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Article review: Histologic structure of stomach in birds

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Abstract

The aims of the review to describe the histological structures in stomach of birds to providing information about gastric wall structure for the veterinarians for the treatment of birds.

Keywords: Birds, histologic, stomach

Introduction

The gastrointestinal system in fowls has appear complete a multitude of variations through the development to be suitable physiological and anatomical structures paralleled to animals, some particular structures in the dissimilar birds type and strains. The digestive system is tube short, and compound organs starting from beak finishes in the cloaca. The stomach has been extensively in dissimilar types of fowls, mammals. (Baumal *et al.*, 1993; Rossii, 2005; Ogunkoya Cooke, 2009; Hassan and Mousa, 2012; Hsue *et al.*, 2014) ^[1, 2, 3, 4, 5]. Gastric juice secretion from stomach of birds depend on the type of nutrition, proventriculus and ventriculus consider main site of enzymes secretion (Selven *et al.*, 2008) ^[6]. The gut of avian is portion of the avian digestive apparatus in the greatest types Dyce *et al.* (2010) ^[7]. Langlois (2003) ^[8] mention the stomach morphology in fowl and vertebrates, modified with type of foods. The gut in birds consist from two parts glandular part (proventriculus) and muscular part (ventriculus) connect by intermediate zone (isthmus). The glandular part differs in form and size in dissimilar fowl. The gut comparatively small in granivorous type & comparatively large in carnivorous fowl. (Svihuos 2014) ^[9]. A mucous membrane of stomach of fowls is coating by layer of mucus which guards a fundamental epithelium of harmful factors like chemical substances, enzymes, & pathological microorganisms (Ogunkoya & Cook, 2009) ^[3]. The cuticle membrane (koilin membrane) recognized on the surface of the ventriculus portion (Alaa *et al.*, 2019; Preja *et al.*, 2023) ^[10, 11] in Black Francolin and *Ciconia ciconia*.

Histology

A histological construction of wall gut (glandular part) in birds made from the following tunics: tunica mucosa, submucosa, muscularis and serosa, the epithelial lining of tunica mucosa is simple columnar epithelium which rest on lamina propria which contain tubular glands (Attia, 2008; Mahdy, 2009; Ogunkoya & Cook, 2009; Hassan & Moussa, 2012; Al-Saffar and Al-Samawy, 2015) ^[12, 13, 3, 4, 14] the gastric papilla found in mucosa of omnivores appear shallow and lacking in birds carnivores like falcon (Abumandour, 2013; El-Shammaa *et al.*, 2019) ^[15, 16]. The tubular glands differs in long with different species of birds which reach to the tunica submucosa in some type of birds, present double kinds of glands: simple tube-shaped mucous glands & complex tube-like (Hodges, 1974; Lei and Zhu, 2015; Alaa *et al.*, 2019) ^[17, 18, 10] the simple type of gland not identified in proventriculus of falcon (Abumandour, 2013) ^[15]. A complex tube-shaped glands of found in thicker part of proventriculus in black-tailed crane whereas in falcon found in tunica muscularis of proventriculus (Abumandour 2013) ^[15]. The muscularis mucosa be made of irregular smooth muscular fibers like muscular bundles in some time reached to lamina propria (Al-Kinany *et al.*, 2012; Mousa and Iman, 2019; Alaa *et al.*, 2019) ^[19, 20, 10]. While (Zhu, 2015) ^[21] mention that the muscularis mucosae of (*Lanius tephronotus*) bird consist from double layers inner and outer smooth muscle fibers. second tunica submucosa made the greatest portion of glandular part wall which be made up of loose connective tissue containing vessels and

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nerves fibers (Rossii *et al.*, 2005: Al-Saffaar and Al-Samaawy, 2014: Alaa *et al.*, 2019) [2, 22,

^{10]}. tunica muscularis consists from three sheets of smooth muscle threads, a first layer inner longitudinally set, second layer (middle) were dense and circularly arrangement, and outer layer thin longitudinally arrangement (Al-Sheshani, 2006: Al-Taee, 2017) [23, 24]. Alaa (2019) [10] mention the tunica muscularis in francolin consist from double layer inner and outer layer. author (Zhu, 2013) [21], mention the tunica muscularis in greybacked shrikes not advanced and consisting only smooth muscle fiber which arrangement circular. The fourth tunic in proventriculus serosa made from loose connective tissue vessels, nerve fibers, lymph cells, fat cells enclosed by thin layer of mesothelium (Hassaan & Moussa, 2012: Jassem *et al.*, 2016: Alaa *et al.*, 2019) [4, 25, 10].

The histological structure of muscular part (Gizzard) consist from the following tunics: tunica mucosa, tunica submucosa, tunica muscularis, the luminal surface of gizzard was roughly & crooked, contain oblique tall folds observed in this part, wall of muscular part (gizzard) lining via special coating of cuticle known koilin. This layer looks yellow, dense made of two kinds of koilin, the horizontal koilin, which covers the tunica mucosa and the vertical koilin that located between the mucosal fold of tunica mucosa (Hassan and Moussa, 2012) [4]. The thickness of koilin layer because of the type of food of birds on grain or meats and presence of stone intra gizzard the function of this layer to protect the wall from crushing process. Mucosa layer consist from of two or three minor stratum, (epithelium, lamina propria and muscularis mucosa layer) (Al-Araji, 2007: Kadhim *et al.*, 2011: Abumandour, 2013) [26, 27, 15]. The epithelium lining mucosa simple low columnar or cuboidal epithelial tissue. Lamina propria about loose connective tissue contain glands were simple straight tube-shaped glands, situation in lamina propria stratum (Lei and Zhu, 2015) [18]. The muscularis mucosa found in some type of birds (Al-Saffar and Al-Samaawy, 2015) [14], mention the mucosa muscularis looks as two layers of smooth muscle filaments in striated scope owl while (Moussa *et al.*, 2019) [20] mention its absent in Black Partridge. The second layer tunica submucosa consist from dense connective tissue. The tunica musculari make the greater part of gizzard some authors notice consist of two layer of smooth muscles fibers arrangement to dense circular inner layer middle & outside thick longitudinal layer (Taki-El-Deen, 2017) [28] in the Vanellus spinosus and (Alaa *et al.*, 2019) [10] in Black Francolin and Common Teal while (Moussa *et al.*, 2019) [20] in Black Partridge made from three layer internal & outside circular position and middle thin layer of smooth muscle fibers oblique position. last layer serosa made from of tissue with bloody vessels.

Conclusion

The gut of birds consist from two part glandular part and muscular part, the histological structure wall of gut made from the following layer mucosa, submucosa, muscular and serosa.

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