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Micrometrical studies on the gizzard of Kadaknath fowl

Abstract

The study was conducted to assess various micrometrical readings of different layers in the gizzards of Kadaknath breed of fowl at Department of Anatomy, College of Veterinary Sciences, Pantnagar. The study used 24 birds, divided in age groups of (day old, 7, 28 and 112days old) with 6 birds in each age group. Gizzard samples were collected and processed for paraffin sections and slides were stained with H&E stain and viewed at different magnifications. It has been found that the thickness of the different layers were maximum in 112days old whereas it was minimum in day old birds, indicating that the thickness of different layers also increased as the age of the birds advanced due to continuous development. Micrometry of epithelial cell and nucleus diameter reveals that there is less variation in height, width and diameter with the advancement of age.

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Introduction

Kadaknath is a famous Indian poultry breed and pride of Madhya Pradesh. It is also known as "Kala Masi" because of the black color meat, skin, tongue, beak, legs and intestines. So it requires a continuous research to add scientific inputs. Digestive system is vital which needs to be explored starting from its basic structural peculiarities and as there is paucity of literature pertaining to the micrometrical studies of gizzard of Kadaknath breed of fowl. Therefore, this study was embarked to act as base line data for this breed for further research.

Materials and methods

The present study was conducted on Kadaknath breed of fowl in the Department of Veterinary Anatomy, College of Veterinary & Animal Sciences, G. B. Pant University of Agriculture & Technology, Pantnagar. The birds were procured from Instructional Poultry Farm, G.B. Pant University of Agriculture and Technology, Pantnagar. The birds were divided into four groups (day old, 7days, 28days and 112days) with six birds in each age group. The birds were sacrificed by severing the carotid artery and jugular veins. Feathers were removed manually and the gizzards were carefully dissected out. Tissue samples were collected and processed in routine manner and slides were prepared. Then the slides were stained with H&E stain. Slides were observed under compound microscope at different magnifications. For each slide 10 observations were taken and the average of these micrometrical observations were recorded and presented in table form of Mean±Se. In the present study thickness of inner cornified layer, tunica mucosa, tunica submucosa, tunica muscularis, tunica serosa, epithelial cell height, breadth and nucleus diameter was recorded.

Results and discussion

The thickness of the inner cornified layer of the gizzard in day old, 7, 28 and 112days old birds was 184.5±18.595µm, 276±20.666µm, 368±15.567µm, and 411±23.872µm respectively (Table 1). Results from the current study are (in agreement or not in line with) Ahmed et al.[1] who reported the thickness of keratinized layers of gizzard of Japanese quail during 1,15,30,45days were 136.55±30.12, 223.07±42, 318±17.12, 336±15.12µm respectively. In another study, Kausar et al.,[2] reported the thickness of keratin layer in Japanese quail during 4 weeks, 8 weeks and above 8 weeks were 134.43±7.89, 164.43±12.75 and 201.63±41.42µm respectively.

The thickness of the tunica mucosa of gizzard in day old, 7, 28 and 112days old birds was 300.5±12.028µm, 319±11µm, 459±27.826µm, and 634±26.381µm respectively (Table 1). The results are similar to Ahmed et al.,[1] reported the thickness of gizzard glands of Japanese quail during 1,15,30,45days were 301.41±30.32, 410.49±43.10, 532.81±23.12, 541.82±21.43µm respectively.

Table 1 Showing the thickness of various layers in various age groups

Name of the layer	Age groups			
	0Day	7days	28days	112days
Inner Cornified Layer	184.5±18.59	276±20.66	368±15.56	411±23.872
Tunica Mucosa	300.5±12.02	319±11	459±27.826	634±26.381
Tunica Submucosa	41±4.268	78.6±4.52	158.55±8.45	198.75±21.03
Tunica Serosa	23.1±2.350	36.15±3.582	50.25±3.598	81.5±9.945

The thickness of the tunica submucosa of gizzard in day old, 7, 28 and 112days old birds was 41±4.268µm, 78.6±4.522µm, 158.55±8.453µm, and 198.75±21.033µm respectively (Table 1). The thickness of the tunica serosa of gizzard in day old,7,28 and 112 old birds was 23.1±2.350µm, 36.15±3.582µm, 50.25±3.598µm, and 81.5±9.945µm respectively (Table 1). In the present investigation, it was observed that with the age advances there was an increase in the dimension of various layers of gizzard of Kadaknath fowl which is in agreement with Ahmed et al.[1] in Japanese quail and Lambate et al.,[3] in broiler birds.

The average height of the epithelial cell of the gizzard mucosa in day old, 7, 28 and 112days old birds was 7.62±0.471µm, 7.7±0.478µm, 9.35±0.605µm, and 10.6±0.515µm respectively (Table 2). In their study, Ahmed *et al. (*2011) reported the height of gizzard glands epithelium of Japanese quail during 1,15,30,45days were 6±2.12, 9±1.90, 14±2.43, 17±1.90µm respectively. In another study, Kausar et al.,[2] found the height of gizzard epithelium in Japanese quail during 4weeks, 8 weeks and above 8 weeks as 188.57±7.18, 195.86±5.2 and 220.13±24.54µm respectively. The average breadth of the epithelial cell of the gizzard mucosa in day old, 7, 28 and 112days old birds was 4.51±0.404µm, 4.6±0.4µm 5.01±0.439µm, and 6.76±0.420µm, respectively (Table 2). The average nucleus diameter of the gizzard epithelium in day old, 7, 28 and 112days old birds was 4.92±0.370µm, 5.03±0.257µm, 5.97±0.468µm, and 6.13±0.381µm respectively (Table 2). The increase in the epithelial dimension in the present investigation indicated higher activity with advancement in age.[4–10]

Table 2 Showing the Height, Breadth and Nucleus diameter in various age groups

Mucosal epithelium	Age groups			
	Day old	7days	28days	112days
Height	7.62±0.471	7.7±0.478	9.35±0.605	10.6±0.515
Breadth	4.51±0.404	4.6±0.40	5.01±0.439	6.76±0.420
Nucleus Diameter	4.92±0.370	5.03±0.257	5.97±0.468	6.13±0.381

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None.

Conflicts of interest

Author declares that there is no conflict of interest.

References

1. Ahmed, YAEG, Kamel G, et al. Histomorphological Studies on the Stomach of the Japanese Quail. *Asian Journal of Poultry*. 2011;5(2):56–67.
2. Razia Kausar, Anas Sarwar Qureshi, Malik Zohaib Ali, et al. Age induced changes in the microscopic anatomy of the digestive system of Japanese quails *(Coutrnix japonica)*. *Bioscience Research*. 2016;13(1):26–31.
3. Lambate SB, Mamde CS. Histological studies of proventricular and gizzard glands in broiler. *Royal Veterinary Journal of India*. 2008;4(2):9–12.
4. Hodges RD. *The Histology of the Fowl*. London: Academic Press; 1974:35–112.
5. McLelland J. Aves Digestive System. In: *Sisson and Grossman, the Anatomy of the Domestic Animal*. Philadelphia: Saunders Company; 1957:1857–1882.
6. Nickel R, Schummer A, Seiferle E. Digestive system. In: *Anatomy of the Domestic Birds*. Berlin: VVerlag Paul Parey; 1977.
7. Banks WJ. *Applied Veterinary Histology*. 3rd ed. 1993. p. 410–414.
8. Das LN, Biswal G. Microscopic anatomy of oesophagus proventriculus and gizzard of the domestic duck (Anas boscas). *Indian Vet J*. 1967;44(4):284–289.
9. King AS, McLelland J. *Outlines of Avian Anatomy*. 1st edn. CAB Direct; 1975. p. 37–39.
10. Prasad RV, Kakade K. Histology and histochemistry of proventriculus of domestic duck (*Anas platyrhynchos* Linnaeus). *Mysore Journal of Agricultural–Sciences*. 1990;25(4):506–511.