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Histological study of pancreas gland in falcon (*Falco peregrinus*)

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Abstract

The objective of this investigation was to study the histologicalcal structure of the pancreas on six pairs adult's (six male and six female) of falcon (*Falco peregrinus*),tissue section's were stained with haematoxylin and eosin, the capsule composed of loose connective tissue surrounded the whole gland. The gland's parenchyma was consisted of large area of exocrine secretory acini and small area of endocrine portion (Islets of Langerhans), The acini of exocrine portion composed of acinus cells and ductal cells, intercalated duct connected to the centro-acinar cells inside the acini opened to the intralobular duct, interlobular duct, and main ducts (pancreatic duct) respectively, which lined by simple to stratified columnar, externally surrounded by circular smooth muscle covered by connective tissue. The pancreatic islets were composed of large (Alpha and small Beta) islets each are surrounded by a network of fibers. Blood vessels, ducts, and aggregation of lymphatic tissue, and nerve ganglia were dispersed between Islets of Langerhans. No clear boundaries between the Islets of Langerhans and exocrine portion. In conclusion the histological structure of falcon (*Falco peregrinus*) pancreas was found to be similar to that of other avian species

Key words: Pancreas, Histological, falcon, *Falco peregrinus*

INTRODUCTION

Histological properties of pancreas which is the most important mixed gland connected to the gastrointestinal tract[1,2] were examined in different bird species such as duck [3,4] eagle [5], ostrich [6,7] , Coturnix quail [8,9], goose [10-16], turkey [17], pigeon[1,18, 19], falcon [20], Hobart bustard [21] and red jungle fowl[22, 23].

The pancreas in all birds, was situated on the right side of the abdominal cavity [24], in chicken, and quail is considered to compose the ventral lobe , dorsal lobe, third lobe and splenic lobe, ventral duct, dorsal duct. However, the presence of an additional third duct was found in some bird species [25], the pancreas includes two parts, the endocrine which responsible for produces some hormones like insulin, glucagon, and somatostatin which organize blood sugar [26]. Moreover,the the endocrine divided to two types of islets; the large alpha islets, consisting mostly of alpha (glucagon) and delta (somatostatin) cells, the beta islets, containing beta (insulin) and delta (somatostatin) cells [27,28].The exocrine forms the main part of the pancreatic mass, consists of the acinar cellular that secretes basic electrolytes and digestive enzymes [1], and the ductal cellular [29, 30].

Pancreatic ducts empty their contents by intercalated ducts, intralobular ducts, interlobar ducts, and pancreatic ducts (main ducts) from the acinus into the duodenum [31].

In poultry, The wall of pancreatic ducts consists of three layers: from inside the mucosa, is composed of the epithelialis, that have high columnar epithelial cells, and the lamina propria, consisting of connective tissue, this is surrounded by a muscular layer that is arranged inside circularly and the outside longitudinally. Externally, the adventitial layer surrounds the duct [32]. The *Falco peregrinus* was not study in iraq,so the aim of study was to present the histological structure features of the pancreas of it.

MATERIALS AND METHODS

The study was conducted on adult's six pairs (six male and six female) clinically healthy adult falcon (*Falco peregrinus*) were used to determine the histological structures of the pancreas. The birds were deeply anaesthetized using excess ether inhalation. The pancreas were removed from the donors, washed in normal saline and the tissue pieces of 1 cm thickness were fixed immediately in 10% buffered formalin solution for 24 h and processed for embedding in paraffin. Tissue blocks were cut by a rotary microtome into 6 µm sections. The sections were stained with hematoxyline and eosin, histological studies on these sections were carried out using light microscopy, the processing and staining methods were done according to [33].

RESULTS AND DISCUSSION

The current histological study under the light microscope for the pancreas of the falcon (*Falco peregrinus*), showed, the capsule (Fig. 1) which composed of loose connective tissue surrounded the whole gland, consist of collagenous fiber, elastic fiber and reticular fiber , a single layer of mesothelium enclosed it these results are in line with the finding of [3] in duck and [11] in goose.

The Parenchyma of pancreas is divided into Lobules by septa, its fascicles of fiber, which extend into pancreatic from the connective tissue of capsule, this findings in agreement with that found in pancreas of ostrich [6,7], goose [11-16] and turkey [17].

The tissue of pancreas indicated that the exocrine portion occupied larger area in comparison with that of the endocrine portion(Fig.2; Fig.B&C), this study in agrees with the results of previous studies [7- 16, 34-36]. Each exocrine secretory portion (Exocrine secretory acini) and endocrine portion (Islets of Langehans) are surrounded by a network of fibers(Fig2.B&C), which in similar to that showed in pigeon [1], duck[3] and eagle [5]

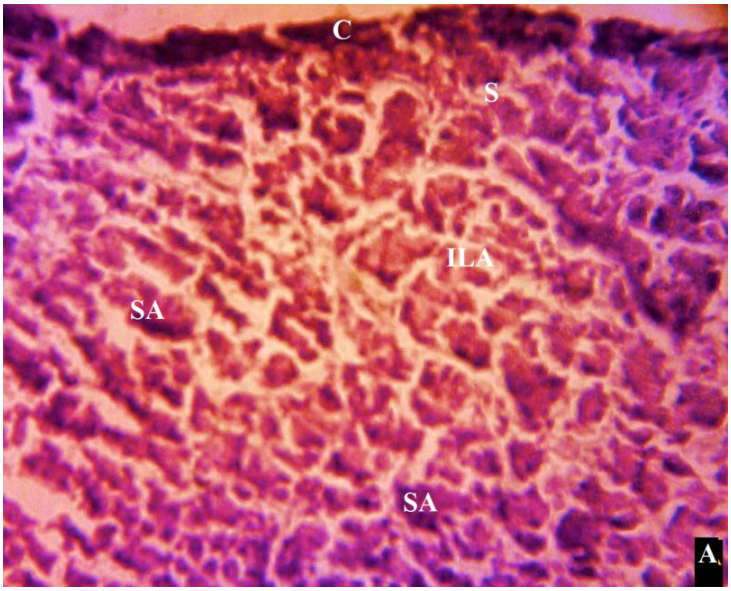

Fig1:A cross section in pancreas Falco peregrinus, showing onnective tissue capsule (C), serous acini (SA),also septa (s) between the lobules , and the islets of langherhans A (ILA)

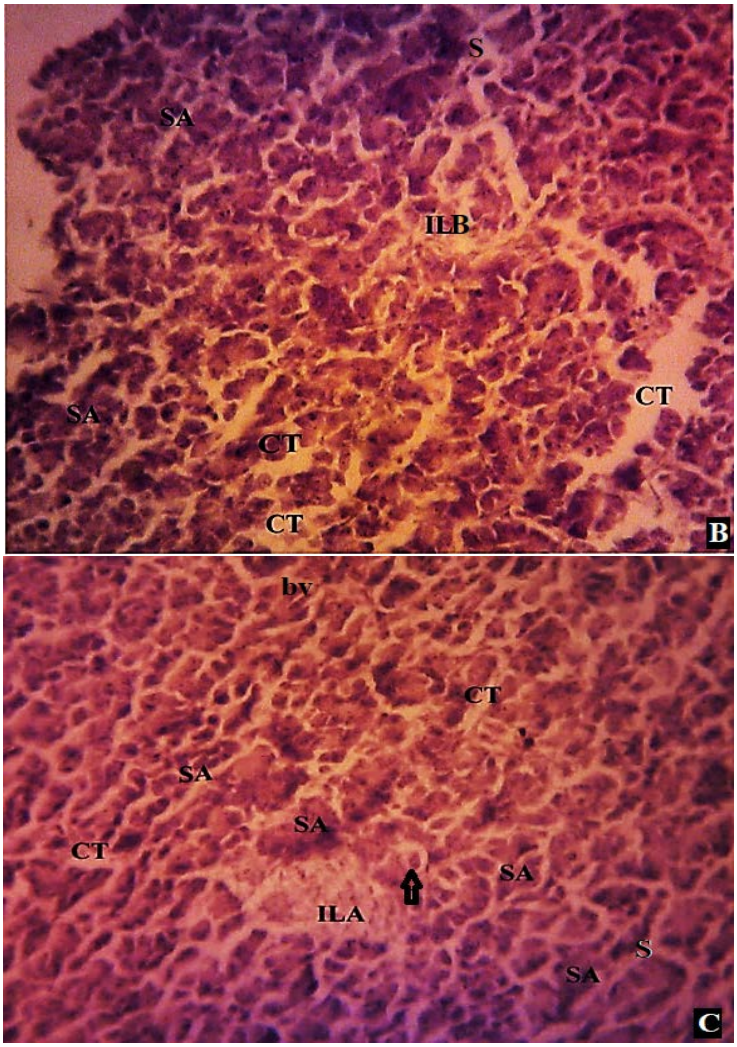

Fig 2:B &C- cross section in pancreas (Falco peregrinus), showing connective tissue capsule of septa (s) between the lobules , and the islets of langherhansA (ILA) & islets of langherhans B (ILB)

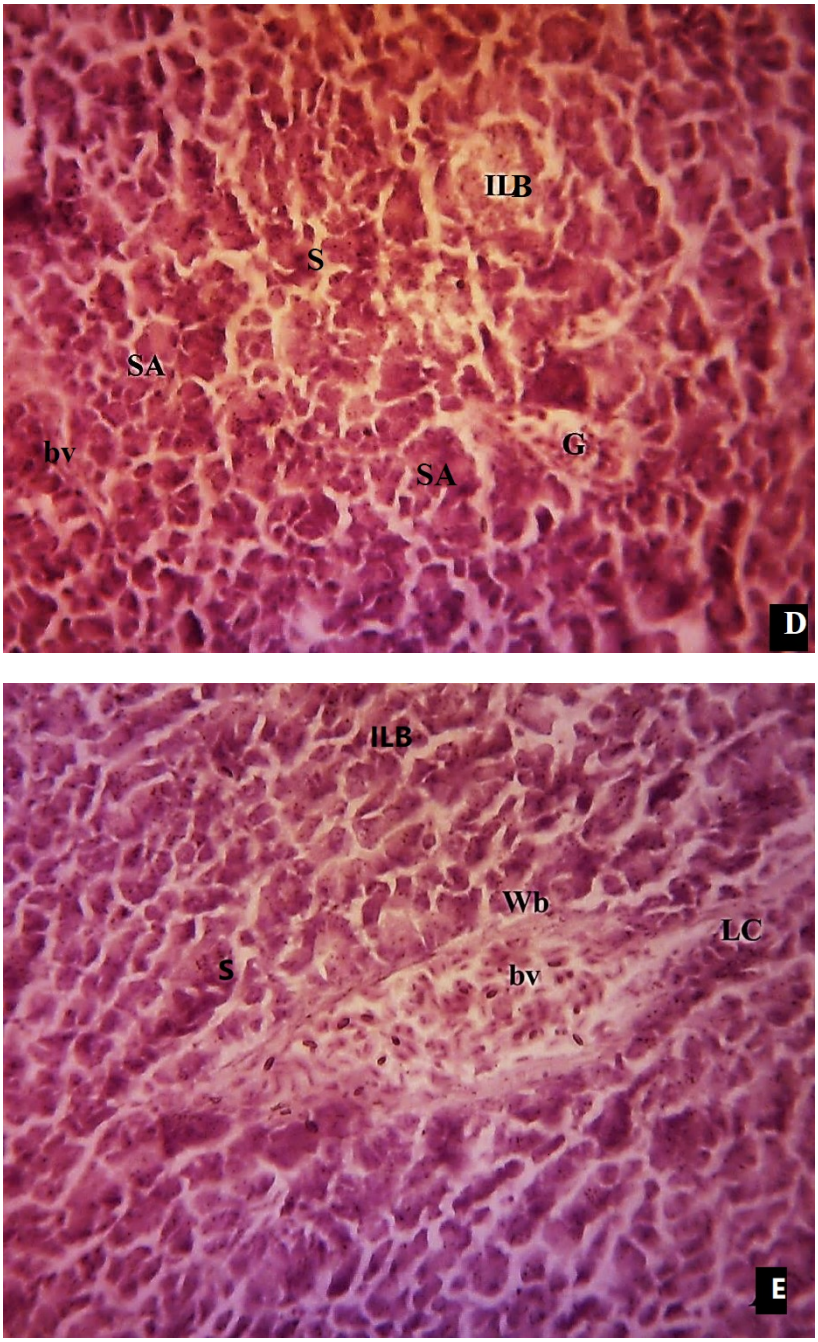

Fig3:D &E- cross section in pancreas (Falco peregrinus), , the islets of langherhansB (ILB) ,alsothe blood vessels (bv) and leucocyte (LC)

The alkaline secretion of acini cells staining with basic dyes where the apical portion containing of acidophilic zymogen. Acini of exocrine portion in pancreas of *Falco peregrinus* clarifies tubulo-acinr gland , each acinus composed of pyramidal cells, although the cells can be varies from triangular to columnar depending on plane sections this results in line with that reported, columnar in goose[11-16], fowl [22, 23], and polygonal in duck [3, 4]

Intercalated duct connected to the Centro-acinar cells opened to the interlobular duct which lined by simple to stratified columnar, externally surrounded by circular smooth muscle covered by connective tissue. Blood vessels and ducts and aggregation of lymphatic tissue can be viewed in cross section of parenchyma. (Fig3.D&E), The Islets of Langehans demonstrated different shapes and sizes spreading among exocrine portion and almost no clear boundaries between the Islets of Langehans and exocrine portion (Fig.3), this findings was agreements to that found in Guinea fowl and Common gull [33], goose pancreas [12-14], duck[3,4] and goose.[11, 14].

In this study, the islets were found to be of two types; the large alpha islets (ILA)and the beta islets (ILB)(Fig.B&C), these finding in agreement with previous studies [33-36].

THE CONCLUSION

In conclusion the histological structure of falcon (*Falco peregrinus*) pancreas was found to be similar to that of other avian species.

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