

Histochemical Studies On the Peyer's Patches of Sheep

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Abstract

Tissue pieces of jejunum and ileum from different prenatal and postnatal age groups of sheep were collected from Corporation slaughter house, Perambur, Chennai. The goblet cells in the villous epithelium were positive for Periodic acid Schiff (PAS) but the negative reaction was observed in the follicle-associated epithelium as the goblet cells were absent. The follicleassociated epithelium showed positive activity for the alkaline phosphatase. The activity was more intense over the follicle domes in all the prenatal and postnatal age groups. An intense acid phosphatase activity was observed in the follicle-associated epithelium and dome areas of Peyer's patches. A linear activity of the adenosine triphosphatase was observed in the capsule of the ileal follicles and a mild enzyme activity was noticed in the interfollicular region. A reticular pattern of 5?nucleotidase enzyme activity was observed in the follicles of ileal Peyer's patch.

Index terms— Sheep, Peyer's patches, Histochemistry

1 Introduction

The health of the digestive tract is important to receive the food material and for proper digestion and absorption. About 70 per cent of the body immune system is found in the digestive tract. This immune system often referred to as gut-associated lymphoid tissue and works to protect the body from invading pathogens (Ma et al., 2007). Peyer's patches are the aggregations of lymphatic nodules in the mucosa and submucosa of the jejunum and ileum of mice (Rowinski et al., 1984). Peyer's patches are immunocompetent lymphoid organs primarily engaged in immune responses to antigens presented from the intestinal lumen in guinea pig (Jurg et al., 1975).

The secretions from the loops containing Peyer's patches exhibit a stronger early Ig A response to bacteria than the secretions from loops lacking Peyer's patches. The large number of lymphocytes in Peyer's patches increases the probability of an antigen encountering an immunocompetent cell (Keren et al., 1978).

A thorough knowledge of the histological changes in gut-associated lymphoid tissue (GALT) is very essential to gain a comprehensive knowledge on the gut immunology and to form a basis for the interpretation of various pathological conditions of the gut. Hence, the present work has been undertaken to explore the histochemistry of the GALT in sheep.

2 II.

3 Materials And Methods

Tissue pieces from the terminal part of jejunum and parts of ileum were collected from sheep. The tissues from six animals each from different age groups viz. three months, four months and five months in prenatal and neonatal (0-2 months), young (3-9 months) and adult (10 months-2 years) in postnatal groups were procured from the Corporation slaughter house, Perambur, Chennai. The determination of age ascertained as described by Richardson et al. (1976) in prenatal and Noden and de Lahunta (1985) in postnatal age groups.

The routine paraffin sections of 3-5 μ m thickness were used for carbohydrates. Frozen sections of tissues fixed in chilled formol calcium (4°C) were used for localization of alkaline phosphatase (Singh and Sulochana, 1996),

43 acid phosphatase (Singh and Sulochana, 1996) and 5'Nucleotidase (Bancroft and Gamble, 2003). Frozen sections
44 of fresh unfixed tissues were also used for localization of adenosine triphosphatase (Bancroft and Gamble, 2003).
45 All the frozen sections were cut at 15-20 μ m thickness by cryostat.

46 4 III.

47 5 Results And Discussion

48 6 a) Carbohydrates

49 The goblet cells of the villous epithelium were positive for PAS reaction (Fig. ??). But, these cells were absent in
50 the follicle-associated epithelium of the ileal Peyer's patches in all the age groups of sheep which is in accordance
51 with Befus et al. (1980) in chicken.

52 When the combined PAS and alcian blue technique was applied, a blue reaction was observed in the follicle-
53 associated epithelium of the ileal Peyer's patches. However, Burns (1982) observed that when the alcian blue was
54 followed by PAS a purple reaction was. The follicle-associated epithelium showed positive activity for the alkaline
55 phosphatase. The activity was more intense over the follicle domes (Fig. 2) which is in agreement with Landsverk
56 (1981) in calves, Bjerknes and Cheng (1981) in rat, Burns (1982) in domestic fowl and Owen and Bhalla (1983)
57 in rat. However, Schmedtje (1965) noted that, the lymphoid follicle domes in rabbit appendix revealed negligible
58 alkaline phosphatase activity over the cytoplasmic band separating intraepithelial lymphocytes from the lumen.
59 Nordstrom et al. (1968), Weiser (1973) reported that the alkaline phosphatase activity increased as maturing
60 epithelial cells migrated upto the villi in rats and human foetuses respectively. Ropke et al. (1972) noted in
61 mouse that the high endothelial postcapillary venules through which lymphocytes entered the lymph nodes and
62 Peyer's patches expressed a weak or no reaction for alkaline phosphatase in contrast to other endothelia. Ono
63 (1975) recorded the alkaline phosphatase activity in tubules and vacuoles of enterocytes overlying the follicle in
64 neonatal rats but not in adult animals. Further, Halleraker et al. (1990) observed in ruminant that, the alkaline
65 phosphatase enzyme activity was shown in the follicle capsule.

66 A reticular pattern of staining was found in the centre of the follicle, interfollicular area and in the corona.
67 A weak reaction was seen in the dome. Muscularis mucosae was positive for the enzyme. In lamb, the reticular
68 reaction in the dome of the ileal Peyer's patches was absent. Nicander et al. (1991) reported that in sheep and
69 goat foetuses by 90 days of gestation, a positive band of alkaline phosphatase activity was seen at the base of
70 the villi in the follicular area. Weaker staining was observed in stromal elements of subepithelial tissues in both
71 villi and primordial domes.

72 ii. Acid phosphatase An intense enzyme activity was observed in the follicle associated epithelium and dome
73 areas of ileal Peyer's patches (Fig. ??) which is in accordance with Owen et al. (1986) in rat. Halleraker et
74 al. (1990) stated that the cells stained for acid phosphatase were interpreted as macrophages in the follicle and
75 dome in ruminants.

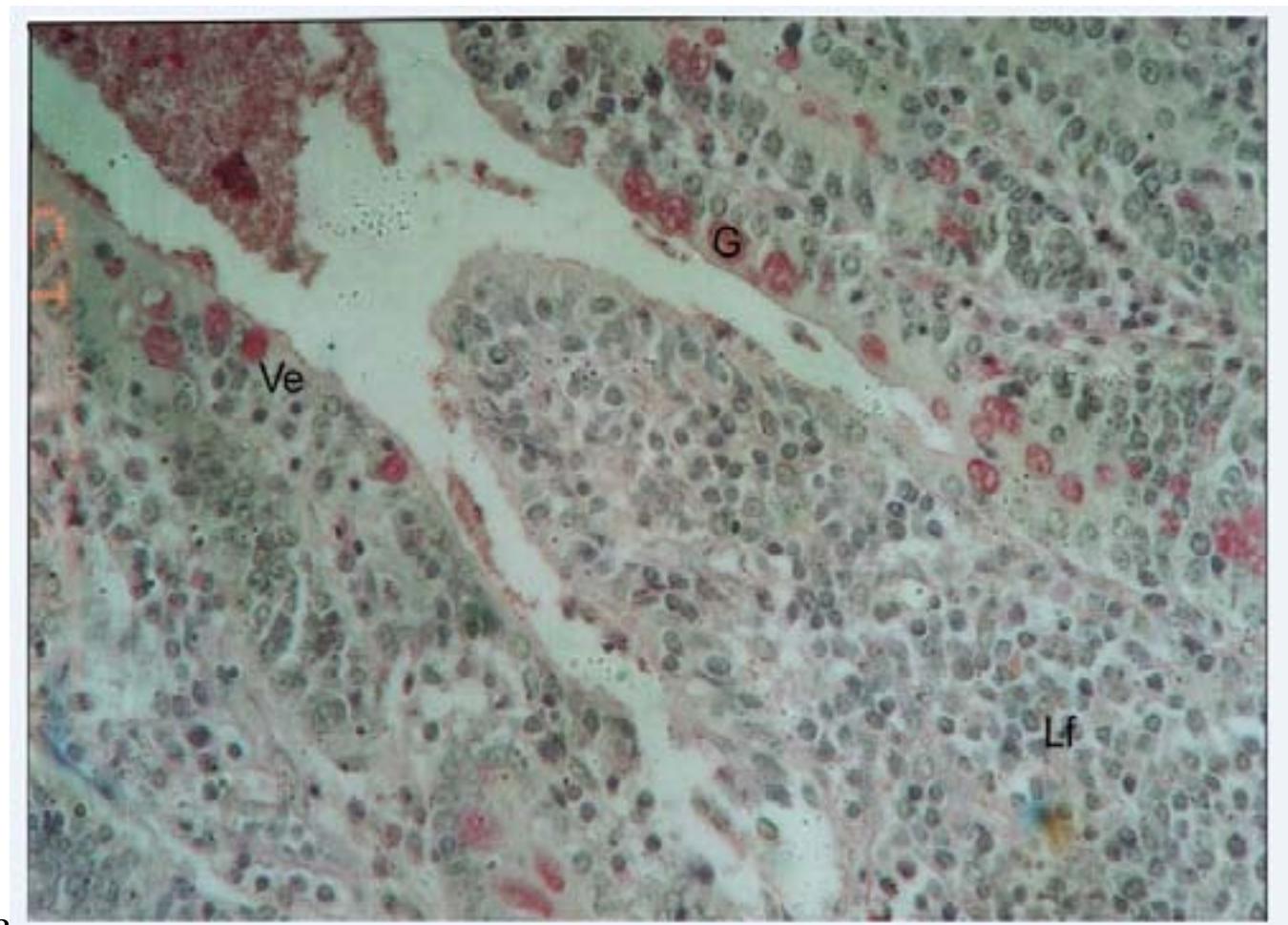
76 A strong activity in the interfollicular region and a mild activity of the enzyme in the capsule was observed
77 in the ileal Peyer's patches. A pattern of enzyme activity was noticed in the follicles. However, Halleraker et
78 al. (1990) stated that, the smooth muscle cells and reticular cells of the interfollicular tissue reacted strongly. A
79 linear reaction outlined the follicle capsule.

80 iii. Adenosine triphosphatase A linear activity of the enzyme was observed in the capsule of the ileal follicle
81 (Fig. ??). A mild enzyme activity was noticed in the interfollicular region and a weak positive reaction for the
82 enzyme was observed in the follicle. However, Nicander et al. (1991) noticed a stronger activity of enzyme within
83 the follicle and more pronounced activity within the centre of the follicle by 128 days in sheep foetuses. Halleraker
84 et al. (1990) found that in lambs, the reticular cells stained weakly for this enzyme in the T-cell area and in
85 the centre of the follicle. The follicle capsule had a weak, linear and discontinuous staining. iv. 5'nucleotidase
86 A reticular pattern of enzyme activity was observed in the follicles of ileal Peyer's patches (Fig. 5). A linear
87 activity of the enzyme was outlined in the capsule of the follicle which is in accordance with Halleraker et al.
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Figure 1: T © 2012



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Figure 2: Fig. 2 :

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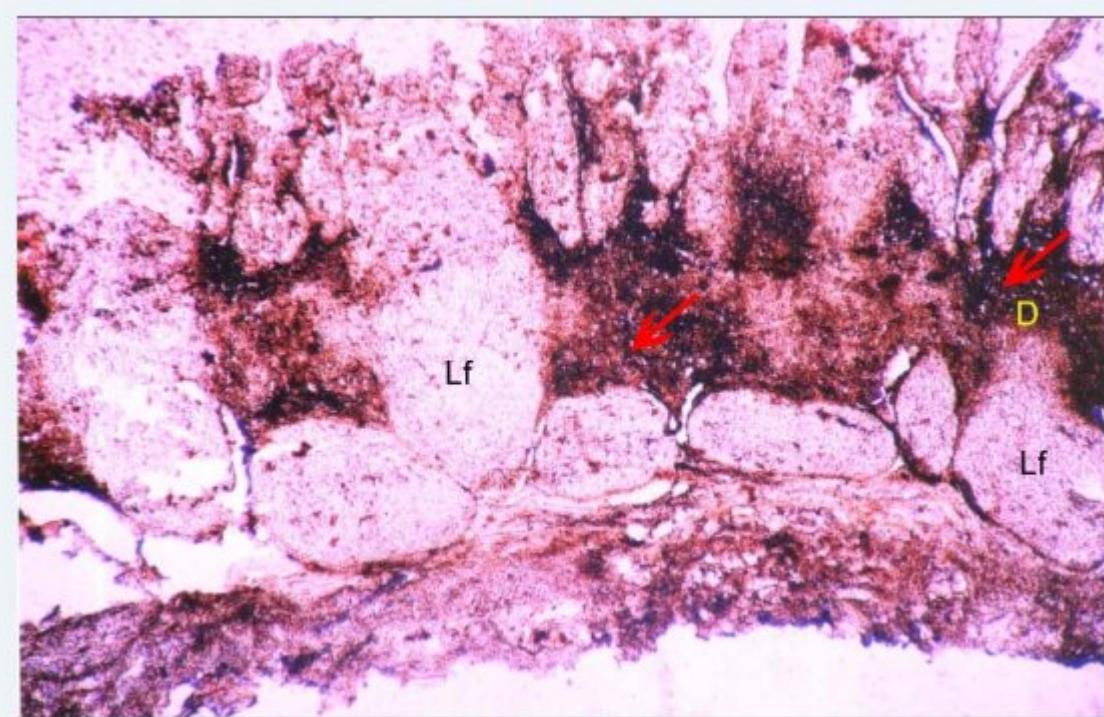


Figure 3: Fig. 3 :Fig. 4 :

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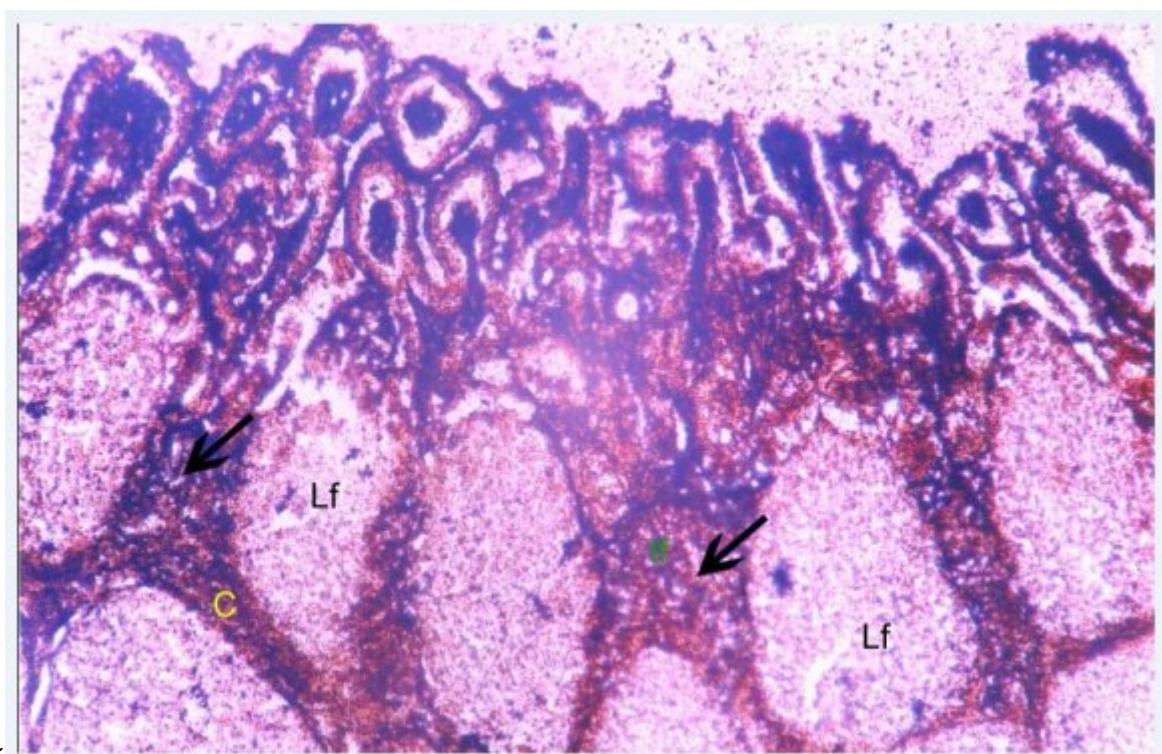


Figure 4: Fig. 5 :

89 .1 Legends To Figures

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