

GROSS ANATOMICAL STUDIES ON THE THYMUS GLAND IN TURKEYS (*Meleagris gallopavo*)

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ABSTRACT

The gross anatomical study of thymus was carried out in birds of different ages, ranging from day 7 to 10 months, in both the sexes. The shape, colour and weight of the thymus and the percentage of thymic weight related to body weight was calculated. The thymus gland in turkey consisted of two long chains having of 6 - 8 irregularly shaped lobes. The lobulation was distinct during first month of age. Later on it was indistinct and surrounded by a connective tissue. The thymus consisted of irregular elliptical shaped lobes which varied in colour from pale red to pink. The posterior end of the right thymic lobe extended beyond the posterior end of the left thymic lobe. The largest lobe was located close to the thyroid gland at the base of the neck. The thymus gland reached its maximum weight at the age of 6 months in both the sexes. The thymus was completely involuted at the age of 8 months in females and 10 months in males.

Key words: Thymus, Anatomy, Shape, Colour, Location, Turkey

INTRODUCTION

Thymus gland is found in all the vertebrates except in the cyclostomes and derives its name from the resemblance of its lobes in human beings to a leaf of the thyme plant (Schrier and Hamilton, 1952; Hammond, 1954). Reptiles and birds have a series of large nodes in the neck. In neonatal and young mammals, the thymus is a bi-lobed mass in the thoracic cavity (Kent, 1978).

The thymus gland is regarded immunologically as a primary or central lymphoid organ. Its presence is essential for the development of peripheral lymphoid tissues and their associated adaptive immune functions (Clawson *et al.*, 1967). It also provides a specific microenvironment for multiplication and differentiation of cells into the immunologically competent effector cells.

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Though elaborate work has been done on the thymus of birds, information available regarding the gross morphology of the thymus gland in turkeys is arguably less. These lacunae prodded to take up this study with the objectives of studying the morphology and morphometry of the thymus gland in turkeys

MATERIALS AND METHODS

The thymus gland was collected by thymectomy from apparently healthy turkeys (Beltsville small white variety) from Poultry Research Station, Nandanam, Chennai - 35

The study was carried out in birds of different ages, ranging from day 7 to 10 months. From seventh day of hatch upto one month, the samples were collected at weekly interval and from one month to ten months of age, at monthly interval. Each group consisted of six birds, with three birds for each sex

The body weights of the birds were recorded. The collected samples were washed in normal saline and mopped with blotting paper and the shape, colour and weight were recorded. The percentage of thymic weight related to body weight was calculated.

RESULTS AND DISCUSSION

1. Location

The thymus gland in turkey was in two long chains each consisted of 6-8 irregularly shaped lobes (Fig. 1 & 2). They were located on either side of the neck embedded in the connective tissue. This observation is in accordance with King and Mc Lelland (1984) and Fitzgerald (1969) in fowl and quail.

However, White (1981) reported that there were five pairs of thymic bodies in young chicken, situated on each side of the neck superficial to the jugular vein and vagus nerve. The lobes were extended from anterior cervical region to anterior thoracic region as observed by Koch (1973) in birds.

The posterior end of the right thymic lobe extended beyond the posterior end of the left thymic lobe (Fig. 2). The largest lobe was located close to the thyroid gland at the base of the neck. The posterior lobes were associated with thyroid, parathyroid and ultimobranchial gland on each side of the neck as stated by Koch (1973) in birds.

The lobulation was distinct during first month of age. Later on it was indistinct, surrounded by a connective tissue, contradicting the findings of Kendall and Ward (1974), who stated that the thymus gland of *Q. quelea* consisted of number of lobes, well separated from one another in two long chains both on each side of neck. Similarly, Bahadir et al. (1992) noticed 6-9, 5-6, 4-7 lobes on right side and 5-9, 5-7, 4-6 distinct lobes on left side in goose, native duck and White Pekin duck, respectively. This difference could be seen in the growth pattern of thymus in turkeys.

2. Weight

In turkeys, the thymus formed $0.38 \pm 0.19\%$ of body weight at the age of 1st week. During the 1st month of age, the total thymus weight was between $0.30 \pm 0.19\%$ to $0.39 \pm 0.20\%$ of the body weight, which decreased to $0.18 \pm 0.05\%$ during 6th month. It gradually regressed when the age advanced and at the age of 9th month it was reduced to only $0.02 \pm 0.01\%$ of the body weight due to involution of the glandular tissue. This is not in accordance with Hohn (1956) who stated that the total thymic weight was about 0.5% of body weight between 4 and 17 weeks of age in chicken. This might be due to species difference. He further stated

that at the age of 23 weeks it was 0.16% of body weight which is closely agreeable with the present study.

The weight of the thymus gland on the right side was more than that of the left side in both the sexes (Table. 1). The variation in weight was maximum during the 8th month of age where the right thymus weighed 1.42 ± 0.07 gm and left thymus weighed only 1.25 ± 0.02 gm. This observation differs from Wolfe *et. al.* (1962) who recorded that the mean weight of right thymus was 0.06 g at one week of age and the weight of left and right lobe was 2.19 and 1.99 g respectively at 8th week in chickens. The weight reached its maximum of 6.39 ± 0.23 gm at the

age of 24 weeks. This finding is also in contrast with Hashimoto and Sugimura (1976) who stated that the maximum total weight of the thymus gland was 15.76 g at 17 weeks of age in White Pekin ducks. This might be due to the age variation between different species.

3. Shape and Colour

The thymus consisted of irregular elliptical shaped lobes which varied in colour from pale red to pink (Fig. 3). This observation is in accordance with Rajeshkumar *et. al.* (2001) in chicken. But this result differs from that of Kendall and Ward (1974) who stated that each lobe was small and white from embryo to hatching and pink in colour at 10th day. This might be due to species difference.

Table 1 : Biometry of the thymus gland in turkeys

Age groups	Body Weight (gm)	Thymic weight (gm)		Total thymic Weight (gm)	% of body weight
		Right	Left		
1 st week	115.00 ± 9.15	0.22 ± 0.11	0.22 ± 0.11	0.44 ± 0.22	0.38 ± 0.19
2 nd week	251.75 ± 19.64	0.37 ± 0.03	0.38 ± 0.02	0.76 ± 0.03	0.30 ± 0.19
3 rd week	407.75 ± 48.65	0.78 ± 0.03	0.74 ± 0.03	1.42 ± 0.068	0.37 ± 0.14
1 st month	445.75 ± 40.03	0.90 ± 0.04	0.85 ± 0.04	1.75 ± 0.08	0.39 ± 0.20
2 nd month	1607.75 ± 195.89	1.64 ± 0.04	1.53 ± 0.06	3.18 ± 0.10	0.19 ± 0.05
3 rd month	1714.75 ± 205.39	2.31 ± 0.04	2.18 ± 0.07	4.49 ± 0.11	0.26 ± 0.05
4 th month	2023.25 ± 137.26	2.60 ± 0.65	2.50 ± 0.07	5.11 ± 0.09	0.25 ± 0.02
5 th month	2676.50 ± 255.18	2.68 ± 0.11	2.57 ± 0.09	5.26 ± 0.20	0.19 ± 0.08
6 th month	3380.75 ± 395.34	3.21 ± 0.11	3.18 ± 0.12	6.39 ± 0.23	0.18 ± 0.05
7 th month	5318.50 ± 609.54	1.99 ± 0.07	2.04 ± 0.06	4.03 ± 0.13	0.07 ± 0.21
8 th month	6091.50 ± 622.37	1.42 ± 0.07	1.25 ± 0.02	2.62 ± 0.08	0.04 ± 0.13
9 th month	6226.00 ± 564.84	0.65 ± 0.04	0.64 ± 0.31	1.30 ± 0.07	0.02 ± 0.01

Photo 1

Photograph showing the thymus gland (arrow) in the anterior cervical region in 4 months old turkey



Photo 2:

Photograph showing the thymus gland (arrow) in the anterior thoracic region in 4 months old turkey

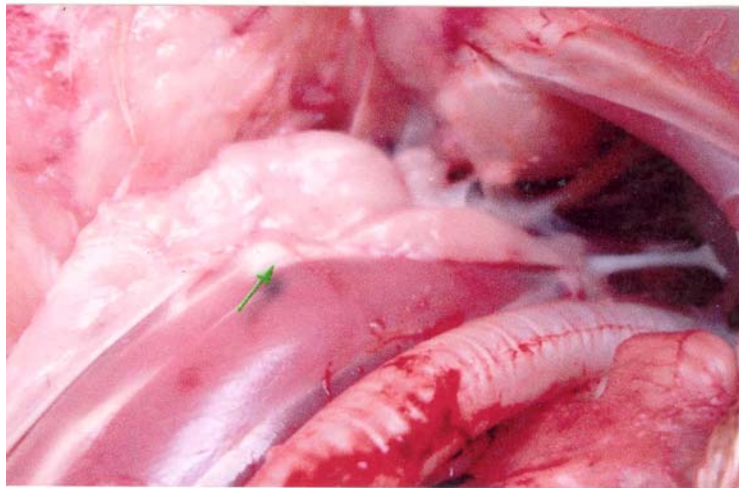
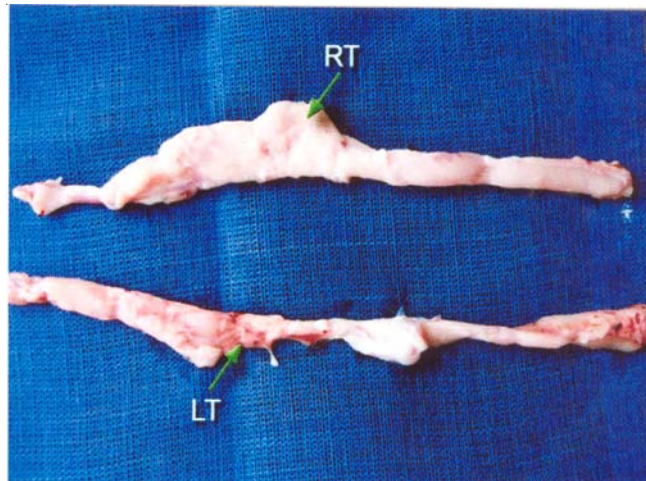


Photo 3

Photograph showing the left and right side thymus glands in the anterior cervical region in 4 months old turkey.



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