

Research Article

HISTOMORPHOMETRIC STUDIES OF PANCREAS IN CASPIAN GULL

***Zahra Basir¹ and Rahim Abdi²**

¹*Department of basic Science, Faculty of Veterinary Medicine, Shahid Chamran University of Ahvaz*

²*Department of Marine Biology, Faculty of Marine Science, Khorramshahr University of Marine Science and Technology*

**Author for Correspondence*

ABSTRACT

Based on our studies there are many studies about anatomy of the alimentary tract of many other birds but, a little paper has been published about the pancreas of sea gull. Five adult male and female have been coast from Persian Gulf in south of Iran. After weighting, routine procedures of preparation of tissues were followed and the paraffin blocks were cut at 6 microns, stained with H&E and PAS and studied under light microscope. The pancreas of Caspian Gull had three lobes. Most of acini was round to oval in shape with large granules. Ducts in exocrine part had simple to stratified cuboidal epithelium with muscular layer around and without any gland. In dorsal lobe, A islets were more than B islets and in ventral lobe, B islets were more than A islets. B islets were composed of B cells and D cells at the periphery. But A islets were composed of A cells and D cells at the center. The structure of Caspian Gull's pancreas was similar to that of other avian species with minor differences. The results allow the understanding of the particular digestive process of this species.

Keywords: *Histomorphology, Histometric, Pancreas, Caspian Gull*

INTRODUCTION

The Caspian Gull has a long, slender bill, accentuated by the sloping forehead (Collinson *et al.*, 2008; Heubeck *et al.*, 2009). The legs, wings and neck are longer than those of the herring gull. They are scavengers and predators with a very different diet (Eaton *et al.*, 2009). They almost feed fishtrashes but in breeding season they often eat rodents such as ground squirrels, flying some distance into the steppes to find them (Hospitaleche *et al.*, 2009). There are many studies about anatomy of the alimentary tract of many other birds but, a little paper has been published about the pancreas of sea gull. Understanding of the anatomy of the accessory glands of alimentary tract as pancreas of this bird is important, because it is known that anatomical differences can cause significant variation in food absorption from the oral cavity in animals (Ivey and Edger, 2005). Pancreas in avian differs from other animals in being composed of two or more lobes and in containing two islet types (Gulmez, 2003). Researchers reported that there are many species differences in structure of avian pancreas. For example division of lobes, distribution of the islets in lobes, form and frequency of endocrine cells in islets and structure of ducts are the most important differences. The interest in protect and maintain of this bird for better environment is developing (Meyers and Stakebake, 2005). Such studies provide useful information in relation to medical, surgical, propagation and nutritional management of the sea birds in the best mode of procedure (Small, 2000). To the knowledge and literature of the authors, there was no published reports exist describing the normal anatomy and histology of the pancreas in Caspian Gull. Then the present study was undertaken to investigate the histomorphology and histometric of the pancreas in Caspian Gull to provide base line information.

MATERIALS AND METHODS

Five adult male and female, approximately with equal weight were bring from Persian Gulf coast in south of Iran. After examined their healthy clinically, birds were deeply anesthetized by excess ether inhalation. For anatomical studies, birds slaughter. The total length of the entire of alimentary tract was defined as

Research Article

the length of the pancreas. After weighting of pancreases they were washed with distilled water and dissected. The weight and length for males and females were described separately and the data were analysed by Student's *t* test (2-tailed test assuming equal variance) using Microsoft Excel (Microsoft Corporation, USA) to assess sex differences. Specimens were then kept in 10% buffered formalin for 48 hours for next histological examination. Then samples were washed in ethanol 70%, putting them into alcohol series for dehydration and clearing and then embedded in paraffin for histological studies. 5 to 6 μm thick serial sections were cut off with LEICA microtome (RM2245, Germany). Some sections were stained with haematoxylin- eosin and periodic acid schiff for histological examination according to the method Crole and Soley (2010).

RESULTS AND DISCUSSION

Results

In this present study, the Caspian Gull pancreas was found to be located between the duodenal loops and had dorsal, ventral and third lobes. The lobes had different length and width in two sexes Table (1 - 2). There was no splenic lobe in macroscopic investigation. Microscopic examination showed the pancreas was covered with a thin connective tissue which consisted of collagenous fibres and was lined by mesothelium. In paranchima two distinct populations of cells the exocrine cells that secrete enzymes into the digestive tract, and the endocrine cells, type (dark) and type (clear) islets of Langerhans, that secrete hormones into the blood were seen. Exocrine part of pancreas in Caspian Gull, supported by a thin reticular stroma, was composed of acini and numerous ducts. The acini were various forms of round to oval in shape with large granules; they had no centroacinar cell. Their ducts were different sizes with simple to stratified cuboidal epithelium. In exocrine part, endocrine parts were as islets of various sizes and shapes scattered in small groups of cells. B islets were slightly larger and more than A islets. They had no distinct borders with the exocrine parts and were more densely populated .In ventral lobe B islets and in dorsal lobe A islets were more numerous. There were B cell and a few D cells inside the light B islets and there were A cell and a few D cells inside the dark A islets figure (1-5).

Table 1: Average Weight (g) of Pancreas in CASPIAN Gull (Mean \pm SEM)

Gender	Male	Female
Weight	4.23 \pm 0.49	4.67 \pm 0.67

Table 2: Average Measurements (mm) of Pancreas Lobes in Caspian Gull (Mean \pm SEM)

Region	Gender	Length	Width
Dorsal lobe	Male	20.68 \pm 0.60	3.00 \pm 0.57
	Female	21.38 \pm 0.42	2.910 \pm 0.37
Ventral lobe	Male	31.30 \pm 0.84	2.33 \pm 0.68
	Female	33.29 \pm 0.34	3.00 \pm 0.97
Third lobe	Male	10.80 \pm 0.24	4.21 \pm 0.07
	Female	9.30 \pm 0.14	4.11 \pm 0.17

Research Article

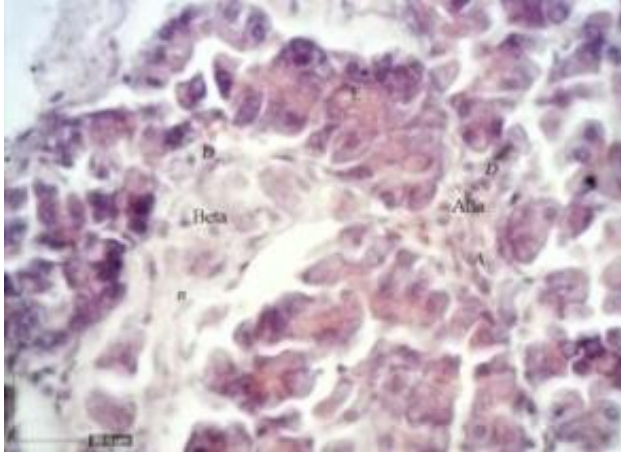


Figure 1: Photomicrograph of the Pancreas in the Caspian Gull. Exocrine Part (E), Beta islet (Beta), Alfa islet (Alfa), B cell (B), A cell (A), D cell (D) (H&E)

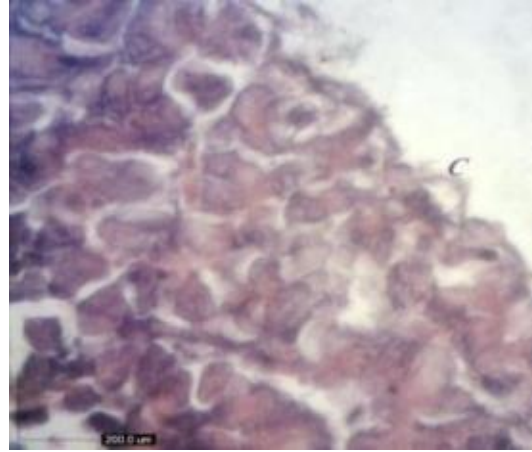


Figure 2: Photomicrograph of the Pancreas in the Caspian Gull. Capsule that Surrounds Tissue Around (C) (H&E)

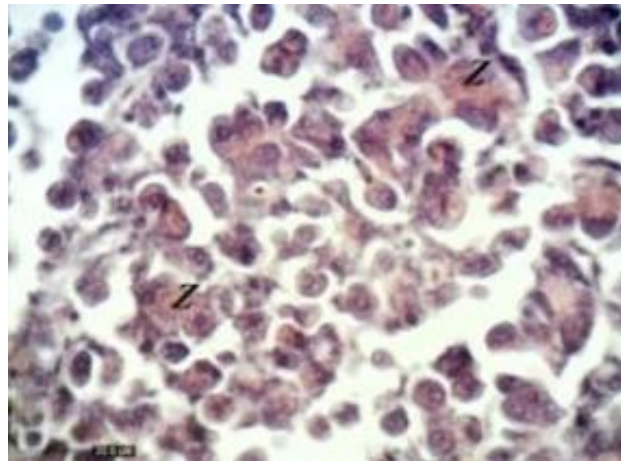


Figure 3: Photomicrograph Showing Zymogen Granules in Exocrine Part (Z) (PAS)

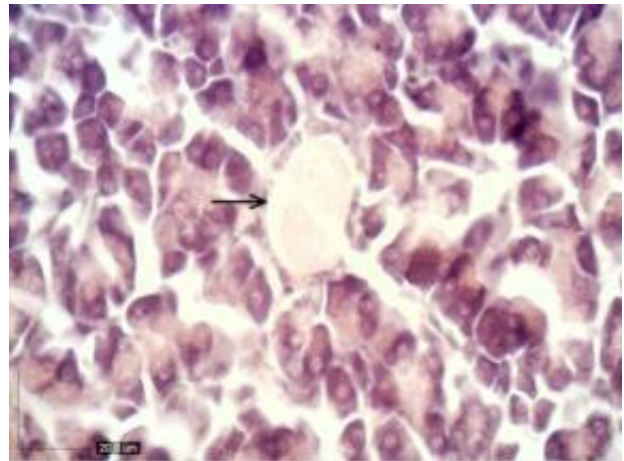


Figure 4: Photomicrograph Showing an Big Inter Lobular Duct with Secretion and Cuboidal Cells in Wall (arrow) (H&E)

Research Article

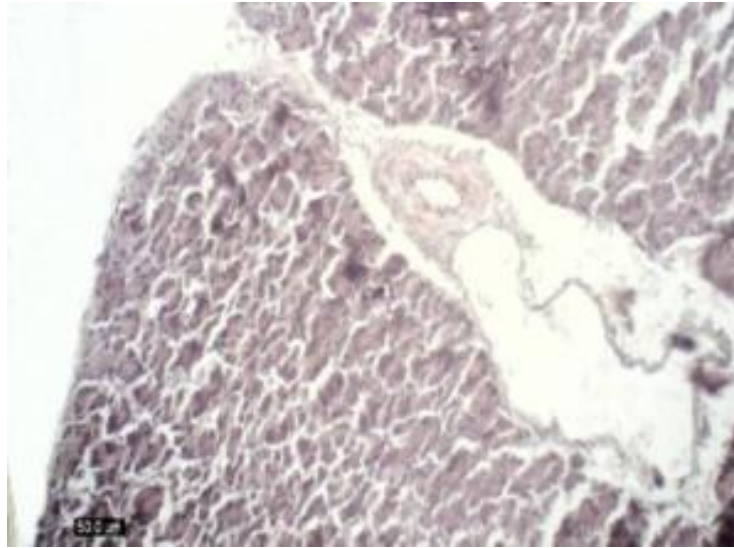


Figure 5: Photomicrograph Showing an Intera Lobular Duct with Smooth Muscle in Around (Arrow) (H&E)

Discussion

This study referred that the pancreas in Caspian Gull was an accessory organ that located in association with duodenum with three lobes, this result agrees with gulmez (2003) that reported that the avian pancreas differs from other animals in being composed of two or more lobes and in containing two islet types. According to the macroscopic observations no splenic lobe was seen in pancreas of Caspian Gull, but other researchers reported this lobe in duck (Mcclish *et al.*, 1969), chicken (Gencer *et al.*, 2007) and goose (Gulmez *et al.*, 2004). In our studies the third lobe in Caspian Gull was a part of the ventral lobe as in chicken (Gencer *et al.*, 2007). Segmentation of pancreas in this birds to two of the exocrine and endocrine part was in accordance with other researchers have done on other species as homer pigeon (Batah, 2009). Also inter and intra-lobular ducts systems with no mucous cells observed in this species has been described by other researchers, such as goose (Gulmez *et al.*, 2004). In study of endocrine and islands system there was some difference and similarity between our finding sand other researchers on other species. For examlle in A islet, A cells were present in all parts of the islet, however many reports illustrate that in avian pancreas these cells are in peripheral region (Mensha- Brown *et al.*, 2000; Gulmez *et al.*, 2004). But this was different for B cells. In B islet B cells, like other avian species (Gulmez *et al.*, 2004; Tarakcy *et al.*, 2005) were demonstrated in the center of the pancreatic islets. We found D cells in histological examination in pancreas in Caspian Gull. D cells in Mynah were also seen in both A and B islets (Gencer *et al.*, 2007). However, we found a few B cells in A islets, but in some avian pancreas there were no B cells in the A islets (Gulmez *et al.*, 2004). In the studied birds in exocrine pancreas, there were no centroacinar cells but they are present in central lumen of acini in some species that reported by Gulmez (2003). The ducts in this sea gull were similar to that observed in previous studies. In addition, many circular smooth muscles were present around it but there wasn't any gland in its wall as in goose pancreatic duct (Pyle *et al.*, 2011). In conclusion the structure of Caspian Gull pancreas was found to be similar to that of other avian species except few minor differences that separated it from other species.

Research Article

REFERENCES

- Batah A (2009).** Histological, Histochemical study for alimentary tract of Homer pigeon. *British Birds* **35** 31-32.
- Collinson J, Parkin D, Knox A, Sangster G and Svensson L (2008).** Species boundaries in the Herring and Lesser Black-backed Gull complex. *British Birds* **101** 340–363.
- Crole M and Soley J (2010).** Gross Morphology of the Intra-Oral rhamphotheca, Oropharynx and Proximal Oesophagus of the Emu, *Dromaius novaehollandiae*. *Anatomy Histology Embryology* **39** 207–218.
- Eaton M, Brown F, Noble D, Musgrove A, Hearn R, Aebischer N, Gibbons D, Evans A and Gregory R (2009).** Birds of Conservation Concern 3: the population status of birds in the United Kingdom, Channel Islands and the Isle of Man. *British Birds* **102** 296–341.
- Gencer B, Yaman M and Bayrakdar A (2007).** Immunohistochemical study on the endocrine cells in the pancreas of the ostrich (*Struthio camelus*). *Journal of Animal Veterinary Advances* **6** 693-696.
- Gulmez N (2003).** Are glands present in goose pancreatic ducts? A light microscope study. *Pancreas* **4**(3) 125-128.
- Gulmez N, Kokamis H, Alsan S and Nazli M (2004).** Immunohistochemical distribution of cells containing insulin, glucagon and somastatin in the goose (*Anser anser*) pancreas. *Turkish Journal of Veterinary* **28** 403-407.
- Heubeck M, Meek E, Mellor R and Wilson M (2009).** Numbers of Atlantic Puffins *Fratercula arctica* found on beached bird surveys in Orkney and Shetland over a 30-year period. *Seabird* **22** 19–35.
- Hospitaleche C, Montalti D and Marti J (2009).** Skeletal morphoanatomy of the Brown Skua *Stercorarius antarcticus lonnbergi* and the South Polar Skua *Stercorarius maccormicki*. *Polar Biology* **32** 759–774.
- Ivey W and Edger S (2005).** The histogenesis of the esophagus and crop of chicken, turkey, guinea fowl, and pigeon, with special reference to ciliated. *The Anatomical Record*. Article first published on lin.3FB Doi: 10.1002 or 1091140207.
- McClish R and Eglitis J (1969).** Distribution of the A and B cells and of the islets (Langerhans) in the Duck Pancreas. *Ohio Journal of Science* **69**(5) 285-293.
- Mensah-Brown E, Bailey T, Pallot D and Garner A (2000).** Peptidergic hormones and neuropeptides and aminergic neurotransmitters of the pancreatic islets of the Houbara bustard, (*Chlamydotis undulate*). *Journal of Anatomy* **196** 233-241.
- Meyers R and Stakebake E (2005).** Anatomy and Histochemistry of Spread-Wing Posture in Birds, 3 Immunohistochemistry of Flight Muscles and the "Shoulder Lock" in Albatrosses. *Journal of Morphology* **263** 12-29.
- Pyle P, Welch A and Fleischer R (2011).** A new species of Shearwater (*Puffinus*) recorded from Midway Atoll, Northwestern Hawaiian Islands. *Condor* **113**(3) 518-527.
- Small B (2000).** Caspian Gull *Larus cachinnans* in Suffolk identification and status. *Suffolk Birds* **49** 12–21.
- Tarakcy G, Yaman M, Bayrakdar A and Atlar O (2005).** Immunohistochemical detection of gonadotropin-releasing hormone (GnRH) in porcupine (*Hystricxristata*) pancreas. *Journal of Animal Veterinary* **8** 747-749.