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Histochemical studies on pancreas of domestic animals

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Abstract

The pancreas is a unique and composite digestive gland consisting of exocrine part of acini and endocrine part of islets of Langerhans. Histochemical study revealed that pancreas showed a mild activity for neutral mucopolysaccharides in the capsule of pancreas in buffalo, dog and pig. A strong activity for the same was noted in the epithelial cells of ducts i.e intercalated, intralobular and interlobular ducts in buffalo, sheep, goat, dog and pig. The activity of alkaline phosphatase was strong in the acini, around the islets and endothelium of blood vessels. But a mild to moderate activity was observed in the islet cells of pancreas in buffalo, sheep, goat, dog and pig. Acid phosphatase activity was strong in the islets of Langerhans, with a moderate activity in the interlobular septa and its activity was not seen in the acini of pancreas of buffalo, sheep, goat, dog and pig.

Keywords: Pancreas, histochemistry, domestic animals

Introduction

The pancreas is consists of both exocrine and endocrine parts. The exocrine portion secrete digestive enzymes and the endocrine portion i.e islets of Langerhans is responsible for the synthesis of regulatory hormones such as insulin and glucagon. The parenchyma of pancreas is divided into distinct lobes and lobules by a connective tissue septa and each lobule is consisted of several secretory units called 'acini' and various sizes of ducts viz., intercalated, intralobular, interlobular and main pancreatic ducts in domestic animals (Dellmann and Eurell, 1998) [2]. The acini contained a small lumen and were lined by pyramidal cells with spherical nucleus at the basal region. The exocrine component was far larger in domestic animals (Nickel *et al.* 1979, Dellmann and Eurell, (1998) [7, 2] and Konig and Leibich (2004) [6]. But literature is scanty in pancreas of domestic animals. Therefore present study was undertaken to see comparative histochemical reactions on pancreas of domestic animals

Materials and Methods

A total of 15 adult buffalo, 19 sheep, 18 goats, 9 dogs and 17 pigs of either sex were utilised for present study. The tissue samples of pancreas were collected immediately after their slaughter at municipal slaughter house, Proddatur and Tirupati whereas pancreas of pigs were collected from AICRP on pigs, Tirupati and pancreas of dog were collected under willed animal body programme from Veterinary Clinical Complex, College of Veterinary Science, Proddatur and Tirupati. The tissue samples of pancreas were taken at different regions of pancreas i.e body, right lobe and left lobe. Then the tissue samples were fixed in 10 % Neutral buffered formalin and Bouin's fluid. The fixed tissues were subjected to routine tissue processing and paraffin blocks and sections of 4-5µm thickness and the sections were stained subjected to routine as well as special histological staining methods (Bancroft and Gamble, 2008) [1].

Results and Discussion

Histochemical study revealed the following features in the pancreas of buffalo, sheep, goat, dog and pig. The pancreas showed a mild reaction for neutral mucopolysaccharides in the capsule of pancreas in buffalo, dog and pig, whereas, moderate reaction was observed in sheep and goat. Contrary to this Rohankar *et al.* (2005) [8] reported intense PAS activity in parenchyma of pancreas in sheep. There was a mild reaction was noticed for neutral mucopolysaccharide in intralobular, interlobular septa as well as in the blood vessels and around the acini of the pancreas in buffalo, sheep, goat, dog and pig. It is contrary to Rohankar *et al.* (2005) [8] reported the intensive PAS activity in parenchyma of pancreas in sheep.

Whereas, Swetha *et al.* (2015) ^[9] noted the absence of mucopolysaccharides in acinar cells in group I i.e 44 to 55 days of gestation and a mild reaction was noticed in acinar cells at 56 to 76 days of gestation in sheep foetus but a moderate reaction was noticed in group II at 80 to 90 days of gestation and group III at 122 days of gestation, while Gupta *et al.* (2017) ^[4] observed weak activity for neutral mucopolysaccharides in acinar cells in group I, whereas moderate to strong reactions in group II and group III in pancreas of prenatal buffalo.

A strong reaction was noted in the epithelial cells of ducts i.e intercalated, intralobular and interlobular ducts in buffalo (Fig: 1), sheep (Fig: 2), goat (Fig: 3), dog and pig (Fig: 4). It is inconformity with the findings of Rohankar *et al.* (2005) ^[8] in sheep and Dhoolappa *et al.* (2005) ^[3] in Indian donkeys. There was no evidence of the PAS reaction in the islets of pancreas of buffalo and sheep but moderate reaction was observed around the islet in goat, dog and pig. The intralobular and interlobular ducts in pancreas of buffalo, sheep, goat, dog and pig showed the intense activity for acid mucopolysaccharides in epithelium of ducts (Fig: 5), but acid mucopolysaccharides were completely absent in the acini and islets of Langerhans as noted by Dhoolappa *et al.* (2005) ^[3] in Indian donkey.

The activity of alkaline phosphatase was strong in the acini, around the islets and endothelium of blood vessels (Fig: 6). But a mild to moderate activity was observed in the islet cells of pancreas in buffalo, sheep, goat, dog and pig. It is in agreement with the findings of Gupta *et al.* (2017) ^[4] in buffalo foetuses and Singh *et al.* (2017) ^[11] in islet cells, acinar cells, stromal tissue and wall of blood vessels in pancreas of buffalo.

The activity of acid phosphatase was strong in the islets of Langerhans (Fig: 7), while, moderate activity was noted in the interlobular septa and its activity was not seen in the acini of pancreas of buffalo, sheep, goat, dog and pig. Contrary to the present observation, Singh and Gupta (1999) ^[10] noticed the acid phosphatase activity in the wall and luminal borders of pancreas in buffaloes. Further, Gupta *et al.* (2017) ^[4] in buffalo foetuses and Iniyah *et al.* (2018) ^[5] in pancreas of pigs reported a variable activity of acid phosphatase.

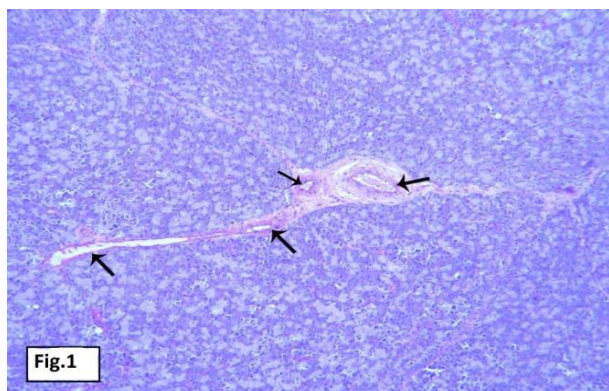


Fig 1: Photomicrograph showing intense PAS activity in epithelium of intralobular duct of exocrine pancreas of buffalo.

PAS x 100

Black arrow – PAS activity

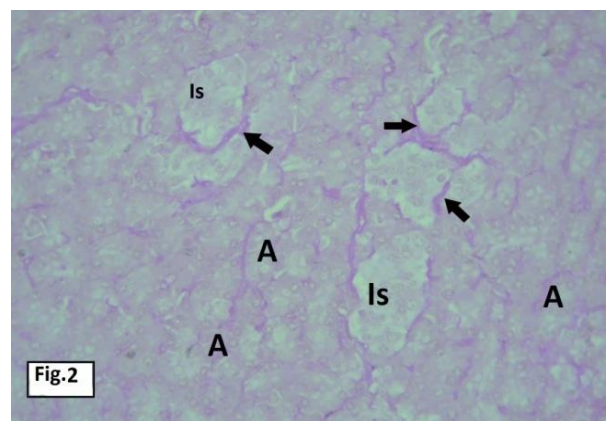


Fig 2: Photomicrograph showing intense PAS activity around the islet of Langerhans in endocrine pancreas of goat.

PAS x 400

Black arrow – PAS activity around the islet of Langerhans

A-Acini

Is- islet of Langerhans

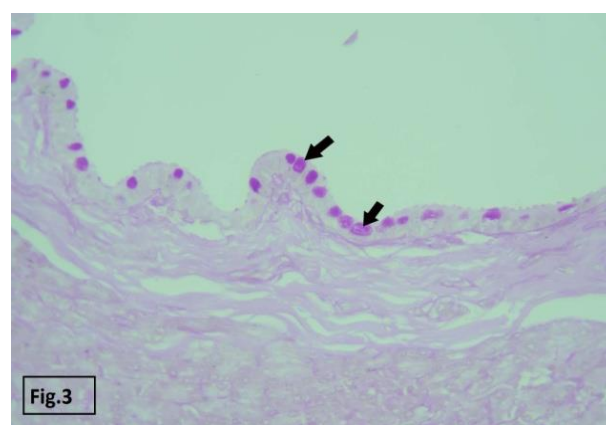


Fig 3: Photomicrograph showing intense PAS activity in epithelium of interlobular duct of exocrine pancreas of goat.

PAS x 400

Black arrow – PAS activity

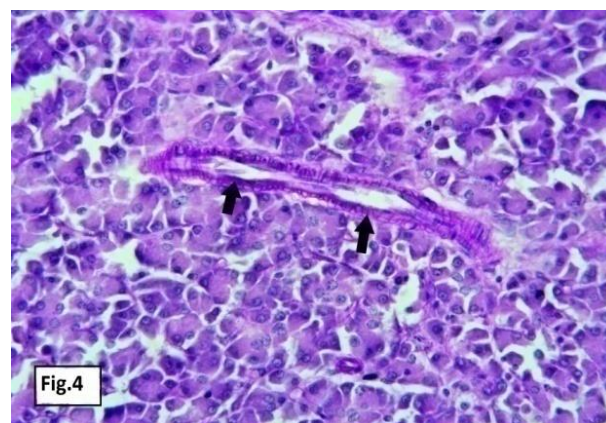


Fig 4: Photomicrograph showing intense PAS activity in epithelium of intralobular duct of exocrine pancreas of pig.

PAS x 400

Black arrow – PAS activity

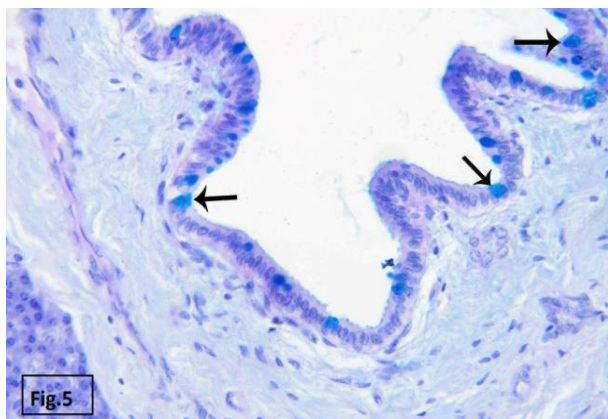


Fig 5: Photomicrograph showing intense PAS-AB activity in epithelium of interlobular duct of exocrine pancreas of goat.
PAS x 400
Black arrow – PAS-AB activity

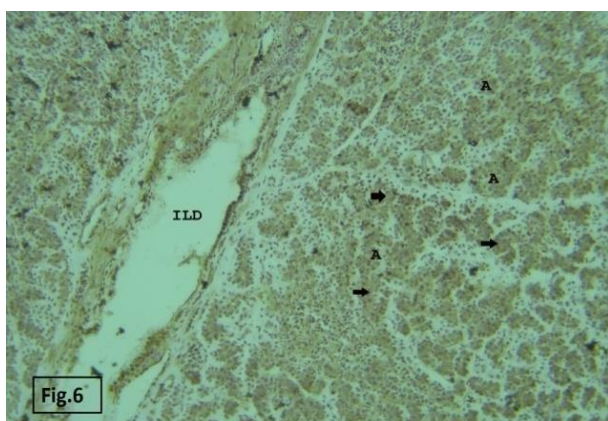


Fig 6: Photomicrograph showing alkaline phosphatase activity in epithelium of Interlobular duct and acini of goat.
Alkaline phosphatase x 100
Black arrow –Alkaline phosphatase activity
ILD- Interlobular duct

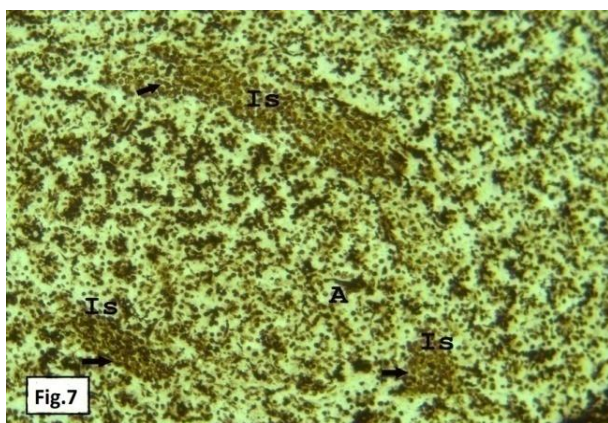


Fig 7: Photomicrograph showing acid phosphatase activity in the islet of Langerhans of pancreas of dog.
Acid phosphatase x 100
Black arrow –Acid phosphatase activity

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