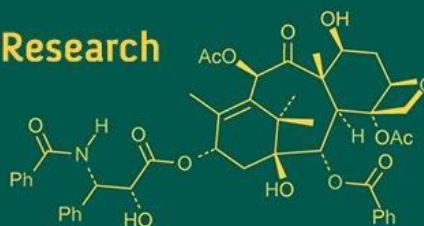


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Demodicosis and hepato-renal complications secondary to canine distemper in a non-descript dog

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Abstract

Demodicosis is generally observed in dogs with poor immunity or predisposed by immunosuppressive diseases or disorders. An unvaccinated five year old non-descript dog presented with the systemic signs suggestive of canine distemper and 'spectacled eye' appearance was diagnosed as canine distemper by immunochromatography test. *Demodex canis* could be demonstrated by microscopic examination of skin scrapings. Haemato-biochemical analysis revealed reduction in lymphocyte count, and elevated serum hepatic and renal markers. Treatment with antibiotic, ectoparasiticide, immunomodulator and supportive therapy resulted in recovery from the mange infestation and hepato-renal complications.

Keywords: Demodicosis, azotemia, hepatic injury, canine distemper virus, lateral flow assay

Introduction

Demodex mites are normal flora of the skin of most apparently healthy dogs, and the clinical disease appears when these mites multiply on the skin and hair follicles (Gortel, 2006) [4]. Demodicosis occurs in dogs which are affected with immunosuppressive diseases or cases undergoing immunosuppressive therapies (Miller *et al.*, 2013) [7] and diagnosis is made by microscopic examination of deep skin scrapings (Mederle *et al.* 2010) [6]. Canine distemper virus (CDV) causes multisystemic illness, neurological signs, and immunosuppression in dogs and secondary complications are common in affected dogs (Silva *et al.*, 2022) [11]. Hence, this paper reports demodicosis and hepato-renal changes as complications associated with CDV infection in a non-descript dog.

Case History and Observations

An unvaccinated male non-descript dog of five year old was presented to the Teaching Veterinary Hospital, Veterinary College and Research Institute, Namakkal, with signs of erythema, pruritus and alopecia under the neck, depilation of hairs around eyelids (spectacled eyes), bilateral mucoid ocular discharge, hyporexia, melena, enamel hyperplasia and hyperkeratosis of nasal planum and foot pads (Figure 1, 2a and 2b). The conjunctival swab was collected and subjected to lateral flow assay based immunochromatography assay (QuickVET®, Ubio Biotechnology Pvt. Ltd., Kochi). Approximately 15 microliters of the test sample followed by two drops of the assay buffer using a sterile pipette were added into the sample hole of the test kit. The results were interpreted within 10 minutes. The positive result is indicated by the red lines in both the control (C) and test (T) marks (Figure 3), whereas the negative result is indicated by the red line only in the (C) mark. Whole blood and serum samples were collected for haemato-biochemical analysis. Deep skin scrapings were collected from under the neck region and around eyes and subjected to microscopic examination.

Results and Discussion

Microscopic examination revealed the mite, *Demodex canis*, cigar-shaped organisms (Figure 4). Similar observations were made by Salem *et al.* (2020) [10]. The case was diagnosed to be positive for canine distemper by immunochromatography test and demodicosis might be associated with the immunosuppressive effect of the CDV. Canine distemper is often complicated by secondary bacterial infections and immunosuppression. Previously, demodicosis was reported in dogs with immunosuppressive disease such as leishmaniosis,

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babesiosis and ehrlichiosis, and other causes such as hyperadrenocorticism, hypothyroidism, neoplasia, glucocorticoid treatment and chemotherapy (Mueller *et al.*, 2020) [8]. The T-cell exhaustion characterized by decreased circulating CD4+ T cells (Ferrer *et al.*, 2014) [3] and increased number of immunosuppressive cytokines (IL-10) were reported in dogs with demodicosis (Kumari *et al.*, 2017) [5].

Haemato-biochemical analysis revealed red blood cells- $6.3 \times 10^6/\mu\text{L}$, haemoglobin-4.0 mg/dl, packed cell volume-48.2%, white blood cells- $22.0 \times 10^3/\mu\text{L}$, platelet- $927 \times 10^3/\mu\text{L}$, neutrophils-80.0%, lymphocytes-14.0%, monocytes-5.0%; total protein 5.7 g/dL, albumin-2.8 g/dL, globulin-2.9 g/dL, aspartate aminotransferase-1.6 u/L, alkaline phosphatase-284 u/L, blood urea nitrogen-47.0 mg/dL, creatinine-2.64 mg/dL, calcium-14.5 mg/dL, phosphorous-15.3 mg/dL. Reduction in lymphocyte count could be associated with the infection and immunosuppression caused by the canine distemper virus (CDV) and neutrophilia associated leukocytosis could be due to secondary bacterial infection as a complication of the CD (Sykes, 2014) [12]. A marked thrombocytosis in this case could be due to the inflammatory response associated with cytokine (IL-6), which increases the thrombopoietin level and is an indicator of thromboembolism (Woolcock *et al.*, 2017) [13].

The elevated hepatic enzyme level might be due to the hepatic necrosis caused by CDV (Bastos *et al.*, 2020) [1]. Elevated renal markers, melena and hyperphosphatemia could be the signs of pre-renal azotemia associated with the CDV, since the virus affects urogenital epithelia (Palomino *et al.*, 2022) [9]. Whereas, Silva *et al.* (2022) [11] recorded renal changes at tubular and glomerular levels due to IgM mediated immune complex deposition in cases of canine distemper.

Ivermectin @ 0.2 mg/kg, S/C as ectoparasiticide, chlorpheniramine maleate @ 0.5 mg/kg, IM, as an antihistaminic, vitamin AD₃E-0.2 ml, IM as an immunomodulator, enrofloxacin @ 5 mg/kg, IM to combat secondary bacterial infection and furosemide @ 2 mg/kg as a diuretic, were administered. Follow-up therapy was recommended with oral herbal immunomodulator (Immunol®) for immunostimulation and antiviral property, oral ivermectin @ 0.4 mg/kg for 10 days, and topical application (thrice a week) of sulphur @ 22.0% (Dermodip®) as an ectoparasiticide. Two weeks post treatment, the case recovered from mange dermatitis, and the serum

biochemical values returned to normal range. In conclusion, lateral flow assay could be useful in identifying the canine distemper virus as an underlying cause for demodicosis and liver injury and azotemia. Administration of immunostimulant and antimicrobials in combination with ectoparasiticides would be useful in treating the systemic effects of CDV and demodicosis.

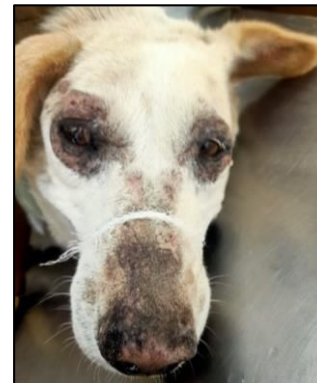


Fig 1: Spectacled eye due to demodicosis in a non-descript dog, nasal hyperkeratosis due to CDV



Fig 2a and b: Enamel hypoplasia of canine tooth (left and right) caused by CDV in a non-descript dog



Fig 3: Lateral flow assay based immunochromatographic test showing positivity for CDV (C-control line; T-Test line)

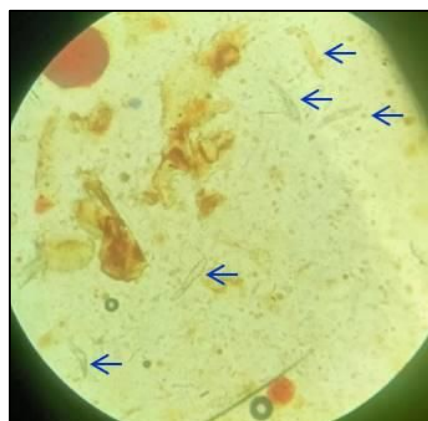


Fig 4: Microscopic examination of the skin scrapings demonstrating the mite, *Demodex canis* (10x)

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Declaration of Conflict of Interests: None

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