

## Morphological and histological investigation of proventriculus structure in common kestrel (*Falco tinnunculus*), steppe eagle (*Aquila nipalensis*), golden eagle (*Aquila chrysaetos*), and imperial eagle (*Aquila heliaca*)

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### Abstract

The proventriculus is one of the most important parts of digestive tract in birds for mechanical and chemical digestion and can vary depending on the bird's eating habits. In the present study, the morphological and histological structure of proventriculus in common kestrel, steppe eagle, golden eagle and imperial eagle have been investigated and compared. In this study, Proventriculus of common kestrel (n=4), steppe eagle (n=5), golden eagle (n=4) and imperial eagle (n=6) were collected and fixed in 10% formalin buffer solution and the histological process were carried. Finally, H&E, Masson's trichrome, Orcein and PAS stainings were utilized. Histologically, slight differences were observed between the proventriculus of common kestrel and steppe eagle. Notable differences included a continuous and relatively thicker layer of mucosal muscle in the steppe eagle's proventriculus, and the distinct simple columnar epithelium of the submucosal glands type II ducts. The only notable structural difference in golden eagle was the presence of relatively dense connective tissue of lamina propria and one to three layers of continuous smooth muscle in its structure. The histological structure of imperial eagle's proventriculus had two differences with its structure in common kestrel. Firstly, the lamina propria was composed of relatively dense connective tissue and secondly, the muscle layer was relatively thinner than other species examined in this study, while the serosa layer had a considerable thickness. It can be concluded that the structure of proventriculus was similar in three species of eagles and common kestrel, and the main significant difference was related to the layers of mucosal muscle.

**Keywords:** Histology, Gastrointestinal tract, Birds of prey, Lamina propria, Mucosal layer, Muscular layer

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