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## Comparative histomorphology and histochemistry of exocrine pancreas in Deccani sheep and Bidri goat

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**Abstract**

The present study on comparative histological study of exocrine pancreas in six adult Deccani sheep and Bidri goat to know the structural differences between the small ruminants. Histologically, in both species exocrine pancreas forms bulk of gland and was tubuloacinar in nature. Tubular secreting units were dominating type as compared to acinar secreting units. In present study secretory cells were pyramidal in shape. They were arranged in single layer and two zones in each secretory cell. Three types of secretory cells *viz.*, active, exhausted and resting cells were recorded in present study in both species. Centroacinar cells were observed at lumen of secretory units which continues with intercalated ducts. Histochemically, secretory cells in both species showed moderate (++) PAS positive reaction towards the apical part.

**Keywords:** Histology, histochemistry, exocrine pancreas, sheep, goat

**Introduction**

Small ruminants like sheep and goat form an important economic and ecological niche of agricultural system in India. Socioeconomic growth and national economy of the country has been significantly backed by small ruminants' sector. There has been considerable progress in science and technology to understand small ruminant biology and knowledge in this field need to be transformed into practice for sustainable production. Digestive system of small ruminants includes digestive tract and its accessory organs, which process food into molecules that can be absorbed and utilized by the cells of body. Pancreas is a major accessory organ and has important role in digestion. It consists of right lobe (head), left lobe (tail) and a short body. During development distal part of accessory duct atrophies and only pancreatic duct persists. It unifies with bile duct and both enter via common duct, a feature that makes these small ruminants suitable for experimental studies. Larger part of gland is exocrine consisting of pancreatic acinar cells that secrete digestive enzymes such as amylase, trypsin, peptidase, and lipase.

However, there has been limited scientific work done on the histomorphological study of pancreas in Deccani sheep and Bidri goat. The present research was conducted to analyze the general histomorphology and histochemistry of exocrine pancreas, to understand its role in carbohydrate metabolism. It is also useful in future for transplantation of pancreatic cells, stem cell regeneration, tissue engineering and *in vitro* studies. Therefore, for better understanding of pancreatic histomorphology in humans, who have longer pregnancy than rodents, comparative animal systems will be needed. The sheep and goat were a long standing large animal model for study. Hence the present research work was undertaken with the following objective to study the histomorphology and histochemistry of exocrine pancreas in Bidri goat and Deccani sheep.

**Material and Methods**

The present study was carried out in the Department of Veterinary anatomy and Histology, Veterinary College, KVAFSU, Bidar, Karnataka. The material for the study were collected from six adult Deccani sheep and Bidri goat immediately after slaughter from local slaughter houses. The collected tissue pieces were washed in normal saline later, they were fixed in different fixatives like normal buffered formalin, Bouin's solution and Zenker's solution. The tissue pieces were processed and embedded in paraffin by routine method. Sections were cut at 4-6µm thickness and were utilized for histomorphological, histometrical study and histochemical studies.

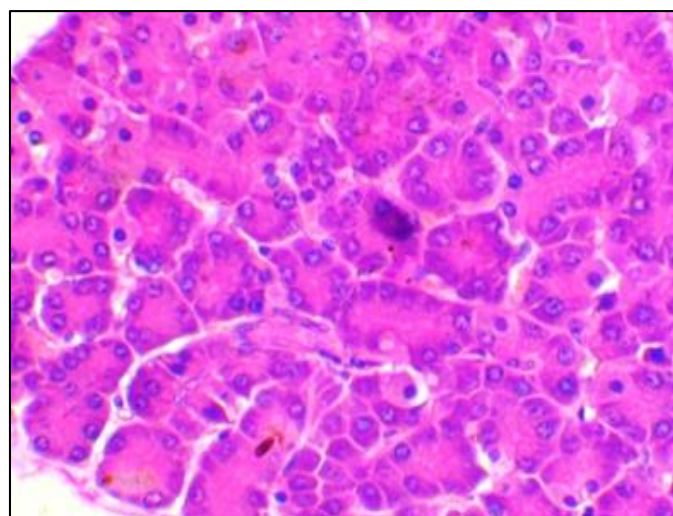
## Results and Discussion

### 1. Histology

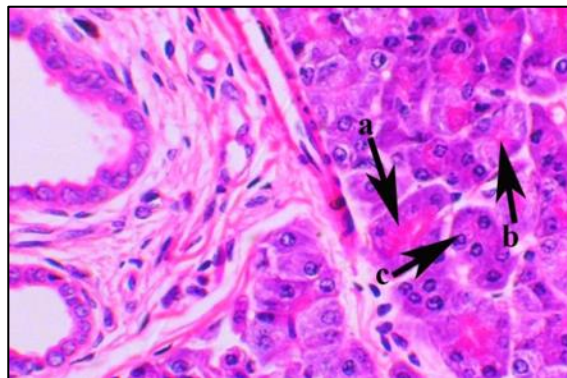
Exocrine pancreas formed the bulk of gland in both sheep and goat. The fundamental secretory unit of the exocrine pancreas is the acinus, it is collection of numerous acinar cells, adjacent Centro acinar cells, and proximal small ducts. These acinar cells are pyramid shaped epithelial cells. They contain granules called as zymogens that are rich in proenzymes. The tubular secreting units were the dominant type as compared to the acinar secreting units (plate 1, 5). Eurell and Frappier, (2006) [2] in ruminants and Mobin *et al.*, (2008) [5] in sheep. In the present study, the secretory cells were pyramidal in shape. They were arranged in a single layer with two zones in each secretory cell (plate 2, 5). These findings were in accordance with findings of Prashar *et al.*, (1999) [6] in buffalo, Trautmann and Fiebiger, (2002) [7] and Eurell and Frappier (2006) [2] in domestic animals. However Lone *et al.*, (1989) [4] described truncated acinar cells lining the secretory units in goat. These acinar cells can be classified into three types based on quantity of zymogen granules. The zymogen granules were abundant in resting cells, moderate in active cells and least in exhausted state. Prashar *et al.*, (1999) [6] in buffalo observed three types of secretory cells *viz*; active, exhausted and resting cells. Similar observations were also recorded in the present study in both sheep and goat (plate 2, 7). In the present study, centroacinar cells form a very small duct of flattened epithelium that extends near the lumen of secretory units which continued with intercalated ducts in both species (plate 3, 8). Morphologically centroacinar cells were different from acinar cells in its size. They are present at the junction between the acinus and the ductal cells of the intercalated duct. These findings were in accordance with observation made by Trautmann and Fiebiger, (2002) [7] and Eurell and Frappier, (2006) [2] in domestic animals.

### 2. Histochemistry

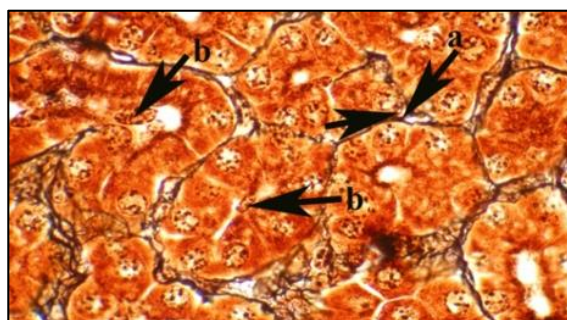
The secretory cells in both species showed moderate (++) PAS positive reaction towards the apical part. These indicated presence of Mucopolysaccharides in zymogen granules. These zymogens are needed for digestion lipids, carbohydrates, and proteins, and it secretes a bicarbonaterich fluid that neutralizes acidic secretions of gut. These results were in accordance with Lilli, (1965) [3] in man and Duhan, (1992) [1] in buffalo (plate 4, 6).



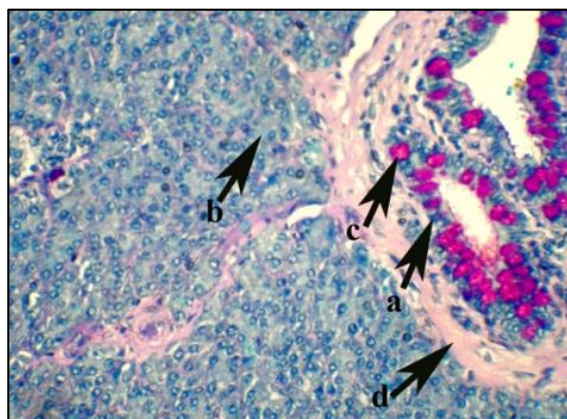
**Plate 1:** Photograph of pancreas of adult bidri goat showing tubular secretory units (a), acinar secretory unit (b), eosinophilic (c), basophilic zones (d) in secretory cell H & E X 40



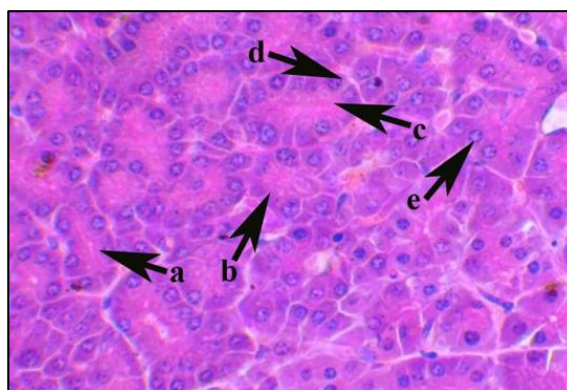
**Plate 2:** Photomicrograph of pancreas of adult Bidri goat showing resting (a), active (b), ad exhausted type (c) of secretory cells, H & E X 40



**Plate 3:** Photomicrograph of pancreas of adult Bidri goat showing fibers (a), around the secretory units and Centroacinar cell (b). Gomori's reticulum stain X100

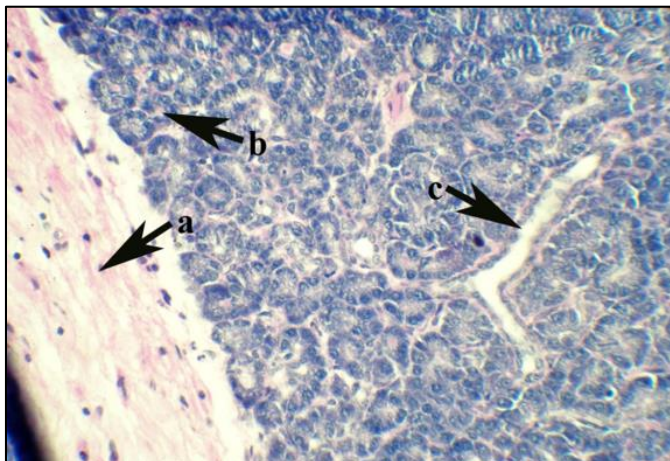


**Plate 4:** Photograph of pancreas of adult Bidri goat showing Alcian blue positive reaction in duct epithelium (a), secretory cells (b), and connective tissue around duct (d). Alcian blue - Pas technique x -40.

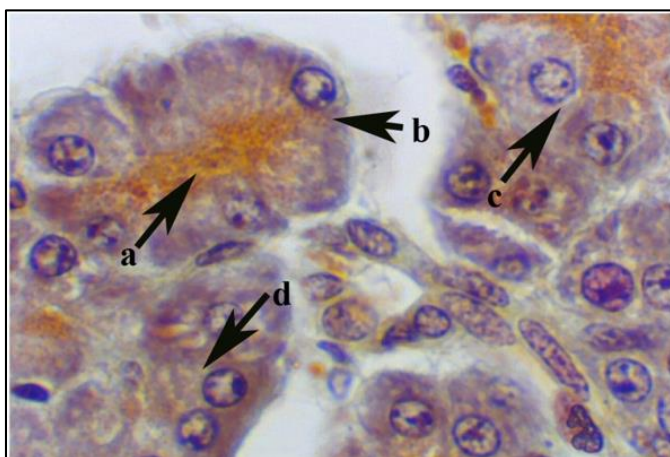


**Plate 5:** Photograph of pancreas of adult Deccani sheep showing: Tabular secretory unit (a), acinar secretory units (b). Eosinophilic zone (c), Basophilic zone (d), Nucleus of secretory cell (e), H & E X 40

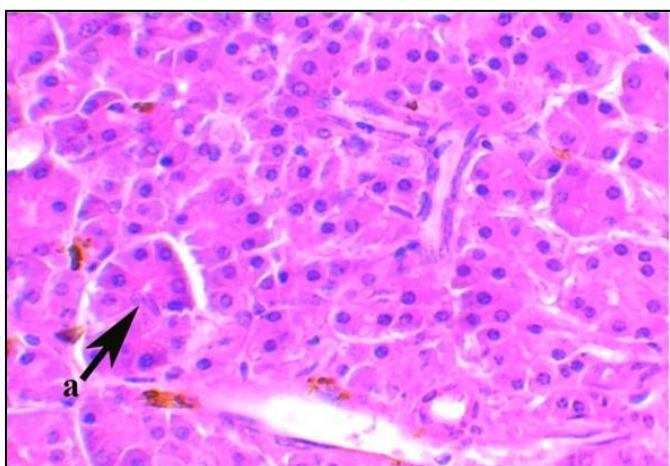




**Plate 6:** Photograph of pancreas of adult Deccani sheep showing PAS positive reaction, Capsules (a), Tip of secretory cell (b) interlobular duct (d) PAS technique X 40



**Plate 7:** Photograph of pancreas of adult Deccani sheep showing Zymogen granules (a), resting type of secretory cell (b), Active type of secretory cell (c) and exhausted secretory cell (d). Modified aldehyde fuchsin stain X 100



**Plate 8:** Photomicrograph of pancreas of adult Deccani sheep showing Centroacinar cells (a) FI & E X 40

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