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**Sonam Bhatt**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**Pankaj Kumar Patel**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**Babul Rudra Paul**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**Naveen Kumar Verma**Division of Surgery, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**R Raguvaran**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**SK Dixit**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India**DB Mondal**Division of Medicine, ICAR-  
IVRI, Izatnagar, India**Correspondence****SK Dixit**Division of Medicine, ICAR-  
IVRI, Izatnagar, Uttar Pradesh,  
India

## Diagnosis and therapeutic management of hypothyroidism in a Labrador retriever dog

**Sonam Bhatt, Pankaj Kumar Patel, Babul Rudra Paul, Naveen Kumar Verma, R Raguvaran, SK Dixit and DB Mondal**

### Abstract

Hypothyroidism is one of the common endocrine disorder of the dogs. A five-year-old Labrador male dog was presented to Referral Veterinary Polyclinic, IVRI, Izatnagar with history of anorexia, fever, continuous weight gain, patchy hair loss and itching all over the body. Clinical examination showed elevated body temperature, congested mucous membrane, tachycardia, rough and brittle hair coat, patchy alopecia predominantly in limbs and tail. Laboratory diagnosis showed altered thyroid profile. On the basis of laboratory diagnosis and clinical symptoms the case was diagnosed as hypothyroidism case. It was successfully treated with Tab. Levothyroxine @ 20 µg/kg b.wt. bid for 30 days orally along with supportive therapy.

**Keywords:** Hypothyroidism, hypercholesterolemia, levothyroxine

### 1. Introduction

Hypothyroidism is one of the common endocrine disorder which may result due to dysfunction of any part of the hypothalamic-pituitary-thyroid axis and mostly associated with a deficiency of thyroxine (T<sub>4</sub>) and triiodothyronine (T<sub>3</sub>) hormones resulting different cutaneous and non-cutaneous clinical signs. Lymphocytic thyroiditis and idiopathic follicular atrophy were the most common lesions associated with clinical hypothyroidism in pet dogs [5]. Mostly, canine thyroiditis believed to be immune mediated, presence of antithyroglobulin antibodies in 36% to 50% of the hypothyroid dogs confirmed the fact [3]. Thyroid hormone helps in initiation of anagen hair follicles, cornification process regulation and for sebaceous gland secretion [6]. 60-80% of the hypothyroidism dogs show dermatological disorders. Among varied clinical signs, bilateral symmetric truncal alopecia, dry brittle hair coat and myxoedema with variable hyperpigmentation were the most common [3]. In general, overt and subclinical hypothyroidism was associated with hypercholesterolemia possibly due to elevation of low density lipoprotein (LDL) cholesterol levels, whereas high density lipoprotein (HDL) cholesterol concentration is usually normal but found elevated sometimes [11]. Hypothyroidism treatment includes supplementation of L-thyroxine (T<sub>4</sub>) with regular exercise and dietary management. The present case reports dealing with the hypothyroidism management in a Labrador dog.

### 2. Materials and methods

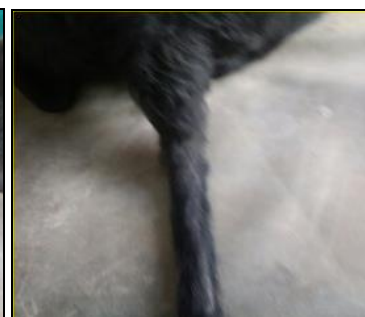
#### 2.1 Case history and diagnosis

A five-year-old Labrador male dog was presented to Referral Veterinary Polyclinic, IVRI, Izatnagar with a history of anorexia, fever, continuous weight gain, lethargy, exercise intolerance, rough brittle hairs (Fig. 1), patchy alopecia (Fig. 2), rat tailed appearance (Fig. 3) and itching all over the body and with repeated skin affections since two months. Clinical examination revealed a high rise of body temperature (104.4°F), tachycardia and congested mucous membrane. Thorough physical examination showed rough and seborrheic hair coat (Fig. 3) and alopecia mostly in the limbs. Blood and serum sample were collected for hematology and serum biochemistry, respectively. Hemato-biochemical profiling done revealed low levels of TT<sub>4</sub>, TT<sub>3</sub>, hypercholesterolemia and hypoproteinemia (Table.1). Based on the history, clinical observations and laboratory diagnosis, it was confirmed as hypothyroidism case.

**Table 1:** Detailed hemato-biochemical profiling

Parameter	Reference range <sup>[10]</sup>	0day	30 day
Hb (g/dl)	11.9-18.9	7	13.4
PCV (%)	24-46	21	36
TEC (10 <sup>6</sup> /cmm)	4.95-7.87	3.03	4.68
TLC (10 <sup>3</sup> /cmm)	5.0- 14.1	12	6.4
Neutrophils %	58-85	72	74
Lymphocytes %	8-21	28	20
Monocytes%	2-10	0	2
Eosinophils%	0-9	0	3
Basophil%	0-1	0	0
Platelet count (10 <sup>6</sup> /cmm)	211-621	360	382
SGPT(U/L)	10-109	26	24
SGOT (U/L)	13-15	24	21
BUN (mg/dl)	8-28	13	17
Creatinine(mg/dl)	0.5-1.7	0.7	0.5
Total Protein (mg/dl)	5.4-7.5	6.5	7.1
Albumin (mg/dl)	2.3-3.1	2.7	3
Globulin (mg/dl)	2.7-4.4	3.8	4.1
Triglyceride (mg/dl)	22-125	151	93
Cholesterol (mg/dl)	100-150	164	99
HDL Cholesterol (mg/dl)	17-21	48.0	20
VLDL Cholesterol (mg/dl)	60-93	30.2	68
LDL Cholesterol (mg/dl)	36-197	85.80	53
Total T3 (ng/dl)	30-70	26	43.5
Total T4 (µg/dl)	1.2-3	0.95	2.1
TSH (µIU/ml)		0.005	

**Note:** TSH levels are subject to circadian, variation, reaching peak levels between 2-4am and at a 6-10pm. The variation is of the order of 50%, hence time of the day has influence on the measured serum TSH concentrations.

**Fig 1:** Rough and brittle hair coat**Fig 2:** Seborrheic hair coat**Fig 3:** Rat tail appearance

## 2.2 Treatment

The dog was treated with Tab. Levothyroxine (Eltroxin)<sup>®</sup> 100µg, bid, orally for 30 days with supportive treatment included Syp. Liveril, 2 tsf and Syp. nutricoat Advance 2 tsf two times a day orally for 30 days.

## 3. Results and discussion

Thyroid abnormalities (hyperthyroidism and hypothyroidism) are accompanied by changes in intermediary metabolism leading to alterations in body weight, insulin resistance, and plasma lipid profile in humans and dogs. Decreased metabolic rate and dermatological signs increased suspicion of hypothyroidism in this case. Thyroid hormone (TH) regulates metabolic processes essential for normal growth and development <sup>[1, 2, 12]</sup>. Hypothyroidism is associated with reduced metabolism characterized by weight gain, increased cholesterol levels, reduced lipolysis and gluconeogenesis resulting fatty acid losses <sup>[9]</sup>. Thyroid hormones regulate the basal metabolic rate of all the cells, including hepatocytes <sup>[8]</sup>. It plays vital role in regulating thermogenesis <sup>[9]</sup> and altered body temperature found in hypothyroidism is possibly due to deficiency in metabolic heat production <sup>[4, 15]</sup>. Among biochemical parameters, total TT<sub>4</sub> and free thyroxine hormone

(FT<sub>4</sub>) are reliable markers for the hypothyroidism. As per Kantowitz *et al.*, 2001 the sensitivity and accuracy of a serum TT<sub>3</sub> was doubtful for hypothyroidism diagnosis as observed in the present case.

Syp. Nutricoat Advance, a blend of the most active form of essential fatty acids including Omega3, Omega6, EPA (Eicosapentaenoic acid) & DHA (Docosahexaenoic acid) was administered. PUFA maintains fluidity, flexibility, and functionality of cell membranes and required for biosynthesis of intercellular lipids in the stratum corneum layer of skin. Liveril suspension (Choline, Coenzyme Q 10, D-Panthenol, Folic Acid, L-Carnitine, L-Glutathione, L-Ornithine L-Aspartate, N-Acetyl Cysteine, Selenium, Silymarin, Vitamin B<sub>1</sub>, Vitamin B<sub>2</sub>, Vitamin B<sub>6</sub>, Vitamin B<sub>12</sub>, Vitamin C, Vitamin D, Vitamin E, and Zinc) helps in transformation of fatty acids into the energy required for proper muscular activity; mobilize fat from liver; stimulate release of growth hormone from the pituitary; restore or maintain the glutathione levels; prevents the damage to the body from oxidative stress and free radicals generation. Vitamin C and silymarin significantly affects the malondialdehyde level (MDA) as an antioxidant in the liver and kidney <sup>[13]</sup>.

Diet management was recommended for reduction in body

weight. Although total energy restriction (starvation) successfully leads to weight loss, but with some ill effects like excessive protein loss (and thus lean body mass) and need hospitalization for proper monitoring further [2]. High fiber diet dilutes energy density of the diet and reduces voluntary intake. Increased physical activity is a useful adjunct to dietary therapy; when used in combination with dietary therapy; promotes fat loss [14]. Based on the following facts, owner was advised to avail animal protein and fiber rich diet to the dog on a daily basis. After 30 days of treatment, dog showed marked improvement in the condition. Serum biochemical examination also showed a normal thyroid profile after 30 days of treatment (Table.1), but the owner was advised to continue the tablet lifelong to prevent disease progression.

#### 4. Conclusion

Hypothyroidism can be successfully managed by levothyroxine along with supportive therapy and proper dietary management in case of dogs.

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