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Histomorphological study of postnatal changes in the bulbourethral gland of buffalo

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ABSTRACT

The postnatal changes in the bulbouretheral gland in buffaloes (17) aged 6 months, 1–1.5 years, 2–2.5 years and > 3.5 years with 5, 4, 4 and 4 animals in each group, respectively, were studied. The histological investigations revealed that the bulbourethral gland in buffalo was compound tubulo-acinar type. At 6 months of age the lobulation was not distinct and the parenchyma comprised of ducts, tubular invaginations and non-luminated solid cell masses. The lobulation became distinct at prepubertal age. Mucous acini appeared at puberty. Characteristic glands with predominant mucous acini developed in adults. Epithelium of intralobular ducts varied from cuboidal to columnar type while main secretory ducts had transitional type epithelium even at 6 months of age.

Key words: Buffalo, Bulbourethral gland, Histomorphology

The information on the histomorphology of bulbourethral glands is available for bull (Trotter 1959), domestic animals (Dellmann and Wrobel 1987), camel (Ali *et al.* 1978, Degan and Lee 1982, Sambyal 1989), ram (Aitken 1959) and buck (Wrobel 1970, Kundu 1980, Gupta and Singh 1982, Pyne *et al.* 1990, 1991, Farooqui *et al.* 1997). Little literature is available on this aspect in buffalo, hence the present study was undertaken.

MATERIALS AND METHODS

Apparently healthy male Murrah buffaloes (17) aged 6 months to > 3.5 years were divided in 4 age groups, viz. aged 6 months, 1–1.5 years, 2–2.5 years and > 3.5 years with 5, 4, 4 and 4 animals, respectively, in each group. The age of animals was estimated on the basis of eruption and wear and tear of teeth (St. Clair 1975). The tissue samples from the bulbourethral glands of the above animals were collected at the earliest (but within 30 min) after the slaughter of the animals and transferred to the Bouin's fixative for paraffin sectioning. Tissue samples fixed in Bouin's fixative from all the animals were treated for the routine post-fixation and processed for paraffin blocks using cedar wood oil schedule (Luna 1968). The transverse sections of 5 μm thickness were stained by Mayer's heamatoxylin and eosin staining for routine examination (Luna 1968), Masson's trichrome method for connective tissue (Sheehan and Hrapchak 1973), Verhoeff's stain for elastic fibres (Sheehan and Hrapchak 1973) and Gridley's silver impregnation method for reticular fibres (Sheehan and Hrapchak 1973).

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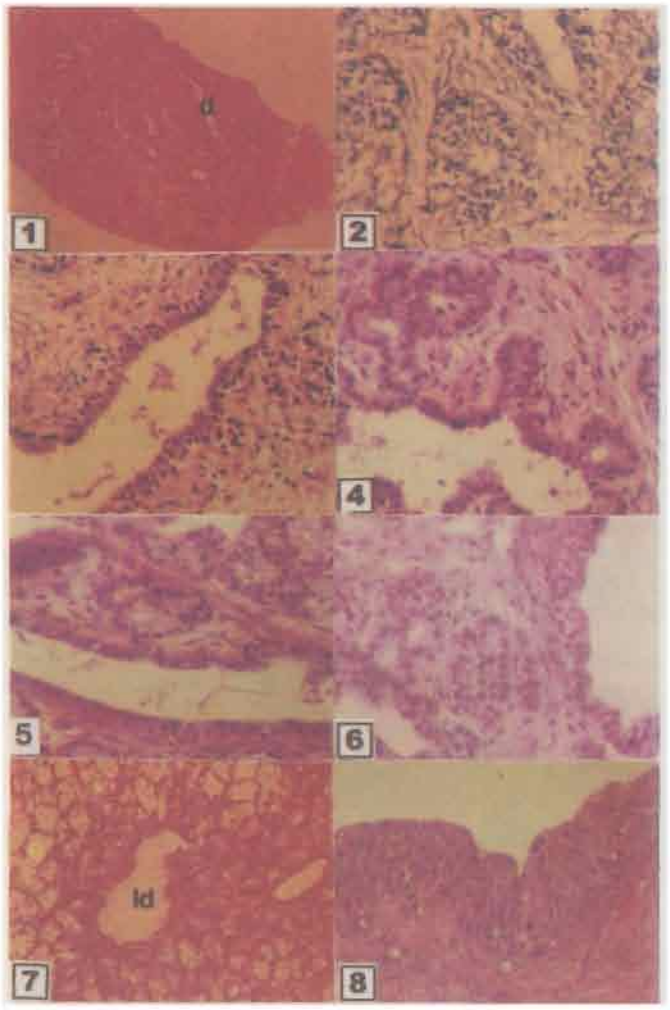
RESULTS AND DISCUSSION

In 6-month old buffalo calves a thin collagenous connective tissue surrounded the gland from which the connective tissue septae devoid of muscle fibres penetrated and divided it into the variably sized lobules (Fig.1). The interlobular and intralobular tissue comprised of undifferentiated connective tissue containing fine weakly argyrophilic reticular fibrils and stellate fibroblasts with processes (Fig.2). The stroma within the lobules and the interlobular connective tissue septae were undifferentiated comprising alcinophilic gelatinous or mucous connective tissue (Fig.3). In 1 to 1.5-year-old animals the septae were more prominent dividing the gland into lobules and comprised dense collagenous connective tissue with no muscle fibres. The intralobular connective tissue was still gelatinous or mucous type (Figs 4,5,6). In 2 to 2.5-year-old and adult (>3.5years) animals the intralobular stroma constituted thin layer of connective tissue. While no muscle fibres in interlobular septae were found in buffalo, they have been reported in bull (Trotter 1959) and goat (Kundu 1980).

The parenchyma was poorly developed and comprised mostly of large and small ducts with tubular invaginations and non-luminated solid cell masses emerging from the



Figs 1–8. Photomicrographs of buffalo bulbouretheral glands. **1.** at 6 months ×20; **2–3.** 8. at 6 months ×400; **4–6.** at 1–1.5 years ×400; **7.** In adults ×100. (1, 3–8: Hematoxylin and eosin stain; 2: Gridley's reticular stain; d: main duct; ld: lobular duct.)

intralobular ducts, in 6-month old calves. In 1 to 1.5-year-old buffalo calves the peculiar tubulo-acinar secretory units developed characterising the gland as compound tubulo-acinar with some of non-luminal end pieces still present. Also Sudhakar (1982) observed mostly solid and few luminated end pieces in the bulbourethral gland of buffalo calves up to 2 years of age.

The different types of secretory end pieces observed at this stage included—(i) secretory end pieces sprouting from ducts with no lumen, (ii) tubular secretory end pieces sprouting from ducts with lumen, (iii) acinar secretory end pieces sprouting from ducts with lumen, and (iv) tubulo-acinar end pieces. The number of these different types of secretory end pieces varied in different areas of the gland indicating variable extent of development in different areas of the gland. In 2 to 2.5-year-old animals, the same different types of secretory end pieces appeared in the developing area in the viscinity of main secretory duct, whereas those in the peripherally developed glandular areas comprised majority of mucous acini with few serous acini or tubular structures. In adults the characteristics of compound tubulo-acinar pattern with compound parenchyma became well evident with predominance of mucous acini (Fig.7). This is in agreement with the observations of Sudhakar (1982) who found that from 4 years onward the bulbourethral gland became compound tubulo-alveolar and the differentiation into serous and mucous end pieces occurred, the gland being predominantly mucous in nature. Also Singh (1967) determined the buffalo bulbourethral gland as tubulo-alveolar type. Tubulo-alveolar type of bulbourethral glands were described in bovine (Trotter 1959), buffalo (Singh 1967), camel (Degan and Lee 1982), stallion, bull and ram (Dellmann and Wrobel 1987) and pig (Bhardwaj and Calhoun 1962), whereas compound tubular type glands were described in cattle, goat, sheep and cat (Bhardwaj and Calhoun 1962), goat (Kundu 1980) and boar, cat and buck (Dellmann and Wrobel 1987).

In 6 months old animals the epithelium of the intralobular ducts varied from columnar in larger ducts to cuboidal in smaller ones with frequent occurrence of basal cells. The epithelium continued to change through interlobular ducts to main secretory duct where it was characteristically transitional type (Fig.8). In 1 to 1.5-year-old animals it was almost the same as in the younger animals except that the smallest intralobular ducts with low cuboidal epithelium and the interlobular ducts with transitional type of epithelium were also seen (Fig.6). At puberty the large interlobular ducts at certain levels presented epithelium foldings which were lined with high cuboidal to pseudostratified columnar epithelium. In the adults, however, some of the intralobular ducts showed irregular lumen due to few epithelial folds (Fig.7). Their interlobular ducts had mucosal foldings, the epithelium lining them varying from cuboidal to columnar with mucous acini located within the mucosa quite frequently (Fig.5). Varying types of epithelium lining the ducts of the bulbourethral glands have been described in different species. In buffalo, while Singh (1967) observed it to be simple and stratified columnar epithelium, Chandrapal (1976) observed that the interlobular ducts were lined with simple columnar, pseudostratified or stratified columnar epithelium, whereas, Sudhakar (1982) stated that ducts were being lined by stratified cuboidal epithelium. In bull, the ductular epithelium became transitional near its termination (Bhardwaj 1960). In camel, the primary ducts were lined with pyramidal or columnar cells while the main duct was lined with transitional epithelium (Ali *et al.* 1978). In goat, the lining epithelium of collecting sinus was stratified cuboidal or stratified columnar (Pyne *et al.* 1991). The glandular epithelium lining the luminated end pieces of bulbourethral gland in buffalo varied, in general, from cuboidal to columnar, which in mucous acini comprised of tall pyramidal cells containing numerous vacuolations. The description is more or less similar to that described in buffalo (Sudhakar 1982) and camel (Ali *et al.*

1978, Degan and Lee 1982). The mucous acini were not seen at 6-months and in 1 to 1.5-year-old buffalo calves. At puberty although the mucous acini located in the developing areas in the vicinity of secretory duct, those in the peripheral developed glandular areas comprised of mucous acini. In adults majority of the secretory end pieces were mucous type but serous end pieces were also seen in the vicinity of intralobular ducts. Acini with serous as well as mucous cells, the acini with all serous cells and the acini with all mucous cells were observed. Mucous type of alveoli and few serous ones were described earlier in buffalo by Sudhakar (1982) and in goat by Wrobel (1970) and Gupta and Singh (1982). The cells resembling centro-acinar cells were evident in the adult male buffalo.

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