



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; SPI: 1711-1713

Dr. K Balasundaram
Department of Veterinary
Anatomy Veterinary College and
Research Institute, Namakkal,
Tamil Nadu, India

Histomorphology of Pancreas in Goats

Dr. K Balasundaram

Abstract

The pancreas as whole was collected from the fresh carcass of goat slaughtered in Namakkal. The complete pancreas was separated from the surrounding organs by careful blunt dissection and washed with normal saline and fixed in Neutral buffered formalin (NBF). The exocrine portion consisted of numerous dark-staining acini composed of tubular and spherical masses of cells, which were the subunits of the lobule. The endocrine part of pancreas appeared as lightly stained clusters of cells among the darkly stained acini. All the islets of Langerhans were surrounded by sparse collagen and reticulin fibres.

Keywords: Histomorphology, Pancreas, Goats

Introduction

Pancreas of mammals is a unique gland as it consists of both exocrine and endocrine portions. The exocrine portion of pancreas which contributes 95% of pancreatic mass, secretes digestive enzymes into the duodenum and it includes acinar and duct cells with associated connective tissue, vessels and nerves. The endocrine portion of pancreas contributes 1-2% of pancreatic mass and it synthesizes insulin, glucagon, and somatostatin and pancreatic polypeptide. The present study was undertaken to reveal the histomorphology of pancreas in goats.

Materials and Methods

The pancreas as whole was collected from the fresh carcass of goat slaughtered in Namakkal. The complete pancreas was separated from the surrounding organs by careful blunt dissection and washed with normal saline and fixed in Neutral buffered formalin (NBF). Pancreas was collected from 10 numbers of adult goats.

The tissue pieces of 2mm³ was collected and processed for histological and histochemical methods. Sections of 5 micron thickness were made and stained with haematoxylin and eosin for studying the histoarchitecture of exocrine and endocrine parts of the goat pancreas. Few other sections were treated with special stains to demonstrate the alpha, beta and delta cells in the islets of Langerhans.

The alpha, beta and delta cells in each Islet were counted. The histomorphology of pancreatic acini (Exocrine part) was studied.

Results and Discussion

The histological structure of the pancreas was first described in 1869 by Langerhans (Motta *et al.* 1997). Shortly thereafter, Heidenhain characterized the periodic postprandial changes that occurred in the histology of the canine pancreas who concluded that the granules in the pancreatic acinar cells contained the precursors of the digestive enzymes (Hans *et al.* 2008).

The present micro-anatomical study of pancreas in goats revealed that pancreas was a compound tubule acinar gland containing both exocrine (about 80%) and endocrine (about 20%) units as described by Dell Mann (1993)

In accordance with the observations of Ganguli and Prasad (1995), the goat pancreas was surrounded by fine connective tissue (Figure 1) but does not have a fibrous tissue capsule. The lobules are visible on gross examination and are connected by connective tissue septa that contained the blood vessels, nerves, lymphatics, and excretory ducts.

The endocrine portion consisted of the islets of Langerhans, which were spherical clusters of light-staining cells scattered throughout the pancreas (Banks, 1981).

The Exocrine Part

The exocrine portion consisted of numerous dark-staining acini composed of tubular and spherical masses of cells, which were the subunits of the lobule (Leeson and Leeson, 1976).

The lumen of the acinus was the origin of the secretory duct and contained centroacinar cells (Figure 2) which are unique to the pancreas. These cells were pale staining in histologic

Correspondence

Dr. K Balasundaram
Department of Veterinary
Anatomy Veterinary College and
Research Institute, Namakkal,
Tamil Nadu, India

sections and smaller than the acinar cells (Malik and Prakash, 1972).

The lumen of the acinus was continued by intra lobular ducts (Figure 3), which were covered by low columnar epithelial cells. These ducts were none striated and anastomosed to form the interlobular ducts, which were lined by columnar epithelium and few goblet cells (Elizabeth and Fredric, 2001). The interlobular ducts fused to form the main pancreatic duct. The larger ducts had thick wall consisting of connective tissue and elastic fibers (Banks, 1981).

Acinar cells were tall, pyramidal or columnar epithelial cells, with their broad bases on a basal lamina and their apices converged on a central lumen (Malik and Prakash, 1972). In the resting state, numerous eosinophilic zymogen granules filled the apical portion of the cell (Figure 4). The basal portion of the cells contained one or two centrally located, spherical nuclei and extremely basophilic cytoplasm (Dell Mann and Brown, 1976).

The Golgi complex was located between the nucleus and zymogen granules and was seen as a clear, non-staining region (Leeson and Leeson, 1976). The nucleus was spherical, with one or more nucleoli (Banks, 1981).

There was a thin basal lamina along the basal surface of the acinar cells, below which were collagen fibers and capillary network Meshram *et al.* (2001).

The Endocrine Part

The present study indicated that the islets were distributed along the periphery of pancreatic lobes, adjacent to interlobular connective tissue in the vicinity of blood capillaries. The islets were found abundantly in the caudal portion of the gland. These findings were in line with that of Bloom and Fawcett (1968), Copen haver and Duglus (1975) in human, Vijay araghavan and Mariappa (1976) in buffaloes and Meshram *et al.* (2001) in caprines.

Bloom and Fawcett (1968), found that there was about one million islets of Langerhans in the human pancreas and each islet was made of anastomosing cords of polygonal endocrine cells.

According to Copen haver and Duglus (1975) each islet in human pancreas was about 0.2 mm in diameter, much larger than an acinus, and separated from the surrounding exocrine tissue by fine connective tissue fibers, which were continuous with those of the exocrine gland.

Spherical or oval shaped islets were found to be intermingled with exocrine pancreatic tissues as reported by Dell Mann and Brown in 1976. The islet cells were arranged in irregular anastomosing cords composed of five different cell types A, B, C, D, and F cells. The alpha cells constituted 25% and beta cells constituted 70%. Of the total islet population.

The chrome alum haematoxylin phloxin stain demonstrated the alpha cells as pink and beta cells as blue coloured cells (Figure 5). The alpha cells were smaller than the beta and delta cells. Beta cells were more in number than alpha and delta cells. Beta cells were located at center of the islet while alpha and delta cells were located at periphery as observed by Meshram *et al.* (2001) in caprine.

The capsule of the Islets was well organized and consisted of collagen, elastic and reticular fibers. It also contained blood vessels and nerves. The similar findings had been reported by Banks (1981) in dogs, Ladukar and Bhamburkar (1994) in layers and broilers and Ganguli and Prasad (1995) in goats. However Ali *et al.* (1991) did not find such evidences of connective tissue surrounding the isolated islets in ultrathin sections of bovines.

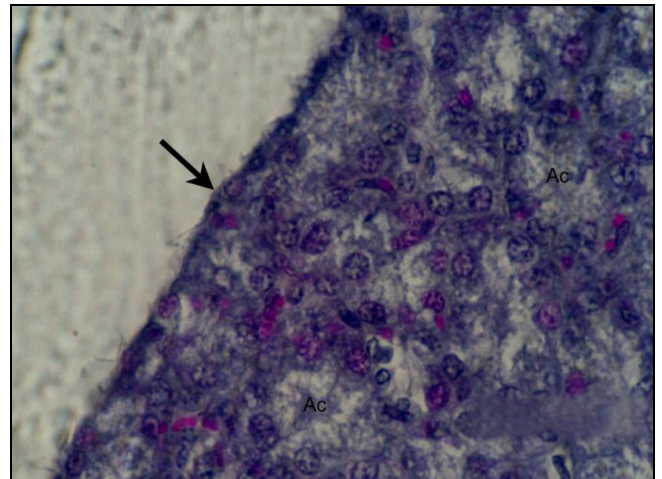


Fig 1: Photomicrograph of Goat Pancreas Showing Capsule (Arrow) and Acini (Ac) H&E x1000

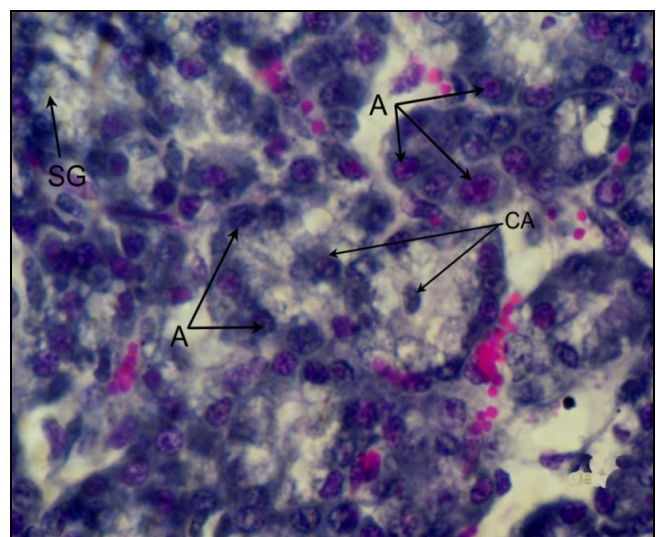


Fig 2: Photomicrograph of Goat Pancreas Showing Acinar Cells (A), Centroacinar Cells (Ca) and Secretory Granules (Sg) H&E X 1000

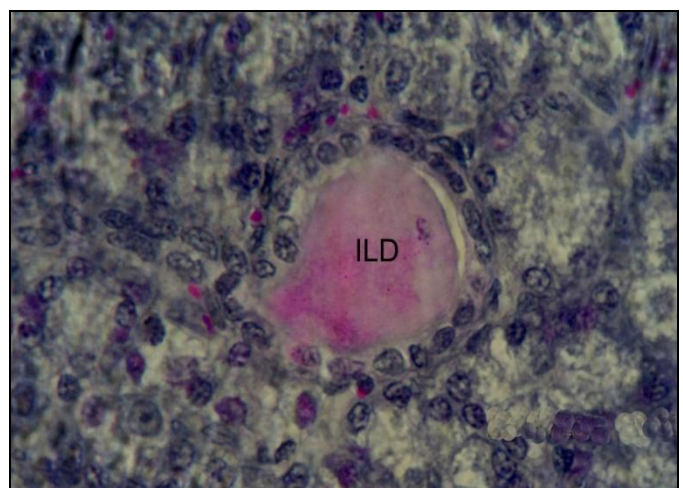


Fig 3: Photomicrograph of Goat Pancreas Showing Intra Lobular Duct (ILD) H&E X 1000

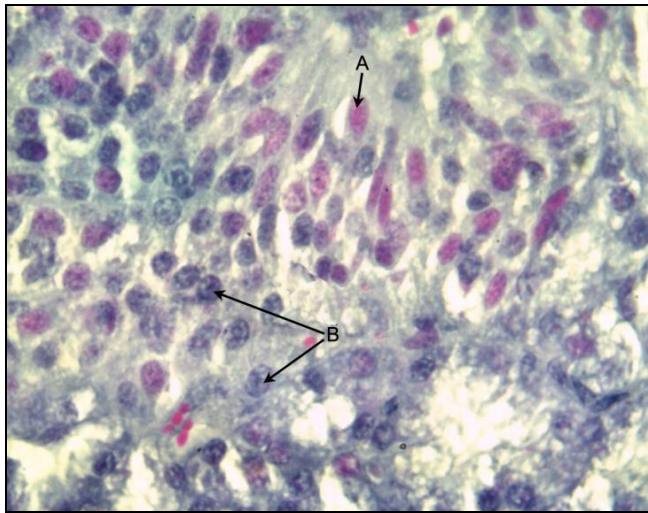


Fig 4: Photomicrograph of A Pancreatic Islet in Goat Showing Alpha Cells (A) And Beta Cells (B) Chrome Alum Heamatoxylin Phloxin X 1000

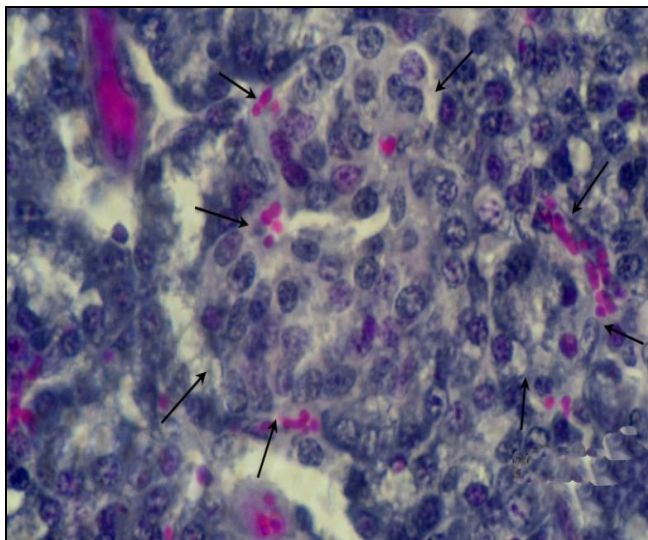


Fig 5: Photomicrograph of Goat Pancreas Showing the Capsule (Arrows) Enclosing a Pancreatic Islet H&E X 1000

9. Ganguli A, Prasad G. Histology of goat pancreas. *Indian J Vet. Anatomy.* 1995; 8:56.
10. Hans GB, Markus B, Kozarek R, Lerch M, Neoptolemos JP. *The Pancreas: An Integrated Textbook of Basic Science, Medicine, and Surgery*, 2nd Edn. Blackwell publishing, Massa chusettes, 2008, 20.
11. Ladukar ON, Bhamburkar VR. Comparative studies on the innervation of islets in pancreas of Layers and Broilers. *Indian J Vet. Anatomy.* 1994; 6(2):101-103.
12. Leeson TS, Leeson CR, *Histology*, 4th Edn, W.B.Saunders Company, 1976, 374-382.
13. Malik MR, Prem Prakash. Comparative Histology of the pancreas of buffalo and ox, a note, *Ind. J Ani. Sc.* 1972; 42(9):681-682
14. Meshram BN, Dalvi RS, Bhamburkar VR, Banubakode SB, Nandeshwar NG. Histomorphological studies on caprine pancreas with reference to ageing. *Indian J of Vet. Anatomy.* 2001; 13(2):130-133.
15. Motta PM, Macchiarelli G, Nottola SA, Correr S. Histology of the exocrine pancreas. *Microsc. Res. Tech.* 1997; 37(5):384-398.
16. Vijayaraghavan G, Mariappa D. Histological observations on the pancreas of Indian Buffalo (*Bubalus bubalis*). *Cheiron.* 1976; 5:115-118.

References

1. Ali SS, Ali MM, Hering BJ, Bretzel RG, Federlin K. Light and electron-microscopic studies on isolated bovine islets of Langerhans, *Annals of Anatomy.* 1991; 173(2):73-80.
2. Bancroft JD, Stevens A. *Theory and Practice of Histological Techniques*, Churchill Livingstone Publications, New York, 1996, 28-283.
3. Banks WJ. *Applied Veterinary Histology*, Williams and Wilkins Publication, 1981, 474-476.
4. Bloom W, Fawcett DW. *A Textbook of Histology*, 9th Edn, W. B. Saunders Company, Philadelphia, 1968; 614-624.
5. Copenhaver WM, Duglus RP. *Bailey's Textbook of Histology*, 16th Edn. The Williams and Wilkins Company, 1975, 466-473.
6. Dellmann HD. *Textbook of veterinary histology*, 4th edn. Lea and Febiger, Philadelphia, 1993, 190-193.
7. Dellmann HD, Brown EM, *Textbook of Veterinary Histology*, Lea and Feibiger, Philadelphia, 1976, 260-262, 396-399.
8. Elizabeth A, Fredric LF. *Comparative Veterinary Histology with Clinical Correlates*, CRC Press, Boca raton, 2001, 129-136.