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Research Article

HISTOMORPHOLOGICAL STUDIES ON THE OVIDUCT OF GOAT (CAPRA HIRCUS) DURING FOLLICULAR AND LUTEAL PHASES

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ABSTRACT

The present study was conducted on the oviduct of adult goats during follicular and luteal phases. Histological study revealed that the primary and secondary folds decreased in height and number from infundibulum to isthmus, however, they were more during follicular phase than luteal phase. The epithelial lining was mainly pseudostratified columnar containing PAS positive ciliated and secretory cells during follicular and luteal phases. The cyclic changes were more pronounced in the infundibulum and ampulla of the oviduct. The thickness of tunica muscularis increased towards the isthmus during follicular phase.

Key words: Follicular and luteal phases, goat, histology, oviduct

The epithelium of the oviduct plays a significant role in the secretion of oviductal fluids that are vital for the survival and transportation of gametes and also provides an intrinsic environment for the sperm capacitation and fertilization. The success rate of fertilization and early embryonic development is dependent upon the oviduct that provides a satisfactory micro-environment for various events to take place. Hence, the present study was conducted to explore histological architecture of the oviduct during two phases of the estrous cycle in goats.

MATERIALS AND METHODS

Reproductive tracts of ten adult and apparently healthy ten adult goats (n=10) were collected immediately after slaughter. The presence of corpus luteum or growing follicles confirmed the luteal and follicular phases, respectively. The tissues were collected from infundibulum, ampulla and isthmus of each oviduct (5 each for luteal and follicular phase) and preserved in 10% neutral buffered formalin solution. The tissues were processed for light microscopy technique and paraffin sections of 5-6 µ were stained with haematoxylin and eosin for routine histomorphology, Crossman's trichrome method for collagen fibres (Crossman, 1937), Periodic Acid Schiff, Alcian Blue for mucosaccharides, Gomori's method for reticular fibres and Weigert's method for elastic fibres (Luna, 1968).

RESULTS AND DISCUSSION

Histological examination revealed that the wall of goat's oviduct had tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa. The tunica mucosa was further subdivided into lamina epithelialis and lamina propria. Lamina propria and tunica submucosa were blended together because of absence of distinct lamina muscularis mucosae. The tunica mucosa of infundibulum was a highly folded structure and the folds were categorized into primary, secondary and tertiary types (Fig. 1). The highly branched folds appeared to unite at the base forming pseudoglands during follicular phase as described earlier in sheep (Abdalla, 1968), goat (Singh and Prakash, 1990; Rajesh *et al*., 1997) and buffalo (Natarajan *et al.,* 2003; Ayen *et al.,* 2012).

During luteal phase, the number and the height of primary folds were less in comparison to follicular phase. The mucosa of isthmus did not have as many folds as in the ampulla during follicular phase. The folds continued as pocketings deep into mucosa reaching upto the tunica muscularis. Secondary folds were rare. The mucosal folds were lined by pseudostratified columnar epithelium having ciliated and secretory cells (Fig. 2) during follicular and luteal phases.

The secretory cells were more during luteal phase. The stroma was formed of loose connective tissue and rich in blood vessels, collagen and reticular fibres. Elastic fibres were sparse and seen mainly in the wall of blood vessels during both phases. However, the study of Marettova and Maretta (2014) revealed that elastic fibres positive for elastin formed a dense network at the base of the mucosal folds and in the muscle layer. Cellular infiltration of macrophages, lymphocytes and lymphoblast cells was also observed. The collagen fibres were present throughout the propria submucosa forming a

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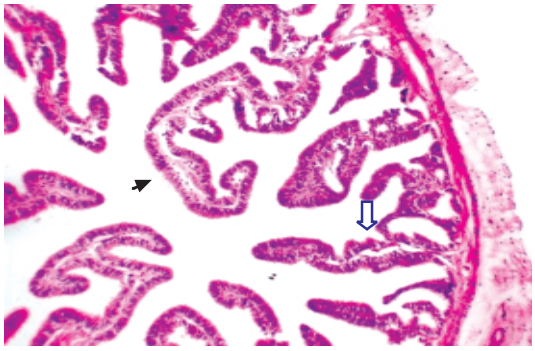

Fig 1. Photomicrograph showing epithelium of infundibulum with primary (➔) and secondary folds (⇩) during follicular phase. H & E ×100

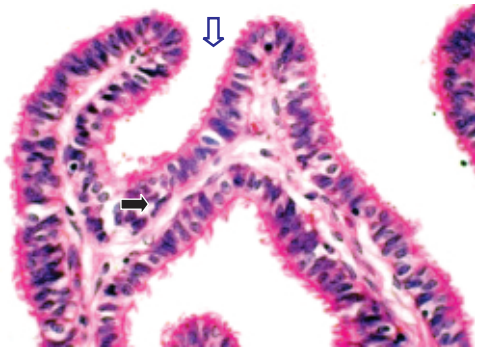

Fig 2. Photomicrograph of oviduct showing pseudostratified columnar epithelium with ciliated (➡) and secretory cells (⇩) during follicular phase. H & E ×400

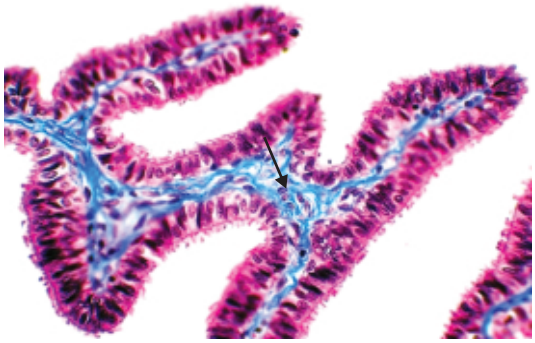

Fig 3. Photomicrograph of oviduct showing the presence of collagen fibers in the propria submucosa (⟶). Crossman's trichome ×400

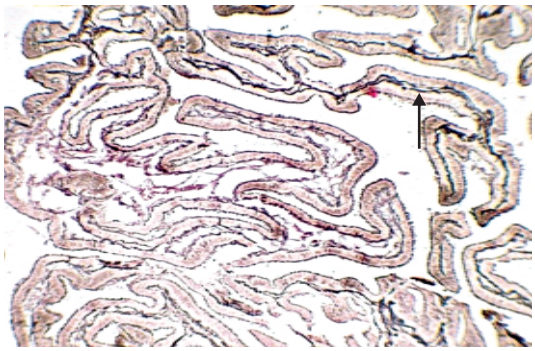

Fig 4. Photomicrograph of oviduct showing the presence of reticular fibers (⟶) in the mucosal folds. Gomori's stain ×100

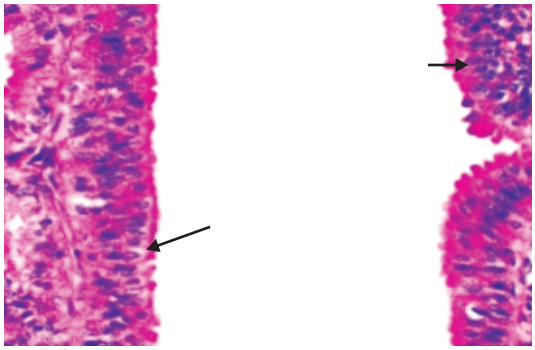

Fig 5. Photomicrograph of infundibulum showing the presence of soluble carbohydrates (➔) in supra nuclear zone of epithelium. McManus method ×400

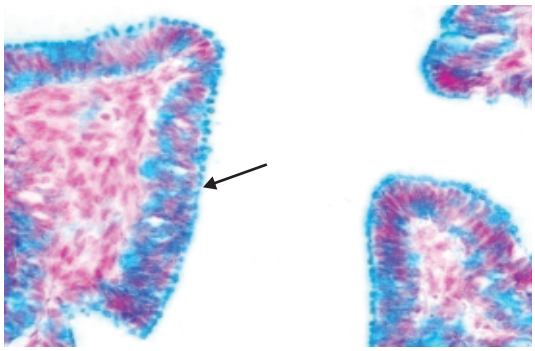

Fig 6. Photomicrograph of epithelial folds of oviduct showing acidic mucopolysaccharides (➔) in lamina epithelialis. Alcian blue ×400

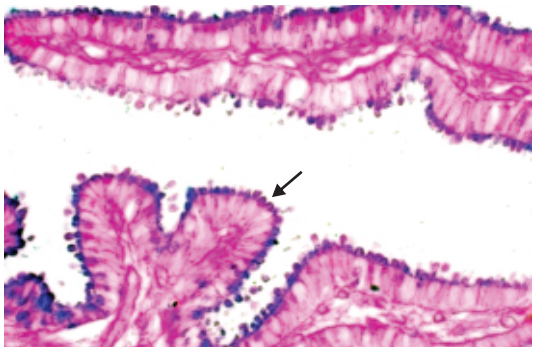

Fig 7. Photomicrograph of ampulla showing the presence of acidic and neutral mucopolysaccharides (⟶) in the luminal zone of epithelium. PAS-AB ×400

network (Fig. 3). The core of the primary and secondary folds contained reticular fibres which extended from the tunica muscularis towards the tip of folds (Fig. 4). Tunica muscularis contained most of the circularly arranged muscle fibers which were loosely arranged. The thickness of tunica muscularis was more during follicular phase than the luteal phase.

The histochemical study revealed a strong PAS positive reaction towards apical border of epithelium of infundibulum, ampulla and isthmus but weak reaction at utero-tubal junction. The intensity of PAS reaction was more intense during follicular phase than the as

compared to luteal phase (Fig. 5). Natarajan *et al.* (2003) reported that the oviduct epithelium in goat had a PAS positive zone that varied depending upon the levels of circulating estrogen in the blood. The increased intracytoplasmic concentration of PAS positive material was observed during follicular phase. These materials when stained with Alcian blue at pH 2.5 suggested the presence of sulphated acid mucopolysaccharides (Fig. 6). Further the PAS-Alcian blue stain revealed the presence of both acid and neutral mucopolysaccharides (Fig. 7).

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