



Research Article

COMPARATIVE HISTO-ARCHITECTURAL STUDY OF GRAVID AND NON-GRAVID OVIDUCTS OF GAROLE SHEEP

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Abstract- The present investigation was conducted to explore the histo-architectural study of both the gravid and non-gravid oviducts of garole sheep. No line of demarcation between *lamina propria* and *tunica submucosa* because of the absence of *lamina muscularis*. *Lamina epithelialis* was composed of pseudostratified columnar epithelium with stereocilia on maximum cells. The epithelial height was more in gravid oviduct. The height and branching of the longitudinal folds of tunica mucosa were more in gravid oviduct. The elastic fibers were found mainly in the wall of blood vessels. Comparatively the average diameter of glandular epithelium was maximum in gravid oviduct. In both the groups the apical borders of lining epithelium showed strong PAS positive reaction. There was no longitudinal muscular layer in tunica muscularis and the collagen fibers were interspersed within the circular muscles layers. A very less amount of mucopolysaccharides were present in both the tunica muscularis and tunica serosa layers.

Keywords- Garole sheep, Gravid, Oviduct, Histology

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Introduction

Livestock plays an important role in the national economy of an agricultural developing country like India and they are reared for the production of milk, meat and wool, particularly in arid, semitropical or mountainous areas. Garole sheep (*Ovis aries*) are distributed in the Sundarban region of West Bengal in India. Twin and triplet births are common and they are reared mainly for mutton production [8]. They are seasonally polyestrous. Generally during spring season they conceive and become pregnant/gravid. The fetal development occurs in horn of the uterus. Morphological and histological studies are important criteria for assessing the reproductive status in animals. The mammalian oviduct is a steroid responsive tissue consisting of three anatomically and functionally distinct regions. The detailed morphological knowledge of oviduct may help in improving the treatment of its anatomical and physiological disturbances. The histomorphological study of oviduct in particular will help to correlate the importance of regional variations in the oviduct with the fertility. Keeping in view the high prolificacy regulated reproductive behaviour and scanty of literature the present study has been undertaken to elucidate the histomorphological characteristics of oviduct of gravid and non-gravid ewes.

Materials and Methods

To undertake the present investigations, apparently healthy 6 gravid and 6 non-gravid oviducts of ewes were procured from Govt. registered slaughter unit, West Bengal. The samples were processed for routine histological sectioning as per Luna [3]. All sections were cut at 5µm thickness. The sections were stained with routine Haematoxylin and Eosin [3], Masson's Trichrome [3] to visualize the collagen fibers, PAS-Alcian Blue Staining (PH 2.5) [3] for demonstration of neutral and acid mucopolysaccharides and Weigert's Resorcin Fuschin Method [12] for elastic fibers identification. Microtomy and micrometry were done by Leica 2125 DM rotary microtome and Leica DM 2000 microscope with Leica Qwin software standard statistical procedure were followed.

Results and Discussion

Different parts of oviduct were randomly selected for histological observations from both the groups. All parts were consisted of tunica mucosa, tunica submucosa, tunica muscularis and tunica serosa from inward to outward direction. Shankhapal et al. [11] and Katare et al. [2] observed similar result in goat. The mucosa was composed of lamina epithelialis and lamina propria. There was no line of demarcation between lamina propria and tunica submucosa due to the absence of lamina muscularis. Lamina epithelialis was composed of pseudostratified columnar epithelium with stereocilia on most of the cells. Secretory activity was found in the non-ciliated cells, alcinoiphilic cells [Fig-3]. Mucopolysaccharides were denoted by alcinoiphilic cells as these were PAS Alcian Blue positive. The average heights of the ciliated and non-ciliated epithelium were $49.35 \pm 2.24 \mu\text{m}$ and $42.16 \pm 1.88 \mu\text{m}$ in gravid oviduct and $41.70 \pm 1.93 \mu\text{m}$ and $37.47 \pm 1.64 \mu\text{m}$ in non-gravid oviduct. The epithelial height was more in gravid oviduct. Saleem et al. [10] observed that the oviduct of Bakerwali goat was lined with pseudostratified columnar ciliated epithelium in infundibulum and ampulla. Tunica mucosa was characterised by presence of longitudinal folds throughout the length of the oviduct. It was frequently folded and within the fold further infolding were noticed which were characterised by primary, secondary and tertiary folds [Fig-1]. Similar finding was cited by Singh and Prakash [13], Rajesh et al. [6] and Natarajan et al. [5]. The height and branching of the folds were more in gravid oviduct. The lamina propria and submucosa were composed of loose connective tissue with abundant collagen fibers. Sahu et al. [9] documented similar features in goat. Beside plasma cells, lymphocytes, blood vessels and elastic fibers were found in the submucosa and propria layers. Maretova and Maretta [4] revealed that elastic fibres (positive for elastin) formed a dense network at the base of the mucosal folds of goat. Oviductal glands were simple tubulo-alveolar type formed by the invagination of the lining epithelium and were found into the lamina propria-submucosa [1]. The average glandular secretory epithelium thickness was $25.25 \pm 1.32 \mu\text{m}$ and $15.92 \pm 0.76 \mu\text{m}$ of gravid and non-gravid ewes.

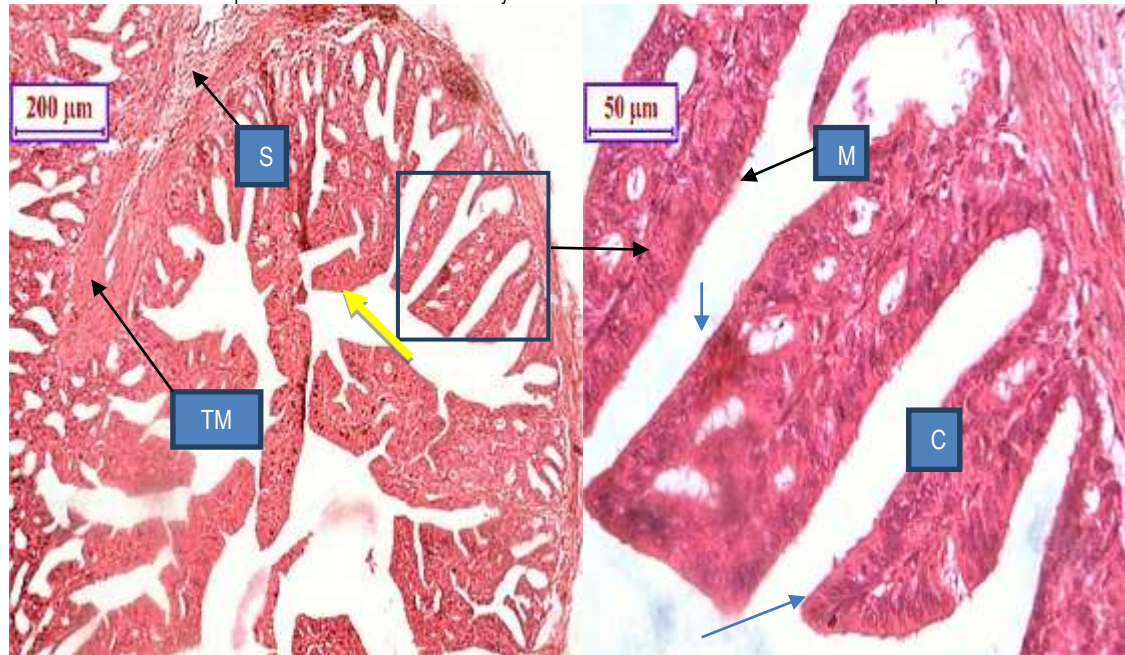


Fig-1 Photomicrograph showing non-gravid oviduct (10X) with high magnification (40X), (S) tunica serosa, (TM) tunica muscularis, (C) mucosal fold, (M) microvilli, (yellow arrow) branched mucosal fold and (blue arrows) simple columnar epithelium. Haematoxylin and Eosin.

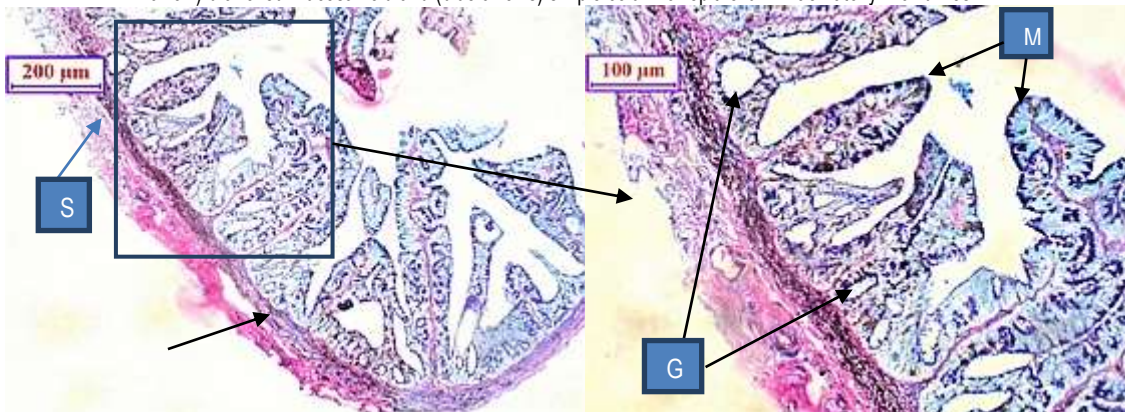


Fig-2 Photomicrograph showing non-gravid Oviduct, (S) tunica serosa and (arrow) tunica muscularis. PAS-AB 10X.

Fig-3 Photomicrograph showing non-gravid oviduct, (G) glands and (M) alcinophilic mucous cells (secretory cells). PAS-AB 20X.

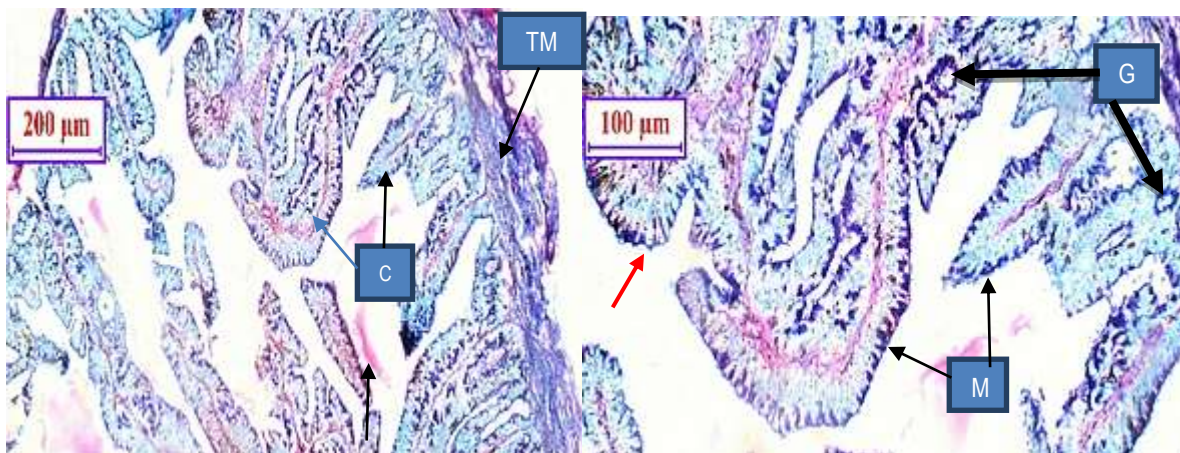


Fig-4 Photomicrograph showing gravid oviduct, (C) mucosal folds and (TM) tunica muscularis, PAS-AB 10X.

Fig-5 Photomicrograph showing gravid oviduct, (M) alcinophilic cells and (G) glands (arrow) apical bleb, PAS-AB 20X.

The secretory material was accumulated in the supra nuclear zone and also apical blebs were formed along the microvillus border of the epithelium indicating apocrine mode of secretions [Fig-3] & [Fig-5]. In follicular and luteal phase, the apical borders of lining epithelium showed strong PAS positive reaction. Similar findings was reported by Restall [7] in ewe, Joshi *et al.* [1] in goat, Natarajan *et al.* [5] in buffalo, Katare *et al.* [2] and Saleem *et al.* [10] in goat. Tunica muscularis was consisted of circular smooth muscle bundles. There was no longitudinal

muscular layer. The average thickness of circular muscle layers were 58.20 ± 2.75 μm in gravid and 47.55 ± 2.18 μm in non-gravid oviducts. The collagen fibers were interspersed within this layer [Fig-6]. There was moderate PAS-AB reaction, revealing the presence of alcinophilic cells, the mucopolysaccharides [Fig-4] in both the gravid and non-gravid ewes. Similar observation was made by Saleem *et al.* [10]. The tunica serosa was composed of mainly collagen fibers and smooth muscle fibers.

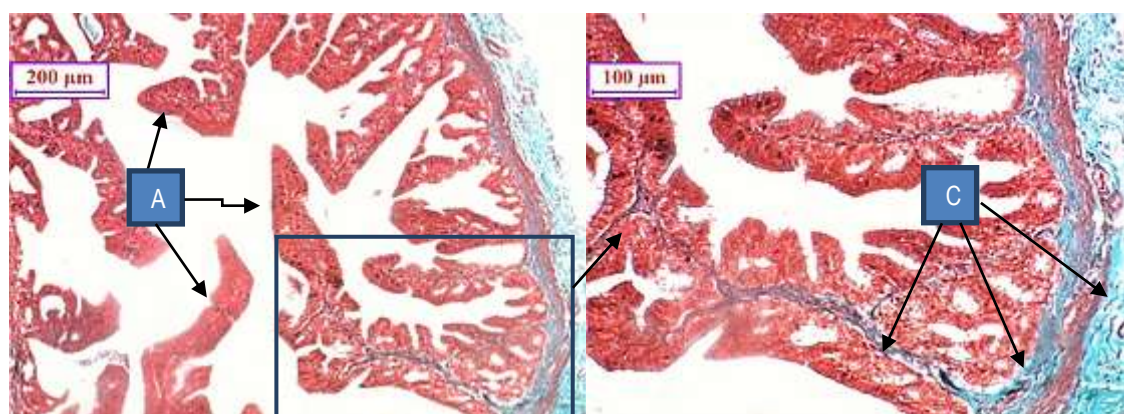


Fig-6 Photomicrograph showing non-gravid oviduct (10X) with high magnification (20X), (A) mucosal folds and (C) collagen fibers. Masson's Trichrome.

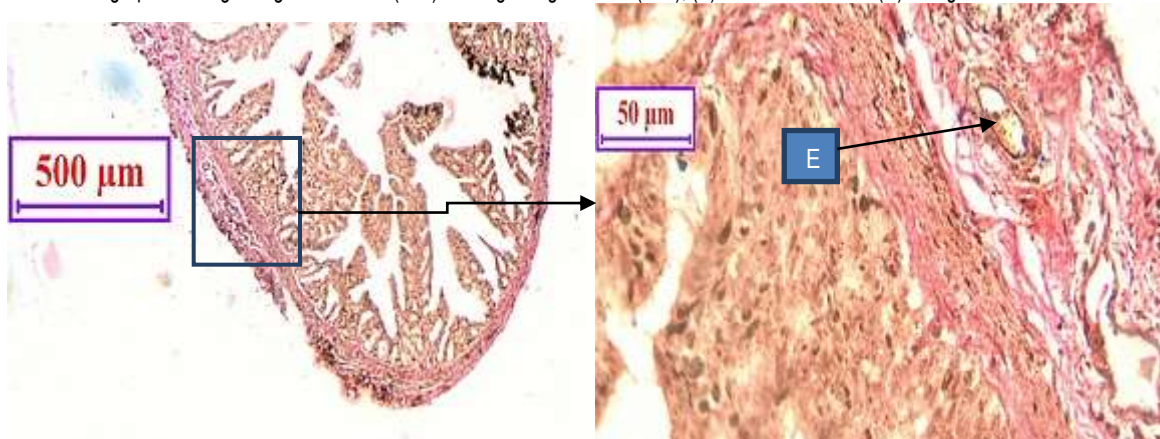


Fig-7 Photomicrograph showing non-gravid oviduct (4X) with high magnification (40X), (E) elastic fiber of blood vessel. Weigert's Resorcin Fuschin Method.

Fine blood vessels were also found in this serosal layer and the elastic fibers were found mainly in the wall of blood vessels [Fig-7]. The serosal layer showed weak reaction for PAS-AB [Fig-2].

Conclusion

On histological examination it was revealed that lamina muscularis was absent throughout the length of oviduct in ewes. Lamina epithelialis was composed of pseudostratified columnar epithelium with stereocilia on most of the cells. The epithelial height was more in gravid oviduct. The height and branching of the longitudinal folds of tunica mucosa were more in gravid oviduct. The elastic fibers were found mainly in the wall of blood vessels. Comparatively the average diameter of glandular epithelium was maximum in gravid oviduct. In both the groups the apical borders of lining epithelium showed strong PAS positive reaction. There was no longitudinal muscular layer in tunica muscularis and the collagen fibers were interspersed within the circular muscles layers. A very less amount of mucopolysaccharides were present in both the tunica muscularis and tunica serosa layers.

Application of research: To understand micro-environment and cellular defense mechanism of the oviduct through which graffian follicles get matured, travelled and fertilizes.

Research Category: Basic Histo-architecture.

Abbreviations:

AB- Alcian blue
PAS- Periodic acid schiff
µm- Micrometer

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Research project name or number: MVSc Thesis

Author Contributions: All authors equally contributed.

Author statement: All authors read, reviewed, agreed and approved the final manuscript. All authors agreed that- Written informed consent was obtained from all participants prior to publish.

Study area / Sample Collection: Govt. registered slaughter unit, West Bengal, India

Breed name: Garole Sheep (*Ovis aries*)

Conflict of Interest: None declared.

Ethical approval: Discarded slaughter house sample were undertaken for the research.

Ethical Committee Approval Number: Nil

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