

## HISTOCHEMICAL LOCALIZATION OF MUCOPOLYSACCHARIDES, PROTEINS AND LIPIDS IN BUFFALO PANCREAS DURING PRENATAL LIFE

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### ABSTRACT

The study was conducted on pancreas of 24 buffalo foeti of CVRL 1.2 to 100.5 cm (age ranging from 34 to 300 days). The foeti were thus divided into group I (CVRL between 0–20 cm), group II (CVRL above 20 cm and up to 40 cm) and group III (CVRL above 40 cm). The tissues of pancreas were processed for paraffin blocks preparation. In addition, cryostat sections of 10–12  $\mu$  were made for histochemistry. The study revealed a weak reaction for neutral and acid mucopolysaccharides in acinar cells in group I but moderate to strong reaction in groups II and III indicating more cellular differentiation and proliferation in these two groups. A strong reaction for proteins in acinar cells is also an indication of formation of zymogen granules during fetal life. The perilobular giant islets may be functionally more active than the Islets of Langerhans as lipids in these cells were better demonstrated.

**Key words:** Buffalo fetus, histochemistry, pancreas

The mucopolysaccharides, proteins and lipids play an important role in cell adhesion, regulation of cell growth and proliferation, developmental processes, cell surface binding of lipoprotein lipase and other proteins, angiogenesis, viral invasion, and tumor metastasis (Rabenstein, 2002). In literature very few reports are available on histochemical distribution especially in buffalo (Prashar, 1995). Keeping in view the gap in literature, the present research was planned because it is important to study their distribution pattern in the tissue during different stages of prenatal life to understand their involvement in histogenesis.

### MATERIALS AND METHODS

The study was conducted on pancreas of 24 buffalo foeti of CVRL (curved crown rump length) 1.2 to 100.5 cm (age ranging from 34 to 300 days) collected from slaughter house and dead foetuses of dystocia cases presented at Teaching Veterinary Clinical Complex of this university. The age of the foetii was estimated by using the formula given by Soliman (1975).

$$Y = 28.66 + 4.496 \times (\text{CVR length} < 20 \text{ cm})$$

$$Y = 73.544 + 2.256 \times (\text{CVR length} \geq 20 \text{ cm})$$

where, Y is the age in days and  $\times$  is CVR length in centimeters.

The foeti were thus divided into group I (CVRL between 0–20 cm), group II (CVRL above 20 cm and up to 40 cm) and group III (CVRL above 40 cm). The tissues were taken from pancreas and fixed in neutral

buffered formalin and Bouin's fixatives immediately after collection. The tissues were processed for paraffin blocks preparation by acetone benzene schedule (Luna, 1968) and sections of 5–6  $\mu$  were cut. The sections were stained with periodic acid Schiff, Alcian blue and bromphenol blue to demonstrate neutral and acid mucopolysaccharides and basic proteins. For demonstration of lipids, cryostat sections of fresh tissue of 10–12  $\mu$  thickness were cut at  $-20^{\circ}\text{C}$  and stained with Sudan Black B (Chayen *et al.*, 1969).

### RESULTS AND DISCUSSION

The pancreas comprised of tubules and solid nest of undifferentiated epithelial cells at 1.2 cm CVRL (34 days) and acinar cells with zymogen granules were observed at 7.5 cm CVRL (63 days). Two types of Islets were observed during fetal life viz; Islets of Langerhans and perilobular Islets.

**Neutral Mucopolysaccharides (NMPS):** The acinar cells of pancreas showed a weak to moderate reaction in group I (Fig. 1), moderate to strong reaction in group II (Fig. 2) and strong reaction in group III (Fig. 3) whereas Prashar (1995) reported weak to moderate reaction for NMPS in acinar cells of neonatal buffalo calves. The basement membrane of acinar cells also showed a moderate reaction in group I and strong reaction in groups II and III. Laitio *et al.* (1974) reported reported by Prashar (1995) in neonatal buffalo pancreas. The stroma showed weak reaction in groups I and II whereas weak to moderate reaction in group III. In

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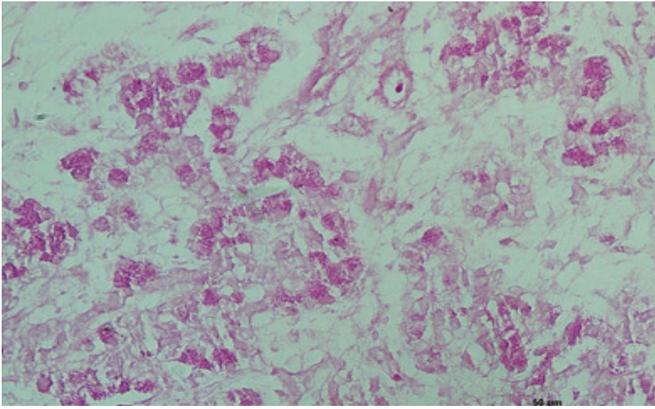


Fig 1. 9.6 cm CVRL (71 days) showing PAS reaction for neutral mucopolysaccharides PAS×40

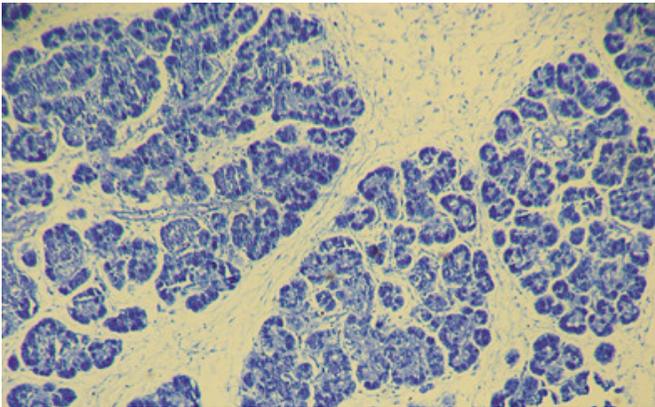


Fig 2. 28.3 cm CVRL (137 days) showing strong PAS reaction PAS×400

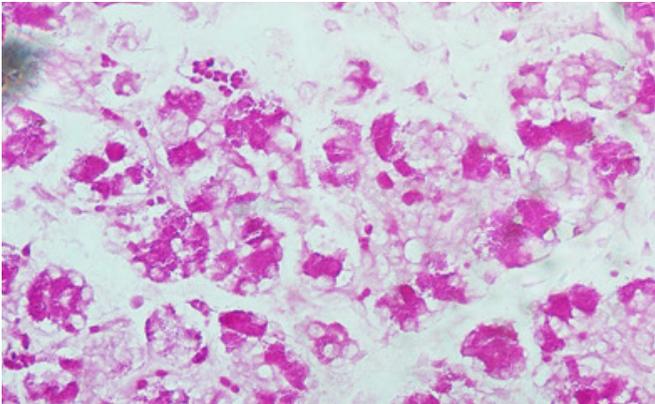


Fig 3. 54.0 cm CVRL (195 days) showing reaction for neutral and acid mucopolysaccharides Alcian blue-PAS×400

contrast, Prashar (1995) observed a strong reaction in stroma of neonatal buffalo calves. The blood vessels were weak to moderately positive for neutral mucopolysaccharides in all three groups. Islets of Langerhans showed weak reaction in all three groups while the perilobular giant islets showed a weak reaction in group I and moderate reaction in groups II and III. Prashar (1995) found that the endocrine cells were weak to moderately positive for neutral mucopolysaccharides. The capillaries in between cords of endocrine cells were

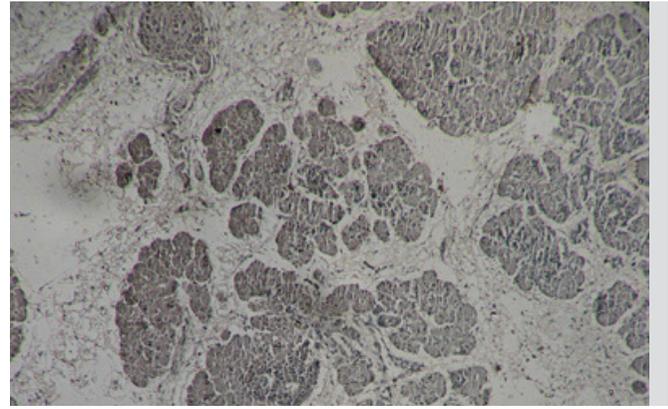


Fig 4. 70.0 cm CVRL (232 days) showing reaction for basic proteins Bromphenol blue×100

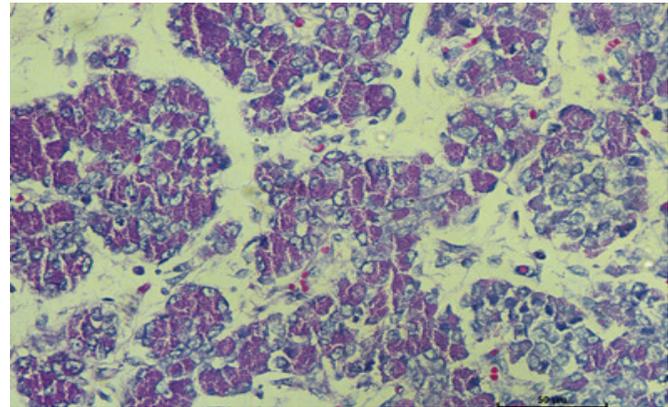


Fig 5. 70.0 cm CVRL (232 days) showing reaction for lipids Sudan black B×100

strongly PAS positive in neonatal fetal buffalo pancreas.

**Acid Mucopolysaccharides (AMPS):** The acinar cells and zymogen granules showed a weak reaction in group I while moderate to strong reaction in group II and group III (Fig. 3) while Prashar (1995) found a weak reaction for AMPS in acinar cells of neonatal buffalo pancreas. The duct cells were weakly positive for acid mucopolysaccharides in group I and weak to moderate in groups II and III. The stroma was weakly positive in all three groups similar to as reported earlier by Prashar (1995) in neonatal buffalo pancreas. The blood vessels showed a weak reaction in group I while weak to moderate in groups II and III. The islets of langerhans showed weak reaction in group I and weak to moderate in groups II and III. The perilobular giant islets showed weak to moderate reaction in group I and moderate reaction in groups II and III. Prashar (1995) also reported a weak reaction of acid mucopolysaccharides in neonatal buffalo pancreas.

**Basic Proteins:** The acinar cells showed weak to moderate reaction for basic proteins in group I and moderate to strong reaction in group II and strong reaction in group III (Fig. 4). The strong reaction

reflected the presence of basic proteins in the zymogen granules. Prashar (1995) also observed a strong reaction of basic proteins in acinar cells of neonatal buffalo calves pancreas. The duct cells were weakly positive for basic proteins in group I and weak to moderately positive in groups II and III. The stroma showed a weak reaction in groups I and II and weak to moderate reaction in group III as earlier reported by Prashar (1995) in neonatal buffalo calf. The blood vessels were weakly positive in group I while weak to moderately positive in group II and group III. The islets of langerhans showed a weak reaction in group I and weak to moderate in group II and group III as earlier reported by Prashar (1995) in neonatal buffalo calf and perilobular giant islets also showed a similar type of reaction in all three groups.

**Lipids:** The acinar cells showed weak reaction for lipids in groups I and II and reaction slightly increased in group III (Fig. 5). Prashar (1995) observed a weak reaction for Sudanophilic lipids in acinar cells of pancreas of neonatal buffalo calves. Finerty and Cowdry (1960) also described fatty droplets in the acinar tissue of the human pancreas. The duct cells and stroma showed a weak reaction in all three groups. The blood vessels also showed a weak reaction in groups I and II whereas weak to moderate reaction in group III. The islets of Langerhans showed weak reaction in all groups. The perilobular giant islets showed weak reaction in group I and group II while weak to moderate in group III. This was in contrast with the findings of Prashar (1995) who did not observe lipid distribution in the Islets, ducts and stromal tissue of

pancreas in neonatal buffalo calf. A weak reaction of lipids in Islets of Langerhans may be an indicator of low functional activity of these cells during fetal life. On the other hand it can be concluded that perilobular giant islets may be functionally more active than the Islets of Langerhans as lipids in these cells were better demonstrated.

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