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Clinical Article

CLINICO-EPIDEMIOLOGICAL STUDIES ON HYPOTHYROIDISM IN DOGS

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SUMMARY

Dogs that were presented to Veterinary Clinical Complex, NTR College of Veterinary Science, Gannavaram, Andhra Pradesh were screened for hypothyroidism. The hospital prevalence of hypothyroidism in the present study was found to be 0.45% (27/5957). Occurrence of hypothyroidism was higher in dogs aged above 8 years with Labrador Retriever as the commonly affected breed. The common clinical signs recorded were dermatological signs (88.88%), metabolic signs (62.96%), reproductive disorders (25.93%), neuro-muscular signs (22.22%) and cardiovascular abnormalities (7.41%).

Keywords: Andhra Pradesh, Dogs, Hypothyroidism

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Hypothyroidism is the most frequently encountered clinical endocrinopathy in dogs resulting from a lowered production of thyroid hormones, namely thyroxine (T4) and triiodothyronine (T3) (Jaiswal *et al.*, 2018). The thyroid gland plays a crucial role in actively producing thyroid hormones, specifically thyroxine (T4) and tri-iodothyronine (T3) under the influence of thyrotropin (TSH) from the pituitary gland and thyrotropin-releasing hormone (TRH) from the hypothalamus. Both T4 and T3 exert a negative feedback effect on TSH and TRH synthesis and secretion. Dysfunction anywhere in the hypothalamic-pituitary-adrenal axis may result in thyroid hormone deficiency (Gulzar *et al.*, 2014). Clinical signs of hypothyroidism are vague and non-specific due to the impact of thyroxine deficiency on all systems of the body. The present study was aimed with the objectives to study the occurrence and clinical characteristics of hypothyroidism in dogs.

A total of 5957 dogs were presented to Veterinary Clinical Complex, NTR College of Veterinary Science, Gannavaram with various problems during the study period from March 2023 to November 2023. Detailed information was obtained from the owners and standardized physical examination of dogs was carried out with special reference to clinical signs of hypothyroidism. Dogs with one or more clinical signs that were suggestive of hypothyroidism were selected and subjected to thyroid hormone estimation. Dogs with low total T4 and free T4 levels, along with compatible clinical or biochemical abnormalities were considered as hypothyroid (Bugbee *et al.*, 2023). Dogs with total T4 less than 12.87 nmol/L (<1µg/dL) and free T4 below 0.8 ng/dL were confirmed as hypothyroid (Nelson and Couto, 2020).

In the current study the hospital prevalence of hypothyroidism was found to be 0.45 per cent (27/5957). The occurrence of hypothyroidism was almost in concurrence with the earlier report of Gulzar *et al.* (2014), who reported the occurrence of 0.40 %. On the contrary, Ghallab *et al.* (2021) reported higher occurrence of hypothyroidism as 7.94%, while Kour *et al.* (2020) recorded lower incidence (0.174%) of hypothyroidism. These variations might be attributed to different geographical areas in which studies have been carried out or differences in sample size or selection of diagnostic criteria for confirmation of hypothyroidism. Age wise occurrence of hypothyroidism presented in Table 1. Higher occurrence of hypothyroidism in aged dogs was in agreement with the report of Raja *et al.* (2021), while Kour *et al.* (2020) reported that hypothyroidism was more frequent in middle aged dogs.

From Table 2, it was evident that, Labrador Retriever was the more susceptible breed which was attributed to the preference of dog owners in keeping particular breeds in their locality. The occurrence of hypothyroidism was higher in male dogs (70.37%) when compared to female dogs (29.63%) (Table 3). These findings gained support from the reports of Kour *et al.* (2020) and Ghallab *et al.* (2021). The higher occurrence of hypothyroidism in male dogs in the current study could be attributed to the overrepresentation of male dogs, possibly influenced by the preference of pet owners for male dogs.

Occurrence of hypothyroidism in relation to body weight was presented in Table 4 and it revealed that among 27 hypothyroid dogs, majority were weighing above 40 kg

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Fig. 1. Bilateral symmetrical alopecia with rat tail

Fig. 2. Myxedema with tragic facial expression

Fig. 3. Obese hypothyroid dog

Fig. 4. Megaoeophagus in a hypothyroid dog

and in between 20-30 kg (29.63%) each.These findings were in corroboration with the findings of Guglielmini *et al*. (2019).

Clinical manifestations of hypothyroid dogs were presented in Table 5 & Figs. 1-4. In the present study dermatological abnormalities were recorded in (87.75%) of the affected dogs. Alopecia, rat tail, hyperpigmentation and lichenification as observed in the present study was in agreement with the findings of Kour *et al.* (2021), who opined that alopecia was due to deficiency of thyroid hormones, which were required for initiation of anagen phase of hair growth, leading to persistence of telogen phase. Pyoderma and pruritus noticed might be attributed to secondary bacterial or yeast infections. Seborrhoea was noticed in 40.74% of hypothyroid dogs was in agreement with Ingole *et al.* (2011) who stated that excessive scaling or seborrhoea in hypothyroid dogs could originate from aberrant keratinization with alterations in the fatty acid composition of the sebum. In the present study facial myxoedema was observed in 7.41% of hypothyroid dogs at the temporal frontal areas, the iconic 'tragic' facial expression was caused by swelling, thickening of the facial skin folds and drooping of upper eyelids (Scott-Moncrieff, 2007). Further, the production of collagen and fibroblast growth induced by thyroid hormones would in turn affects the thickness by controlling the production and breakdown

Table 1. Age wise occurrence of hypothyroidism (n=27)

S. No.	Age group	Number of dogs affected	Percentage
1.	Up to 2 years	1	3.70
2.	2-4 years	5	18.52
3.	4-6 years	5	18.52
4.	6-8 years	5	18.52
5.	> 8 years	11	40.74
	Total	27	100.00

Table 2. Breed wise distribution of hypothyroidism (n=27)

S. No.	Breed	Number of dogs affected	Percentage
1.	Labrador Retriever	9	33.33
2.	Golden Retriever	5	18.52
3.	Pomeranian	5	18.52
4.	Mongrel	3	11.11
5.	Terrier	2	7.41
6.	German Shepherd	1	3.70
7.	Saint Bernard	1	3.70
8.	Great Dane	1	3.70
	Total	27	100.00

Table 3. Gender wise distribution of hypothyroidism (n=27)

Gender	Number of affected dogs	Percentage	Neuter status	
			Intact	Neutered
Male	19	70.37	16 (84.21)	3 (15.79)
Female	8	29.63	6 (75.00)	2 (25.00)
Total	27	100.00		

Table 4. Occurrence of hypothyroidism in relation to body weight (n=27)

S. No.	Body weight	Number of dogs affected	Percentage
1.	Up to 10 kg	1	3.70
2.	10-20 kg	6	22.22
3.	20-30 kg	8	29.63
4.	30-40 kg	4	14.81
5.	> 40 kg	8	29.63
	Total	27	100.00

of glycosaminoglycans and deposition of hyaluronic acid in the dermis resulting in myxoedema (Kim *et al.*, 2012).

Lethargy, obesity and exercise intolerance were due to decreased metabolic rate and heat generation in hypothyroid dogs. It was evident from the present study that 22.22% of the hypothyroid dogs exhibited neuromuscular weakness and was in agreement with the reports of Suraniti *et al.* (2008) who opined that impaired axonal transport or Schwann cell function could be the cause for neuromuscular weakness. These neurological manifestations could be due

Table 5. Clinical signs noticed in hypothyroid dogs (n=27)

S. No.	Condition	Frequency	Percentage
I	**Clinical Sign**		
1.	***Dermatological signs***	24	88.88
	a) Alopecia	20	74.07
	b) Rat tail appearance	18	66.67
	c) Hyperpigmentation	3	11.11
	d) Myxedema	2	7.41
	e) Lichenification	5	18.52
	f) Seborrhea	11	40.74
	g) Pyoderma	10	37.04
	h) Pruritus	10	37.04
	i) Failure of hair regrowth	2	7.41
2.	***Metabolic signs***	17	62.96
	a) Lethargy	13	48.15
	b) Obesity	16	59.26
	c) Exercise intolerance	12	44.44
3.	***Neuromuscular signs***	6	22.22
	a) Hind leg weakness	6	22.22
	b) Megaesophagus	3	11.11
4.	***Reproductive disorders***	7	25.93
	i) Male	4	14.81
	a) Poor libido	4	14.81
	ii) Female	3	11.11
	a) Irregular estrous cycle	2	7.41
	b) Abortion	1	3.70
	c) Pyometra	1	3.70
	d) Pseudopregnancy	2	7.41
5.	***Cardiovascular abnormalities***	2	7.41
	a) Bradyarrhythmias	2	7.41

to peripheral neuropathy or disruption of blood brain barrier in chronic hypothyroidism or central nervous system atherosclerosis due to hyperlipidaemia.

The reproductive abnormalities recorded in the present study were similar to the reports of and Panciera *et al*. (2007) who stated that that hypothyroidism induced retardation of the estrus cycle. Pseudopregnancy was recorded in 2 dogs (7.41%) might be due to hyperprolactinemia. Cardiovascular abnormalities like bradyarrhythmias were recorded in 7.41% were ascribed to obesity, decreased myocardial mass or decreased circulating blood volume. The inotropic and chronotropic effects of the thyroxine could be responsible for the cardiovascular abnormalities mentioned above (Scott-Moncrieff, 2007).

Bradyarrythmias recorded in 7.41% of the dogs were attributed to the alterations in the function of cardiovascular system in hypothyroid dogs resulting in decreased heart rate and myocardial contractility (Tappin, 2014).

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