AGE RELATED HISTOCHEMICAL STUDIES ON THE THYROID GLAND IN MALE ASSAM GOATS (CAPRA HIRCUS) FROM BIRTH TO TEN MONTHS OF AGE*

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ABSTRACT

This study was conducted on the thyroid gland of thirty six male Assam goats divided into six age groups viz. group I (0 day), group II (2 months), group III (4 months), group IV (6 months), group V (8 months) and group VI (10 months) consisting of 3 animals in each group. Tissue pieces from the thyroid lobes and isthmus were fixed in 10 per cent Neutral Buffered Formalin solution and subsequently processed for paraffin sections and stained with Mercuric Bromphenol Blue method for Protein, McManus method for glycogen, Alcian Blue method at pH 1.0 for acid mucopolysaccharides and Fuelgen reaction for nucleic acids. The reaction for basic proteins was weak in the capsule of thyroid glands from birth to 4 months of age (group I to III) and weak to moderate in the older goats. Within the follicles, the principal cells exhibited weak to moderate reaction in day-old kids (group I), moderate to strong in 4 and 6 months old goats (groups III & IV) and moderate reaction in the succeeding age groups. The Para follicular cells revealed weak to moderate reactions for basic proteins in day-old kids (group I), moderately reactive in 2 month old kids (group II) and exhibited a strong reaction in 4 and 6 months old bucks. The connective tissue of the capsule and inter follicular stroma of the thyroid glands were PAS positive. The basement membrane of the follicle showed moderate PAS reactions. The follicular and Para follicular cells exhibited weak to moderate PAS reactions. Fine glycogen granules could be seen at the apical border of the follicular cells in 4 and 6 months old goats (groups III & IV). The tissue of the thyroid gland showed very faint reaction to acid mucopolysaccharides in all the age groups except in 2 month old kids (group II), in which the inter follicular tissue revealed weak reaction. The connective tissue of the capsule, septae and the inter follicular stroma revealed very weak Fuelgen reaction in all the age groups. The Follicular and Para follicular cells of the thyroid follicles showed mild to moderate Fuelgen reaction in the kids of 4 months of age.

Key words: Assam goat, Histochemistry, Postnatal ages, Thyroid gland.

INTRODUCTION

The thyroid gland develops from the floor of the primitive pharynx and begins to synthesise and secrete thyroid hormones by 17 days of gestation (Said et al., 2007). The most numerous cell populations in the gland is the thyroid follicular cells which are responsible for secretion of iodated tyrosine derived hormones which exert important effects on development, growth and metabolism of the organ systems (Cabello and Wrutniak, 1989).

Among the different animals in which investigations pertaining to the anatomical study of the thyroid gland was made by various workers included goat (Agarwal and Bhattacharya, 1981; Baishya et al., 1986), Asiatic water buffalo (Mathur, 1971), sheep (Roy and Saigal, 1987), cattle (Sanap et al., 1998) and pig (Sekulic and Lovren, 1995). Pursuance these literatures revealed that no detailed systematic study on thyroid gland was conducted considering the sequence of morphological changes that takes place during postnatal development from birth to post pubertal period in animals. Hence, the present study was undertaken to elucidate the histochemical characteristics of the thyroid gland in Assam goats at various post natal ages from birth to ten months of age.

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MATERIALS AND METHODS

A total of 18 male Assam goats varying in age from 0-day to 10 months were used in the present study. The animals were divided into six age groups viz. group-I (0-day), group-II (2 months), group-III (4 months), group-IV (6 months), group-V (8 months) and group-VI (10 months) consisting of three animals in each group. The age of the goats were estimated from birth records. Each animal was weighed using Spring Balance to record the body weight. The animals were sedated by giving intramuscular injection of Siquil (Triflupromazine Hydrochloride) @ 1mg/Kg body weight and subsequently anaesthetized by administering intravenous injection of Intravel Sodium (Pentobarbital Sodium)@ 15 mg/Kg body weight (Hall et al., 2000). After induction of proper level of anesthesia, the animals were sacrificed.

Each lobe of thyroid gland was separated. Thyroid lobes and isthmus were fixed in 10 per cent Neutral Buffered Formalin solution. All the tissues were processed for paraffin sections (Luna, 1968) by alcohol-xylene method using ceder wood oil. Sections were cut at 5μ thickness using a Rotary Microtome (Thermo, Germany). Paraffin sections were stained with Mercuric Bromophenol Blue method for Protein, McManus method for glycogen, Alcian Blue method at pH 1.0 for acid mucopolysaccharides and Fuellgen reaction for nucleic acids.

RESULTS AND DISCUSSION

The reaction for basic proteins was weak in the capsule of thyroid glands from birth to 4 months of age (group-I to III) and weak to moderate in the older goats. However, the connective tissue stroma located between the thyroid follicles showed weak reaction in day-old kids (group-I), moderate in the kids of 2 and 4 months of age (groups-II & III) and weak in the older animals. Within the follicles, the principal cells exhibited weak to moderate reaction in day-old kids (group-I), moderate to strong in 4 and 6 months old goats (groups-III & IV) and moderate reaction in the succeeding age groups indicating that these cells became more active secreting more glycoprotein in the form of colloid at this age. Again, the para follicular cells revealed weak to moderate reactions for basic proteins in day-old kids (group-I), moderately reactive in 2 month old kids (group-II) and exhibited a strong reaction in 4 and 6 months old bucks (groups-III & IV), which probably could draw the same justification of being more secretory at 4 to 6 months of age in before or at the onset of puberty. However, no relevant information in this aspect in growing kids was found in the available literature to compare to these present findings.

The connective tissue of the capsule and inter follicular stroma of the thyroid glands were PAS positive. The basement membrane of the follicle showed moderate PAS reactions. The follicular and Para follicular cells exhibited weak to moderate PAS reactions. However, fine glycogen granules could be seen at the apical border of the follicular cells in 4 and 6 months old goats (groups-III & IV). The follicular colloid was weakly reactive in day-old kids (group-I), showed moderate reaction in 2 months old kids (group-II) and revealed strong PAS reaction.

FIG.1: Photomicrograph of the thyroid gland in an eight months old buck showing PAS reaction in the follicular colloid. McManus method, 400 X.
at 4 month of age (group-III) (Fig.1). The PAS reactivity of colloid material gradually decreased to moderate in 8 month old bucks (group-IV) and weak to moderate in the goats of 10 months of age (group-VI). Roy and Yadav (1977) reported that the thyroid follicular cells and colloid of Indian buffalo were PAS positive. Further, Sanap et al. (1998) observed that the PAS reactivity in the thyroid follicles was moderate in pre pubertal and pubertal cattle, while the follicular cells showed weak PAS reaction in younger animals, the colloid being intensely PAS positive in both the groups.

As evidenced from this study, the tissue of the thyroid gland showed very faint reaction to acid mucopolysaccharides in all the age groups except in 2 month old kids (group-II), in which the inter follicular tissue revealed weak reaction. However, no relevant literature was found available to compare to the present findings.

The connective tissue of the capsule, septae and the inter follicular stroma revealed very weak Fuellgen reaction in all the age groups in the present study. However, the Follicular and Para follicular cells of the thyroid follicles showed mild to moderate reaction in the kids of 4 months of age (group-III), which might be due to an enhanced mitotic activity of these cells at that age. However, no relevant literature was found available to compare to the present findings.

CONCLUSIONS

This study was conducted on thirty six male Assam goats divided into six age groups viz. group-I (0-day), group-II (2 months), group-III (4 months), group-IV (6 months), group-V (8 months) and group-VI (10 months) consisting of 3 animals in each group to study the histochemical architecture of the thyroid glands. The follicular and Para follicular cells revealed weak to moderate reactions for basic proteins in day-old kids, moderately reactive in 2 month old kids and exhibited a strong reaction in 4 and 6 months old bucks, which probably could draw the justification of being more secretory at 4 to 6 months of age in before or at the onset of puberty. The connective tissue of the capsule and inter follicular stroma of the thyroid glands were PAS positive. Again, the tissue of the thyroid gland showed very faint reaction to acid mucopolysaccharides in all the age groups except in 2 month old kids. The Follicular and Para follicular cells of the thyroid follicles showed mild to moderate Fuellgen reaction in the kids of 4 months of age.

REFERENCES