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Comparative age related biometrical observations on thymus of Kadaknath and Narmada Nidhi birds

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Abstract
Thymus in Kadaknath and Narmada Nidhi breeds of birds under study, was found to consist of 5-6 paired lobes on each side of the neck. Colour of thymus varied amongst the birds of both the breeds. On an average, the gross biometrical values for weight and thickness of thymic lobes in Narmada Nidhi birds were found to be higher in each age group under study. In both the breeds, the thymic lobes did not show decrease in size grossly with the increase in age which may be attributed to increased deposition of adipose tissue. The gross biometrical values indicated significant (p<0.05) variation in each age group amongst the two breeds which might be due to breed difference.

Keywords: Thymus, Kadaknath, Narmada Nidhi, gross anatomy

Introduction
Kadaknath is considered as a native breed but its meat is priced three times more than that of broiler chicken. Locally, it is called Kalamasi — the fowl with black flesh. This chicken is found in the tribal-dominated Jhabua district, Madhya Pradesh. This breed of chicken is believed to have medicinal properties in it with 25-27% protein and low-cholesterol (0.73-1.03%) content. Narmada Nidhi is an improved location specific breed of chicken developed by the College of Veterinary Science and Animal Husbandry, NDVSU, Jabalpur, Madhya Pradesh. The breed has been developed by crossing chicken breed Jabalpur Colour (coloured broiler) with Kadaknath (native). The final crossed breed has 75% inheritance of Jabalpur colour breed and 25% inheritance of Kadaknath breed. The lymphoid tissue plays an important role in the defence mechanisms against all pathogens. The lymphoid system of poultry consists of spleen, thymus and the Bursa of fabricius and is divided into two morphologically and functionally distinct components (Cooper *et al.*, 1966) [1].

Materials and Methods
The present study was conducted in the Department of Veterinary Anatomy, College of Veterinary Science and Animal Husbandry, Rewa (M.P.). Total 72 unvaccinated chicks (0 day old), 36 each of Kadaknath and Narmada Nidhi breeds were reared separately at College Poultry Farm, Rewa, from day old to above 32 weeks of age. These birds were divided into six groups, *viz*, 0-2 weeks, 2-4 weeks, 4-8 weeks, 8-16 weeks, 16-32 weeks and above 32 weeks and each group contained six birds of both the breeds. After getting permission from the ethical committee of the parent institute, birds were sacrificed ethically at respective age intervals and whole samples of thymus were taken after noting the position of the aforementioned organs *in situ.* Thymus of both the breeds under study was then analysed for gross biometrical measurements. In each age group, weight of the organ was measured with the help of digital weighing balance. Thickness of thymic lobes was measured by using Vernier callipers.

Results and Discussion
Thymus was found to consist of 5-6 paired lobes on each side of the neck in both Kadaknath and Narmada Nidhi birds. This number was reported by Onyeanusi *et al.* (1994) [2] to be about 6 in left and 7 in right side in guinea fowl. Bahadır *et al.* (1992) [3] found about 5-9 lobes in left and 6-9 in right side. The conclusion can be drawn that the number of thymic lobes differs depending on the bird species. These lobes extended in long chains, arranged parallel to vagus nerve and jugular vein (Plate No. 1 & 2) which was in agreement with the findings of Ali *et al.*

(2016) [4] who suggested that the thymic lobes on right and left side varied. These observations were similar to those reported by Muthukumaran *et al*. (2011) [5] who stated that the shape and color of thymic lobes as well as length and width of thymus varied. In both the breeds, the thymic lobes did not show decrease in size grossly which may be attributed to increased deposition of adipose tissue with the increase in age.

The average weight of the thymic lobe of right side in Kadaknath birds of 0-2 weeks of age was found to be 0.08 gm similar to that in Narmada Nidhi, which also was 0.08 gm. The average weight of the organ of right side increased to 0.34+ 0.01 gm and 0.3+0.01 gm in Kadaknath and Narmada Nidhi birds, respectively, of 4-8 weeks age. Gradually, with the advancement of age the organ started regressing. The weight of the thymic lobe of right side was measured to be 0.12 gm and 0.11gm in Kadaknath and Narmada Nidhi breeds of poultry respectively, at 16-32 weeks age. The average weight of the thymic lobe of left side in Kadaknath birds of 0-2 weeks of age was found to be 0.08 gm similar to that in Narmada Nidhi, which also was 0.08 gm. The average weight of the organ of left side increased to 0.32 gm and 0.31+0.01 gm in Kadaknath and Narmada Nidhi birds, respectively, at 4-8 weeks age. The weight of the thymic lobe of left side was measured to be 0.11 gm and 0.11+0.01 gm in Kadaknath and Narmada Nidhi breeds of poultry respectively, of 16-32 weeks age. The values for average weight of the thymic lobe of right side and left side in each age group between the two breeds of poultry under study differ significantly (p<0.05). (Table No.1 & 2)

The average thickness of the largest lobe of thymus of right side in Kadaknath birds of 0-2 weeks of age was found to be 0.12 cm similar to that in Narmada Nidhi, which also was 0.12 cm. The average thickness of the largest lobe of thymus of right side increased to 0.52 cm and 0.56 cm in Kadaknath and Narmada Nidhi birds, respectively, of 4-8 weeks age. The thickness was measured to be 0.14 cm in Kadaknath and Narmada Nidhi breeds of poultry at 16-32 weeks age. The average thickness of the largest lobe of thymus of left side in Kadaknath birds of 0-2 weeks of age was found to be 0.12cm whereas in Narmada Nidhi, it was 0.11+0.001 cm. The average thickness of the largest lobe of thymus of left side increased to 0.52+0.01 cm and 0.56 cm in Kadaknath and Narmada Nidhi birds, respectively, of 4-8 weeks age. The thickness was measured to be 0.14+0.01 cm in Kadaknath and Narmada Nidhi breeds of poultry, at 16-32 weeks age. The difference in average thickness of the largest lobe of thymus of right side and left side in each age group between the two breeds of poultry under study was found to be significant (p<0.05). (Table No.3 & 4)

Table 1: Age wise mean weight (in gm) of right lobe of Thymus of Kadaknath and Narmada Nidhi breeds of poultry

Group	Kadaknath	Narmada Nidhi
0-2 weeks	0.0783a ± 0.004	0.0833a±0.0021
2-4 weeks	0.2767bc± 0.1007	0.2000c±0.0037
4-8 weeks	0.3367c± 0.005	0.3033d+0.0049
8-16 weeks	0.7033d+0.005	0.7017e±0.0031
16-32 weeks	0.1217ab+0.003	0.1050b+0.0022
> 32 weeks	-	-
Total	0.303A+0.014	0.279B+0.014

Table 2: Age wise mean thickness (in cm) of right lobe of Thymus of Kadaknath and Narmada Nidhi breeds of poultry

Group	Kadaknath	Narmada Nidhi
0-2 weeks	0.1183a±0.0031	0.1217a±0.0040
2-4 weeks	0.1783c±0.0048	0.1917c±0.0054
4-8 weeks	0.5217d±0.0040	0.5617d+0.0040
8-16 weeks	0.6400e±0.0026	0.6467e±0.0040
16-32 weeks	0.1350b±0.0406	0.1433b+0.0033
> 32 weeks	-	-
Total	0.319A+0.002	0.333B+0.002

Table 3: Age wise mean weight (in gm) of left lobe of Thymus of Kadaknath and Narmada Nidhi breeds of poultry

Group	Kadaknath	Narmada Nidhi
0-2 weeks	0.0750a± 0.0022	0.0817a±0.0040
2-4 weeks	0.1683c± 0.0065	0.1850c±0.0034
4-8 weeks	0.3150d+ 0.0034	0.3100d+0.0045
8-16 weeks	0.7067e± 0.0033	0.8000e±0.0037
16-32 weeks	0.1050b+ 0.0022	0.1050b+0.0056
> 32 weeks	-	-
Total	0.274A+0.002	0.296B+0.002

Table 4: Age wise mean thickness (in cm) of left lobe of Thymus of Kadaknath and Narmada Nidhi breeds of poultry

Group	Kadaknath	Narmada Nidhi
0-2 weeks	0.1150a+0.0043	0.1133a+0.0049
2-4 weeks	0.1767c+0.0049	0.2000c+0.0037
4-8 weeks	0.5233d+0.0049	0.5583d+0.0031
8-16 weeks	0.6533e+0.0042	0.6617e+0.0031
16-32 weeks	0.1383b+0.0047	0.1417b+0.0048
> 32 weeks	-	-
Total	0.321A+0.002	0.335B+0.002

Plate 1(a): Photomicrograph of Thymus of 4-8 weeks old Kadaknath bird

Plate 1(b): Photomicrograph of Thymus of 4-8 weeks old Narmada Nidhi bird

Conclusions

The biometrical values indicated variation amongst the two breeds which might be due to breed difference. Thymus of Kadaknath was observed to be greyish black in colour whereas it was found to be creamish white in colour in Narmada Nidhi birds. Number of lobes was about 5-6 in Kaiaknath Narmada Nidhi birds. On an average, the gross biometrical values for weight and thickness of thymic lobes on either side in Narmada Nidhi birds were found to be higher in each age group under study than in Kadaknath birds. In both the breeds, the thymic lobes did not show decrease in size grossly with the increase in age which may be attributed to increased deposition of adipose tissue.

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