MORPHOLOGICAL STUDIES ON THE INFUNDIBULUM OF KUTTANAD DUCK (*Anas platyrhynchos domesticus*) DURING POSTNATAL PERIOD

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Abstract

Postnatal development of the infundibular region of the oviduct in Kuttanad ducks was studied using 78 ducklings from day-old to 24 weeks of age. The material was collected from six birds in each group at fortnightly intervals. Infundibulum was not differentiated until 10th week of age, but by 12 weeks it entered into a rapid phase of differentiation and the infundibulum was divisible into funnel and neck regions. Kuttanad duck showed a relatively short infundibulum similar to that of chicken and turkey. From 12th week to 24th week of age, the funnel and neck parameters of infundibulum showed highly significant positive correlation with age and weight and length of the oviduct. However, no significant correlation was noticed between infundibular parameters and the body weight during postnatal period. It was observed that during the egg-laying period the weight-wise and length-wise contribution of infundibulum was found to be more than that in the pre-laying period.

Key words: *Postnatal development, infundibulum, Kuttanad Duck*

Kerala is the home tract of the Kuttanad breed of ducks which are favoured over Khaki Campbell ducks by the farmers due to attractive egg size and better disease resistance (Jalaludeen *et al.,* 2004). In order to ensure persistent and maximum production and to evolve better managemental practices, a sound knowledge on the developmental aspects of the reproductive tract is essential.

Infundibulum plays key functional role in capture and transfer of ovum and formation of chalazae. Although research works have been conducted on the infundibular region of the oviduct in domestic fowl (Aitken and Johnston, 1963; Hodges, 1974; King, 1975 and Nickel *et al.,* 1977), Japanese quail (Lucy and Harshan, 1999a), turkey and pigeon (Mohammadpour and Keshtmandi, 2008), information regarding the developmental pattern of the infundibulum in duck is scanty. Hence, the present work was undertaken to find out the relationship of the developmental pattern of the infundibulum with age, body weight and oviductal parameters during postnatal period in Kuttanad ducks.

Materials and Methods

In all, 78 Kuttanad ducks were used for the present study. The birds were selected randomly from a single hatch and reared at the University Poultry Farm, Mannuthy under semi-intensive system of management. Feed and water was provided *ad lib*. The ducklings were not given any vaccination. The study was carried out in birds of different age groups, ranging from day-old to 24 weeks. The material was collected from six birds in each group at fortnightly intervals. The morphometry including weight, length and diameter of the infundibulum was recorded. The data were analysed statistically (Snedecor and Cochran, 1994).

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Results and Discussion

Two phases of growth were observed during the developmental period in the infundibulum of the oviduct of the Kuttanad duck *i.e.*, phase of structural and functional non-differentiation and phase of complete differentiation. The first phase was observed from day-old to 10th week of age, in which, infundibulum was not differentiated from the magnum and isthmus regions and morphological development was negligible. The second phase started from 12th week onwards and all the five segments of the oviduct including the infundibulum were differentiated. Subsequently the infundibulum became morphologically divisible into cranial funnel and caudal neck regions. In Japanese quail different segments of the oviduct could be distinguished from 40 days of age (Lucy and Harshan, 1999a).

was higher than that of the neck (1.16 ± 0.02 g) (Tables 1 and 2). Length of the neck region was more than that of the funnel in all age groups. The funnel was much wider than the neck throughout the postnatal period. In adult birds (by 20 weeks onwards), the thin walled funnel was flattened dorsoventrally and its flared lips were in close proximity to the ovary (Fig. 1). Infundibulum contributed 11.42% of the oviduct length at 24 weeks of age (Fig. 2). Thus, Kuttanad duck showed a relatively short infundibulum similar to that of chicken and turkey (Woodard and Mather, 1964). Contrary to this, a relatively longer infundibulum, contributing 17.1% of the total oviduct length, was observed in the adult Japanese quail (Lucy and Harshan, 1999b).

From 12th to 24th weeks of age, the weight, length and width of the funnel and neck regions of the infundibulum showed highly

Table. 1 Age related changes in the parameters of funnel region of infundibulum (Mean ± S.E.)

Age	Weight of Funnel (g)	Length of Funnel (cm)	Width of Funnel (cm)
12 weeks	0.03 ± 0.00	0.70 ± 0.02	7.18 ± 0.05
14 weeks	0.08 ± 0.00	0.70 ± 0.02	8.40 ± 0.12
16 weeks	0.12 ± 0.00	0.80 ± 0.03	10.38 ± 0.14
18 weeks	0.69 ± 0.00	0.80 ± 0.02	11.15 ± 0.04
20 weeks	1.01 ± 0.02	3.10 ± 0.04	11.88 ± 0.08
22 weeks	1.35 ± 0.02	3.30 ± 0.09	12.16 ± 0.02
24 weeks	1.49 ± 0.01	3.40 ± 0.02	12.88 ± 0.10

Age related parameters of the funnel and neck regions of the infundibulum in Kuttanad ducks are given in tables 1 and 2. At 12th week of age, the weight of the funnel region of the infundibulum was 0.03 ± 0.00 g and was greater than that of the neck (0.02 ± 0.00 g). This relationship remained constant for all succeeding age groups and at 24th week of age, funnel region weighed 1.49 ± 0.01 g which

significant positive correlation with age (Table 3). But no significant correlation was noticed between infundibular parameters and the body weight. Weight and length of the funnel as well as the neck regions of the infundibulum showed highly significant positive correlation with the weight and length of the whole oviduct at 1% level of significance, whereas, width of the infundibulum showed significant correlation

Table. 2 Age related changes in the parameters of neck region of infundibulum (Mean ± S.E.)

Age	Weight of Neck (g)	Length of Neck (cm)	Width of Neck (cm)
12 weeks	0.02 ± 0.00	0.70 ± 0.03	0.40 ± 0.03
14 weeks	0.04 ± 0.00	0.80 ± 0.03	0.58 ± 0.02
16 weeks	0.05 ± 0.00	1.00 ± 0.02	0.68 ± 0.02
18 weeks	0.06 ± 0.00	1.20 ± 0.05	0.70 ± 0.01
20 weeks	0.60 ± 0.00	3.70 ± 0.05	0.74 ± 0.01
22 weeks	1.06 ± 0.00	3.80 ± 0.02	0.90 ± 0.17
24 weeks	1.16 ± 0.02	3.80 ± 0.04	1.27 ± 0.03

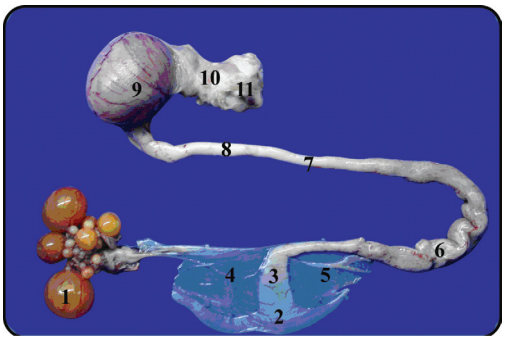

Fig. 1. Segments of the oviduct (22 weeks)
1. Ovary; 2. Funnel of infundibulum; 3. Neck of infundibulum;
4. Ventral ligament; 5. Dorsal ligament; 6. Magnum;
7. Magnum-isthmus junction; 8. Isthmus;
9. Uterus with an egg; 10. Vagina; 11. Cloaca.

with the weight and length of the oviduct only at 5% level of significance (Table 3).

It was observed that during the egg-laying period the weight-wise and length-wise contribution of infundibulum to the total length of oviduct was found to be more than that in the pre-laying period. It was also found that, such difference in weight and length of the infundibulum was positively correlated to total weight and length of the oviduct and was irrespective of the body weight of the bird at that age. In domestic fowl, similar findings were reported by Khokhlov (2008) who speculated that the regular fluctuations in weight, length and width of the infundibulum with respect to total weight and length of the oviduct indicated the synchronization with the functional stages of the oviduct.

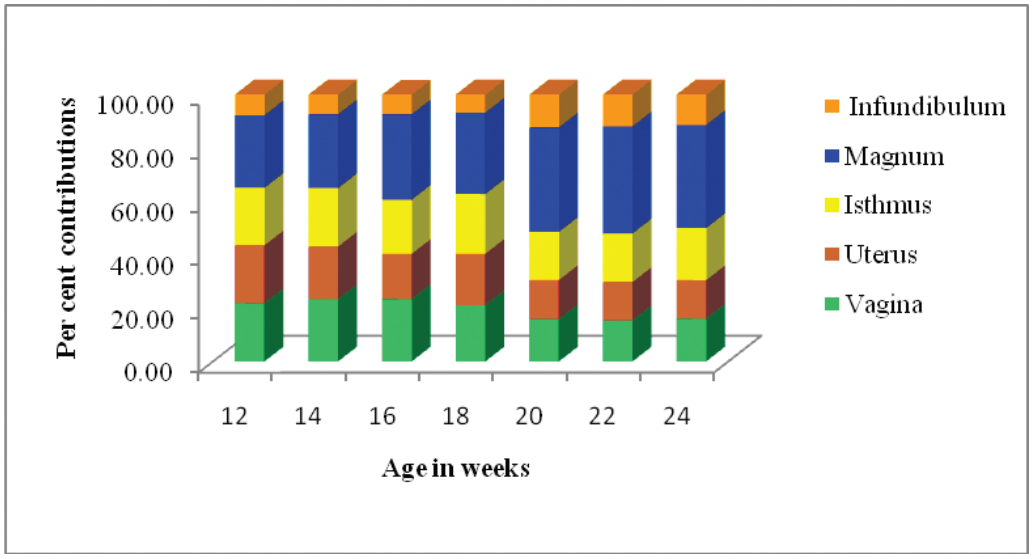

Fig. 2. Percentage contribution of segments of oviduct to the total length at different ages

Table. 3 Correlation coefficients (r) of oviductal parameters on age, body weight and weight and length of the oviduct

Parameters	Age	Body weight	Weight of Oviduct (g)	Length of Oviduct (cm)
Weight of Funnel of Infundibulum (g)	0.970**	0.225 NS.	0.953**	0.969**
Weight of Neck of Infundibulum (g)	0.908**	0.038 NS.	0.955**	0.958**
Length of Funnel of Infundibulum (cm)	0.900**	0.084 NS.	0.997**	0.989**
Length of Neck of Infundibulum (cm)	0.906**	0.153 NS.	0.998**	0.991**
Width of Funnel of Infundibulum (cm)	0.965**	0.483 NS.	0.829*	0.884**
Width of Neck of Infundibulum (cm)	0.930**	0.018 NS.	0.787*	0.844*

** Correlation is significant at 1% level, * Correlation is significant at 5% level, NS. Correlation is non-significant.

References

Aitken, R. N. C. and Johnston, H. S. 1963. Observations on the fine structure of the infundibulum of the avian oviduct. *J. Anat.,* **97**: 87-89.

Hodges, R. D. 1974. *The Histology of the Fowl*. Academic Press, London, 648 p.

Jalaludeen, A., Peethambaran, P. A., Leo, J. and Manomohan, C. B. 2004. *Duck Production in Kerala.* NATP on Ducks, CVAS, KAU, Mannuthy. 44 p.

Khokhlov, R. YU. 2008. Morphology of infundibulum of the oviduct of the sexually mature hens. *Int. J. Morphol.,* **26**:883-886.

King, A. S. 1975. Aves - Urogenital system. In: Getty, R. (Ed.). *Sisson and Grossman's the Anatomy of the Domestic Animals.* Vol. 2. 5th ed., W. B. Saunders Co., Philadelphia pp. 1935-1959.

Lucy, K. M. and Harshan, K. R. 1999a. Developmental pattern of oviduct in Japanese quail from postnatal to adulthood. *Indian J. Poult. Sci.,* **34** : 21-24.

Lucy, K. M. and Harshan, K. R. 1999b. Structure and development of infundibulum in Japanese quail. *Indian J. Poult. Sci.,* **34** : 125-128.

Mohammadpour, A. A. and Keshtmandi, M. 2008. Histomorphological study on infundibulum and magnum in turkey and pigeon. *World J. Zool.,* **3** : 47-50.

Nickel, R., Schummer, A. and Sieferle, E. 1977. *Anatomy of the Domestic Birds*. Verlag Paul Parey, Berlin, 202 p.

Snedecor, G. W. and Cochran, W. G. 1994. *Statistical Methods*.7th ed., The Iowa State University Press, USA, 313 p.

Woodard, A. E. and Mather, F. B. 1964. The timing of ovulation, movement of the ovum through the oviduct, pigmentation and shell deposition in Japanese quail (*Coturnix coturnix japonica*). *Poult. Sci.,* **43**: 1427-1432.

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