



MORPHOMETRICAL CHANGES IN THE ADRENAL GLANDS OF KUTTANAD DUCKS DURING POST HATCH PERIOD*

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Abstract

Morphometrical changes of the adrenal gland in Kuttanad ducks during post hatch period was studied using 78 female birds from day-old to 24 weeks of age. The material was collected from six female birds in each group at fortnightly intervals. The left adrenal gland was significantly longer and wider than the right one throughout the study period. However, the right gland being pyramidal in shape was thicker than the left one in many age groups. Length and breadth of the adrenals showed significant positive correlation with age and body weight. Maximum size for the left and right adrenals was recorded at 24 weeks of age. Size of the adrenal gland showed more correlation with the body weight than with the age of the birds. Length and breadth of the left adrenal gland showed significant positive correlation with the weight of the left adrenal and combined weight of adrenals during post hatch period. All the morphometric parameters of the adrenal glands except the thickness of left one showed significant positive correlation with the weight of the adrenals and combined weight of adrenals.

Keywords: Morphometry, Adrenals, Kuttanad ducks, Post hatch period

Avian adrenal gland is a morphologically and functionally complex endocrine organ having vital role in water metabolism and electrolyte balance of the body. It also regulates the carbohydrate metabolism and acts as a secondary source of sex steroids (Ringer, 1965). Although research has been conducted on the adrenal gland of domestic fowl and Japanese quail, information regarding the normal structure and post-hatch developmental pattern of the adrenal gland in duck is scanty. Hence, this work is designed to trace the morphometrical changes of the adrenal gland at different stages of post-hatch life in Kuttanad ducks.

Materials and Methods

Morphometrical changes of the adrenal gland in Kuttanad ducks during post hatch period was studied using 78 female birds from day-old to 24 weeks of age. The birds were selected randomly from a single hatch and reared at the University poultry and duck farm, Mannuthy, under identical feeding and environmental conditions. Birds were divided into 13 age groups. The adrenal gland was collected from six birds at fortnightly intervals. Body weight, morphological features

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and position of the adrenal gland were recorded. The glands were then carefully dissected out for recording the morphometric parameters and the data were analysed statistically (Snedecor and Cochran, 1994).

Results and Discussion

Length, breadth and thickness of the adrenals at different ages are presented in Table 1. Left gland was significantly longer and wider than the right one throughout the study period. However, the right gland being pyramidal in shape was thicker than the left one in many age groups. The observations were in partial agreement with those recorded by Humayun *et al.* (2012) in chicken, where the right adrenal was significantly wider and thicker than the left one.

Morphometrical changes of the left and right adrenal glands during post hatch period are presented in fig.1 and 2, respectively. Among the three parameters, length of the left and thickness of the right adrenal glands showed undulating pattern during growth. Length and breadth of the left adrenal glands showed significant positive correlation with age ($r = 0.882$ and 0.810 , respectively) and body weight ($r = 0.959$ and 0.901 , respectively). Similarly, length and breadth of the right adrenal glands also showed significant positive correlation with age ($r = 0.791$ and 0.879 , respectively) and body weight ($r = 0.822$ and 0.909 , respectively). Unlike in the case of right adrenal, there was no

significant correlation between the thickness of left adrenal with the age and body weight of the birds. Maximum size for the left and right adrenals was recorded at 24 weeks of age. Size of the adrenal gland showed more correlation with the body weight than with the age of the birds. Ringer (1965) reported that absolute adrenal weight increased with age until 13 weeks of age.

The left and right adrenal glands in adult Kuttanad ducks (24 weeks) measured 1.01 ± 0.00 cm and 0.91 ± 0.03 cm in length, 0.72 ± 0.03 cm and 0.70 ± 0.02 cm in breadth and 0.37 ± 0.02 cm and 0.42 ± 0.02 cm in thickness, respectively. Nickel *et al.* (1977) reported that the adrenal gland in adult fowl measured 13 mm in length, 8 mm in breadth and 4.5 mm in thickness.

Length and breadth of the left adrenal gland showed significant positive correlation with the weight of the left adrenal and combined weight of adrenals during post hatch period (Table. 2), but the correlation was not significant between the thickness of the left gland with its weight and combined adrenal weight. Contrary to this, all the morphometric parameters of the right adrenal gland showed significant positive correlation with the weight of the right adrenal and combined weight of adrenals (Table. 3). Studies on this aspect in ducks are not available for comparison.

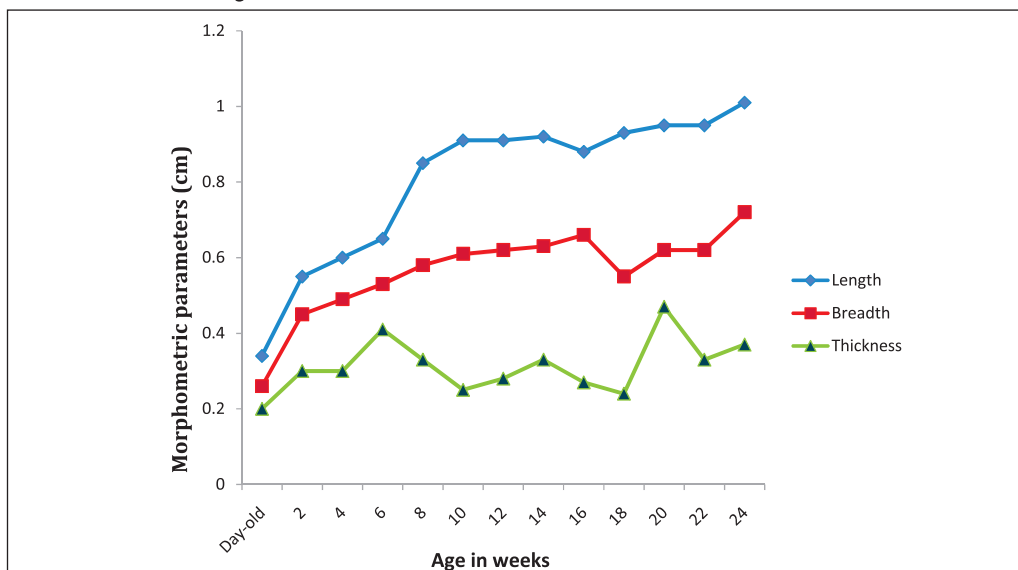


Fig. 1. Morphometric parameters of left adrenal gland during post hatch period

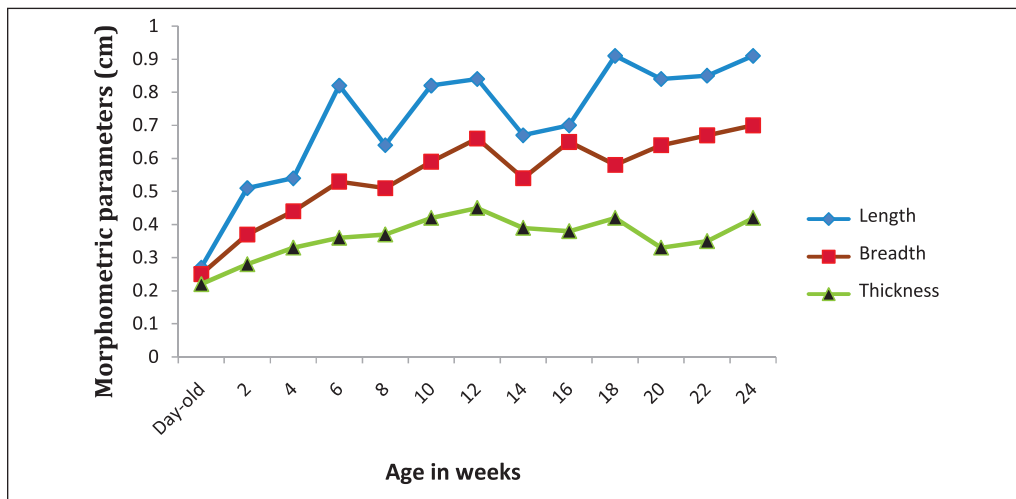


Fig. 2. Morphometric parameters of right adrenal gland during post hatch period

Paired t-test was used to analyze the difference in length, width and thickness between right and left adrenals. Significant differences were recorded in the length of left and right adrenal glands in second, twelfth and eighteenth week of age. Comparison of the breadth of left and right adrenals revealed that there was significant difference in the values of day-old, 8th, 12th, 14th and 18th weeks of age. No significant difference was recorded in the thickness of the left and right adrenal glands

in day-old, two, four, 14, 22 and 24 weeks-old birds. Morphometry of the adrenal gland in adult chicken and ducks was studied by Elbajery (2012) and found that the mean volume of the right adrenal gland was 0.20 cm³ and 0.14 cm³ in chicken and duck, respectively. These values exceeded those of the left glands by 11 per cent and 17 per cent respectively in these species. Humayun *et al.* (2012) noticed that the right adrenal was significantly wider, thicker but shorter than the left adrenal, in chicken.

Table 1. Length, breadth and thickness of left and right adrenal glands in different age groups (Mean ± S.E.)

Age	Left adrenal			Right adrenal		
	Length (cm)	Breadth (cm)	Thickness (cm)	Length(cm)	Breadth (cm)	Thickness (cm)
Day-old	0.34±0.00	0.26±0.01	0.20±0.02	0.27±0.01	0.25±0.01	0.22±0.01
2 weeks	0.55±0.02	0.45±0.03	0.30±0.02	0.51±0.03	0.37±0.01	0.28±0.01
4 weeks	0.60±0.01	0.49±0.01	0.30±0.03	0.54±0.01	0.44±0.02	0.33±0.01
6 weeks	0.65±0.02	0.53±0.03	0.41±0.01	0.82±0.02	0.53±0.03	0.36±0.01
8 weeks	0.85±0.01	0.58±0.02	0.33±0.02	0.64±0.00	0.51±0.02	0.37±0.00
10 weeks	0.91±0.03	0.61±0.04	0.25±0.01	0.82±0.01	0.59±0.02	0.42±0.01
12 weeks	0.91±0.06	0.62±0.01	0.28±0.02	0.84±0.00	0.66±0.01	0.45±0.01
14 weeks	0.92±0.08	0.63±0.01	0.33±0.02	0.67±0.01	0.54±0.01	0.39±0.02
16 weeks	0.88±0.02	0.66±0.01	0.27±0.02	0.70±0.01	0.65±0.01	0.38±0.03
18 weeks	0.93±0.02	0.55±0.00	0.24±0.00	0.91±0.00	0.58±0.01	0.42±0.01
20 weeks	0.95±0.01	0.62±0.01	0.47±0.03	0.84±0.01	0.64±0.01	0.33±0.01
22 weeks	0.95±0.01	0.62±0.04	0.33±0.01	0.85±0.03	0.67±0.03	0.35±0.00
24 weeks	1.01±0.00	0.72±0.03	0.37±0.02	0.91±0.03	0.70±0.02	0.42±0.02

Table 2. Pearson's correlation coefficients (r) of left adrenal parameters with the weight of left adrenal gland

Parameters (cm)	Weight of right adrenal(g)	Combined weight of adrenals(g)
Length of right adrenal	0.860**	0.862**
Breadth of right adrenal	0.937**	0.940**
Thickness of right adrenal	0.761**	0.753**

**Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

Table 3. Pearson's correlation coefficients (r) of right adrenal parameters with the weight of right adrenal gland

Parameters	Weight of left adrenal (g)	Combined weight of adrenals (g)
Length of left adrenal (cm)	0.915**	0.925**
Breadth of left adrenal (cm)	0.922**	0.920**
Thickness of left adrenal (cm)	0.439	0.417

** Correlation is significant at the 0.01 level (2-tailed)

* Correlation is significant at the 0.05 level (2-tailed)

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