosis, and these high IL-10 levels may suggest exhaustion of T-cells.

In present study, subcutaneous injection of ivermectin @ 0.2 mg/kg b.wt at weekly interval for four weeks and amitraz 12.5% liquid mixed in water as 0.05% solution topically weekly once for four weeks (Group II) brought decrease in mite count by 29.65% and 100% with simultaneous clinical improvement on 15<sup>th</sup> and 30<sup>th</sup> days of treatment, respectively. All 6 dogs (100%) of group II had no mites on microscopic examination at 30<sup>th</sup> day of treatment and showed speedy recovery with clinical improvement in the form of hair growth, skin lustre and repair of lesions. Nambi et al. (2010) studied the effect of ivermectin @ 400 µg/kg b.wt. PO in 25 demodectic dogs and recorded remission of clinical signs after treatment with oral ivermectin and ciprofloxacin tablets. The complete remission time of clinical signs was observed as early as 10 days to as late as 4 months. No adverse effects were noticed during the entire course of treatment. Chaudhary et al. (2011) studied efficacy of ivermectin @ 300 µg/kg b.wt. and @ 600 µg/kg b.wt. on demodectic dogs and noticed 30 and 100% efficacy, respectively.

A herbal combination of therapy safrone oil topically bid for 15 days and safrone tablets PO for 10 days (group III) reduced the mite count by 57.11% and 79.93% on 15<sup>th</sup> and 30<sup>th</sup> days of treatment, respectively, with simultaneous clinical improvement. None of the dogs from this group had shown mites on microscopic examination at 30<sup>th</sup> day of treatment and had a slow recovery with clinical improvement as compared to other two treatment groups.

Dogs in group IV treated once with fluralaner @ 25 mg/kg b.wt. PO showed decrease in mite count by 61.72 and 91.18% on 15<sup>th</sup> and 30<sup>th</sup> days of treatment, respectively, with simultaneous clinical improvement. 3 dogs (50%) from group IV showed no mites in microscopic examination of deep skin scrapings and all dogs showed a fast yet a slow recovery compared to those of group II. Duangkaew et al. (2018) reported 100% eradication of parasites in dogs in field after 4 months of treatments. Djuric et al. (2019) reported 98.9% and 100% reduction in mite counts in skin scraping on treatment with Fluralaner tablets by 28<sup>th</sup> and 56<sup>th</sup> day, respectively.

## CONCLUSIONS

It is concluded that all the treatment protocols were effective but the combination of injection ivermectin and liq. amitraz had faster recovery rate than the combination of safrone oil and safrone tablets or a single dose of fluralaner tablets for treating canine demodicosis. Serum IL-10 levels showed a significant or appreciable increase in demodectic dogs as compared to healthy control animals, and it declined to near normal levels within 30 days post-treatment.

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