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Histological study of esophagus in dogs and rabbits

دراسة نسجية مقارنة لغدد المريء بين الكلاب والارانب

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Abstract

The present study was addressed numerous of histological differentiations in esophageal glands between dogs and rabbits. Five dogs and five rabbits were taken for this study. All samples were collected from animal house of Veterinary Medicine college-Kerbala University. The microstructures of esophagus were examined by light microscope، the results showed that the esophageal glands were highly mucous and less number of serous gland in dog while, the esophagus in rabbits have pure mucous gland only. So, all of esophageal glands in dog located in submucosa region but in rabbits can be seen in sub mucosa and tunica muscularis. In dog, the distribution of esophageal glands were randomly, while in rabbits the oesophagus glands were scattering as clumps or grapes between them dense connective tissue regular while in dog, didn't observed lobes and connective tissue unclear between glands. The ducting system in both of animals have some of characteristics different on each other.

المستخلص

بينت الدراسة الحالية عدد من الاختلافات في الغدد المريئية بين الكلاب والارانب.اخذت خمسة من الكلاب وخمسة ارانب للدراسة.جميع العينات تم جمعها من البيت الحيواني في كلية الطب البيطري-جامعة كربلاء.تم الفحص التركيب الدقيق للمريء بواسطة المجهر الضوئي،بينت النتائج ان الغدد اللعابية في مريء الكلاب كان النوع المخاطي يتواجد بكثافة بينما يوجد قليل من الغدد المصلية،في حين الارانب كانت من النوع المخاطي فقط .كذلك، جميع الغدد في الكلاب تقع في الطبقة تحت المخاطية لكن في الارانب كانت في الطبقة تحت المخاطية والطبقة العضلية.وكان توزيعها بشكل عشوائي في الكلاب بينما الغدد في مريء الارانب كان توزيعها على شكل فصوص وعناقيد مفصولة في مابينها بواسطة نسيج ضام كثيف،اما في مريء الكلاب لاتوجد حدود واضحة بين الغدد.وكذلك يمتلك كلا النوعين نظام قنوي له مميزات واشكال يختلف بعضها عن بعضها الاخر

Introduction

The esophagus is a tubular organ which extend form the pharynx to the stomach [1] and consist of three regions: cervical, thoracic and abdominal [2] .Like other parts of the digestive tube, the esophagus has four tunics, but important differences exist in the composition of these tunica in comparison to more distal sections of the tube. First, instead of the muscular tunic being entirely smooth muscle, as it is in the stomach and intestine, the wall of the esophagus contains a variable amount of striated muscle. In dogs, cattle and sheep, its entire length is striated muscles, whereas in cats, horses and humans, the proximal esophagus has striated muscles and the distal esophagus smooth muscles. Second, instead of the esophagus being free as it courses through the thoracic cavity, it is embedded in the connective tissue; thus, its outer tunic is referred to as adventitia instead of serosa. The wall of the esophagus presents the four specific layers of the digestive tract: mucosa, submucosa, muscularis and adventitia or serosa, the mucosa does contain mucous glands that are expressed as foodstuffs distend the esophagus, allowing mucus to be secreted and aid in lubrication. The esophageal glands are present in the lamina propria and submucosa layers [3]. The esophageal glands are not found during the entire length of the esophagus. Therefore, in horse, ruminants and cat they are present solely in the anterior third, while in rabbit, they are absolutely absent [4]. In animals, the degree of esophageal glands development seems to be in direct relation to the masticatory type. Mucous glands are present in the horse, cats and ruminants only at the pharyngeal-esophageal junction. Ruminants, horse and pig have stratified squamous epithelium continuing from the oesophagus into the stomach. Carnivores have an abrupt transition to columnar

epithelium. In Canine No keratinisation, the lamina muscularis is skeletal muscle and is present caudally spirally arranged. The lamina muscularis is however, absent cranially, mucous glands are present throughout but more abundant caudally. There is a thick and strong sphincter of tunica muscularis. For example, in snakes the mastication is absent, thus the glands are very numerous and large, while in cats the mastication is thorough and the glands are small and present solely in the first third of the esophagus [4]. Various esophageal glands were highlighted in the abdominal esophagus in dog through microscopic examination. The glands occupy almost two thirds (internal and middle) of the tunica submucosa thickness). The esophageal glands seem someway convened, with a tendency to form lobules separated by connective tissue. Here and there, the connective tissue surrounding the glands is infiltrated the presence, number and distribution of the mucus secreting esophageal glands in the submucosa are said to vary considerably in different species. Their presence are denied in the horse and cat by [5] but claimed by [6, 7] and (8), at least in the pharyngo-esophageal region of these species and of the ruminants (cattle, sheep, goat) in general. In man, the number of glands is extremely variable; they are few and scattered but are found throughout the esophagus [9, 10, 11, 12]. The lamina muscularis mucosae is said to be present throughout the entire length of the oesophagus in the ruminants but is incomplete. The tunica muscularis externa usually consists of inner circular and outer longitudinal muscle coats, the muscle being striated in the entire oesophagus in the ruminants and for the greater part of its length in the horse. Esophageal innervation in the sheep [13] and the sphincteric action in eructation have been determined by [14] have studied the function of the oesophagus in relation to obstruction in swallowing in cattle. As will be seen from this brief review, little is known about the esophagus of the camel (a ruminant) particularly about its glandular and muscular.

The aim of this research has been described some histological alterations of normal esophagus glands between carnivorous and herbivorous.

Materials and methods

Ten samples were collected from dogs and rabbits, immediately the esophagus were removed from thoracic region and fixed in 10% buffered neutral formalin. The specimens washed with normal saline to carry out through routine histological procedure by taking serial sections. The stain used in this study was Heamatoxlen &Eosin. The microscopic slides were examined by using a light microscope (Olympus BX) endowed with a digital camera [15].

Results

In general, there were found a differents between esophagus in dogs and rabbits, the esophageal portion of the gastrointestinal tract in dogs and rabbits were composed of the four layers, the mucosa, sub-mucosa, muscularis and adventitia. The mucosal lining was composed of a non-keratinized stratified squamous epithelium in rabbits thinner but had a thin layer of keratin in dogs. The lamina blend with sub-mucosa in both of species. However, the sub- mucosa in dog has dense regular connective tissue thicker than in rabbits which was ((126.4±8.6) μm, (24.8±4) μm, respectively [Fig 1,6]. The most of tunica muscularis in dog circular direction and thin but in rabbits had thick, clear circular and longitudinal directions. These were found throughout the length of the esophagus. There were many, ovoid or elongated, different size clusters or lobules of tubulo-aciner mucous and less number of serous glands in the submucosa in dogs but in rabbits had mucous glands only located in sub-mucosa , some of esophageal glands located in tunica muscularis in rabbits [Fig,2,8]. The esophageal glands in dogs scattered randomly and don't form lobules, the septa which separated between these glands appearance as delicate or unclear. The lumen of mucous glands in dogs small size and have alveolar cells in most alveoli were tall and of slender columnar shape [Fig 2,3]. In rabbits, all of mucous gland scattered as form lobules or grapes shape, each lobule disjointed by thick layer of dense regular connective tissue come from upper part of sub-mucosa and enter between alveolar for separate it. Alveolar cells of esophageal glands in rabbits were less tall and smaller lumen than dogs. The esophageal glands in rabbits appear somehow grouped, with a tendency to form lobules separated by connective tissue. The connective

tissue surrounding the glands is penetrated with striated skeletal muscle packs, which derive from tunica muscularis [Fig.5]. The conducting system in both of species had many of characteristic which vary from animal to other. In dogs the secretory units appear elongated with a large lumen dilated, which that the secretion product accumulates in the lumen for a certain period of time. The glands' excretory canals were lined by stratified cuboidal epithelium. They transit tunica muscularis, sub-mucosa then lamina propria and exposed at the outward of the esophageal mucosa [Fig.]. In rabbits, the secretory unit appearance oval - regular in shape and lined by simple cuboidal epithelia [Fig 7, 8].

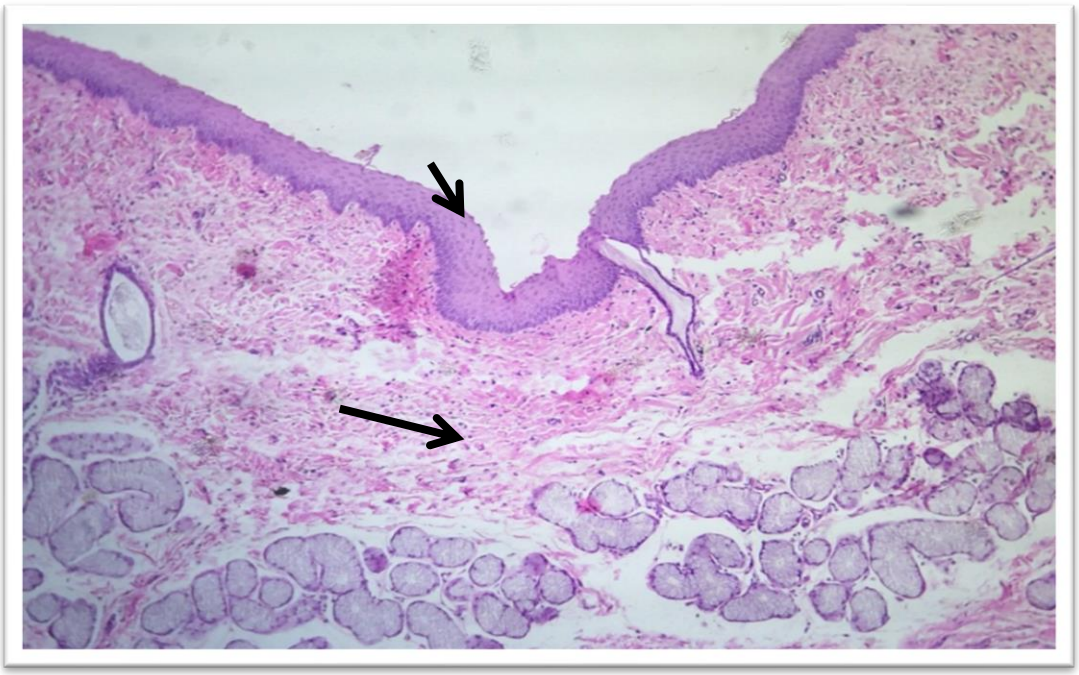

Fig (1) Cross section of Esophagus in dog show mucosa (small arrow), sub-mucosa (large arrow) and esophageal mucous glands (c). Stain H&E, 10X.

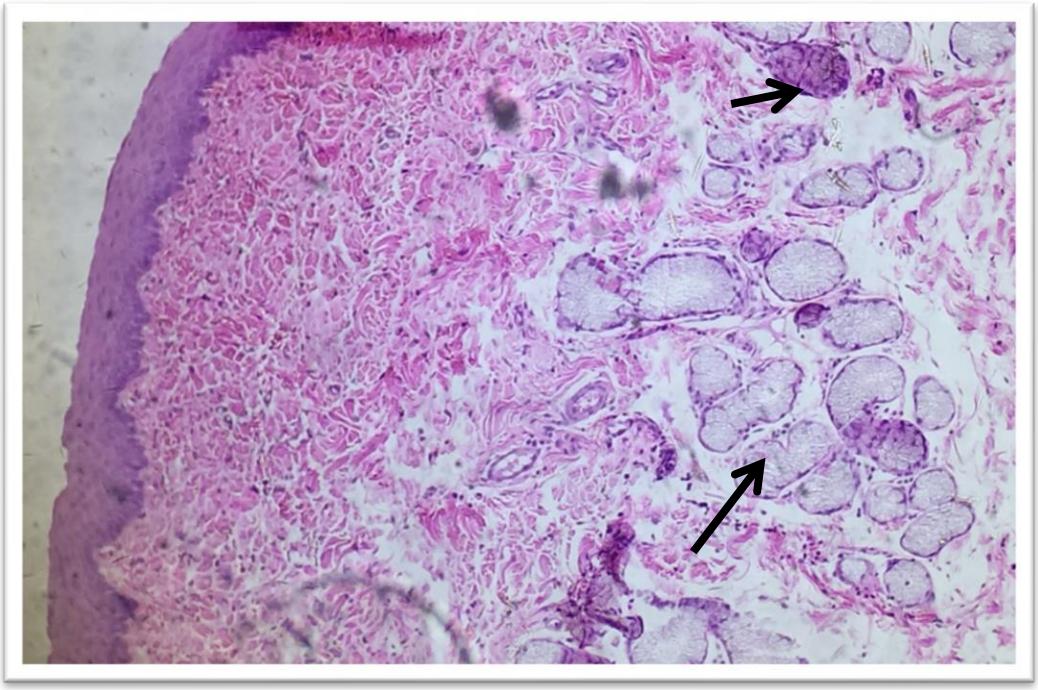

Fig (2) Cross section of Esophagus of dog show serous (small arrow) and mucous gland delicate (large arrows) C.T separating between glands. H&E stain. 10X.

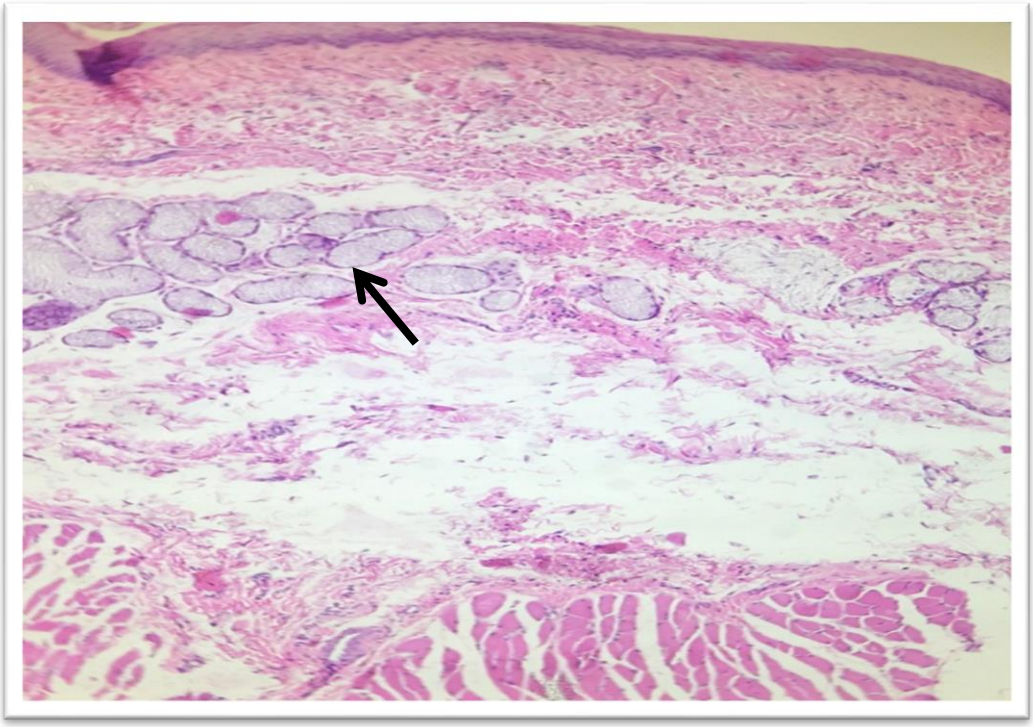

Fig (3) Cross section of Esophagus of dog show all of esophageal glands located in submucosa and mucous glands don't form lobules (arrow).H&E stain,10X

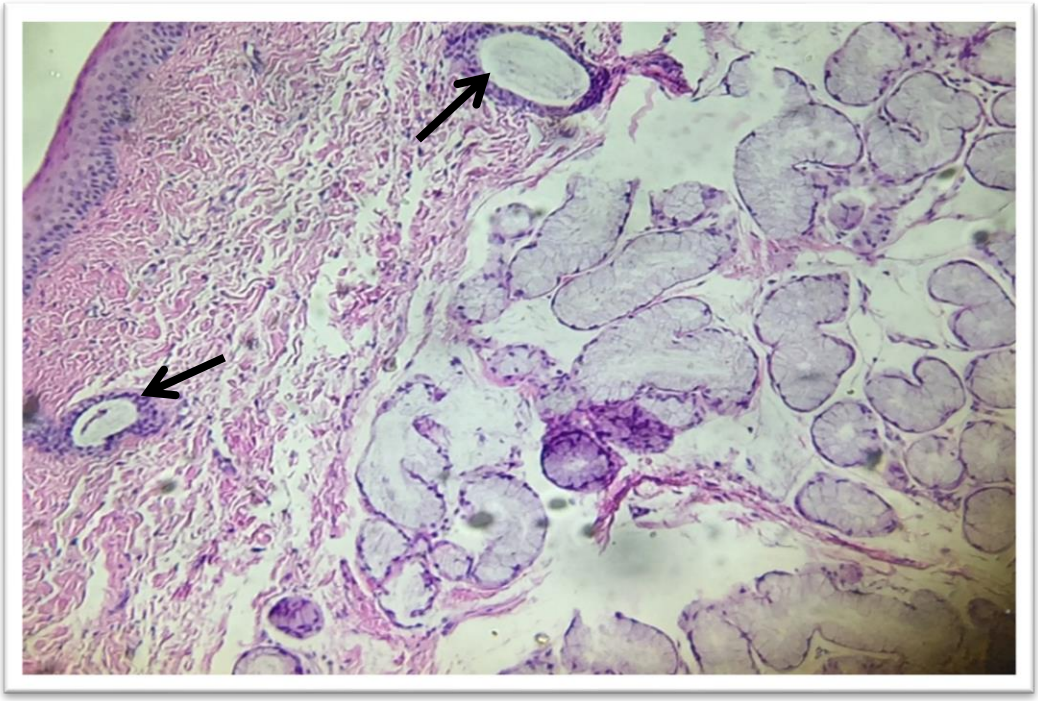

Fig (4) Cross section of Esophagus of dog show excretory duct of esophageal glands lined by stratified cuboidal epithelia (arrows).H&E stain.10X

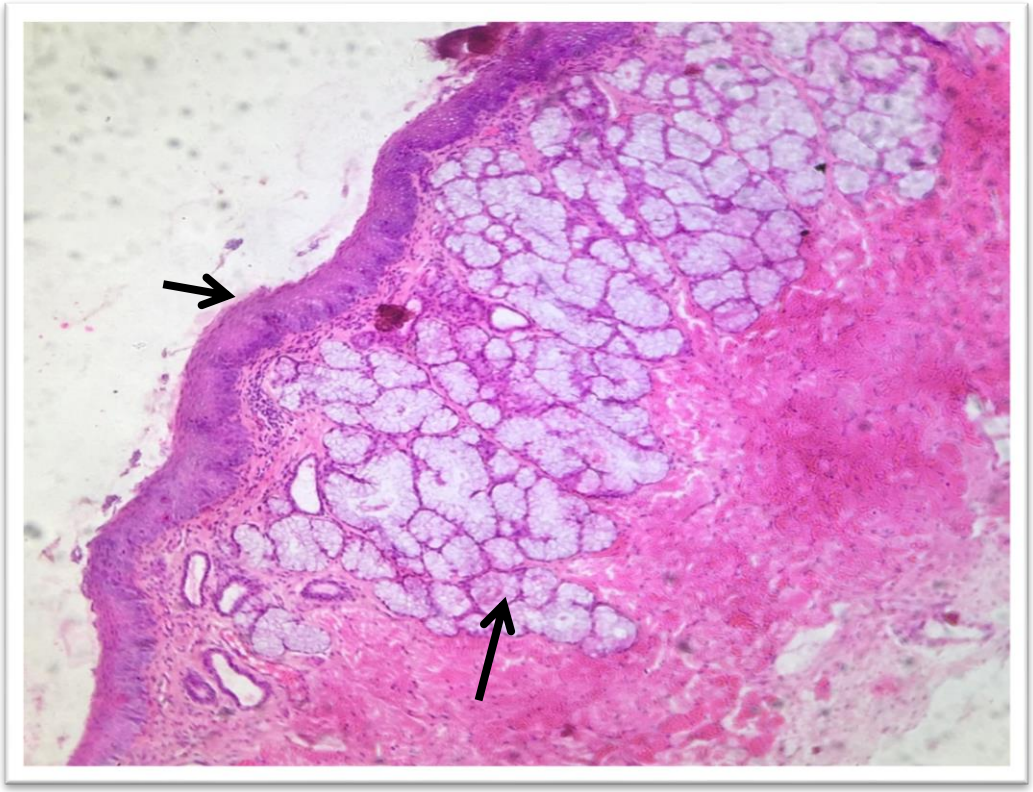

Fig (5) Cross section of Esophagus of rabbits show stratified squamous epithelia non keratinized (small arrow, esophageal glands speared as grapes (large arrow) .H&E stain.10X.

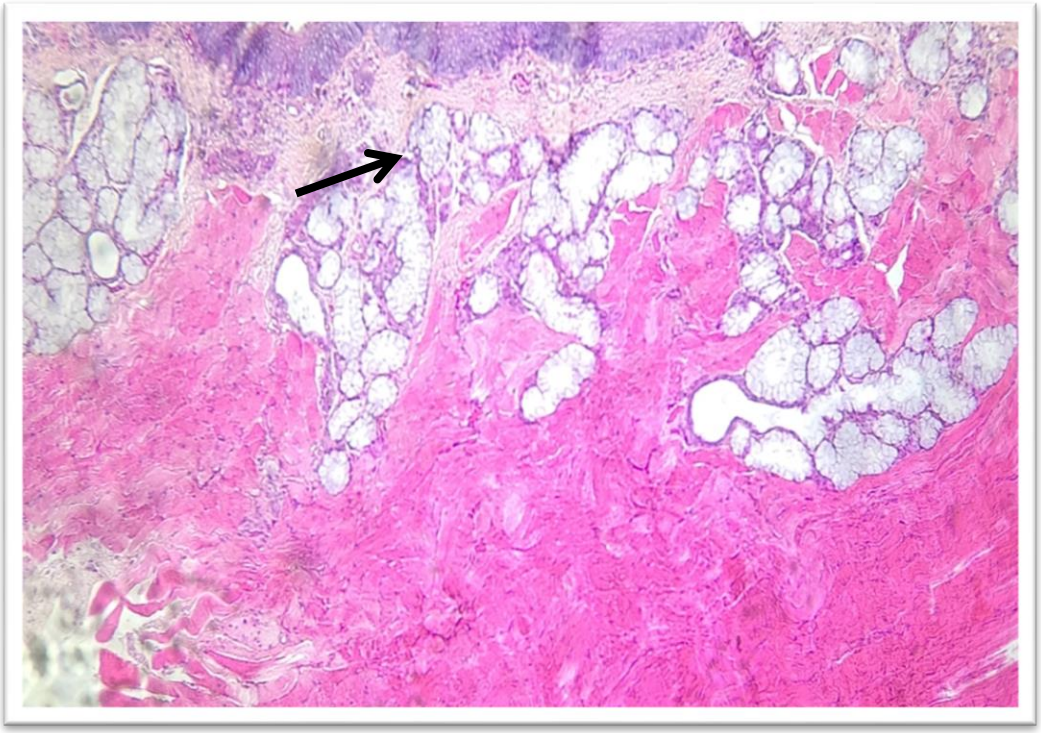

Fig (6) Cross section of Esophagus of rabbit show thin layer dense regular C.T.(arrow) and glands .H&E. 10X.

Fig (7) Cross section of Esophagus of rabbit show thick septa separated esophageal gland (small arrow) and excretory ducts lined by simple cuboidal epithelia (large arrow).H&E.40X

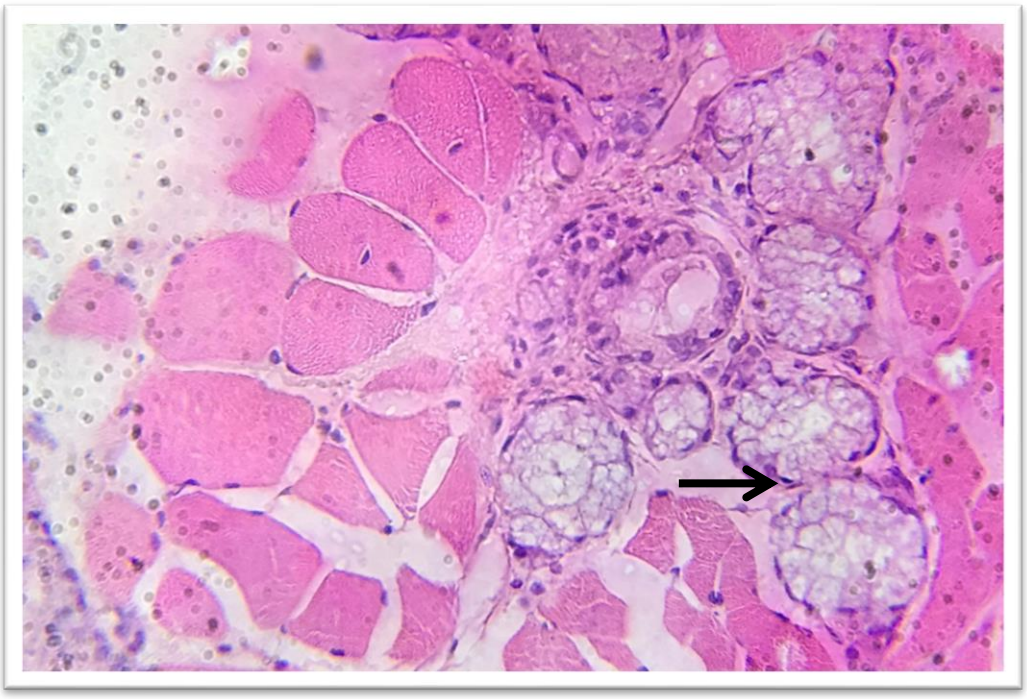

Fig (8) Cross section of Esophagus of rabbit show some of esophageal glands located in tunica muscularis (arrow) .H&E stain.40X.

Discussion

The present study explained there were number of histological characteristics that various between dogs and rabbits, such as shape of mucosa and especially in shape with types of esophageal glands. Also, there were some of specific structures found in carnivores don't found in herbivorous the results in this study agreed with (16), in order to observe the histological differences between the two species. The results of the present work revealed some differences in the structure of the esophagus of both species related to the type of food. The current study showed that the esophagus in dogs lined by stratified squamous epithelial with thin layer of keratin while in esophagus of rabbits was non-keratinized and this disagreed with (16). The current observations revealed that the esophageal glands in dogs irregular in shape and elongated sac like so agreed with (16). also our results revealed that the esophageal glands in rabbits were regular and oval in shape and separated as lobules reach in tunica muscularis and extend between them thick layer of septa which mixture of smooth muscles and collagen fibers, this result may be due to the activity of glands in rabbits because expulsion secretions in glands need more force. The present study demonstrated the presence of the glands in dogs scattered as randomly and don't form lobules, the septa that between glands were very thin and delicate this state indicate the esophageal glands in dogs it's weakly may be the salivary glands in mouth of dogs most important or took great importance and this agreed with (17) who stated that the tissue resistance was a working term that had been applied to all the structural and functional components of the esophageal mucosa that enable it to withstand contact with luminal content, especially acid, without damage. The present study exposed the conducting system in dogs was fewer number than rabbits, lined by two layers of cuboidal cells compare with rabbits ducts lined by single layer of cuboidal we disagreed with (18). Also some of bundles from tunica muscularis reach to submucosa for surrounded esophageal glands and some of glands located in tunica muscularis in rabbits this case was not observed in dogs may be due to give more supporting to glands for empty their secretions.

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