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Histological study of oviduct in adult Iraqi Black Goat

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Abstract

The present study was aimed at the light microscopic examination of the oviduct and show epithelium structure of the iraqi goat oviduct, determination of the histochemical structure of the mucus secreted by epithelial cells, and muscular layers of The oviducts of Twelve healthy adult goat constituted the material of the study. using routine histological techniques by using Hematoxylin and eosin , masson trichrom for Histochemically, it was observed by using Pas Alcian Histological observations revealed that the oviduct consists of 4 layers of mucosa, submucosa, tunica muscularis and serosa. The primary and secondary folds increase both in number and in height in infundibulum and ampulla while less in number in isthmus. Epithelium of folds was composed of simple columnar, although seems pseudostratified in some areas, and contains ciliated and secretory cells. Histomorphometric examinations of three regions demonstrated that the mean height of primary folds increase and the mean thickness of tunica muscularis in isthmus The mean thickness of mucosa-submucosa in ampulla More visibility of the ciliated cells and mucosal folds in infundibulum and ampulla the thick tunica muscularis in isthmus transports sperm cells up; and both require promoting secretory products were increased in the tip of the mucosal fold than in the base. Conclusion By using light microscopic examinations lined by pseudo-stratified columnar epithelium. Mucosal folds were maximum in number in the tubual part of infundibulum, ampulla and least in isthmus in all stages of the animal. The propria–submucosa was comprised of loose connective tissue with blood vessels, abundant amount of collagen fibres and few reticular fibers histochemical staining demonstrated by means of the PAS reaction, and it was observed that secretion increased progressively towards the isthmus.

Key wards: Histology, Goat, oviduct.

I. INTRODUCTION

Mammal oviducts are paired, high, narrow, convoluted tubes that developed from paramesonephric ducts during the emberyonic stage (Pineda, 2003). Oviduct is connected to other female reproductive organs through the mesosalpinx portion of the broad ligament (Mustafa and Reshag., 2018). Main function of the oviduct was to capture and transport the ovum as well as transporting the spermatozoa to the ampulla for fertilization (Arthur et al., 1996). Oviduct divided anatomically into three parts in mammalian the infundibulum , ampulla and isthmus (Altai and

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Abdulla, 2011) Every part of the oviduct has a unique histological profile, anatomical structure, and function abdominal ostium of the oviduct surrounded by special structure such fimbriae surrounding the opening its located in the first part of oviduct infundibulum, while the second portion of the oviduct, known as the ampulla, is the largest portion and has lengthy mucosal folds that penetrate the lumen and take on a distinct shape and direction, the third part of oviduct isthmus thick muscular layer with short and width mucosal fold connected with the uterus. The oviduct epithelium is important for the production of oviductal fluids, which are necessary for the survival and transit of gametes, It also offers an intrinsic environment for the activation of sperm and fertilization. The intricate configuration of these mucosal folds in the ampulla nearly fully fills the lumen, leaving only a theoretical void. In the ewe, the mucosa consists of one layer of columnar epithelial ciliated and non-ciliated cells (Rajesh et al., 1997). The ciliated cells of the oviductal mucosa have slender motile cilia that extend into the lumen. The proportion of ciliated cells gradually decreases from the ampulla toward the isthmus and reaches a maximum in the fimbriae and infundibulum. Ciliated cells are noted in large numbers at the apices of the mucosal folds (Hafez and Hafez, 2000). The oviductal mucosa's nonciliated secretory cells typically contain secretory granules (Banks, 1993), the size and number of which vary widely among species and during different phases of the estrous cycle (Cigankova et al., 1996). The morphology of the ampullar epithelia in Mouse changes during estrous cycle. During estrus and metestrus, non-ciliated secretory cells make up the majority of the ampullar epithelial cells, but during diestrus and proestrus, ciliated cells predominate (Morita et al., 1997). The thickness of the tunica muscularis increases from the ovarian to the uterine end of the oviduct and constricts in response to hormones (Hafez and Hafez, 2000).

II. MATERIALS AND METHODS

The Animals: in This study were conduct on Twelve healthy female Iraqi black goats more than 7 months and their weight between 10-12 kg for All the goats were buy from the Iraqi market. The oviduct observed in the abdomen during surgical operations. The position in situ and the connections of the oviduct with ligaments observed and registered. Then after removed the all part of oviduct from the body observed and recorded (Khalaf and mirhish, 2018). tissue sections collected from three regions of infundibulum, ampulla and isthmus of each oviduct. Tissue samples were preserved in 10% neutral buffered formalin solution. After complete fixation of tissues, specimens were processed through routine paraffin embedding. Transverse sections were cut at 5-7 µm thickness and stained with haematoxylin and eosin for routine histological process (AL-A´araji and AL-Kafagy, 2016) and PAS-Alcian for mucin and reaction for carbohydrate compounds of epithelial cells , and masson trichrom for muscular and elastic fibers, and periodic acid schiff (PAS) reaction for carbohydrate compounds of epithelial cells (Gretchen, 1979; Saif and Rabie, 2019). Graduated (scaled) microscopic lens device was used to measure the height of primary folds; the thickness of primary, secondary and tertiary folds and the thickness of epithelium, mucosa-submucosa, tunica muscularis and serosa in 3 regions of infundibulum, ampulla and isthmus the Histomorphometrical and

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histological technique determination was taken by multiple measurements (N=6) of each section using ocular stage micrometer at 40x and 10 x magnification (Luna, 1968; Abed Muslih and Mirhish, 2017).

III. RESULTS

Infundibulum In the infundibulum mucosa was highly several with primary and secondary folds. The primary fold have special shape appear tall and in some region irregular in shape that gave rise to many branches as secondary fold and some area tertiary fold (fig.1). the epithelia lined by simple columnar epithelia occupy mostly by two type of secretory cell, ciliated and non- ciliated secretory cells. Secretory type characterized by big nucleus that is expanded and mainly located in the apical part of cell wall and pale staining of cytoplasm appear (fig.2).

The second (non ciliated) form had a small in size more compressed nucleus compare with ciliated cell and nucleus located centrally in some time epithelia appear pseudostratified ciliated columnar epithelia covered the mucosal fold (fig.2).

Oviduct gland appeared as simple tubule alveolar type and formed by invagination of epithelial lining and lamina properia-submucosa lining epithelia was pseudostratified columnar.

Tunica muscularis composed of two layers of circular oriented fiber which were loosely distributed, collagen and reticular fiber were found and distributed between the muscle bundles.

Tunica serosa formed by collagen and reticular loose connective tissue ting of blood vessels seen.

Ampulla Ampulla in adult goat appear in the mucosa layer numerous elaborated branched leaf-like folds that formed of primary and secondary fold (fig.3,4) these fold may be interconnected with one to another form anastomosis pattern complex shape (fig.3) ampulla had more folds number and higher evaluation

Mucosal fold lined by pseudostratified ciliated columnar epithelia, lamina properia-submucosa include of extensive loose connective tissue and abundant of collagen fiber (fig.4,5).

Epithelia layer include with two type of secretory cell were predominanted in the all part of the luminal surface they were two type of cells ciliated and non- ciliated secretory cell

Secretory activity was extremely noticeable in the apical and middle part of mucosal fold and cell surface appear swelling of slender secretory cells and nuclei position at various location and might protrude into the lumen ciliated cells which have many noticeable cilia (fig.5). while in the basal part of mucosal fold the nucleus appear dark and rounded surrounded by light stain cytoplasm (fig.6).

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Secretory cells characterized by their narrow slenders shape with basal elongated nucleus and more densely stain cytoplasm than that located in the ciliated cell (fig.6).

Tunica musclaris consist of circumferentially organized muscles fiber and small blood vessels entered and located between muscles bundles.

Isthmus Third part of oviduct called isthmus narrow tube connected to the uterus, isthmus like ampulla have mucosal fold was lined by non-ciliated pseudostratified columnar epithelium. Mucosa fold appear height of the tining of epithelium was noticeable higher with different type of cells, in the mucosal fold apical and basal part of lining epithelium displayed positive reaction to the PAS-Alcian reaction staining. Lamina propria is a thin layer of connective tissue that is densely packed with different size of blood vessels, collagen fiber (fig.7).

Oviduct gland less in number compare with ampulla appear as tubular part.

Muscular part layer were increased compare with ampulla, have thickest smooth muscles and narrowest lumen (fig.8)

Tunica serosa make up majority elastic & reticular fiber & smooth muscles with connective tissue blood vessls.

IV. DISCUSSION

In this study conducting on the oviduct of goat evidence of uterine tube similar to that of other ruminants in that it consists of the fimbriated funnel, shaped infundibulum , ampulla and isthmus. There was gradually statistically significant growth in diameters through the age & length of the oviduct (McGeady et al., 2006; Hyttel et al., 2010). The oviduct wall exhibited the typical four layered issues of goat like in the other species of ruminants and show decreasing mucosal fold heights from infundibulum connected to the isthmus. these result finding confirm main function of infundibulum to capturing & channelling of oocyte from ovary to the ampulla, mucosal fold appear tall and branched (Banks, 1993 and Samuelson, 2007).

Infundibulum and ampulla similar from the reported pattern of regular tall, elongated branched of mucosa fold in the ruminants (Ayen et al., 2012; Banks, 1993; Bacha et al., 2012).

Anastomosis pattern appear in ampulla invariable result to increase mucosal surface area and may also serve to slow down movement of oocyte. Epithelial layer lined by pseudostratified columnar ciliated & secretory activity appear and show indifferent part of mucosal fold and nuclei extrnded on the basal line of cells (Ayen et al., 2012; Hafez et al., 2000; Ozen et al., 2013).

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The presence secretion in the oviducts positive reaction to PAS-Alcian (Jainudeen et al., 2000; Khanum et al., 2000).

Tunica muscularis within the wall of the three sigments varing in the thickness of smooth muscles, in the three sigments snggested that the development of smooth muscles of different segments of oviducts releated to the main function (Hafez et al., 2000) and increase thickness layer of isthmus for contraction of muscular layer as a result of stenosis of the flexure at the utero-tubal junction leading to restrication & regulation of the upword passage of sperm cell (Hunter, 1981 and Suarez, 1987).

Histometrical measurements of mucosal fold of the uterine tube

Ampulla	Premature	Mature
Number / fold	25-30	15-22
Fold length /mm	72.26±41SE**	366.940 ±0.40 SE
Thickness wall mm	102.02±SE	221.776 ±0.13 SE**
Ishmus	**Premature**	**Mature**
number / fold	10-15	7-9
Width /mm	244.98±08SE**	415.699±0.11SE
Fold Length /mm	82.87 ±0.25SE	155.703±0.65SE

The values represent as mean ± SE (Standard error) (n=8 for each group and reactions were carried out in triplicates). **P≤0.01

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Fig: 1 Photograph of infundibulum in the oviduct of adult goat showed: ciliated cells (black arrow), collagen fibers in lamina propria (red arrow), blood vessel (green arrow). PAS stain.

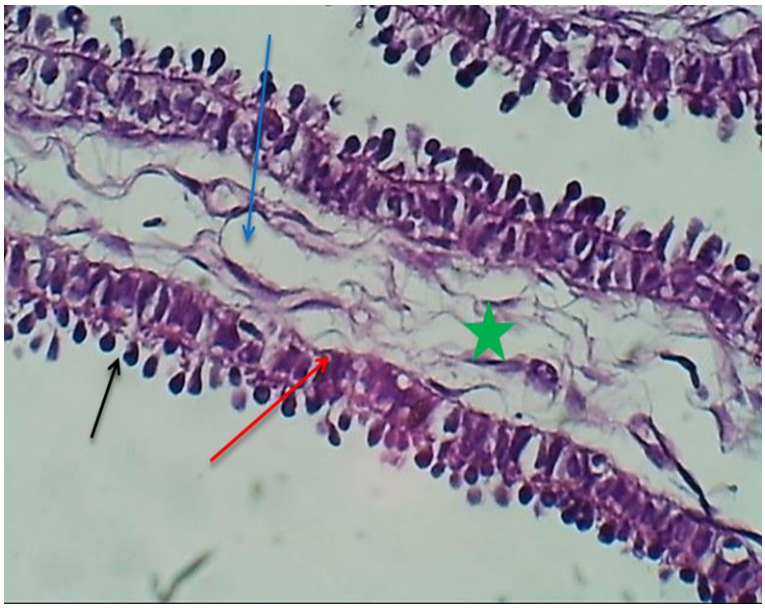

Fig:2 Photograph of infundibulum in the oviduct of adult goat showed: ciliated cells (black arrow), non-ciliated cells (red arrow), collagen fibers in lamina propria (star), blood vessel (blue arrow). PAS stain X400.

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Fig3: Photograph of ampulla in the oviduct of premature goat showed mucosal folds (black arrow), lamina propria-submucosa (red arrow), simple columnar epithelium (blue arrow), tunica muscularis (green arrow), tunica serosa (yellow arrow). Masson stain X100

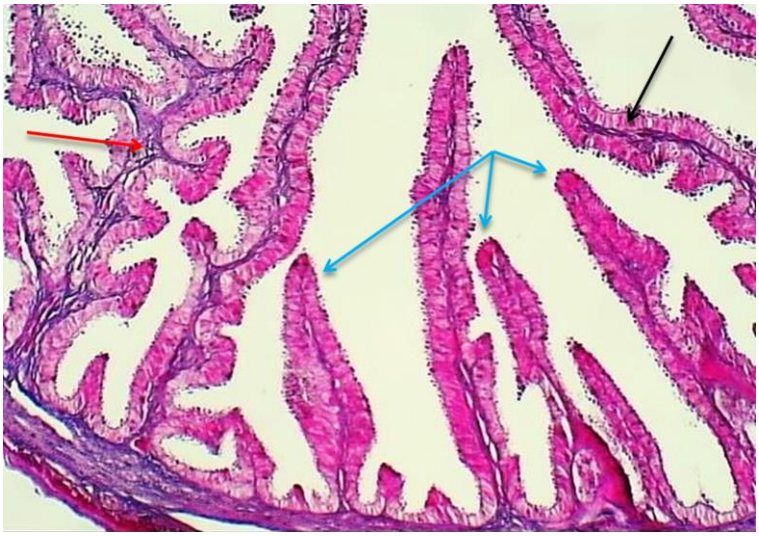

Fig. 4: Photograph of ampulla in the oviduct of adult goat showed highly mucosal folds (blue arrow), simple columnar epithelium (black arrow), collagen fibers in lamina propria-submucosa (red arrow). PAS-alcian stain

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Fig. 5: Photograph of ampulla in the oviduct of adult goat showed ciliated cells (black arrow), simple columnar cells (red arrow), collagen fibers in lamina propria (green arrow),blood vessel (yellow arrow).PAS-alcian positive stain, X400

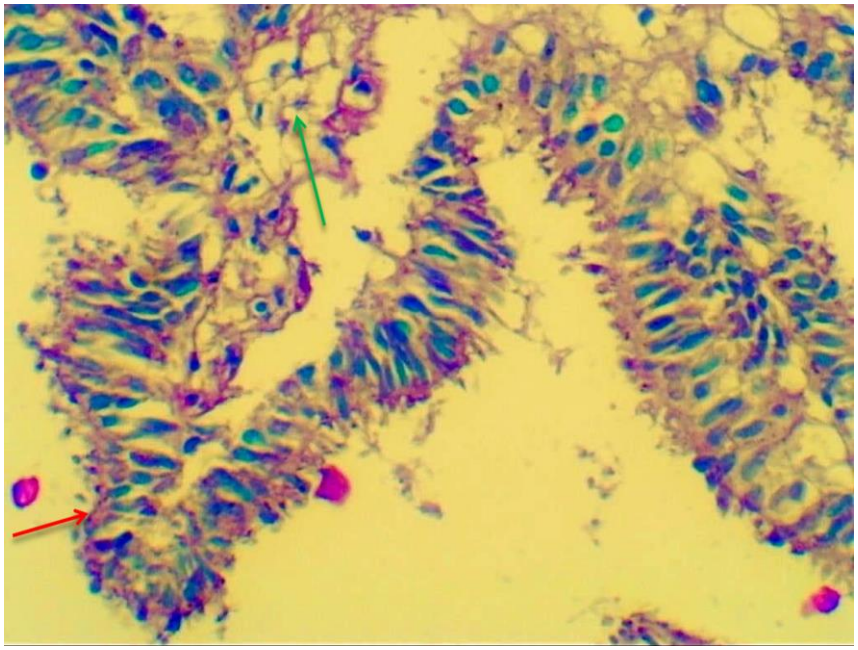

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Fig. 6 : Photograph of ampulla in the oviduct of adult goat showed ciliated cells (black arrow), simple columnar epithelium (red arrow), lamina propria-submucosa (green arrow). PAS- alcian stain.X400

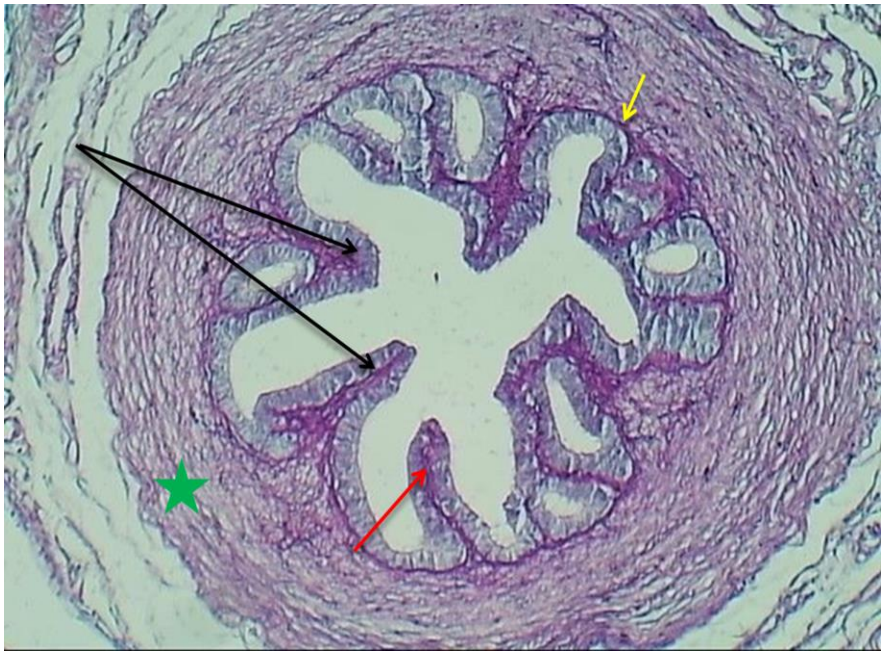

Fig.7 : Photograph of isthmus in the oviduct of adult goat showed highly folded lumina surface (black arrow), simple columnar epithelial (red arrow), thin muscularis layer (smooth muscle) (yellow arrow), thick muscularis layer (green star).masson trichrom X100

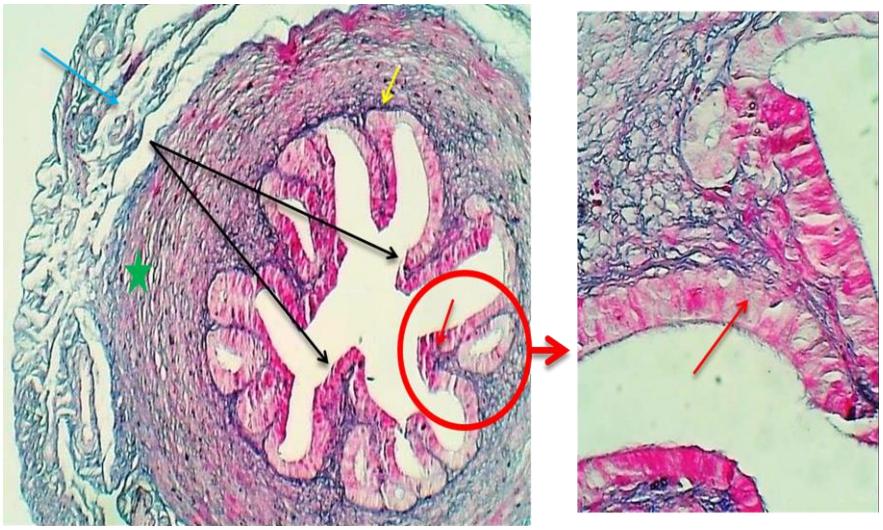

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Fig.8 ; Photograph of isthmus in the oviduct of adult goat showed short folds (black arrow), simple columnar epithelial (red arrow), thin muscularis layer (smooth muscle) (yellow arrow), thick muscularis layer (green star), tunica serosa (blue arrow). masson stain

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