Original Research Article

<https://doi.org/10.20546/ijcmas.2019.812.204>

The Hormonal Study of the Thyroid Gland of Male and Female Chabro Chicken Reared in Summer and Winter Seasons

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ABSTRACT

Keywords

Thyroid gland,
Chabro chicken,
Hormone, Season

Article Info

Accepted:
15 November 2019
Available Online:
10 December 2019

The present study was conducted on thyroid gland of eight to ten weeks old 12 apparently healthy Chabro chickens procured from Poultry Farm, DUVASU, Mathura. The birds were divided into two groups consist of six chickens in each group (three male and three female) reared in summer and winter seasons. The serum concentration of T₃, T₄ and TSH hormone was measured in both groups. In summer the concentration of T₃ was higher in male than female but T₄ concentration was higher in female chabro. In winter the concentrations of T₃ and T₄ was higher in female in comparison to male chabro. The concentration of T₃, T₄ and TSH was higher in winter season than summer season. Increased activity of active follicles in winter season was responsible for higher concentration of thyroid hormones in the same season.

Introduction

Thyroid is a bilobed structure situated on either side of trachea. It is the only gland in the body of both mammals and birds that stores hormone in its inactive form. In birds, thyroid gland controls the basal metabolic rate, differentiation and development of the

central nervous system, development and growth of muscles and bones, control of reproduction and integumentary development including feathering. The thyroid hormones are primarily involved in energy production by increasing the metabolic rate. This increase in energy production is to the greatest extent manifested as heat production. Secretion of

TSH and T₄ of thyroid gland play an important role in maintenance of body temperature in hot and cold seasons in fowl (Hahn *et al.*, 1965).

Materials and Methods

The present study was conducted on thyroid gland of eight to ten weeks old 12 apparently healthy Chabro chickens procured from Poultry Farm, DUVASU, Mathura. The birds were divided into two groups consist of six chickens in each group (three male and three female) reared in summer and winter seasons. Serum concentration of T₃, T₄ and TSH were determined by Chemiluminescence Immuno Assay technology by using Bayer Centaur Abott architect kits supplied by Garrytown, New York. The serum concentration of T₃, T₄ and TSH were detected for 6 chickens (3 males, 3 females) in each season i.e. summer (6 chickens) and winter (6 chickens).

Results and Discussion

In summer the concentration of T₃ was higher in male (80±7.00 ng/dL) than female (72.67 ±

8.25 ng/dL) and T₄ concentration was higher in female chabro (0.17 ± 0.07µg/dL) than male chabro chicken (0.1 ± 0.00 µg/dL). The thyroid stimulating hormone (TSH) concentration was equal in both male and female (0.01 ± 0.00 µIU/ml) (Table 1). In winter the concentration of T₃ (122.67 ± 23.62 ng/dL) and T₄ (0.77 ± 0.03 µg/dL) was higher in female in comparison to male chabro (T₃ was 109.00 ± 25.74 ng/dL and T₄ was 0.63 ± 0.18 µg/dL) but TSH concentration was slightly higher in male chabro chicken (0.05 ± 0.00 µIU/ml) in comparison to female chabro (0.04 ± 0.01 µIU/ml) (Table 1). The concentration of T₃ and T₄ was 76.33 ± 5.11 ng/dL and 0.13 ± 0.03 µg/dL, respectively in summer. The respective cofigures in winter were 115.83 ± 15.92 ng/dL and 0.70 ± 0.09 µg/dL (Table 2). Sinha *et al.*, (2016) in eight weeks old Pati ducks reported the T₃ and T₄ concentration as 2.593 ± 0.006 nmol/L and 46.708 ± 0.401 nmol/L, respectively (irrespective of season). The concentrations of T₃, T₄ and TSH were higher in winter season than summer season (Table 2).

Table.1 Average values (Mean ± SE) for plasma concentration of T₃, T₄ and TSH hormones in male and female chabro chickens reared in summer and winter seasons

		M ₁ (n=3)	M ₂ (n=3)	M ₃ (n=3)	MEAN	F ₁ (n=3)	F ₂ (n=3)	F ₃ (n=3)	MEAN
SUMMER	T ₃	78	69	93	80 ± 7	76	57	85	72.67 ± 8.25
	T ₄	0.1	0.1	0.1	0.1 ± 0.00	0.1	0.3	0.1	0.17 ± 0.07
	TS H	0.01	0.01	0.01	0.01 ± 0.00	0.02	0.01	0.01	0.01 ± 0.00
WINTER	T ₃	106	66	155	109.00 ± 25.74	135	156	77	122.67 ± 23.62
	T ₄	0.7	0.9	0.3	0.63 ± 0.18	0.7	0.8	0.8	0.77 ± 0.03
	TS H	0.06	0.05	0.05	0.05 ± 0.00	0.04	0.03	0.06	0.04 ± 0.01

Table.2 Average values (Mean $\pm$ SE) for plasma concentration of T₃, T₄ and TSH hormones in chabro chickens (both male and female) reared in summer and winter seasons

	Summer	Winter	p value
T₃ (ng/dl)	76.33 $\pm$ 5.11	115.83 $\pm$ 15.92	0.067
T₄ (μg/dl)	0.13 $\pm$ 0.03 ^a	0.70 $\pm$ 0.09 ^b	0.001
TSH (μIU/ml)	0.01 $\pm$ 0.00 ^a	0.05 $\pm$ 0.00 ^b	0.001

NOTE: Superscript **a, b** ... shows significant change in values between summer and winter season

This finding was in accordance with Reineke and Turner (1945) in chicks, Turner (1948) in Old White Leghorn and Beyzai and Adibmoradi (2010) in ostrich. Prakash and Rathor (1991) in goat, Tuckova *et al.*, (1995) in German Shepherd and Dachshund dogs, Shehata *et al.*, (1998) in Newzealand white rabbits, Rasooli *et al.*, (2004) in cattle, Rajeb *et al.*, (2011) in the dromedary, Lalsangpuii *et al.*, (2015) in Mizoram strain adult female mithun and Chakraborty *et al.*, (2017) in crossbred pigs reported that the high temperature decreases the thyroid hormones serum level and the low temperature increases thyroid hormones serum level. The mechanism by which the body adjust the temperature variation involves the increase secretion of TSH and T₃ during period of cold environment and decreases during hot environment (Hahn *et al.*, 1965).

It was concluded that the concentration of T₃, T₄ and TSH was higher in winter season than summer season due to increased activity of active follicles in winter season.

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How to cite this article:

Amit Singh Vishen, Varsha Gupta, M. M. Farooqui, Renu Yadav, R. K. Gupta and Anand Singh. 2019. The Hormonal Study of the Thyroid Gland of Male and Female Chabro Chicken Reared in Summer and Winter Seasons. *Int.J.Curr.Microbiol.App.Sci*. 8(12): 1700-1703. doi: <https://doi.org/10.20546/ijcmas.2019.812.204>