



HISTOLOGICAL STUDY OF THE ISTHMUS AND UTERUS OF TURKEY HENS *MELEAGRIS GALLOPAVO*

Shakir Mahmood Mirhish & Riyadh Hameed Nsaif

Department of Anatomy, Histology and Embryology, Veterinary Medicine College. University of Baghdad

ABSTRACT

In the current study, total of (10) indigenous adult turkey hens (*Meleagris gallopavo*) aged about (45-55) weeks, these birds purchased from local supplier in Diala city, Iraq were kept under normal conditions (outdoor) and allowed to access feed and water *ad-libitum* for two weeks. The mucosal folds of isthmus are in longitudinal orientation, branched into primary and secondary folds but are shorter and not prominent as those of the magnum lined by an epithelium composed of simple columnar epithelium. The mucosal folds of the uterus are longer, narrower, branched into primary and secondary folds arranged in numerous leaf-like lamellae appearance, lined with ciliated pseudo stratified columnar epithelium.

KEYWORDS: Turkey hen (*Meleagris gallopavo*), mucosal folds, lamellae appearance, columnar epithelium *etc.*

INTRODUCTION

In the avian, the surface epithelium of the isthmus is composed of both non ciliated secretory cells and ciliated cells as a pseudo- stratified columnar epithelium. The longitudinally orientated mucosal folds are somewhat smaller than of the magnum and contain tubular gland endowed with a dense array of secretory granules^[1,2]. In Brood Breasted Bronze turkey, the mucosal folds of the isthmus are not broad as magnum folds. The tubular glands of the isthmus showed no difference among those of the magnum except that they are less compact^[3]. In laying Pekin ducks, the mucosal folds of the isthmus showed larger and sometimes branched with small ones in between every two adjacent folds. The tubular glands are simple coiled glands lined with a single layer of low cuboidal cells and supported by a delicate fibro-cellular propria^[4]. In avian, the folds of the uterus are lined with a pseudo stratified columnar that intermittently ciliated and filled with tubular glands that can be both branched and coiled. The secretory cells of these glands are typically granulated and vacuolated. The overall thickness of the wall is the greatest in this portion of the oviduct due to an increased thickening of the tunica muscularis but also a greater developed of the mucosal- sub mucosal folds within this portion, which are oriented both longitudinally and circularly^[1,2,5]. The surface epithelium of uterus in the hen consists of a single layer of columnar cells with alternating apical and basal nuclei^[6]. The tunica muscularis was well developed and consists of 1) inner circular layer 2) outer longitudinal layer, and in general these layers were better developed than in the more anterior segment of the oviduct. In hen and duck, the uterus mucosa forms flat, leaf-shaped, longitudinal folds. The epithelium was a continuous layer of columnar cells with alternating basal and apical cells. The basal cells have a restricted apical surface; the apical cells were ciliated. The tubular glands of the uterus were lined with cells that contain pale staining granules both before and during the phase of shell formation. The mucosal height and primary folds of uterus

in duck was more than that in hen but secondary folds in hen were larger than that in duck. Muscularis mucosa width in duck was more but tunica sub mucosa and muscularis in hen were wider than that in duck^[7]. In the Pekin duck, the ciliated and secretory cells which lined the uterus epithelium are made up of a single layer, the nuclei being positioned optically in ciliated cells, and basally in secretory cells results in a pseudo stratified appearance^[8]. The uterine epithelium of laying pekin duck consists of ciliated and non-ciliated cells described by^[4]. The mucosal folds are narrow, branched and have several invaginations. The tubular glands are branched and coiled tubular. The tunica muscularis is composed of inner circular layer of smooth muscle fibers and an outer longitudinal layer whose fibers showed a single spiral course. In mature Japanese quail (*Coturnix japonica*), the mucosa of the uterus formed numerous long, spatula-shaped folds covered by ciliated apical cells and basal cells. The lamina propria was loosely packed with tubular glands. Tunica muscularis was well developed and consisted of inner circular and irregular bundles and the outer thick longitudinal layer^[9,10]. In guinea fowl, the height of the mucosal folds was significantly greater in the shell gland (uterus) than that in the magnum and isthmus as well, the height of the mucosal folds was significantly greater in the guinea fowl than in chickens. The distribution of the tubular glands in the lamina propria of the shell gland in guinea fowl are markedly dense at the bottom region of mucosal folds, and are loose at the apical region of the folds. Also, in chickens, the density of the tubular gland was denser at the bottom region of the folds than that at the apical region of the folds^[11]. In mature rhea (*Rhea Americana*), the surface epithelium of the uterus is pseudo stratified columnar epithelium, mainly shows ciliated cells. Cranially in the uterus, there are mainly primary folds with only discrete secondary folds, whereas, caudally these folds are more complexly arranged forming many secondary folds. The propria mucosa in cranial folds of the

uterus is densely tubular glands, which opens on mucosa by regular intervals^[12]

In ostrich (*struthiocamelus*), the luminal surface of the uterus presents tall longitudinal mucosal folds which have lamina epithelial is resembles that of the previous segment. It's lined by ciliated cells, with several opening of tubular glands in between^[13].

MATERIALS & METHODS

In the current study, total of 10 indigenous adult turkey hens (*Meleagris gallopavo*) Aged about(45-55) weeks, these birds purchased from local supplier in DIALA city, Iraq were used birds were kept under normal conditions (outdoor) and allowed to access feed and water *ad-libitum* for two weeks to eliminate those who have the signs of illness. the euthanasia done by overdose of ketamine (25mg/Kg. B.W) and xylazine (10mg/Kg. B.W), intramuscular injection. Abdominal laparotomy was performed, the ovary and oviduct immediately removed from the abdominal cavity. Then specimens were washed with 0.9% normal saline and transferred to 10% formalin solution in labeled containers. The period of fixation in 10% formalin solution (48) hours. After fixation the specimens almost 1-2cm were washed with running tap water for (4-6) hours, the specimens were proceed with routine Histological technique as the following steps^[16]. Dehydration: in order to remove all extractable water from them, clearing.

Infiltration: The specimens of ovary and oviduct were transported to melted paraffin in two steps each step rest for two hours using oven at (58°C).

Embedding (Blocking): The specimens were blocked with paraffin wax and then sectioned using standard histological techniques.

Sectioning: Standard histological techniques was applied by using rotary microtome, exactly 5-6µm thick were prepared from the center and margin of each specimens.

Mounting: The section were carried out from bath and fixed on a slide contained mayers albumin (mixture of egg

albumin with glycerin). The slides were dried by an oven with (40°C) for (24) hours (16).

Staining:

1-Harris hematoxylin and Eosin stain:For appearance of the general structure of tissue.

2- Periodic Acid Schiff (PAS): For coloring the basement membrane and mucopolysaccharide materials:

3- Van Gieson's Stain: For staining connective tissue and muscular fibers. and its constituents composed

RESULTS & DISCUSSION

The mucosal folds of isthmus are in longitudinal orientation, branched into primary and secondary folds but are shorter and not prominent as those of the magnum lined by an epithelium composed of simple columnar epithelium as given in (Figure 1, 2).The lamina propria submucosa is dense glandular tissue filled with branched tubular glands that resembled those in the magnum except they are fewer and less densely for secretion of the shell membranes (Figure 2). This result is consistent with ^[1,2] in the hen and ^[12] in rhea's.

The mucosal folds of the uterus are longer, narrower, branched into primary and secondary folds arranged in numerous leaf-like lamellae appearance, lined with ciliated pseudo stratified columnar epithelium as given in (Figure 3). This result as reported in laying hen and duck by ^[7] and in mature Japanese quail by ^[10]. The lamina propria-submucosa contains branched tubular glands loose and well vascularized connective tissue was sparse between these glands as shown in (Figure 4). These information were declared by ^[12] in rhea's and ^[10] in mature Japanese quail. The tunica muscularis is thicker, highly vascularized than previous anterior segment of the oviduct to provide the uterus with the necessary amounts of calcium during egg production, consists of thin outer longitudinal and thick inner circular smooth muscle layer (Figure3). This result coincides with ^[4] in laying pekin ducks and ^[6] in hen.

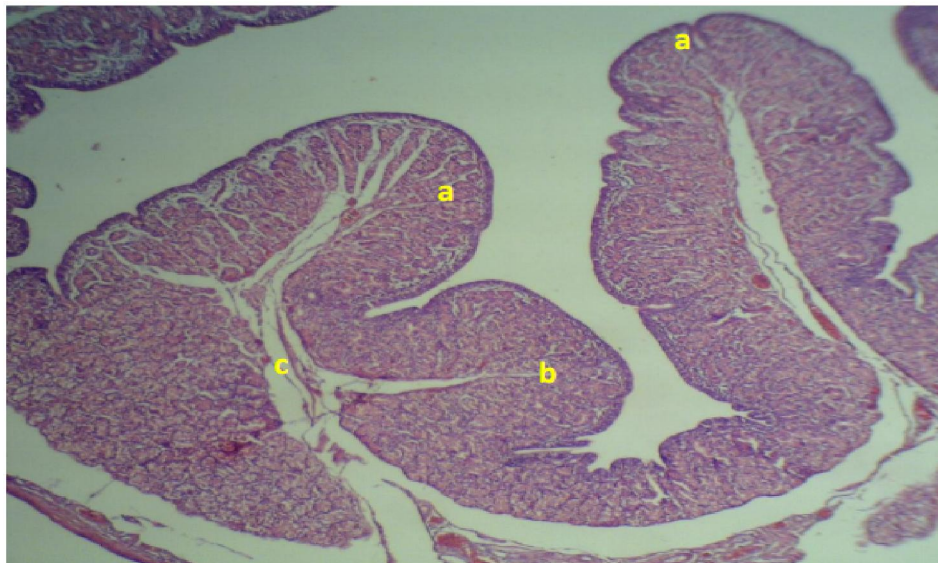


FIGURE 1: Histological Section of Isthmus Shown: a- Primary fold, b- Secondary fold, c- Lamina propria (H&E stain x40).



FIGURE 2: Histological Section of Isthmus Showed: a- Ciliated pseudo stratified columnar epithelium b- Lamina propria – sub mucosa filled with tubular glands (arrow) (H&E stain x400)

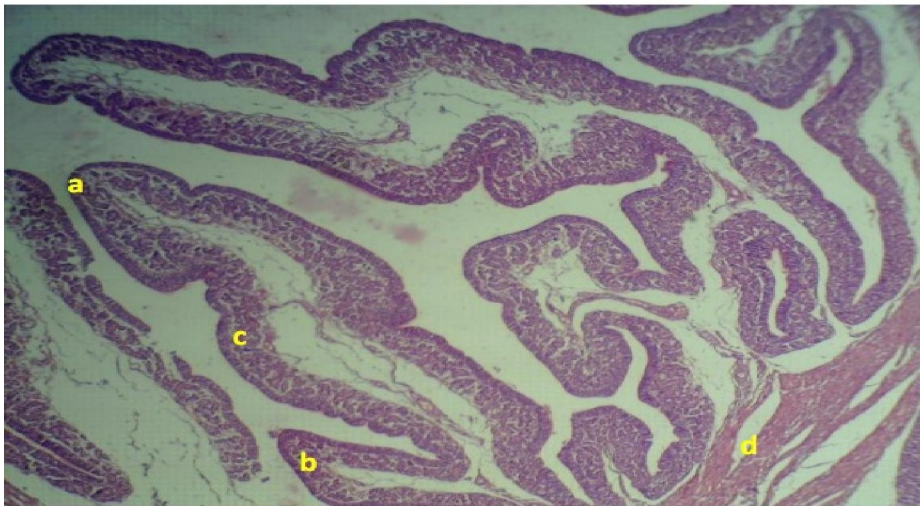


FIGURE 3: Histological Section of Uterus Showed: a-Primary fold, b- Secondary fold, c- Lamina propria, d- Tunica muscularis(H&E stain x40).

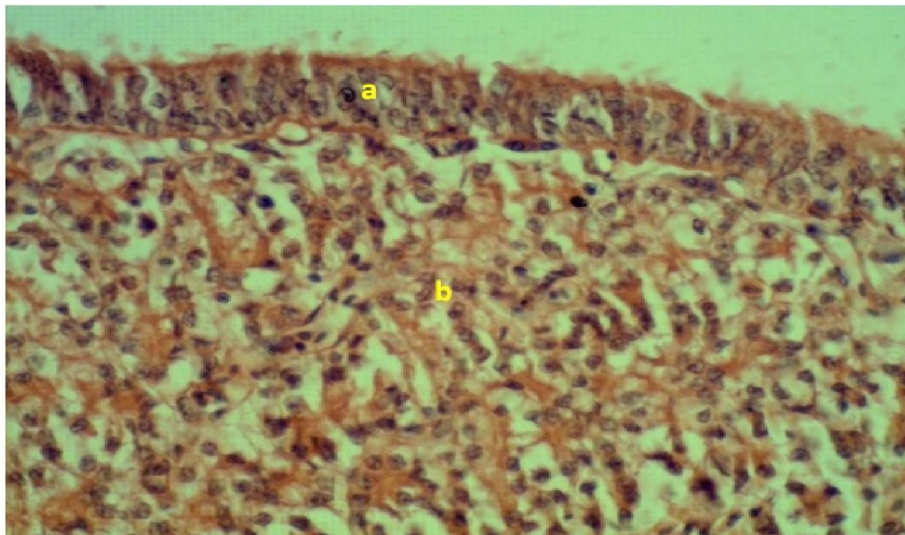


FIGURE 4: Histological Section of Uterus Showed: a- Ciliated pseudo stratified columnar epithelium b- Lamina propria–submucosa filled with tubular glands (H&E stain x400).

REFERENCES

- [1]. Bacha, W. J. and Bacha, L. M. (2000) Color atlas of veterinary histology. Lippincott Williams and Wilkins, London. 2nded. Pp: 223-243.
- [2]. Jamieson, B. G. M. (2007) Reproductive Biology and Phylogeny of Birds. Science and Publishers. Australia. Vol.6 Pp: 166-191.
- [3]. Verna, O. P. and Chermis, F. L. (1964) Observation on the oviduct of turkeys. Avian Dis., 8:19-26.
- [4]. El- Habbak, H. A. M. (1990) Histological and some histochemical studies on the oviduct of pekin ducks. M.V.Sc. Thesis, Faculty of Veterinary Medicine, Cairo University.
- [5]. Samuelson, D. A. (2007) Textbook of Veterinary Histology. Pp: 478-484. Saunders of Elsevier Inc. China.
- [6]. Hodges, R. D. (1974) Histology of the fowl. London. Academic Press. Pp: 344-349.
- [7]. Mohammad pour, A. A. (2007) Comparative Histomorphological Study of Uterus Between Laying Hen and Duck. Pakistan Journal of Biological Sciences., 10(19):3479-3481
- [8]. Özen, A., Ergun, E. and Kurum, A. (2009) Light and electron microscopic studies on the oviduct epithelium of the pekin duck (*Anas platy rhyngchos*). Ankara Univ Vet Fak Derg., 56:177-181.
- [9]. Eroschenko, V. P. (1979) Morphological alterations in the cells of the development quail oviduct as influenced by estradiol - 17b and the insecticide kepone: I. observations by light and scanning electron microscopy. BiolReprod. 21:625-638.
- [10]. Lucy, K. M. and Harshan, K. R. (1998) Structure and postnatal development of uterus in Japanese quail. Indian J. Poult. Sci., 33:250-254.
- [11]. Yoshimura, Y. and Ogawa, H. (1998) Histological charaterization of the oviducal structures in guinea fowl (*Numidameleagris*). Japan Poultry Sci ., 35(3) :149-156.
- [12]. Parizzi, R. C., Santos, J. M., Oliveira, M. F., Maia, M. O., Sousa, J. A., Miglino, M. A. and Santos, T. C. (2008) Macroscopic and microscopic anatomy of the oviduct in the sexually mature rhea (*Rhea americana*). Anat. Histol. Embyol., 37(3):169-176.
- [13]. Sharaf, A. S. (2005) Histological and histochemical studies of the oviduct of ostrich of different ages. M. V. Sc. Thesis, Faculty of Veterinary Medicine, Zagazige University.
- [14]. Saber, A. S., Emara, S. A. M. and Abosaeda, O. M. M. (2009). Light, Scanning and Transmission Electron Microscopical Study on the Oviduct of the Ostrich (*Struthio camelus*). J. Vet. Anat., 2(2):79-89
- [15]. Sturkei, D. D. (1986) Reproductive in the female. In: Avian physiology. Pp:403-431. 4thed. Springer varlag, New York, Berlin
- [16]. Luna, L. G. (1968) Manual of Histological Staining Methods the Armed Forced Institute of Pathology " 3rd Ed. American Registry of Pathology. New York. Pp: 76-98.