The role of intestine in the absorption of the food, water and electrolytes is well known. There is paucity of literature on the light microscopic structures of the intestine of small ruminants except for a few reports in goats (Andleeb et al., 2009) and on the jejunum of sheep (Kumar et al., 2014). The present study was undertaken to study the histo-architecture and the histochemical components in the ileum of sheep.

MATERIALS AND METHODS

The ileum was collected from five adult sheep immediately after slaughter. The ileal tissues were fixed in 10% neutral buffered formalin and processed for light microscopy. The villi of the ileum varied from elongated to blunt with broad bases and were lined by a simple columnar epithelium having few goblet cells. The intestinal glands or crypts of Lieberkuhn were simple branched tubular coiled lined by simple cuboidal to low columnar epithelium. The lamina muscularis mucosa was uniform in thickness. The submucosa had loose irregular connective tissue. The tunica muscularis had an inner circular and an outer longitudinal layer of smooth muscles. Histochemical studies revealed that the goblet cells showed a strong PAS activity, whereas the crypts of Lieberkuhn showed more concentration of acidic muco-polysaccharides. The ileum had lymphoid aggregates in the form of Peyer’s patches.

RESULTS AND DISCUSSION

The villi were blunt with their broad base towards the cranial portion and they became elongated towards the caudal portion of the ileum. These were, however, reported to be mostly finger like and pointed in buffalo calves (Barnwal and Yadava, 1975) and short with a broad base in pig (Sloss, 1954; Talukdar, 1999). The number of goblet cells was moderate from the cranial to the caudal end of ileum. The nuclei had 1-2 nucleoli which were centric or eccentric in position. The cytoplasm was slightly eosinophillic and granular, however, the eosinophilia accentuated towards the lumen and formed a distinct border with few lymphocytes infiltrated in between the columnar cells. The nuclei were oval or round in shape and situated at the base of the cells in buffalo calves (Barnwal and Yadava, 1975).

The villi epithelium showed less amount of mucin in this study. However, greater quantity of mucin in duodenum and jejunum of sheep (Kumar et al., 2013, 2014) and Gaddi goats (Andleeb et al., 2011) had been reported. The goblet cells of villi showed an intense PAS positive reaction indicating the presence of glycogen (Fig. 3). These cells also showed a positive reaction with Alcian blue showing the presence of hyaluronic acid, sialomucins and weakly sulfated mucopolysaccharides, and also the presence of more acidic than neutral polysaccharides (Figs. 4, 5). However, the luminal border of columnar epithelium has been reported to show a mild
reaction with PAS in the ileum of Gaddi goat (Andleeb et al., 2009) and presence of a greater concentration of glycogen in the epithelium of the small intestine in goat foetii (Ramakrishna and Tiwari, 1979). The villi and the basement membrane of the epithelium in this study showed a weak reaction with Alcian blue stain. Similar findings have been reported in the intestine of Gaddi goat (Andleeb et al., 2009) and in goat, sheep and cattle (Ohwada and Suzuki, 1992). In mammals, the striated border of columnar cells in the small intestine had been reported to be PAS positive (Sheahan and Jarvis, 1976).

The lamina propria had loose irregular connective tissue along with a network of reticular, collagen and elastic fibres and with few lymphoid cells and lymphoid aggregates throughout the ileal length (Figs. 1, 6). However, a large number of lymphocytes were reported in addition to the above structures in buffalo (Barnwal and Yadava, 1975). The lamina propria and the lamina muscularis mucosae did not show any PAS and Alcian blue reaction in the ileum as also reported in Gaddi goats (Andleeb et al., 2009).

The intestinal glands or crypts of Lieberkuhn were simple branched tubular coiled glands lined with simple cuboidal to low columnar epithelium (Fig. 1) as also observed in pig (Talukdar, 1999). Whereas in buffalo, the crypts of Lieberkuhn were made up of undifferentiated columnar cells and goblet cells, this may be few in number or absent (Barnwal and Yadava, 1975). The crypts of Lieberkuhn in this study showed a PAS positive reaction for acidic as well as neutral mucopolysaccharides and showed a strong reaction with Alcian blue. In Gaddi goat, the crypts showed a moderate reaction in the supranuclear zone of the epithelium with PAS and a mild reaction with Alcian blue stain (pH 2.5) showing less amount of both sulphated and non-sulphated mucins (Andleeb et al., 2009).

The lamina muscularis mucosa was uniform in thickness throughout the ileal length and consisted of smooth muscles. However, in buffalo it was reported to be thick and made up of a continuous layer of smooth muscle fibers (Barnwal and Yadava, 1975) whereas it was reported as a thin continuous inner circular and outer longitudinal smooth muscle layer in pig (Talukdar, 1999). The submucosa was formed by loose irregular connective tissue and connective tissue cells, fine blood capillaries along with elastic, collagen and reticular fibers. Peyer’s patches were observed throughout the ileal length (Figs. 1, 6). The shape of Peyer’s patches varied from oval to elongated oval in shape.

The tunica muscularis was constituted by an inner circular and an outer longitudinal layer of smooth muscles. In between these layers there were small blood capillaries, blood vessels, venous cavernous sinuses, nerve bundles and fatty tissue and at places myenteric plexus was also observed. Similar findings were reported in buffalo calves (Barnwal and Yadava, 1975).
The tunica serosa formed by the loose irregular connective tissue had isolated collagen, elastic and reticular fibers along with varying amounts of fatty tissue, few blood capillaries and a flat mesothelial cell layer as reported in domestic animals (Stinson and Calhoun, 1993).

REFERENCES


