

Histoenzymic distribution of esterases in adrenal gland during prenatal development in buffalo (*Bubalus bubalis*)

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ABSTRACT

The study included the adrenal glands of 9 buffalo fetuses ranging from 100 mm to 890 mm crown-rump length (CRL). The non specific esterases activity was weak in the capsule, stroma and capillaries, strong to intense in the definite and foetal cortex, and weak to moderate in both the zones of the medulla. The activity of acetylcholinesterases associated with neuronal elements of the adrenal gland was more in the medulla as compared to the cortex.

Key words: Adrenal, Buffalo, Esterases, Foetus

The histoenzymic distribution of esterases in the adrenal gland had been studied in pig fetuses (Bielanska-Osuchowska 1989a,b) but there is scanty information available on this aspect in the adrenal gland during the prenatal development in buffalo, hence, the present study was undertaken.

MATERIALS AND METHODS

The adrenal glands from 9 buffalo fetuses ranging from 100 mm to 890 mm in CRL were collected from non-descript buffaloes sacrificed at abattoir, Saharanpur, Uttar Pradesh and Punjab Meats Limited, Dera Bassi, Punjab. Immediately after the collection of the fetuses their CRL was measured in millimeters (mm) with a calibrated inelastic thread as a curved line along the vertebral column between the most anterior part of frontal bone to the rump at ischiatic tuberosity and designated as crown rump length (Edward 1965). The approximate age of fetuses was determined on the basis of their CRL by using following formulae based on Soliman (1975).

$$Y = 28.66 + 4.496 X \text{ [CRL} < 20 \text{ cm]}$$

$$Y = 73.544 + 2.256 X \text{ [CRL} \geq 20 \text{ cm]}$$

where, Y is the age in days and X is the CRL of fetuses in centimeters (cm). After measurement of CRL, the fresh and unfixed adrenal glands from 9 buffalo fetuses were quickly frozen in liquid nitrogen. These tissues were subjected to cryostat sectioning at -20°C . The 10–12 μm sections were obtained on clean glass slides and these sections were stored temporarily in deep freezer before incubation

for the histoenzymic demonstration of enzymes as detailed below:

Enzyme	Substrate	Method	Reference	Incubation time
Non-specific esterase (NS)	Alpha naphthol acetate	Napthol method	Barka and Anderson (1963)	10 min
Acetylcholin-esterase (AChE)	Acetyl thiocholine iodide	Thiocholine method	El-Badawie and Schenk (1967)	60 min

The duplicate sections were counterstained either with nuclear fast red or with Meyer's haematoxylin. The positive and negative controls were carried out, wherever possible.

RESULTS AND DISCUSSION

Esterases

Non specific esterases (NSE): The NSE activity was weak in the capsule and stroma of the adrenal gland of buffalo fetuses in group 1. Similarly Bielanska-Osuchowska (1989a) reported that the celomic epithelium covering the capsule of the adrenal gland of pig fetuses showed a positive NSE activity. The foetal cortical cells of the adrenal gland of buffalo showed a strong to intense granular NSE activity. On the contrary, Bielanska-Osuchowska (1989a) observed absence of NSE activity in the foetal cortical cells in the adrenal gland of pig fetuses. In the present investigations, the cells of outer zone of the medulla showed a negative to weak diffuse NSE activity, however, the activity was moderate and granular in the inner zone of the medullary

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cells of the buffalo foetuses.

In groups 2 and 3 the NSE activity was strong to intense in the definite cortex and strong in the foetal cortex of the adrenal gland of buffalo foetuses. Both the zones of the medulla showed a weak activity. However, Bielanska-Osuchowska (1989a,b) reported no NSE activity in the undifferentiated, definitive cortical and FC cells in the pig foetuses.

Acetylcholinesterases (AChEase): The AChEase activity was associated with neuronal elements. It was strong in the nerve fibres of foetal cortex of the adrenal gland of buffalo foetuses in group 1. The strong activity was also observed in the subcapsular area. The neuronal elements of both the outer and inner zones of the medulla showed a moderate to strong activity. The activity was intense in the neuronal elements passing to medulla through the capsule via the cortical tissue. Bloom and Fawcett (1975) described that preganglionic sympathetic nerve fibres traversed through adrenal capsule and cortex to terminate in the medullary parenchyma that secretes adrenaline and noradrenaline. These preganglionic sympathetic nerve fibres are basically cholinergic in nature. So the present findings confirmed that AChEase positive fibres are sympathetic preganglionic fibres and medullary cells received impulses through fibres for the purpose of hormone secretion. The similar results were observed by Bhattacharya and Saigal (1987) in the adrenal gland of goat.

In groups 2 and 3 the AChEase activity was negative to weak in the definite and foetal cortex of the adrenal gland of

buffalo foetuses. Both the zones of the medulla showed a moderate activity.

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