



Diagnosis and Therapeutic Management of Mixed Demodex and Sarcoptes Mite Infestation in Dog

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Abstract

An adult male dog of German Shepherd breed with the history of localized as well as generalised dry alopecic patches along with moist crusty lesions associated with intense pruritis was brought to Veterinary Hospital and Livestock Expert Service Centre, Bharatpur, Chitwan. Microscopic observation of the superficial as well as deep skin scrapings on paraffin mount and tape impression smears revealed cigar shaped Demodex mites while KOH digestion test revealed both the Demodex and Sarcoptes mites. It was successfully treated with Ivermectin, Amitraz, Antibiotic along with nutrient and skin supplement. Oral form of Ivermectin was found more effective than injectable one, observing the course and extent of recovery. Observation of hematological and biochemical parameters before treatment showed leukocytosis, neutrophilia, anaemia, hyperalbuminemia, hyperglobulinemia along with rise in AST and ALP levels which came to normal range after recovery. There are many other effective drugs alternatives for the successful treatment of mange but not usually available in Nepal.

Keywords: Demodex; Dog; Oral Ivermectin; Sarcoptes

Introduction

The infestation of the mite called *Demodex canis* on skin is called demodicosis or demodectic mange. *Demodex canis* is an ectoparasite and the normal inhabitant of the canine hair follicles and sebaceous glands of skin. These mites assume pathogenic role mainly due to altered immune response or transmission from dam to pup leading to the development of clinical signs like alopecia, erythema and development of scales and lesions either localized on face and limbs or generalized all over the body. There are mainly three species of recognized *Demodex* mites in canine which are *Demodex canis*, *Demodex injai* and *Demodex cornei* while *Demodex canis* is the most common [1]. Similarly, the skin disorder caused by another mite called *Sarcoptes scabiei var canis* is called scabies or sarcoptic mange. *Sarcoptes scabiei* is a highly zoonotic ectoparasite burrowing into the epidermis of skin of almost all warm blooded animals [2]. In dog it leads to severe irritation and inflammation causing pruritus causing alopecia and hyperkeratosis. Dry and encrusted while sometimes exudative lesions are typically found in ear margins, lateral hocks and elbows and ventrum of the dog in more severe cases.

Case History and Clinical Observations

A 4 years old, male German Shepherd dog weighing 30 kg was brought to Veterinary Hospital and Livestock Expert Service Centre, Bharatpur, Chitwan with the history of dry alopecic patches as well as exudative lesions associated with pruritis all over the body (Figure 1). On clinical examination, the dog was normal, finely alert and responsive as well. The appetite, pulse rate and respiratory rate of the dog was found to be within the normal range while the dog had mild fever of 104°F. Most of the lesions on the skin were wound like (2 - 4 cm diameter) and exudative with some dry alopecic patches around the mouth and eyes. The ventral neck and the area around the scrotum was reddened. The dog was shaking its head with occasional discharge of pus from one of the ears.

Diagnosis and treatment

Superficial and Deep skin scrapings along with tape impression smears were collected in the regular interval from first day to 32nd day of case presentation. Scrapings were collected in 10% Potassium Hydroxide (KOH) after using a scalpel blade with paraffin in the affected parts until there was a slight capillary oozing. The scrap-



Figure 1: Case of severe generalised mange with skin lesions.

ings with the paraffin was observed directly under low and high magnification (10X and 40X) along with the tape impression (Figure 2 and 3). The scrapings in 10% KOH solution was digested and then centrifuged to be observed under the earlier magnification.



Figure 2: Tape Impression showing *D. canis*.

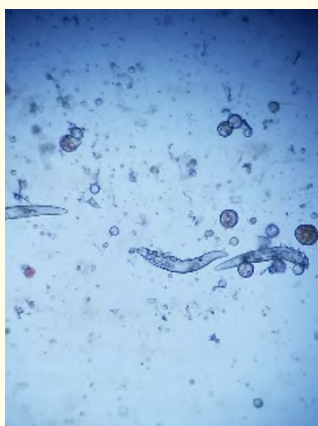


Figure 3: Skin Scraping showing live *D. canis*.

Microscopic examination from Paraffin Mount and Tape impression revealed *Demodex canis* under microscope. The method described by Soulsby 1982 [3] was followed to identify the mites. Cigar shaped adult mites with four pair of stubby legs in the thorax part of their body were seen. But the KOH digestion test revealed *D. canis* along with *Sarcoptes* mites (Figure 4). No fungal hyphae were observed in the beginning of the case presentation.



Figure 4: KOH Digestion skin scraping showing *sarcoptes* mite.

The blood from the affected dog was collected in 10% EDTA coated vials and Serum Collection Tubes coated with Clot Activator. Blood was sent to Diagnostic Lab for checking the total leucocyte count (TLC), differential count (DLC), Packed cell volume (PCV), Haemoglobin (Hb), total erythrocyte count (TEC) to know about the related haemato-biochemical abnormalities along with to screen for any other infections. The blood test was performed in the day 1 and after the treatment (day 32) (Table 1).

The affected dog was treated with injection of Ivermectin (Endact LA®) @ 0.2 mg/kg body weight S/C, to be repeated in 15 days interval. four weeks. Prednisolone (Prelol®) 1 mg/kg was in used in tapering dose to reduce itching. Amitraz (Vitraz®) 12.5% was diluted @ 4 ml/L of water and carefully worked into the skin with a sponge after every week for twenty-one days. Everyday Flotas® for topical application was advised for soothing of skin and removal of crusts and debris. The antibiotic Ceftriaxone and Sublactam Sodium (Keftraguard®) was also used @30 mg/Kg IM for 5 days to check any secondary bacterial infections along with nutritional supplement (Vitabest Derm®; Omega 6 and Omega-3 fatty acid supplement in 5:1 ratio).

The owner reported less marked improvement in condition after 14 days of treatment. After 15 days while the second dose of the Ivermectin was to be given, tape smears revealed fungus infection and the condition of disease was not progressive, so after that, Oral Ivermectin (Tab. Iver DT®-3 mg) @ 0.6 mg/kg PO *OD along with the Terbinafine Tablets (Tab. Tafine®) was prescribed. Ampicillin and Cloxacillin (Inj. Megapen®) @ 25 mg/kg tid IM was also used for 5 days. Although skin scraping showed various disintegrated as well as live *Demodex canis*. Oral Prednisolone was stopped as use of glucocorticoids is generally considered contraindicated in systemic fungal infections and also the immunity of dog seemed to go down, owing immunosuppressive property.

Haematological Test	Before Treatment (Day 1)	After Treatment (Day 32)	Units	Reference Range
Total Leucocyte Count (TLC)	21,200	16900	units/ μ L	5000 - 16000
Neutrophils	94	83	%	58 - 85
Hemoglobin	10.1	11.9	gm/dl	12 - 19
PCV	31	34	%	35 - 57
Total RBCs	4.2	5.3	million/ μ L	5.6 - 8.8
Biochemical Tests				
Blood Urea Nitrogen (BUN)	30	26	mg/dl	7 - 27
Alkaline Phosphatase (ALP)	169	156	units/L	10 - 150
Alanine Aminotransferase (ALT)	55	50	units/L	5 - 60
Serum Protein (SP)	8	7.4	g/dl	6.0 - 7.5
Serum Albumin (SA)	4.7	4.3	g/dl	2.7 - 4.4
Serum Globulin (SP-SA)	3.3	3.1	g/dl	3.0 - 3.4

Table 1: Haemato-biochemical parameters in day 1 and day 32 of German shepherd dog.

Hence this treatment was continued for 32 days until there was no live mites found in skin scrapings.

Results and Discussion

In this present study, the haematological parameters revealed Leukocytosis, neutrophilia and anemia. These findings were similar to Arora, *et al.* [4] and Nikee Kumari [5]. This might be due to inflammation and secondary bacterial infections. Biochemical Parameters showed hyperalbumemia, hyperglobulinemia along with rise in AST and ALP levels. This suggests liver disorder or elevated liver enzymes of idiopathic origin. After treatment the blood values moved towards normal although liver enzymes were still elevated, which might suggest the increase in liver function with concurrent use of various drugs to treat the disease.

A visible recovery occurred while observation on 32th day after start of the treatment as evident from skin scrapings negative for mange mite (Figure 5 and 6). Oral Ivermectin showed a good response in treating generalized demodicosis. Ivermectin can be given orally at a dose of 300 - 600 mg/kg day [6]. Plumb's Veterinary Drugs Manual suggested similar treatment regimen, for generalized demodicosis 0.6 mg/kg PO *OD until 4 weeks two negative skin scrapings for 4 - 6 weeks apart. Amitraz, as a topical treatment is used as 0.025% (250 ppm) dips in alternate weeks until no live mites are observed in skin scrapings [7], this was similar but the case was treated according to Product Manual, which was also effective in reducing number of live mites. Omega fatty acids solution along with vitamins for the supplement also helped in improving

immune system and strengthening skin health by maintaining integrity of the epithelial barrier. Although this case was treated with Ivermectin and Amitraz as miticides, many other drugs are also used. Selamectin is used in treating sarcoptic and demodectic mange by veterinary dermatologists [8]. Use of Milbemycin oxide at dose rate of 1.5 - 2 mg/kg/day has good results as it is well tolerated by Ivermectin sensitive dogs as mentioned in Blackwell's five-minute Veterinary consult: canine and feline as well as in Plumb's Veterinary Drug Handbook [9]. Doramectin Pour-on can be used as topical application to treat demodicosis in the cases where there is less efficacy of Amitraz dip [10]. Ketoconazole is also preferred in mixed fungal and mange infestation.



Figure 5: Recovered dog after day 32.

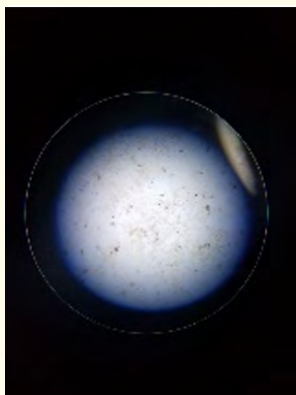


Figure 6: Skin Scrapping negative for mites after day 32.

Conclusion and Recommendations

This case had a successful therapeutic management of severe demodectic and sarcoptic mange. With this present case study, it can be concluded that oral Ivermectin is a good choice of drugs along with Amitraz dip to treat mange. Nutrient supplement containing Omega 3 and 6 fatty acids helped in skin regeneration. To control the reoccurrence of infection, cage or premises of dog residence should be sprayed with diluted Cypermethrin or Amitraz solution.

Further studies can be performed to know the efficacy of Ivermectin at higher dose of oral Ivermectin and use of drugs like Doramectin, Selemectin and Milbemycin Oxides in treating mange.

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