

COMPARATIVE MORPHOLOGY AND MORPHOMETRY OF THE CAECUM IN PIGEON AND QUAIL SHORT TITLE - CEACUM IN PIGEON AND QUAIL

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Abstract: Comparative morphological and morphometrical study was performed in the caecum of six adult male pigeon and Japanese quails of both the sexes. The animals were weighed, anaesthetized and caecum was dissected out. The caecum in both the birds was observed for morphological study. The proximal, middle and distal portions of caecum were not easily distinguishable in pigeon whereas in quail all the regions were evidenced. Only two caecal buds were seen on either side of colon in pigeon.

Keywords: Morphology, Morphometry, Comparison, Caecum, Pigeon, quail.

Introduction

Bird's large intestine consists of paired caecum and a short rectum joined to ileum and cloaca. Caecum, in birds, the largest part of intestine has an important role in liquid absorption, cellulose digestion and defensive mechanism. The lymphatic nodules in the mucous membrane of caecum are considered important both for immune responses and medicinal therapies. Pigeons are maintained for their beauty as toy bird, for meat purpose and for sport purpose. Japanese quail is mostly reared for the meat purpose all over the world. The differences between these two birds are pigeons are grain eaters and quails are grass eaters or herbivore birds. So the understanding of digestive anatomy becomes more important for the bird rearers as there is difference in feeding pattern. Literature on the digestive organs of pigeon and quail is scanty. Here this research work was undertaken to study the morphology and morphometry of caecum in Pigeon and quail. This will form the basis for correlating the defensive and digestive functions of the caeca.

Materials and Methods

Six numbers of male and female quails and pigeon of six week old age were used for the study. The body weight of the birds was noted. The birds were anaesthetized and dissected. The caecum was dissected in all the birds and gross appearance and adjoining

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structure was noticed. The morphometric measurements like length, width, thickness of the caecum were recorded using thread and scale in centimetres. The data on these parameters were analysed statistically (Snedecor and Cochran, 1985).

Results and Discussion

A pair of outpocketing extended from either side of the colon at the junction between it and the small intestine was the ceca which is present in almost all the birds and in both the sexes. They usually have varied shape in different birds depending upon their feed habit, location etc. (Clench and Mathias, 1995). Within and inbetween species of birds also there was a great variability in morphological and functional aspects (Mobini, 2011)

The sex based differences were not found in this study. The paired caeca extended caudally from the terminal part of ileum and proximal part of colon forming a ileo-caeco-colon junction in both the birds. In pigeon, the caecum appeared like two buds projecting from the ileocaecal junction. While in quails the caecum was two blind long tubes extending from the ileocaecal junction. The caeca of the quails are quite prominent and longer when compared to pigeons which had only a rudimentary caeca (Hena *et. al.*, 2012). The three region of caecum like proximal, middle and distal part as noticed in galliform birds like chicken were found in quails and were not found in pigeons. This was in partial agreement with the results of Vibek (2005) who reported that there were variations in the mucosal surface in the three parts of caecum of white Plymouth Rock hens giving morphological evidence for different function between the three parts. The caecum of ostrich contained folds that it gradually decreased and disappeared 14 cm from apex, suggesting that these folds play an important role in the absorption of volatile fatty acids and other metabolites produced by microbial fermentation of cellulose and hemicelluloses (Hodges, 1974). The proximal portion was short in length with narrow lumen and thick wall. The middle part was longer in length with wider lumen and thin wall. The distal part was shorter in length with narrow lumen and a pointed tip. The caecal tonsils were seen in both the birds in the areas of thickening of the wall of the caecum which were seen mostly in the proximal part in quail and throughout in pigeons.



Caecum of adult pigeon showing bud like appearance (Arrows)
 I – Small Intestine C - Colon

Caecum of Japanese quail (Arrows)
 I – Small Intestine C - Colon

The average weight of left and right caecum in quails was 0.54 ± 0.12 g and 0.55 ± 0.16 g whereas the average weight of left and right caecum in pigeon was 0.02 ± 0.01 g and 0.02 ± 0.01 g. The weight of the caeca in pigeons were taken with difficulty as it was in small size and difficult to dissect.

The average length of the left and right caecum in quail was 8.2 ± 0.15 cm and 8.3 ± 0.23 cm. The average length of the left and right caecum in the pigeons is 0.3 ± 0.12 cm and 0.3 ± 0.11 cm. The length and weight of the left and right caeca in quails and pigeons were extremely significant ($P < 0.05$). In broilers, the combined length of caeca was ranged from 2.22 to 10.83 cm (Mobini, 2011). But in this study, the combined length in quail was 16.5 cm and in pigeon was 0.6 cm which was totally in contrast to the finding of Mobini (2011) in broilers. The length of the caeca at proximal portion in quails was 2.0 ± 0.11 cm, middle portion was 4.1 ± 0.56 cm and the distal portion was 2.1 ± 0.15 cm in both the right and left sides.

The average width in both the left and right caeca in quails was 0.09 ± 0.11 cm in the proximal part, 0.10 ± 0.01 cm in middle part and 0.09 ± 0.22 cm in distal part. The average width in both the left and right caeca in pigeon was 0.08 ± 0.56 cm.

Chicken and ducks had very large caecum comparable to quails which is essential for proper functioning of digestive system, important organ during the period of stress and helped in digestion of vegetable matter and in water balance (Clench and Mathias 1995).

The morphological differences in the caecum of quail and pigeon suggested that the caecum would function as the part of digestive and immune system in quail and only for immune function in pigeons.

Table 1: Morphometrial parameters of caecum of quail and pigeon (Mean \pm SE)

S. No.	Caecum	Quail			Pigeon		
		Weight (g)	Length (cm)	Width (cm)	Weight	Length (cm)	Width (cm)
1	Right caecum	0.55 \pm 0.16	8.3 \pm 0.23	0.09 \pm 0.11	0.02 \pm 0.01	0.3 \pm 0.11	0.08 \pm 0.56
2	Left caecum	0.54 \pm 0.12	8.2 \pm 0.15	0.09 \pm 0.11	0.02 \pm 0.01	0.3 \pm 0.12	0.08 \pm 0.56

Average mean body weight of quail and pigeon were 155g and 193 g respectively

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