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Histochemical development of prenatal liver in non-descript Indian buffalo

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ABSTRACT

Distribution of carbohydrate, basic protein and lipid in the prenatal liver of 18 non-descript Indian buffaloes was undertaken in 3 groups ranging from 46 days to 323 days (3.8 cm to 110 cm CRL). Group 1 consisted of 7 fetuses from 46 days to 105 days (3.8 to 16.9 cm CRL), group 2 of 5 fetuses from 124 days to 158 days (22.5 to 37.5 cm CRL) and group 3 of 6 fetuses from 166 days to 323 days (41 to 110.6 cm CRL). The acid and neutral mucopolysaccharides showed a gradual increase in its distribution from weak to strong in capsule and the parenchyma with the increase in age. In group I hepatocyte showed moderate to strong reaction for basic proteins. The reaction was strong and moderate in the hepatocytes of groups 2 and 3 respectively. The distribution of sudanophillic lipid showed a decreasing trend from high to low for groups 1, 2 and 3, respectively.

Key words: Buffalo, Histochemistry, Prenatal liver

The present study was designed to investigate the distribution of carbohydrate, basic proteins and lipids in the prenatal liver and their possible role in embryonic and foetal life.

MATERIALS AND METHODS

The present study was conducted on the liver of 18 non-descript Indian buffalo foetii. The fetal liver samples were collected from pregnant buffaloes sacrificed at abattoir, Saharanpur. Immediately after collection, fetuses were measured for the crown rump length (CRL) in centimeters and approximate age of the foetuses were calculated by using formulae based on Edward (1965) and Soliman (1975). Based upon their approximate age fetuses were grouped, viz. group 1 from 46 to 105 days (3.8 to 16.9 cm CRL), group 2 from 124 to 158 days (22.5 to 37.5 cm CRL), and group 3 from 166 to 323 days (41 to 110.6 cm CRL).

The collected liver tissues were fixed in neutral buffered formalin and Bouin's fixative, processed for paraffin sectioning (5–6 µm) by acetone-benzene as per Luna (1968). Six fresh foetal liver samples 2 from each group were collected, frozen at –20°C. Cryostat section of 10–12 µm were obtained on clean glass slide at –20°C and stored in deep freezer until they were stained with Sudan black B stain for lipid (Luna 1968). The various histochemical stains used as per methods of Alcian blue at pH 2.5 (Luna 1968). Sudan black B (Chayen *et al.* 1969), Bromophenol blue (Pearse 1972) and Periodic Acid Schiff (Sheehan and Hrapchak 1973).

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RESULTS AND DISCUSSIONS

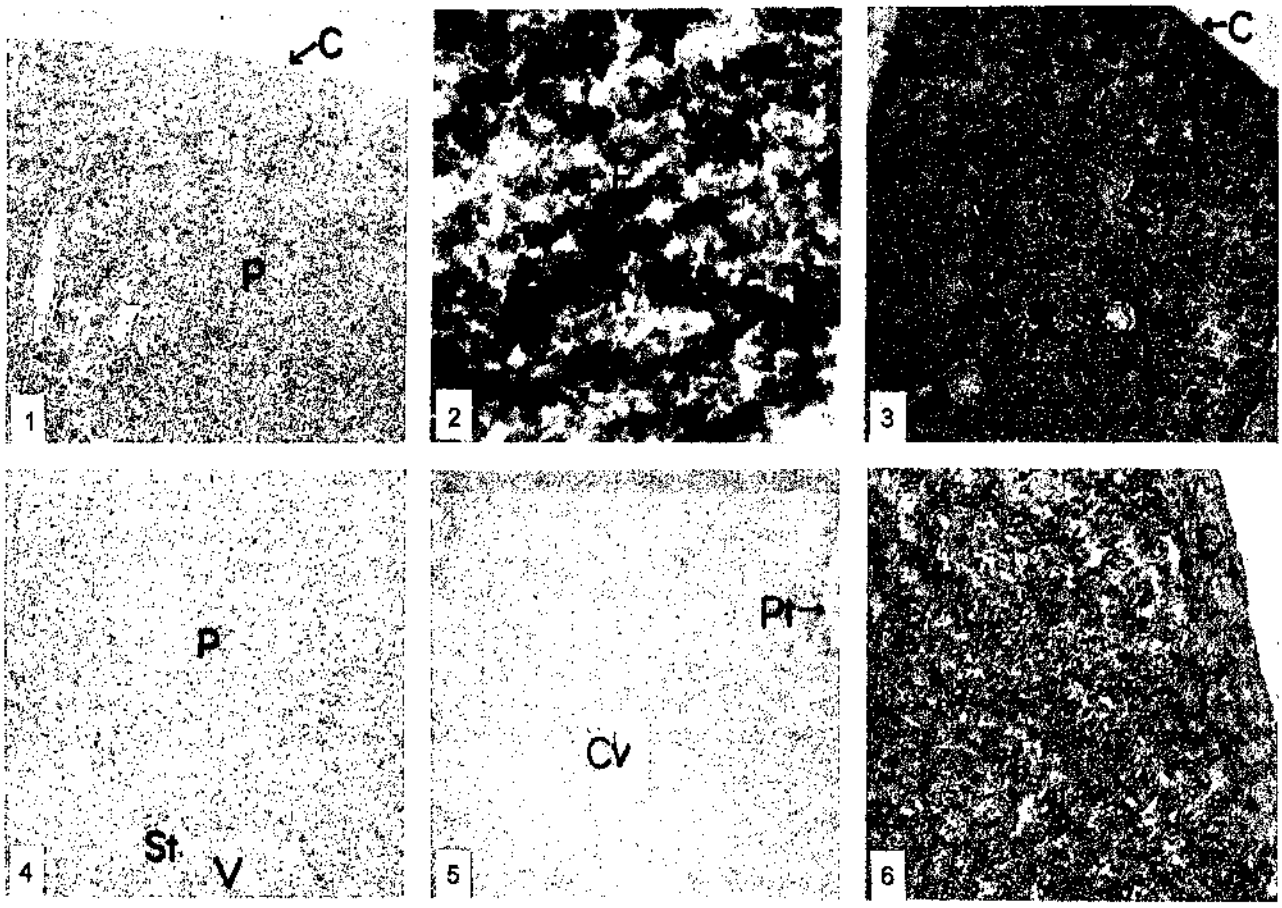
In the present study, the various histochemical observations were recorded and are summarized in Table 1.

Table 1. Distribution of polysaccharides, basic proteins and lipids in the hepatic capsule, stroma and parenchyma of prenatal buffalo liver

Groups		Capsule	Stroma	Parenchyma
Group 1	PAS		+	+
	AB	++	++	++
	BP	++	++±	++±
	Lipid	+++	+++	+++
Group 2	PAS	+++	++	++
	AB	+++	+++	+++
	BP	+++	+++	+++
	Lipid	++	++	++
Group 3	Pas	+++	+++	+++
	AB	+++	+++	+++
	BP	±++	±++	++
	Lipid	+	+	+

Polysaccharides

The capsule, stroma and the parenchyma were weakly positive for neutral mucopolysaccharides in liver at 51 days



Figs 1–6. **1.** Photomicrograph of liver from non-descript Indian buffalo at 13.5 cm CRL showing moderate alcian blue reaction in both capsule (C) and hepatocytes (P). Alcian blue. × 70. **2.** Liver section at 10.1 cm CRL showing high sudanophilic lipid distribution (P). Sudan black. × 70. **3.** Liver section at 10.1 cm CRL showing strong reaction for basic protein (C&P). Bromphenol blue. × 70. **4.** Section of liver at 28 cm CRL showing moderate PAS activity in the parenchyma (P). Periodic acid fast stain. × 70. **5.** Liver section at 83.5 cm CRL showing moderate to strong PAS activity in the parenchyma. Periodic acid schiff stain. × 70. **6.** Liver section at 100.5 cm CRL showing moderate to weak distribution of basic protein in the hepatic parenchyma and weak disribution of basic protein in the capsular region (C). Bromphenol blue stain. × 140.

(5 cm CRL) though alcian blue reaction for acid mucopolysaccharide was moderate in group 1. At 158 days (37.5 cm CRL) the PAS reactivity was strong in the capsule but moderate in the parenchyma while alcian blue was strong in capsule, stroma and parenchyma at 136 days (27.5 cm CRL) (Fig. 4). In group 3 fetuses capsule, stroma and parenchyma were strongly positive for both acid and neutral mucopolysaccharides (Fig. 5) as reported earlier by Pal *et al.* (1991) in prehatched broiler and layer chicks. The acid mucopolysaccharide were present in the intracellular matrix of connective tissue and between fibres. The neutral mucopolysaccharides preferably glycogen was required to meet the energy requirement during histogenesis and maintenance of cellular architecture.

Basic protein

The liver sections from 51 days (5 cm CRL) showed moderate bromphenol blue reaction for basic protein and at 74 days (10.1 cm CRL) it became strong in the parenchyma (Fig. 3). Group 2 liver sample at 158 days (37.5 cm CRL) showed strong reaction for basic protein in the hepatic parenchyma but in the liver sample at 300 days group 3 (100.5 cm CRL) protein content was moderate in the hepatocytes (Fig. 6). The content of basic protein was low to moderate in the capsule and stroma.

Lipid

At 74 days group 1 (10.1 cm CRL) the content of sudanophilic lipid in the fetal hepatocytes was high (Fig. 2).

The lipid content became moderate at 158 days (37.5 cm CRL). This decreasing trend in lipid distribution continued and at 262 days (83.5 cm CRL) it became too low. This gradual decrease in lipid distribution may be due to the decrease in the hemopoietic activity of the liver.

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