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Scanning Electron Microscopic Study on Oviduct of jaffrabadi Buffalo during Follicular Phase

Vishnudeo Kumar* and K N Vyas

Department of Veterinary Anatomy,

College of Veterinary Science & Animal Husbandry

Junagadh Agricultural University, Junagadh-362001, Gujarat, India

Corresponding Author: drvishnudeo@yahoo.co.in

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Abstract

The present study was conducted on oviduct of adult Jaffrabadi buffaloes during follicular phase of estrous cycle. Study revealed that the oviductal mucosa showed large number of longitudinal folds which were connected by transverse folds, lined with ciliated and non-ciliated cells. Lining epithelial of infundibulum was mainly consist of ciliated cell with few non-ciliated cells. Ampullary region in the follicular phase showed extensive ciliation similar to infundibulum. Isthmus showed less ciliated cells as compared to infundibulum and ampulla.

Key Words: Jaffrabadi buffalo, Oviduct, SEM, Follicular phase

Introduction

Buffaloes play an important role in rural livestock production, particularly in India. To improve the buffalo reproduction, better understanding of the cellular differences in relation to the functions that occur in the female reproductive tract, particularly in the oviduct, throughout the stages of estrous cycle in buffaloes is primarily required. (Tienthai *et al.*, 2008). The oviducts play an important role before fertilization, transporting the oocyte from the ovulated follicle in the ovary through the infundibulum and ampulla to the site of fertilization. So, keeping in view all these facts, the present study was conducted on the oviduct of Jaffrabadi buffaloes.

Materials and Methods

The study was conducted on oviduct of 10 adult Jaffrabadi buffaloes during follicular phase of estrous cycle. The oviduct collected fresh from local abattoir, after examining the status of ovaries. Tissue samples were collected from infundibulum, ampulla, and isthmus region. These tissues were thoroughly washed in chilled 0.1 M phosphate buffer (pH 7.2) and were subjected to fixation in 2.5% glutaraldehyde in 0.1 M phosphate buffer at 4°C for 4-6 hrs. followed by washing in 0.1 M phosphate buffer. Thereafter, the samples were dehydrated in ascending grade of acetone solutions i.e. 30%, 50%, 70%, 80%, 90%, 95% and 100% acetone (dry acetone) at 4°C. The specimens were mounted on aluminium stubs, coated with gold in sputter coater. The processed tissue samples were viewed under Zeiss EVO-18 (Germany) scanning electron microscope to take photographs.

Results and Discussion

Under the scanning electron microscopic observation, mucosa of the infundibulum showed large number of longitudinal folds which were connected with each other by transversely placed folds (Fig. 1) and mucosal crypts created by folds in close apposition. The folds were lined by ciliated and non-ciliated cells as described earlier by Kumar *et al.* (2008) in buffaloes and Pathak *et al.* (2012) in Sheep. Yániz *et al.* (2000) reported that near the time of ovulation, numerous spermatozoa were found in the periphery of the caudal isthmus within pockets of basal interfold areas, as well as within pockets of the tubo uterine junction.

In follicular phase, the epithelium of infundibulum was densely ciliated. The luminal surface of ciliated and non-ciliated cells were at about the same level, generally cilia extended above the apical part of non-ciliated cells. The cilia were uniform in length and quite evenly distributed. Few non ciliated cells interspersed between ciliated cells were observed. Numerous stubby microvilli protruded from apical surface of non-ciliated cells and they varied both in length and diameter. Some microvilli were interconnected due to continuity of their plasma membranes or due to secretory material. The non-ciliated secretory cells were rounded or elliptical apical surfaces and some non-ciliated cells also showed secretory cells at their apical surface (Fig. 2). These findings are in agreement with the findings of Hafez (1972) in female rabbits, Hafez and Kanagawa (1973) in cow, Abe *et al.* (1993) in goat and Kumar *et al.* (2008) in buffaloes. Contrary to above observations, Stalheim *et al.* (1975) reported that luminal surface of oviducts of cow, mare, sow and doe contained clusters of ciliated and non-ciliated cells in approximately equal numbers in the infundibulum and ampullary parts.

Mucosa of the ampulla was also thrown into longitudinal folds. During follicular phase the epithelium of ampulla were also richly ciliated, similar to the infundibulum. The ciliated cells were evenly distributed in the epithelium. The cilia of the ciliated cells were fairly uniform in length and evenly distributed and usually extended above the apical surface of the non-ciliated cells. At higher magnification, the non-ciliated cells appeared rounded on their apical surfaces. Well-developed microvilli were present on most of non-ciliated cells (Fig. 3). Similar observations were recorded by Kumar *et al.* (2008) in buffaloes and Sharma *et al.* (2015) in oviduct of caprine.

During follicular phase the epithelium of isthmus showed less ciliated cells as compared to infundibulum and ampulla. Epithelium of isthmus showed irregularly distributed ciliated cells present in groups amongst the non-ciliated cells. The cilia of ciliated cells were

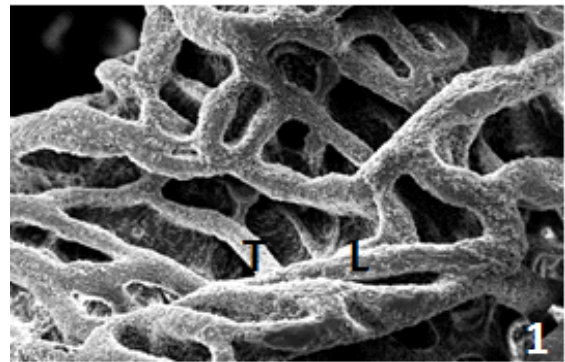


Fig-1. Scanning Electron Micrograph of oviduct showing presence of longitudinal (L) and Transverse Folds (T). X 321

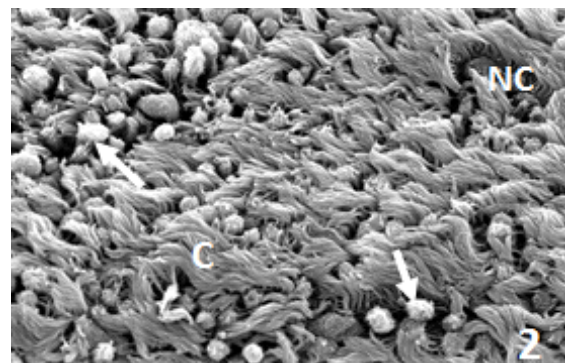


Fig-2. SEM micrograph of infundibulum in follicular phase showing ciliated cells with cilia (C), non-ciliated cell (NC) and secretory cells (Arrow). X 3.70K

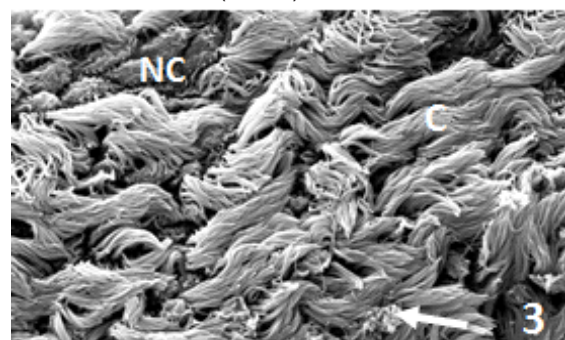


Fig-3. SEM micrograph of ampulla in follicular phase showing ciliated cells with cilia (C), non-ciliated cell (NC) and secretory cells (Arrow). X 5.79 K

varied in lengths and orientations. At some places large numbers of the non-ciliated cells were seen. The surface of non-ciliated cells had microvillous processes which were having a bulbous apical end. Few small sized secretory masses were present over the microvillous processes of non-ciliated cells (Fig. 4). Similar observation were reported by Abe and Oikawa (1993) in cow, Kamaci *et al.* (1999) in human and Tienthai *et al.* (2009) in Thai swamp buffalo.

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Conflict of Interest: All authors declare no conflict of interest.

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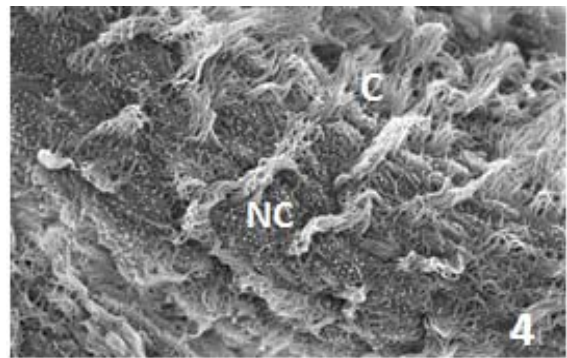


Fig-4. SEM micrograph of isthmus in follicular phase showing ciliated cells with cilia (C), non-ciliated cell (NC) and secretory cells (Arrow). X 4.50 K