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Short Communication

Management of dermatitis associated with hypothyroidism in a Labrador dog

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Abstract

A 7-year-old Labrador dog was presented with a history of chronic alopecia, weight gain and dermatitis without response to previous treatments for two months. Physical examination revealed pyoderma, excoriation and hyperpigmentation along with generalised alopecia indicative of fungal overgrowth. Estimation of thyroid profile revealed a hypothyroid profile with decreased free thyroxine levels, high TSH level and low T4 levels, indicating dermatitis associated with hypothyroidism. Management was achieved with levothyroxine @ 0.022 mg/kg body weight for 2 months along with fluconazole @ 10 mg/kg once a day for 14 days, fexofenadine @ 5 mg/kg twice a day for 5 days, and omega 3,6 fatty acid syrup @ 5 mL twice a day daily for 2 months. Visible improvement was seen after 2 months with diminishing skin lesions.

Keywords: Dermatitis, Fexofenadine, Fungal alopecia, Levothyroxine, TSH

Highlights

- Canine hypothyroidism is a complex disorder that can be challenging to diagnose accurately due to the influence of other medical interventions.
- Concurrent assessment of TSH, tT4, and fT4 levels aids in the confirmatory diagnosis of the condition.
- Dermatological changes, secondary skin infections, neurological disorders and alterations in haematological and biochemical parameters are commonly associated with canine hypothyroidism.
- Levothyroxine therapy is the preferred treatment option for managing the disorder with a recommended dosage of 0.22 mg/kg body weight.

Hypothyroidism is a frequent hormonal ailment in dogs characterized by a thyroid hormone deficit (O'Neill *et al*., 2022). The condition is most commonly seen in middle-aged dogs belonging to more than 5 years age group without any gender susceptibility (Raja *et al*., 2021). The disorder can be either congenital or acquired and is usually caused by a malfunction in any portion of the hypothalamic-pituitary-thyroid axis (Mooney, 2011). Hypothyroidism in dogs is frequently associated with dermatological and metabolic disorders. Non-pruritic, bilateral and symmetrical skin lesions, including alopecia, seborrhoea, and hyperpigmentation with recurring skin infections, while metabolic disturbances like obesity and resistance to exercise are the symptoms manifested as a result of thyroid imbalances (McKeown, 2002; Scott-Moncrieff and Nelson, 2009). Canine hypothyroidism is frequently misdiagnosed due to the influence of various other medical interventions that can cause a decrease in thyroid hormone levels (Parry, 2013). However, an accurate diagnosis of the disorder can often be made by simultaneously assessing the levels of TSH, tT4 and fT4 and its correlation with clinical signs (Panciera, 2013). It has been observed in studies that neurological disorders are also known to occur in dogs with canine hypothyroidism, as reported by De Oliveira *et al*. (2022). Total thyroxine (tT4), total triiodothyronine (tT3), and free T4 (fT4) are the thyroid hormones that are most routinely tested (Costa *et al*., 2016). The present case study reports dermatitis associated with hypothyroidism and management of dermatitis associated with canine hypothyroidism in a Labrador dog.

A 7-year-old Labrador dog was presented to Dr. I. P. Singh Veterinary Clinical Complex and Trauma Centre, College of Veterinary and Animal Sciences, G.B.P.U.A. and T, Pantnagar, Uttarakhand with a history of chronic alopecia, weight gain and dermatitis without response to previous treatments for two months. Physical examination revealed red pustules and epidermal collarettes all over the skin indicative of pyoderma, excoriation and hyperpigmentation along with generalised alopecia indicative of fungal overgrowth (Fig. 1). Blood and serum samples were

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Table 1. Haemato-biochemical changes in blood parameters of dog both before and after 60 days of treatment

Blood parameter	Before treatment	After treatment	Reference value
Haemoglobin (g/dL)	9.2	12.86	12-18
PCV (%)	29.56	38.48	37-55
TEC (106/µL)	4.84	6.98	5.5-8.8
TLC (103/µL)	26.49	14.25	6-17
Neutrophils (%)	83	65	60-76
Lymphocytes (%)	14	28	12-30
Eosinophils (%)	2	3	2-10
Monocytes (%)	1	2	3-10
Thrombocytes thou/mm3	295	303	200-500
Total bilirubin (mg/dL)	0.26	0.2	0-0.3
ALT (U/L)	86	82	10-109
AST (U/L)	56	52	9-49
ALP (U/L)	202	156	21-170
Total Protein (g/dL)	5.24	5.46	5.4-7.5
Albumin (g/dL)	2.7	2.8	2.3-3.1
Globulin (g/dL)	2.54	2.6	2.4-4.1
A: G	1.06	1.07	0.6-1.3
Creatinine (mg/dL)	1.9	1.5	0.5-1.7
Blood glucose (mg/dL)	175	112	100-120
Cholesterol (mg/dL)	420	234	12-270

collected to determine various haematobiochemical changes. Also, thyroid profile was evaluated for confirmatory diagnosis of the condition. Moist swabbed samples were collected from the skin lesions and stained using modified Diff-Quik staining for fungal identification. Based on clinical findings, thyroid profile and hematobiochemical parameters, the dog was diagnosed with hypothyroidism.

The clinical signs observed in this study were consistent with previous reports by Kumar and Srikala (2013). Dermatological changes, such as alopecia, are commonly observed in dogs with hypothyroidism. These changes occur because the deficiency of thyroid hormone leads to a disruption in the hair follicles, causing them to prematurely enter the telogen phase instead of the growth phase (Das *et al*., 2021). Microscopic examination using modified Diff-Quik staining, swabs collected from the lesions revealed spores of *Malassezia* sp. indicative of fungal overgrowth (Fig. 2). Secondary skin infections in dogs affected by canine hypothyroidism are frequently encountered and primarily result from reduced T cell activity and humoral immunity in the hypothyroid state (Kour *et al*., 2021). The haematological and biochemical parameters depicted an increase in neutrophils, total leucocytic count and a decrease in haemoglobin levels with an increase in blood glucose, ALP and cholesterol levels, which align with the findings of Kour *et al*. (2021) (Table 1). Increased total leukocyte count (TLC) and neutrophil count can be attributed to secondary infections. Anaemia observed in this case study may be attributed to bone marrow depression or a decrease in plasma erythropoietin levels (Fracassi and Tamborini, 2011) (Table 1). Hypercholesterolemia, a common finding in hypothyroid dogs, is caused by impaired lipid synthesis, clearance and breakdown, leading to cholesterol accumulation in the plasma (De Oliveira *et al*., 2022) (Table 1). The increase in blood glucose levels observed in this study may be a result of insulin resistance due to elevated growth hormone and IGF-1 levels in hypothyroid dogs (Hofer *et al*., 2012) (Table 1).

In the present study, total T4 and free T4 levels were 0.78 nmol/L and 0.95 pmol/L, respectively, which significantly improved post-treatment to 16.43 nmol/L and 13.26 pmol/L, respectively (Table 2). Hypothyroid dogs often have serum T4 levels that are lower than the reference range, indicating a decrease in the production of this important hormone (Miller *et al*., 2013). T3 levels may also be reduced in hypothyroid dogs, though it is not necessarily as consistent as T4 reductions (Scott-Moncrieff and Nelson, 2009). Meanwhile, TSH levels in hypothyroid dogs are frequently raised as a compensatory reaction from the pituitary gland to boost the underactive thyroid, which is evident in the present study to be 1.72 mg/dL and subsequently lowered to 0.26 mg/dL post-management (Table 2).

The management goal for canine hypothyroidism

Table 2. Alteration in thyroid profile of dog both before and after 60 days of treatment

Parameter	Before treatment	After treatment	Reference value
TSH (mg/dL)	1.72	0.26	0.19-0.31
Total T4 (nmol/L)	0.78	16.43	15.5-17.25
Free T4 (pmol/L)	0.95	13.26	11.83-17.25

Management of hypothyroidism in a Labrador dog

Fig. 1. Visible alopecia with dermatitis on presentation

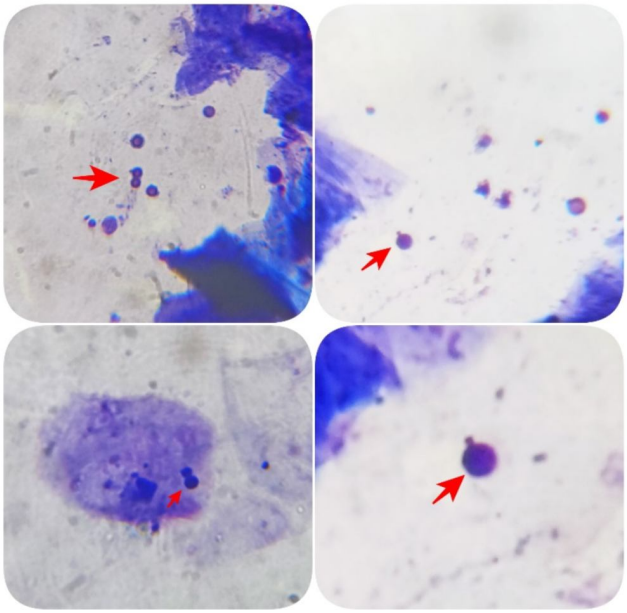

Fig. 2. Spores of *Malassezia* sp. visible on 1000X magnification

Fig. 3. Visible improvement and regrowth of fur post-therapy

is to restore normalcy to the thyroid axis and circulating T4 levels (Costa *et al*., 2016). Levothyroxine therapy is the preferred treatment for canine hypothyroidism (Neeraj *et al*., 2019). In this study, a dosage of 0.22 mg/kg of body weight of levothyroxine was found to be effective in managing canine hypothyroidism, which is consistent with the observations made by Hare *et al*. (2018). Secondary conditions were managed according to the involved etiology or changes in bio-chemical profiles respectively by fluconazole @ 10 mg/kg once a day for 7, 14 days, fexofenadine @ 5 mg/kg twice a day for 5 days, and omega 3, 6 fatty acid syrup @ 5 mL twice a day daily for 2 months. There was an improvement in hair coat condition in a month. The dog was advised for thyroid profile assay after 2 months, which revealed free T4 levels to be found in the normal range, and noticeable improvement was seen post-therapy (Fig. 3).

Canine hypothyroidism is a complex disorder that can be challenging to diagnose accurately due to the influence of other medical interventions. However, concurrent assessment of TSH, tT4, and fT4 levels can aid in the precise diagnosis of the condition. A decrease in free thyroxine levels, high TSH and low T4 levels indicates hypothyroidism. Dermatological changes, secondary skin infections, neurological disorders, and alterations in haematological and biochemical parameters are commonly associated with canine hypothyroidism. Levothyroxine therapy is the preferred treatment option for managing the disorder, with a recommended dosage of 0.22 mg/kg body weight. The dermatological condition of affected dogs can be considerably improved by early detection and treatment of the underlying hypothyroidism, ensuring a better quality of life for these cherished pets.

Conflict of interest: The authors have no conflict of interest in the study.

Author's contributions: PV, NA, JCK, AP, AKS, RG: Involved in clinical examination, diagnosis, treatment and drafting of the manuscript; NA, AP: Revised and approved the manuscript.

Data availability statement: The authors confirm that the data supporting the findings of this study are available within the article.

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