

# Clinico-Therapeutic Study of Pyodermatitis with Underlying Ulcerative Keratitis in a Pug: A Case Report

Kapil Kumar Gupta<sup>1\*</sup>, Jasleen Kaur<sup>1</sup>, Gagandeep Singh<sup>2</sup>, Chetna Mahajan<sup>2</sup>

*Ind J Vet Sci and Biotech* (2024): 10.48165/ijvsbt.20.2.29

One of the most difficult challenges in veterinary dermatology is treatment and management of canine demodicosis which is prevalent in many breeds of dog and can sometime lead to mortality of animal (Miller *et al.*, 2013). It is clamant, infectious but non-contagious parasitic skin disease caused by over-proliferation of *Demodex spp.* which is a host specific follicular mite. On the basis of skin lesions distribution canine demodicosis can be categorized into canine local demodicosis (CLD) and canine generalized demodicosis (CGD) with good prognosis in former one (Scott *et al.*, 2001) while later one is a serious condition requiring intensive therapy (Miller *et al.*, 2013). Over-proliferation of *Demodex* mites and immunosuppression are important factors for the development of generalized demodicosis (Singh *et al.*, 2019). Juvenile onset demodicosis is more common in the dogs of age of 3-18 months, whereas, adult onset in dogs >4 years of age is less frequent (Mueller, 2004). Canine pyodermatitis or pustular demodicosis (CPD) is a condition of superficial bacterial folliculitis (pyoderma) merged with canine demodicosis leading to furunculosis and cellulitis (Miller *et al.*, 2013; Kuznetsova *et al.*, 2012). This secondary bacterial infection, most of the time, occurs due to *Staphylococcus pseudintermedius*, a commensal bacterium of canine skin (Miller *et al.*, 2013). Therapeutic management of demodicosis is somewhat difficult when it is complicated by secondary bacterial infection and other traumatic injury due to intense pruritis. Ophthalmic affections are not uncommon in young dogs because of their playful nature leading to keratitis/ keratoconjunctivitis and corneal ulcer/injury (Kumar *et al.*, 2018). Generally therapeutic protocols are well available for canine pyodermatitis until it is complicated by secondary lesions which make its management very difficult. Present case report describes the successful therapeutic management of pyodermatitis complicated by ulcerative keratitis in a six month old male Pug.

## CASE HISTORY AND OBSERVATIONS

A six month old male Pug was presented with the inappetence, generalized alopecia, erythema (Fig 1A) and mild itching. History revealed previous treatment with prednisolone and cetirizine since last 2-3 months. Dietary history revealed no change in diet since last 3 months which excluded the probability of occurrence of food allergy. Careful clinical examination revealed normal respiration (22/min), rectal

<sup>1</sup>Department of Veterinary Medicine, COVS, Rampura Phul, GADVASU, Ludhiana, Punjab, INDIA

<sup>2</sup>Department of Veterinary Clinical Complex, COVS, Rampura Phul, GADVASU, Ludhiana, Punjab, INDIA

**Corresponding Author:** Kapil Kumar Gupta, Assistant Professor, Department of Veterinary Medicine, COVS, Rampura Phul, GADVASU, Ludhiana, Punjab, India. e-mail: dr.kapil09@gmail.com

**How to cite this article:** Gupta, K. K., Kaur, J., Singh, G., & Mahajan, C. (2024). Clinico-Therapeutic Study of Pyodermatitis with Underlying Ulcerative Keratitis in a Pug: A Case Report. *Ind J Vet Sci and Biotech*. 20(2), 128-131.

**Source of support:** Nil

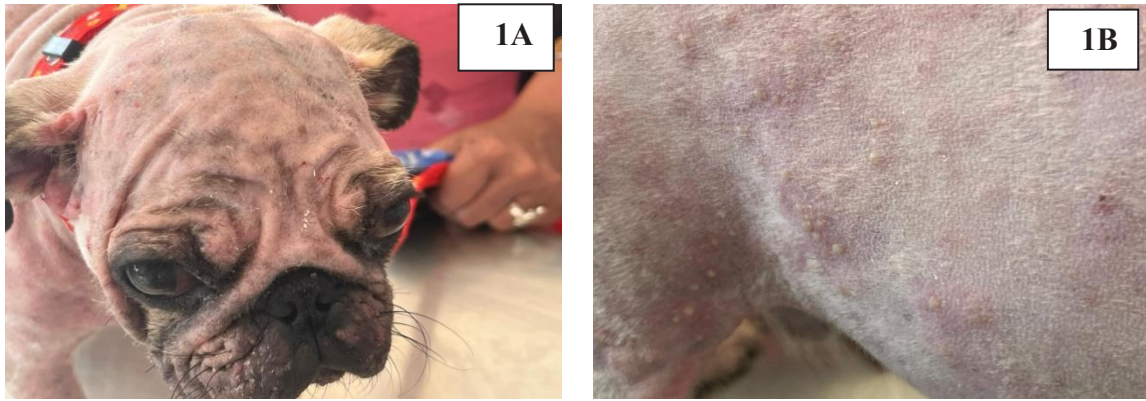
**Conflict of interest:** None.

**Submitted** 30/10/2023 **Accepted** 18/12/2023 **Published** 10/03/2024

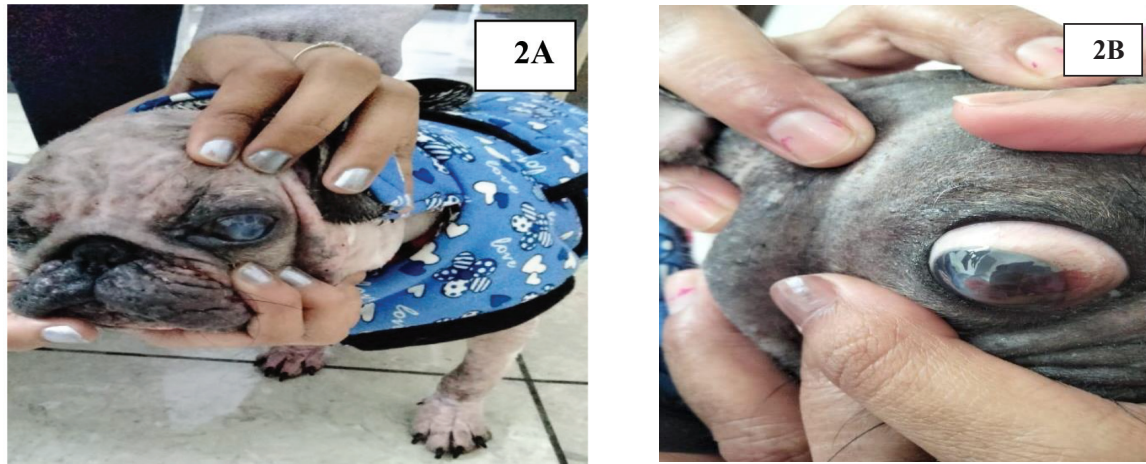
temperature (102°F) and heart rate (84/min) with concurrent presence of small pustules all over the body especially on lateral abdominal region (Fig 1B). Ocular examination revealed moist and pink conjunctiva, cloudiness of cornea (Fig 2A) and evidence of ulcerative keratitis (Fig 2B). No ticks and/or fleas were present on any of the body region.

Deep skin scrapping (in triplicate) were taken from the periphery of three separate skin lesions, viz., forehead (L<sub>1</sub>), lateral thorax (L<sub>2</sub>) and base of tail (L<sub>3</sub>), on separate clean glass slides (containing mineral oil) with a #10 scalpel blade squeezing the lesions until mild capillary bleeding was achieved. Scrapings were taken during each visit (day 0, 21, 28, 35 and 56) from the same three lesion. Adult live *Demodex* mites were detected and counted under microscope at 40 x magnification (Fig 3). Ten microscopic fields were analysed for presence of mites in each skin scrapping separately. Average of total mite count in the entire triplicate sample was taken as total mite count in one lesion. Finally, the sum of all the mites from all three lesions was taken as Total Mite Count (TMC). Furthermore, percentage reduction in mite count from the pre-administration to post-administration was also calculated as per the previously described method with slight modification (Beugnet *et al.*, 2016).

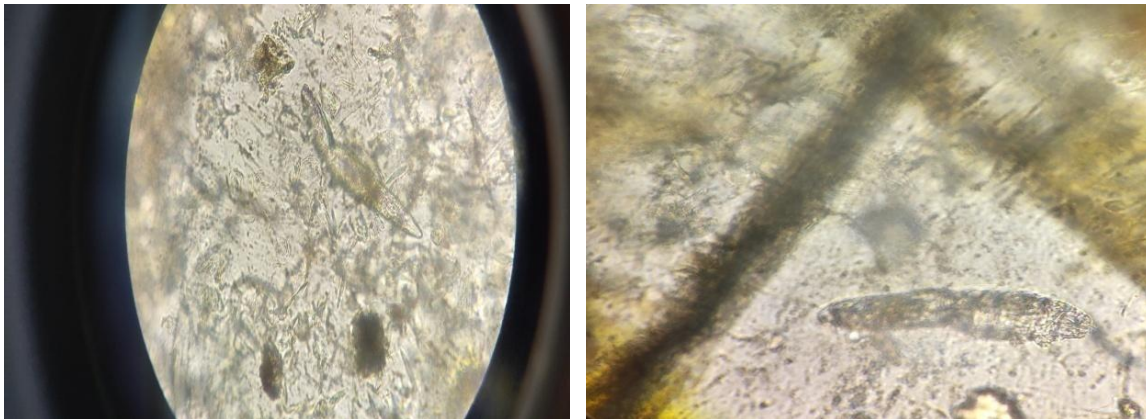
$$\% \text{Reduction (individual)} = \frac{(\text{Preadministration} - \text{Postadministration})}{\text{Preadministration}} \times 100$$



**Fig. 1:** Dog affected with pyodermatitis: A) Alopecia and erythema B) Pustular lesions



**Fig. 2:** Ophthalmic infection: A) Corneal edema B) Corneal ulcer showing neovascularization



**Fig. 3:** Live adult *Demodex canis* (spindal shape) seen in deep skin scrapings under microscope ( $\times 40\times$ )

About 3 mL blood was collected into clot activator vial for separation of serum. For preparation of autologous serum, additional five mL blood was collected and centrifuged @ 200g for 10 min (Gunay *et al.*, 2015). Hepatorenal biomarkers (serum total protein, albumin, ALT, BUN and creatinine) and electrolytes ( $\text{Na}^+$ ,  $\text{K}^+$ ,  $\text{Cl}^-$ ) were determined following standard protocols on day 0 and 28 post-therapy.

## TREATMENT AND DISCUSSION

Therapeutic management was started with oral administration of fluralaner (Tablet<sup>®</sup> Brevecto, containing 250 mg fluralaner, once only), Cephalexin (Lixen<sup>®</sup> @ 20 mg/kg, PO, bid  $\times 5$  days) and topical antimicrobial shampoo (PetBen<sup>®</sup> @ once in a week for four week). For ophthalmic infection 5% w/v

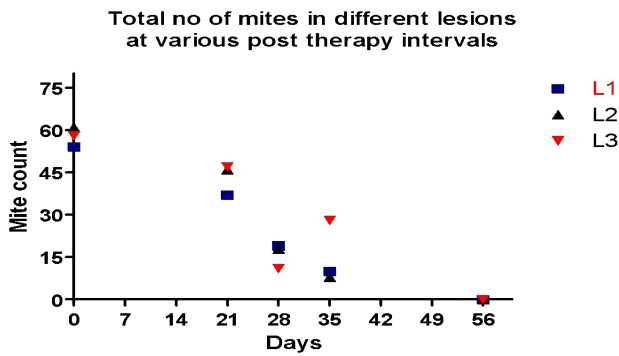
sodium chloride eye drop (®Hypersol-5 @ 2-4 drop bid ×15 days), Tobramycin eye drop (0.3% w/v Tobacin @ 2 drop bid ×15 days), fresh extract of human placenta (®Placentrex gel) and autologous serum @ 2-3 drops, od ×10 days. Percentage reduction in total mite count (TMC) was calculated as 24.85%, 72.25%, 83.82% and 100% on day 21, 28, 35 and 56, respectively. Maximum percentage reduction on day 21, 28 and 35 was observed in lesion of forehead lesion ( $L_1$ ), base of tail ( $L_3$ ) and lateral thorax lesion ( $L_2$ ) respectively. Three consecutive negative skin scrapings were recorded on day 56 onwards (Table 1). On day 0 the total number of mites counted were 54, 61, 58 in forehead lesion ( $L_1$ ), thorax lesion ( $L_2$ ) and base of tail ( $L_3$ ) respectively. On day 21 post therapy the respective figures were 37, 46, 47 respectively. On day 28 post therapy total numbers of mites counted were 19, 18, 11 in forehead lesion ( $L_1$ ), thorax lesion ( $L_2$ ) and base of tail ( $L_3$ ) respectively. On day 35 post therapy the corresponding values were 10, 8, 28 respectively. No mites were seen in any lesion on day 56 post therapy (Fig. 5). Hepatorenal and electrolyte study revealed no significant effect of therapy on functioning of vital organs. A non significant decrease in serum SGPT, albumin, creatinine, sodium, potassium and chloride and non significant increase in BUN was recorded on day 28 post therapy when compared with pre treatment values. After about 8 weeks of treatment clinical recovery was recorded in terms of dissolution of clinical signs and symptoms. Dog regained normal appetite, full hair growth without the complaint of itching, with resolution of corneal edema and keratitis.

Pyodemodicosis is a condition where demodicosis is complicated by secondary bacterial infection. In present case it might have probably triggered by chronic glucocorticoid therapy as evident in history. Therapeutic management of canine demodicosis with concurrent ocular abnormalities is somewhat difficult and usually time taking. Pyodemodicosis, in present case, was treated by using single oral dose of Fluralaner, which resulted in rapid reduction of mite

count with complete clinical recovery on day 56 which is an advantage over long term conventional therapy with ivermectin involving repeated dosing and number of side effects. Karas-Tecza and Dawidowicz (2015) and Djuric *et al.* (2019) also proved the efficacy of oral fluralaner in term of parasitological cure after sixty day of administration. Fluralaner is a heterocyclic chemical compounds used as systemic insecticide and acaricide. It selectively inhibits the nervous system of parasite by binding to receptors of ligand-gated chloride channels; gamma-aminobutyric acid (GABA) and L-glutamate receptors (Mueller *et al.*, 2020). To overcome secondary bacterial infection we used broad spectrum antibiotic (Cephalexin) and topical antimicrobial shampoo. Benzoyl peroxide shampoo has follicular flushing action (FFA) which is beneficial in resolving folliculitis. Benzoyl peroxide has anti-inflammatory, antibacterial (against *Cutibacterium acnes*), sebostatic and keratolytic effects (Matin and Goodman, 2021). Ocular affections like corneal edema, opacity and keratitis in present case, induced by self trauma due to itching, were treated accordingly by using ocular antibiotics, hypertonic saline, autologous serum and placental extract. Placentrex is human placental extract contains polydeoxy ribonucleotide responsible for its wound healing, anti-inflammatory, immunotropic and antioxidant properties (Wijesinghe *et al.*, 2005). In previous report Preena and Aravind (2017) also used subconjunctival injection of Placentrex and instillation of Tobramycin (0.3%) for the management of corneal opacity in Captive Elephant Tusker. Therapeutic use of autologous serum eye drops has also been reported previously in various clinical studies (Gunay *et al.*, 2015). It stimulates corneal epithelial migration, enhances epithelial healing and reduces many secondary ocular problems. Many researchers used diluted serum and physiological saline solution for the same purpose but most promising results were obtained with undiluted serum in resolving ocular affections (Salman *et al.*, 2011).



**Fig. 4:** Clinical recovery after 8 week post therapy A) Re-growth of hairs B) dissolution of corneal opacity



**Fig. 5:** represents total number of mites in different lesions at various post therapy intervals

**Table 1:** Percentage (%) reduction in total mite count (TMC) on different days post-treatment

Days	Day-21	Day-28	Day-35	Day-56
Forehead (L <sub>1</sub> )	31.48	64.81	81.48	100
Lateral thorax (L <sub>2</sub> )	24.59	70.49	86.88	100
Base of tail(L <sub>3</sub> )	18.96	81.03	82.75	100
<b>Total Mite Count</b>	<b>24.85</b>	<b>72.25</b>	<b>83.82</b>	<b>100</b>

**Table 2:** Serum profile of hepatorenal biomarkers and electrolytes in dog affected with pyodermatitis (day 0 and 28 of treatment)

Serum profile	Parameters	Day-0	Day-28	*Reference value
<b>Hepatorenal biomarkers</b>	SGPT (IU/L)	54	39	10-109
	ALB (g/dL)	3.9	3.6	2.3-3.1
	TP (g/dL)	06	06	5.4-7.5
	BUN (mg/dL)	8.8	13	8-28
	CRE (mg/dL)	0.64	0.34	0.5-1.7
<b>Electrolytes</b>	Na <sup>+</sup> (mEq/L)	144	94	142-152
	K <sup>+</sup> (mEq/L)	4.1	3.8	3.9-5.1
	Cl <sup>-</sup> (mEq/L)	91	59	110-124

\*Merck Veterinary Manual, 11th edition

In conclusion, the use of single dose of fluralaner in present case resulted in good clinical and parasitological cure and hence may be recommended in managing the clinical cases of canine generalized pyodermatitis. No significant change in hepatorenal biomarkers and electrolytes suggests the safety of fluralaner. Autologous serum along with supportive treatment provides good results in resolving ulcerative keratitis.

**ACKNOWLEDGMENT**

Authors express their gratitude towards Dean, COVS, Rampura Phul for their support and providing necessary facilities to conduct the study.

**REFERENCES**

Beugnet, F., Halos, L., Larsen, D., & de Vos, C. (2016). Efficacy of oral afoxolaner for the treatment of canine generalized demodicosis. *Parasite*, 23, 1-8.

Djuric, M., Matic, N.M., Davitkov, D., Glavinic, U., Davitkov, D., Vejnovic, B., & Stanimirovic, Z. (2019). Efficacy of oral fluralaner for the treatment of canine generalized demodicosis: A molecular-level confirmation. *Parasites and Vectors*, 12, 270.

Gunay, C., Sagliyan, A., Yilmaz, S., Kandemir, F., Han, M., Ozkaraca, M., & Kulualp, K. A. D.R.I. (2015). Evaluation of autologous serum eye drops for the treatment of experimentally induced corneal alkali burns. *Revue de Medecine Veterinaire*, 166, 63-71.

Karas-Teczka, J., & Dawidowicz, J. (2015). Efficacy of fluralaner for the treatment of canine demodicosis. *Veterinary Dermatology*, 26, 307.

Kumar, T., Punia, M., Agnihotri, D., Sindhu, N., & Jain, V.K. (2018). Incidence of ophthalmic affections in dogs: A short study. *International Journal of Current Microbiology & Applied Sciences*, 7(9), 1560-1565.

Kuznetsova, E., Bettenay, S., Nikolaeva, L., Majzoub, M., & Mueller, R. (2012). Influence of systemic antibiotics on the treatment of dogs with generalized demodicosis. *Veterinary Parasitology*, 188(1-2), 148-155.

Matin, T., & Goodman, M.B. (2021). Benzoyl peroxide. In: StatPearls [Internet]. StatPearls Publishing.

Miller, W.H., Griffin, C.E., & Campbell, K.L. (2013). Parasitic diseases. In: Muller and Kirk's *Small Animal Dermatology*, 7<sup>th</sup> edn., Ed: W.B. Saunders Co. Philadelphia. pp 284-342.

Mueller, R.S. (2004). Treatment protocols for demodicosis: An evidence-based review. *Veterinary Dermatology*, 15(2), 75-89.

Mueller, R.S., Rosenkrantz, W., Bensignor, E., Karas-Teczka, J., Paterson, T., & Shipstone, M.A. (2020). Diagnosis and treatment of demodicosis in dogs and cats: Clinical consensus guidelines of the World Association for Veterinary Dermatology. *Veterinary Dermatology*, 31(1), 4-e2.

Preena, P., & Aravind, B. (2017). Case report on the medical management of corneal opacity in a captive elephant tusker. *Advances in Animal and Veterinary Science*, 5(8), 342-345.

Salman, I.A., Kiziltunc, A., & Baykal, O. (2011). The effect of alkali burn on corneal glutathione peroxidase activities in rabbits. *Turkish Journal of Medical Science*, 41, 483-486.

Scott, D.W., Miller Jr, W.H., & Griffin, C.E. (2001). Canine demodicosis. In: Muller, Kirk's (Eds.), *Small Animal Dermatology*. W.B. Saunders, Philadelphia. Pp. 457-474.

Singh, A., Kumari, P., Singh, S.K., Soman, S.P., Choudhury, S., Srivastava, A., & Garg, S.K. (2019). Pre- and post-therapy circulating immuno-stimulatory and immuno-suppressive cytokines in dogs with juvenile-onset generalized demodicosis. *Veterinary Dermatology*, 275, 108954.

Wijesinghe, S.J., Dangolla, A., & Silva, I. (2005). Correction of vision in an elephant (*Elephas maximus maximus*) with corneal opacity. *Proceedings of Scientific Session of Sri Lanka Veterinary Association*, p. 32-33.