A successful therapeutic management of *Demodex canis* infestation in dog: A case report

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Abstract

A ten month old local male dog was presented with a history of inappetence, severe itching alopecia, erythema, dullness, papular and pustular lesions on face, fore limbs, hind limbs, ventral abdomen, inner thigh, loin region and tail. On the basis of history, clinical findings, hematological parameters and skin scraping confirm the case of generalized demodicosis. The dog was treated with acaricide, Anthelmintic, Keratolytic agent, Antibiotic, Antihistaminic and immunostimulant. Treatment was continued until complete recovery of the animal. Two consecutive negative skin scrapings after treatment were considered as recovery from *Demodex canis*.

Keywords: Demodicosis, skin lesions, mange, moxidectin

Introduction

In canine clinical practice, one of the most commonly encountered pathological conditions of skin is demodicosis. Demodicosis, also known as demodectic mange, follicular mange or red mange can be defined as an inflammatory, non-contagious parasitic dermatosis caused by overpopulation of the host-specific follicular mites of various *Demodex* species (Shrestha et al., 2015) [23]. The life cycle stages of *Demodex* includes an egg that develops into a 6 legged larvae which then develops into an 8 legged nymph (Mueller, 2008) [14], the later can be differentiated from an adult by the lack of an “armor-like” breastplate in it. Demodicosis can be classified into localized and generalized forms (Shipstone, 2000) [22] with juvenile or adult onset. In localised form, 4 or fewer areas of the body are involved, most often the face and the forelegs, with lesions smaller than 2.5 cm in diameter. On the other hand, generalized demodicosis is characterized by lesions in more than 4 areas of the body, with 2 or more feet affected or where an entire body region is involved (Mueller, 2012) [13]. Treatment of Canine demodicosis remained a challenge to treat due to several factors such as age of the animal, body condition, breed, prevailing climatic conditions of the area (Rodriguez-Vivas et al., 2003, and Abdel-Ghaffar et al., 2008) [18,11], recurrence of disease after treatment (Morita et al., 2018) [11], progression to generalized form (Ferrer et al., 2014) [5], localized immunosuppression (Kumari et al., 2017, Tarallo et al., 2009 and Janus et al., 2014) [9,28,6] and the duration of the treatment (Paradis, 1999) [15]. Demodicosis is characterized by excessive proliferation of mite, with in the hair follicles and sebaceous glands of the animal (Scott et al., 2001) [20]. The clinical signs include alopecia, erythema, crusts, hyperkeratosis, scaling, hair casting, pustules and pruritus with secondary pyoderma as a frequent complication, which ultimately leads to concomitant bacterial and fungal infections (Pradhan et al., 2012 and Koch, 2017) [17, 8]. The easiest and quicker mean for diagnosis of canine demodicosis is microscopic examination of skin scraping as it is both simple and a confirmatory method (Mederle, et al., 2010 and Paterson et al., 2017) [10, 16]. Generalized demodicosis may be a severe and potentially life-threatening disease in comparison to localized demodicosis as it is being observed by many veterinarians that most of the (90%) localized demodicosis cases will resolve spontaneously over 6-8 weeks period (Mueller et al., 2012 and Singh et al., 2011a) [13, 24]. The most common treatments recommended by veterinarians are a combination of systemic antibiotics and/or anti-septic shampoo, with spot-on application of acaricides, subcutaneous ivermectin injection and/or amitraz bath. As an adjunct or supportive therapy, omega-3 fatty acids in the form of capsules or fish oil and/or vitamin E are considered (Arsenovic et al., 2015) [2].
Thus, the present case report shows the successful therapeutic management of a generalized demodicosis with a combination therapy of acaricides and macrocyclic lactones along with supportive treatment.

Case History and Observations
A ten month old local male dog weighing 10.5 kg was presented to the State Veterinary Hospital, Eidgah Field, Civil Chariali Tezpur with a history of inappetence, severe itching, foul body odour, alopecia, erythema, dullness, papular and pustular lesions, skin rashes, & formation of scabs in the face, fore limbs, hind limbs, ventral abdomen, inner thigh, loin region and tail (Fig-1). There was no previous history of skin infections nor was ectoparasite reported. The animal was regularly vaccinated and deworming schedule was also followed as advised by veterinarian. On clinical examinations, the body temperature of the affected dog was found to be 101.8°F and the mucous membrane was slightly pale. Other parameters like Heart rate, respiration rate, pulse rate, urination and defecation were normal.

The dog was presented in 0 day post treatment stage. The animal was malnourished and had body odour, alopecia, erythema, dullness, papular and pustular lesions, skin rashes, & formation of scabs in the face, fore limbs, hind limbs, ventral abdomen, inner thigh, loin region and tail (Fig-1). There was no previous history of skin infections nor was ectoparasite reported. The animal was regularly vaccinated and deworming schedule was also followed as advised by veterinarian. On clinical examinations, the body temperature of the affected dog was found to be 101.8°F and the mucous membrane was slightly pale. Other parameters like Heart rate, respiration rate, pulse rate, urination and defecation were normal.

Fig 1: The dog was presented in this condition i.e. 0 day post treatment

Result
For the confirmatory diagnosis of the condition, deep skin scrapings were taken and digested in warm 10% KOH solution and centrifuged at 1500rpm for 5 minutes. A smear was prepared with the sediment and examined under microscope for detection of mites, if any. The skin scraping examination revealed the presence of elongated, cigar shaped mite, Demodex canis with body divisible into head, thorax bearing four pairs of short and stumpy legs and abdomen bearing transverse striations (Soulsby, 1982) [27] (Fig-2). For hematological study two millilitre of blood from cephalic vein was collected in EDTA vial & different parameters were studied by using fully automated haematological analyser. The hematological parameters haemoglobin (Hb), packed cell volume (PCV), total erythrocyte count (TEC), total leucocyte count (TLC), Neutrophil, Eosinophil and Lymphocytes were estimated on 0th and 45th days after treatment (Table-1). On the basis of history, clinical signs and skin scraping examination the case was diagnosed as a generalized canine demodicosis.

Table 1: Hematological parameter of the animal during 0th and 45th day post treatment

<table>
<thead>
<tr>
<th>Haematological values</th>
<th>0th day treatment</th>
<th>After 45th days post-treatment</th>
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</thead>
<tbody>
<tr>
<td>Hb (g/dl)</td>
<td>9.45</td>
<td>12.84</td>
</tr>
<tr>
<td>TEC (10⁷/mm³)</td>
<td>9.55</td>
<td>6.27</td>
</tr>
<tr>
<td>PCV (%)</td>
<td>29.80</td>
<td>38.35</td>
</tr>
<tr>
<td>TLC(10³/mm³)</td>
<td>17.51</td>
<td>10.73</td>
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<tr>
<td>Neutrophils (10³/mm³)</td>
<td>14.06</td>
<td>7.15</td>
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<tr>
<td>Eosinophils (10³/mm³)</td>
<td>2.04</td>
<td>1.05</td>
</tr>
<tr>
<td>Lymphocytes (10³/mm³)</td>
<td>1.48</td>
<td>2.16</td>
</tr>
</tbody>
</table>

Treatment
The dog was treated with Amitraz dip (acaricide) @ 250ppm, for four occasions at weekly interval along with Moxidectin (a macrocyclic lactone of milbemycin class) @ 0.3mg /kg body weight, subcutaneously injected for four occasions at seven days interval. To counteract secondary bacterial infection Cephalalexin antibiotic @ 25mg/kg body weight, was administered orally daily for 10 days. Chlorpheniramine maleate @ 0.5mg /kg body weight as antihistaminic was injected intramuscularly for 5 days to inhibit severe itching. Benzoyl peroxide shampoo as keratolytic agent was applied during bath on weekly basis. As immunosupression in puppies is an important cause of canine demodecosis, immunostimulator syrup (immunol) was administered @ 5ml orally two times daily after food. For hair re-growth and glossy coat, oral nutritional supplement containing natural egg protein, biotin (Samfur power) @ 1.5 tsf twice daily along with feed was administered. Treatment was continued until complete recovery of the animal (Fig-3). Two consecutive negative skin scrapings after treatment were considered as recovery from Demodex canis.

Discussion
The present case was considered as a generalised demodicosis due to presence of more numbers of lesions throughout the body (Satheesha, et al. 2016) [16] and (Kaplaywar et al., 2017) [7]. The lesions found in the present case were similar to those described by Kaplaywar et al., 2017 [7]. Treatment of canine generalized demodicosis is multimodal which include a number of medications for demodicosis treatment (Mueller, 2008) [14]. The clinical signs and lesions of canine demodicosis might be due to various predisposing factors like...
poor condition, malnutrition and abnormal environment that favours mite proliferation and development of skin disease which is supported by previous reports of (Mueller et al. 2012 and Shrestha et al., 2015) [13, 23]. The use of broad spectrum antibiotic in the present study is primarily due to the fact that most cases of canine generalized demodicosis involve a secondary bacterial skin infection, which needs administration of systemic antibiotics for several weeks along with acaricidal treatment i.e., Amitraz (Verde, 2005 and Mueller, 2011) [29, 12]. Amitraz associated with the antibiotic therapy is highly effective for treating generalized demodectic mange (Horne, 2010) [4]. In the present case study the haematological parameters (Table-1) revealed decreased level of haemoglobin concentration, total erythrocyte count, leucocytosis, neutrophilia and eosinophilia. These finding were in accordance with the findings of Pradhan et al., 2012 [17]. Benzyl peroxide-based shampoo are often recommended because of their keratolytic and supposed follicular flushing activity Scott, 2001 [21]. Benzoyl peroxide shampoo showed a good success in the treatment of generalised demodecosis. These findings were in accordance with the findings of Kaplaywar et al., 2017 [7]. Most commonly, corticosteroids cause immune suppression in case of demodicosis (Barriga et al 1992) [3]. In the present case study animal was provided with adequate nutritional supplements showed good response in managing canine demodicosis by its antioxidiant properties (Singh et al., 2011, Yatoo et al., 2014 and Arsenovic et al., 2015) [25, 30, 2] and also to overcome side effects of specific acaricidal treatment (Singla et al., 2013) [30] as well.

Conclusion
Thus, it can be concluded from present case study that moxidectin and amitraz may be considered as a drug of choice for canine demodicosis. Benzoyl peroxide containing shampoo and immunostimulant should be used as a supportive therapy against generalized canine demodicosis.

References