The Pharma Innovation Journal 2019; 8(9): 430-433

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.03
TPI 2019; 8(9): 430-433

www.thepharmajournal.com
Received: 22-07-2019
Accepted: 24-08-2019

Neeraj Thakur
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Chethan GE
Assistant Professor, Department of Veterinary Medicine, CVSc & AH, Selesih, Aizawl, Mizoram, India

Akhilesh
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

K Mahendran
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Ajith Y
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

Aishwarya Lekshman
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

CK Gaykwad
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

UK De
Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India

JB Rajesh
(1) Division of Medicine, ICAR-Indian Veterinary Research Institute, Izatnagar, Bareilly, Uttar Pradesh, India
(2) Department of Veterinary Medicine, CVSc & AH, Selesih, Aizawl, Mizoram, India

Correspondence
Chethan GE
Assistant Professor, Department of Veterinary Medicine, CVSc & AH, Selesih, Aizawl, Mizoram, India

A juvenile onset generalized pyodemodicosis in a Dobermann dog and its therapeutic management

Neeraj Thakur, Chethan GE, Akhilesh, K Mahendran, Ajith Y, Aishwarya Lekshman, CK Gaykwad, UK De and JB Rajesh

Abstract
In this case report, a juvenile-onset generalized pyodemodicosis in a Dobermann dog and its therapeutic management has been described. A one year old female Dobermann dog was presented with a history of generalized patchy alopecia and pruritus since 2 months. Physical and clinical examination of the animal revealed mild increase in body temperature and presence of generalized erythematous, papular and pustular lesions all over the body. Deep skin scrapings from the lesions revealed cigar shaped *Demodex* spp. mites. Haematological examination revealed leukocytosis with eosinophilia. Skin swab from the lesions showed presence of *Staphylococcus aureus* and *Pseudomonas aeruginosa* isolates and were found to be sensitive for nitrofurantoin, chloramphenicol and cefepime, aztreonam, piperacillin-tazobactam, respectively. Based on history, clinical and laboratory findings, the case was diagnosed as a juvenile onset generalized pyodemodicosis. The dog was treated with topical benzoyl peroxide (2.5% w/v) followed by application of amitraz at 0.025% once in 2 weeks, ivermectin (0.4 mg/kg body weight, po, sid), nitrofurantoin (5 mg/kg body weight, po, bid) and cefepime (40 mg/kg body weight, iv, bid) for 28 days along with supportive therapy consisting omega 3 and 6 fatty acids, tocopheryl acetate and herbal immunostimulant for 60 days. The dog showed improvement in condition after 28 days of therapy and complete recovery was noticed after 90 days.

Keywords: Pyodemodicosis, Dobermann, *Demodex*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, amitraz

1. Introduction
The first description of *Demodex* spp. mites was made in 1842 by the French dermatologist Gustav Simon. From that time till now more than 140 known species or subspecies have been described [1]. These are tiny, cigar-shaped, living in the hair follicles and sebaceous glands of mammals. Until the animal is infested by a large population of mites, most infections are not associated with any clinical disease. Probably due to genetic characteristics or immunodeficiency of the host or to concomitant disease, clinical manifestation of the infestation may occur [2]. Demodicosis may be grouped into two categories: localized and generalized, based on the body regions involved. In localized infestation on dogs, circumscribed areas of erythema and alopecia appear typically around eyes, mouth and on the forelegs and localized infestations may self-cure in time [3]. Generalized demodicosis can occur in juvenile as well as adult dogs and is categorized as squamous or pustular. Squamous demodicosis is characterized by scaling, erythema, alopecia, folliculitis and comedones [4]. In juvenile and adult-onset generalized demodicosis, involvement of feet (pododemodicosis) is common, for which longer treatment period is required to resolve [5]. Pyodemodicosis (pustular demodicosis) is diagnosed when secondary bacterial infection complicates the disease and lesions may progress to furunculosis and cellulitis [5]. Dogs with generalized demodicosis suffer from an immune dysfunction that has been called T-cell exhaustion [6]. An increase in major histocompatibility complex (MHC) class II expression was noticed on different skin cells in dermatitides caused by *Demodex* spp. Mites [7]. In this report, a case of juvenile-onset generalized pyodemodicosis in Dobermann dog and its therapeutic management has been described.

2. Materials and Methods
A one year old female Dobermann dog was presented to the Referral Veterinary Polyclinic, Indian Veterinary Research Institute, Izatnagar with a history of generalized patchy alopecia and pruritus since two months.

The dog was treated in the local veterinary hospital, but, no improvement was noticed. Physical and clinical examination of the animal revealed mild increase in body temperature (102.8 ^{0}F) and presence of generalized erythematous, papular and pustular lesions all over the body with blood oozing from deep lesions (Fig. 1). Pododermatitis was observed along with inflamed foot mucosa. Deep skin scrapings from lesions were collected and examined under 10X microscope after digestion with 10% KOH. Skin swabs from the lesions were submitted for bacterial culture and antibiotic sensitivity test. Whole blood sample was collected for haematological examination.

Deep skin scraping examination showed presence of cigar shaped *Demodex* spp. mites (Fig. 2). Haematological examination revealed leukocytosis and eosinophilia (Table 1). In skin swab cultures, growth of methicillin resistant *Staphylococcus aureus* (MRSA) and *Pseudomonas aeruginosa* organisms were noticed. On antibiotic sensitivity test (ABST), MRSA was found to be sensitive for nitrofurantoin and chloramphenicol, whereas, *Pseudomonas aeruginosa* was found to be sensitive for cefepime, aztreonem, piperacillin. Based on history, clinical and laboratory findings, the case was diagnosed as a juvenile onset generalized pyodemodicosis.

Table 1: Haematological parameters of animal on day 0 and day 28 post treatment

Parameter	Day 0	Day 28	Reference range*	Key findings
RBC count (million/mm^3)	5.5	5.3	5.0-7.9	
PCV (%)	36	36	35-57	
Haemoglobin (g/dL)	12.17	12.68	12-19	
MCV (fL)	65.45	67.92	66-77	
MCH (pg)	22.12	23.92	21.0-26.2	
MCHC (%)	33.80	35.22	32.0-36.3	
Total WBC count (cells/ mm^3)	22500	7800	5000-14100	
Neutrophils (%)	74	63	58-85	Leukocytosis
Lymphocytes (%)	13	31	8-29	
Monocytes (%)	04	04	5-11	
Eosinophils (%)	09	02	0-9	
Basophils (%)	00	00	0-4	Eosinophilia
Platelets (lakhs/ mm^3)	2.75	2.82	2.11-6.21	

*2016: Haematology reference ranges, 11th edn. The Merck Veterinary Manual

3. Treatment and Results

A treatment regimen including combination therapy using the following drugs was initialized. Benzoyl peroxide (2.5% w/v) shampoo was given for external application followed by amitraz solution at 0.025% once in two weeks till two consecutive negative skin scrapings, ivermectin at 0.4 mg/kg body weight, po, sid, nitrofurantoin at 5 mg/kg body weight, po, bid and cefepime at 40 mg/kg body weight, iv, bid for 28 days. Supportive therapy including omega 3 and omega 6 fatty acid (Nutricoat advance^{TM}) syrup at 1 tsp/10 kg body weight, po, bid, tocopheryl acetate (Evion^{TM}) capsules at 400 mg, po, on alternate days and herbal immunostimulant (Immunol^{TM}) syrup at 1 tsp/10 kg body weight, po, bid for 2 months. Animal showed uneventful recovery after 28 days of therapy and complete recovery was noticed after 90 days (Fig. 1).

Fig 1: Clinical recovery of the animal after therapy

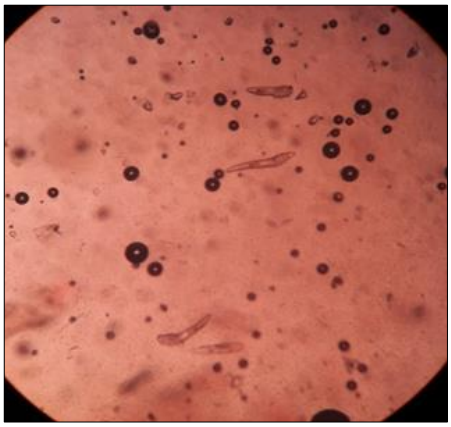

Fig 2: Presence of cigar shaped *Demodex* spp. mites in skin scraping examination (10X)

4. Discussion and Conclusion

Demodicosis is a common inflammatory skin disease of dogs [3]. Demodicosis has been classified into two types depending on the age at which it develops. Juvenile onset demodicosis tends to occur in the dog between the ages of 3 and 18 months, whereas, adult onset demodicosis usually occurs less frequently in dogs over 4 years of age [8]. In the present case, the confirmation of a juvenile onset generalized pyodemodicosis was done based on history, clinical examination and microscopic demonstration of *Demodex* spp. mites. The standard method to diagnose demodicosis is microscopic evaluation of material obtained by a deep skin scraping in the direction of hair growth [8]. Skin swab taken from the skin lesions showed presence of *Staphylococcus aureus* and *Pseudomonas aeruginosa* isolates and were found to be sensitive for nitrofurantoin, chloramphenicol and cefepime, aztreonam, piperacillin-tazobactam, respectively. Most dogs with generalized demodicosis suffer from secondary superficial or deep pyoderma [9]. Impression smears from the affected skin usually confirm the presence of bacteria. The bacterial infection, particularly in deep, increases pruritus, pain and malaise of affected patients. Based on ABST reports, the dog was treated with combination of nitrofurantoin and cefepime for 4 weeks. Long courses of oral antibiotics are needed for complete recovery of generalized pyodemodicosis [3]. *Pseudomonas aeruginosa* is resistant to a wide range of antimicrobials including benzylpenicillins, aminobenzylpenicillins, carboxypenicillins, first and second generation cephalosporins, chloramphenicol and tetracycline, which is due to the presence of several drug efflux systems and porins [10,11]. Cefepime, piperacillin/ tazobactam, ceftazidime, and ceftazidime/clavulanic acid showed less than 7% resistance in a study conducted by Rubin *et al*. [11] Methicillin resistant *Staphylococcus aureus* (MRSA) has gained global attention as a human pathogen and recent reports of MRSA infection and colonization of dogs and cats indicate that MRSA has apparently emerged as a pathogen of animals too [12]. In the present study, MRSA has been found to be least resistant for nitrofurantoin as well as chloramphenicol and this is in accordance with the results of study undertaken by Vincze *et al*. [13] in companion animals.

The management of canine demodicosis remains one of the main challenges in veterinary dermatology and the disease takes very severe form in certain breeds [14]. In the present case study, benzoyl peroxide was used for topical application followed by amitraz. Benzoyl peroxide is having follicular-flushing activity and is essential for the management of demodicosis as *Demodex* spp. is a follicular mite. Amitraz is an acaricide and insecticide which is the only product licensed for use in generalized demodicosis. It is licensed for use as a 0.025% dip every 14 days in dogs older than 4 months of age [15]. Amitraz has also been mixed with mineral oil (1:9 ratios) for treatment of pododemodicosis and demodectic otitis [9]. Macrocyclic lactone is an alternative to amitraz for treatment of generalized demodicosis. It potentiates glutamate-gated chloride channels or gamma-aminobutyric acid (GABA)-gated chloride channels of the mite's nervous system, resulting in increased cell permeability to chloride ions, neuromuscular blockade leading to paralysis of parasite [16]. Ivermectin is usually given at higher dose (300 to 600 µg/kg/day, po) for the treatment of generalized canine demodicosis [8]. Combination of oral ivermectin and topical amitraz for the successful management of generalized demodicosis has been reported [17].

In the present study, the dog has been treated with supportive therapy consisting polyunsaturated fatty acids (omega 3 and 6 fatty acids), anti-oxidant (tocopheryl acetate) and herbal immunostimulant. Polyunsaturated fatty acids maintain fluidity, flexibility and functionality of cell membranes and are essential for the biosynthesis of intercellular lipids in the stratum corneum layer of skin [18]. Canine demodicosis is associated with oxidative stress. Excess free radicals released during the disease process causes lipid peroxidation resulting in oxidative stress[19]. Immunosuppression of the host is one of the major predisposing causes for the occurrence generalized disease condition. Oxidative stress may contribute to the development of immunosuppression that in turn aggravates the severity of the disease condition [19].

In the present case study, therapeutic management of a juvenile onset generalized pyodemodicosis in a Dobermann dog has been described. Combination of oral ivermectin and topical amitraz is effective against severe generalized pyodemodicosis. ABST is necessary for rational use of antibiotics and is essential for better prognosis. Along with specific therapy, supplementation of polyunsaturated fatty acids, antioxidant and immunostimulant will be helpful for speedy recovery from the disease condition.

5. Ethical approval

This article does not contain any studies with human or animal participants performed by any of the authors. The article reports a clinical case presented to Referral Veterinary Polyclinic, Indian Veterinary Research Institute, Izatnagar. All protocols followed were as per the guidelines from the standard textbooks in Veterinary Medicine and were in compliance with ethical standards.

6. Acknowledgement

The authors are grateful to the Director and Joint Director (Academic and Research) of ICAR-Indian Veterinary Research Institute, Izatnagar for providing necessary funding to carry out this case study.

7. References

1. Singh A, Ilyas W, Thakur N, Singh AK, Diwakar. Demodicosis: A Major Mite Infestation of Canines. In: Sreedhar S editor. Advances in veterinary sciences Volume 4. AkiNik Publications, New Delhi, 2019, 1-20.
2. Fisher MA, Shanks DJ. A review of the off-label use of selamectin (Stronghold®/Revolution®) in dogs and

cats. Acta Veterinaria Scandinavica. 2008; 50(1):46.
3. Gortel K. Update on canine demodicosis. Veterinary Clinics: Small Animal Practice. 2006; 36(1):229-241.
4. Shipstone M. Generalised demodicosis in dogs, clinical perspective. Australian Veterinary Journal. 2000; 78(4):240-242.
5. Lemarie SL, Hosgood G, Foil CS. A retrospective study of juvenile-and adult-onset generalized demodicosis in dogs (1986–91). Veterinary Dermatology. 1996; 7(1):3-10.
6. Ferrer L, Ravera I, Silbermayr K. Immunology and pathogenesis of canine demodicosis. Veterinary Dermatology. 2014; 25(5):427-e65.
7. It V, Barrientos L, Lopez Gappa J, Posik D, Diaz S, Golijow C *et al*. Association of canine juvenile generalized demodicosis with the dog leukocyte antigen system. Tissue Antigens. 2010; 76(1):67-70.
8. Mueller RS. Treatment protocols for demodicosis: an evidence-based review. Veterinary Dermatology. 2004; 15(2):75-89.
9. Scott DW, Miller WH, Griffin CE. Diagnostic methods. In: Muller and Kirk's small animal dermatology. 6th edn. Philadelphia, USA: WB Saunders, 2001, 574-601.
10. Li XZ, Ma D, Livermore DM, Nikaido H. Role of efflux pump (s) in intrinsic resistance of *Pseudomonas aeruginosa*: active efflux as a contributing factor to beta-lactam resistance. Antimicrobial Agents and Chemotherapy. 1994; 38(8):1742-1752.
11. Rubin J, Walker RD, Blickenstaff K, Bodeis-Jones S, Zhao S. Antimicrobial resistance and genetic characterization of fluoroquinolone resistance of *Pseudomonas aeruginosa* isolated from canine infections. Veterinary Microbiology. 2008; 131(1-2):164-172.
12. Meredith CF, Michelle T, Kathy CT, David LP, Scott JW. Methicillin-Resistant and Susceptible *Staphylococcus aureus* infections in dogs. Emerging Infectious Diseases. 2010; 16(1):69-75.
13. Vincze S, Stamm I, Kopp PA, Hermes J, Adlhoch C, Semmler T *et al*. Alarming proportions of methicillin-resistant *Staphylococcus aureus* (MRSA) in wound samples from companion animals, Germany 2010–2012. PloS One. 2014; 9(1):e85656.
14. Plant JD, Lund EM, Yang M. A case–control study of the risk factors for canine juvenile-onset generalized demodicosis in the USA. Veterinary Dermatology. 2011; 22(1):95-99.
15. Plumb DC. Veterinary drug handbook. 4th edn. Ames (IA): Iowa State Press, 2002.
16. Mealey KL, Bentjen SA, Gay JM, Cantor GH. Ivermectin sensitivity in collies is associated with a deletion mutation of the mdr1 gene. Pharmacogenetics and Genomics. 2001; 11(8):727-733.
17. Panigrahi PN, Gupta AR, Patra RC. Therapeutic management of generalised demodicosis and dermatophytosis in a dog. Intas Polivet. 2013; 14(2):347-349.
18. Bhatt S, Patel PK, Paul BR, Verma NK, Raguvaran R, Dixit SK. Diagnosis and therapeutic management of hypothyroidism in a Labrador retriever dog. Journal of Entomology and Zoology Studies. 2018; 6(6):834-836.
19. Dimri U, Ranjan R, Kumar N, Sharma MC, Swarup D, Sharma B *et al*. Changes in oxidative stress indices, zinc and copper concentrations in blood in canine demodicosis. Veterinary Parasitology. 2008; 154(1-2):98-102.