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Morphological and Histological Studies on the Female Oviduct of Balady Duck (*Anas boschas domesticus*)

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Abstract

The present study was conducted on ten adult mature female balady ducks to demonstrate the morphological and histological structures of its oviduct. The birds were slaughtered then dissected to study the different parts of oviduct with its relation, the left oviduct was long convoluted tube that occupied large part of abdominal cavity and extended from the ovary to the cloaca. It consisted of five parts: infundibulum, magnum, isthmus, shell gland and vagina. Some specimens stained with stain (H&E) stain for histological investigation. The lining epithelium of oviduct was pseudo stratified columnar ciliated and non-ciliated secretory epithelium except infundibulum and magnum were simple columnar ciliated and secretory cells, the tunica serosa of duck oviduct formed by, loose connective tissue covered by mesothelium.

Keywords: Morphology - Histology –Female oviduct– Balady duck.

Introduction

The domestic ducks considered the main source of food and income for people in many parts of the world. Ducks belong to family Anatidae, genus Anas. Almost all varieties of domesticated duck (*Anas boschas domesticus*) were descended from the mallard (*Anas platyrhynchos*). Native breeds of duck as Domiati duck and Balady (Sudan) duck were neglected in research for long time as most of scientists worked on foreign breeds.

Our studies were on some parameters on balady duck to help the genetic scientists to focus up the increase in the weight of male (red meat), laying capacity and productivity in female. Moreover, to understand the pathology of female oviduct as the domestic duck infected by *Escherichia colli, tetratrichomonas* sp. and oviductal fluke (*Prosthogonimus* sp.), which affects the morphology of the female genital tract as they cause salpingitis and high mortality rate per week so decrease the productivity.

Materials and Methods

The present study was carried out on ten adult duck weighing (2-4) kg. The birds were anesthetized by intramuscular injection of ketamine HCl 60 mg/kg and xylazine 6 mg/kg, then slaughtered. Macroscopically dissection were carried out on 6 adult females for study the morphology of the oviduct, the oviduct was exposed to be seen *in situ* with its relation to the surrounding organs, then dissected out separately on a plastic sheets to study the external and internal features of each part. Four female duck were used to histological studies, pieces of the dissected samples

fixed in 10% neutral buffered formalin and embedded in paraffin wax. Section of each block was stained using hematoxyline and Eosin (H&E) stain for general tissue studies. The anatomical nomenclature used was that recommended by the (Nomina Anatomica Avium, 1993).

Results

A- Anatomical study:

The left oviduct (oviductus sinister). (Fig. 1/5) was a long convoluted tube of 45-50 cm in length. It filled most of the dorsal and caudal part of left side of the abdominal cavity, extended from the ovary to the cloacae, it related to left kidney, gizzard, spleen and jujenum. It suspended from the roof of the celomic cavity by double peritoneal fold. That fold divided by the oviduct into dorsal **(lig. Dorsalae oviductus) (Fig. 1, 2, 3/5)** and ventral **(lig.Ventraleoviductus)** oviduct alligament **(Fig. 1, 2, 3/6)**.

The left oviduct was divided anatomically into five major sections: Infundibulum, magnum, isthmus, uterus or shell gland and vagina.

The **infundibulum** was the first part of the oviduct which fixed dorsally by the cranial ligament of the infundibulum **(Fig. 1, 2/6a)**. Its total length was 5-7cm.

It consisted of **funnel part (Fig. 2, 3 /5a)** that measured about 4-5cm, flattened dorso-ventrally with thin, translucent wall, and its opening was an elongated slit which faced the ovary. It narrowed abruptly to **a neck part (Fig. 2, 3/5a1)** which had thicker wall than the funnel and about 2-3 cm length.

The **magnum (Fig. 2, 3, 4/5b)** was the second section of the oviduct which immediately succeeding the infundibulum. It was longest and the most coiled part of the oviduct, with average length 20-22cm. It was distinguished externally from the infundibulum by its greater diameter and thicker wall. Internally it had thick, irregular longitudinally arranged mucosal folds that ranged from 15-20 folds**.**

The **Isthmus (Fig. 2, 3, 4 /5d)** was the third part of the oviduct. It was short and less coiled than magnum of length about 9-11cm.The junction between magnum and isthmus was demarcated externally by gradually reduce in diameter while internally characterized by thin, bright, narrow constricted translucent zone (zona translucence) **(Fig. 4/5c).**The isthmus mucosal folds were thinner, lower than that of magnum and ranged from 30-35 in number. Those folds were arranged longitudinally and alternative.

The fourth part of the oviduct was **uterus or shell gland (Fig. 2, 3, 4/5e)** was a sac or pouch like region of average length 6-8 cm. The dorsal surface of the uterus was fixed by dorsal oviductal ligament, while its ventral surface attached to vagina by the muscular cord **(funiculus musculus) (Fig. 2/8)**. The caudal end of the uterus was attached with the cranial border of first curve of vagina.

The mucosal folds of uterus was numerous in number, about 55-60 fold that arranged longitudinally, forming leaf-like lamellae and intersected by 4-5 transverse furrows.

The last part of the oviduct was the **vagina (Fig. 2, 3, 4/5f),** it was narrow, S- shaped muscular tube, about 7-8cm long. It consisted of two curvatures and opened directly into the urodeum. Its mucosal folds were7-9 in number and transversally arranged.

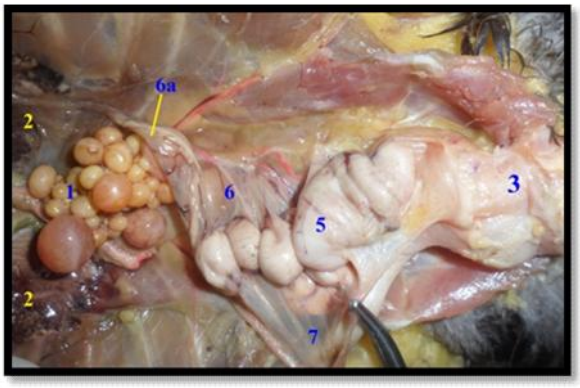


Fig :(1) A photograph showing the position of oviduct

1. Ovary; 2. Lung; 3. Cloacae; 5. Oviduct; 6.Dorsaloviductal ligament; 6a) Cranial ligament of the infundibulum 7.Ventraloviductal ligament

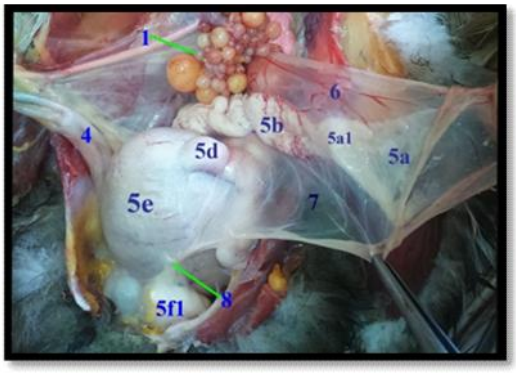


Fig :(2) A photograph showing the different parts of oviduct

1. Ovary; 4. Rectum; 5.Oviduct 5a) Funnel of infundibulum 5a1)Neck of Infundibulum 5b) Magnum 5c) Translucent Zone 5d) Isthmus 5e) Uterus (Shell gland) 5f) Vagina 5f1) Cranial segment (first curve) 5f2) Caudal segment (second curve) 6.Dorsaloviductal ligament 7.Ventraloviductal ligament 8. Muscular band

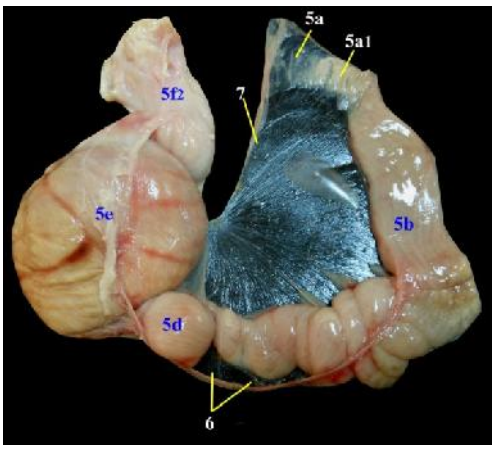


Fig :(3) A photograph showing the external feature of oviduct

5a) Funnel of infundibulum; 5a1)Neck of Infundibulum; 5b) Magnum ; 5d) Isthmus 5e) Uterus (Shell gland); 5f2) Caudal segment (second curve);

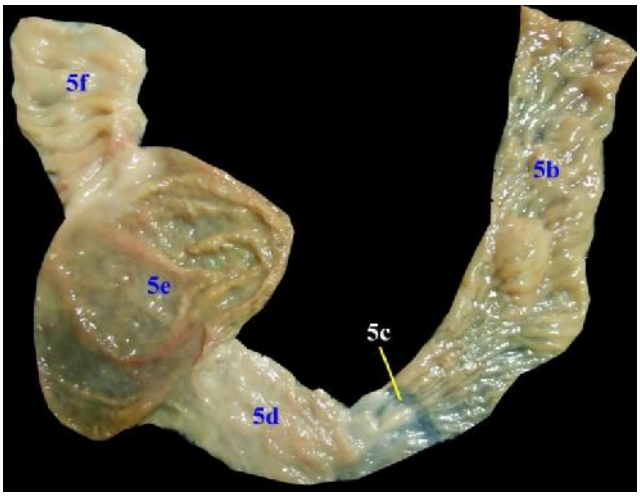


Fig :(4) A photograph showing the internal feature of oviduct

5b) Magnum; 5c) Translucent Zone; 5d) Isthmus; 5e) Uterus (Shell gland); 5f) Vagina;

B-Histological study:

The infundibulum (Fig.5) divided histologically into funnel and neck region. The mucosal folds of infundibulum lined with simple cuboidal to columnar secretory ciliated epithelium. The lamina propriasubmucosa consisted of loose connective tissue, blood vessels and both funnel and neck region contained tubular gland. The lamina muscularis constituted of two layers of smooth muscle fibers; inner circular and outer oblique.

The mucosal folds of magnum lined with simple columnar secretory cells with alternating ciliated ones. The lamina propriasubmucosa contained branched tubular glands. The tunica muscularis mucosa constituted of two layers; inner longitudinal and outer oblique smooth muscle fibers.

The transition zone between magnum and isthmus presented very low mucosal folds and devoid of gland.

The mucosal folds of isthmus (Fig. 6B) lined with pseudo-stratified columnar ciliated epithelium. The lamina propriasubmucosa housed coiled tubular glands. The tunica muscularis mucosa was thicker than that of magnum and arranged in two layer; inner longitudinal and outer circular.

The mucosal fold of the uterus (Fig. 7C) was lined pseudo stratified columnar ciliated and non-ciliated secretory cells. The lamina propriasubmucosa consisted of highly vascularized loose connective tissue housing branched tubular glands. The tunica muscularis mucosa was thicker than the preceding parts and constituted of thick inner circular and outer longitudinal.

The mucosal folds of vagina (Fig. 7D) lined by pseudo stratified columnar ciliated and non-ciliated secretory cells. There were several epithelial invaginations which form sperm-host gland. There were no tubular glands in the propria sub mucosa.

The muscular coat composed of thick inner longitudinal and thin outer circular smooth muscle layers. The tunica serosa of duck oviduct formed by, loose connective tissue covered by mesothelium.

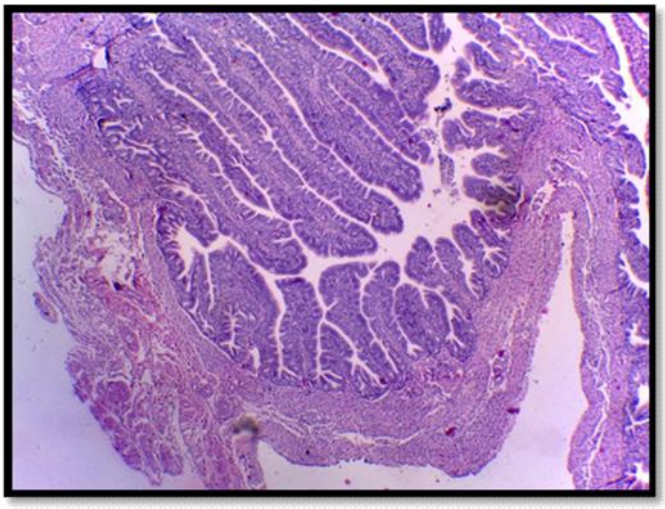
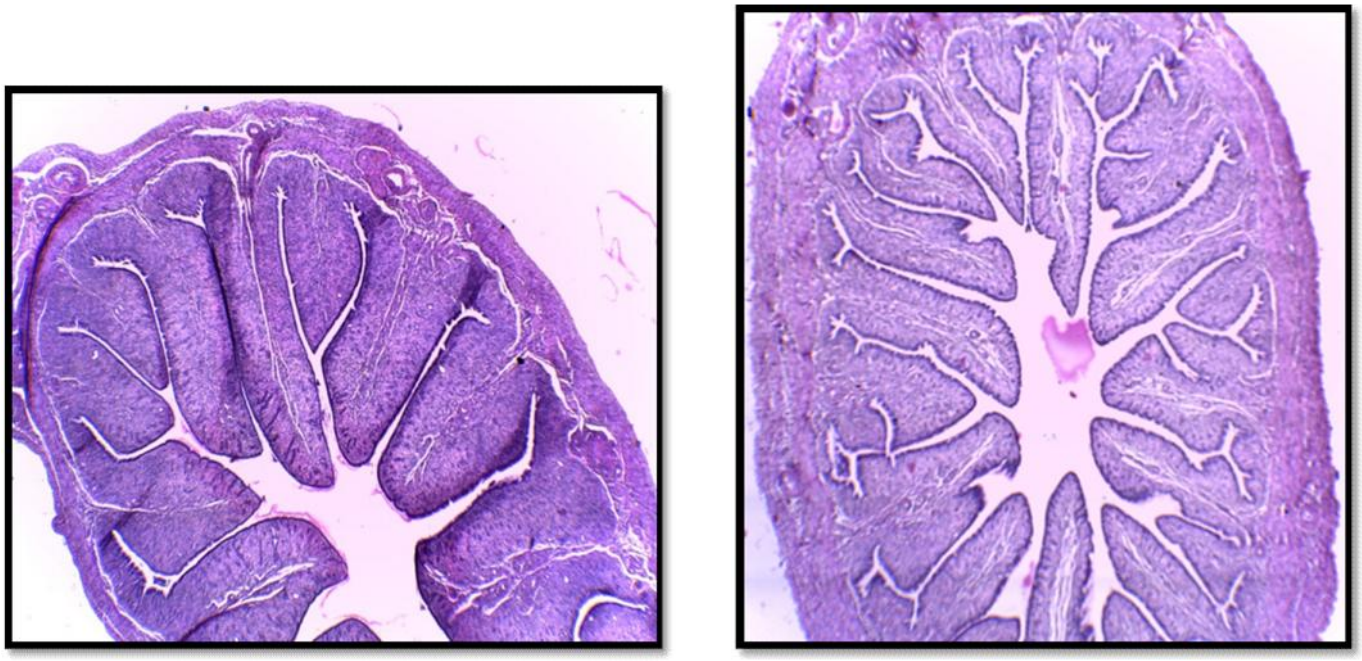
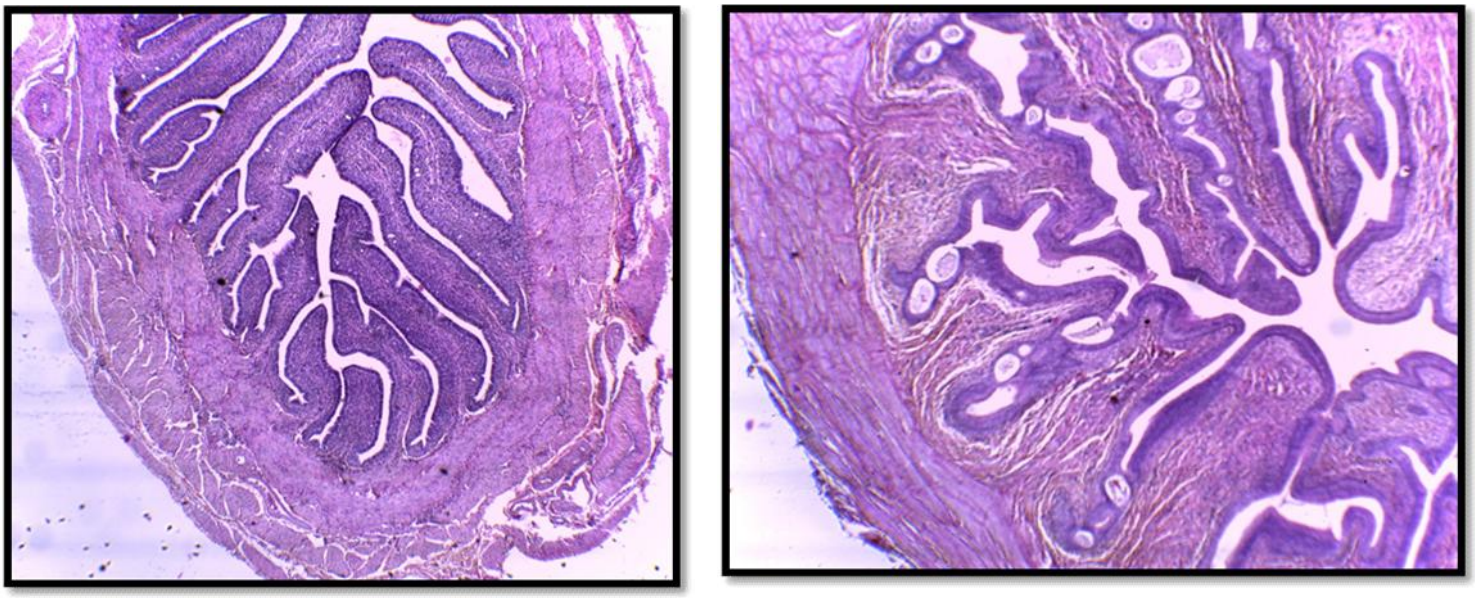


Fig:(5) A photomicrograph the infundibulum (40X H&E stain)



A **B**

Fig:(6) A photomicrograph (40X H&E stain) showing
A-Magnum
B-Isthmus



C **D**

Fig:(7) A photomicrograph (40X H&E stain) showing
C-Uterus
D-Vagina

Discussion

A- Anatomical study:

The left oviduct was a long convoluted tube, extended from ovary to the cloacae where it related to the kidney, intestine and gizazard. That statement agreed with **Getty (1975)** and **Dyce *et al* (2002)** in domesticated Fowl, **Evêncio-Neto *et al*., (1997)** in Muscovy duck.

Regarding the length of left oviduct was 45-50 cm as **Sari *et al*., (2014),** in pegagan duck. While **Parizzi *et al*., (2008)** in rheas revealed that, the average length of left oviduct during egg laying season was 122 cm, **(Blendea *et al*., 2012)** in fowl it reached 60-70 cm**,** and **(Mohammadpour *et al*., 2012)** in duck was 60cm.

Our result revealed that the oviduct was segmented into five regions; Infundibulum, Magnum, Isthmus, shell gland and vagina that confirmed by **Nichkel *et al*., (1977), Getty (1975), Baumel *et al*., (1993),** and **Blendea *et al*., (2012)** in domestic fowl, **Evêncio-Neto *et al*., (1997)** in Muscovy duck, **Parizzi *et al*., (2008)** in rheas, **Özen *et al*., (2009)** in Pekin duck, **Mirhish and Nsaif (2013)** and **El sayed (2016)** in adult turkey, **Sharaf *et al*., (2013).**

Concerning the infundibulum, it consisted of funnel and tubular parts that simulated **Nichkel *et al*., (1966), Getty (1975), Baumel *et al*., (1993),** and **Blendea *et al* ., (2012)** in domestic fowl, **Özen *et al*., (2009)** in Pekin duck, **Patki *et al*., (2013)** in Kuttanad duck, **Sharaf *et al*., (2012)** in ostrich but unlike the investigation of **Bakst (1998)** in poultry, **Mohammadpour and Keshtmandi (2008)** in pigeon, **Parizzi *et al*., (2008)** in rheas, **Moraes *et al*., (2010)** in duck, **Robert *et al*., (2011)** in emu, **Mir**his**h and Nsaif (2013)** and **El sayed (2016)** in turkey who observed that, infundibulum divided into three regions; the fimbriated region which had small finger like process known as infundibular fimbriae, funnel region and tubular region. Such fimbriated region not observed in our study.

Our observation agreed with **Nichkel *et al*., (1977), Getty (1975)** in domestic fowl, **Baumel *et al*., (1993), Blendea *et al*., (2012)** in fowl, **Parizzi *et al* (2008)** in rheas, **Özen *et al*., (2009)** in Pekin duck, **Robert *et al*., (2011)** in emu, **Sharaf *et al*., (2012)** in ostrich**, Mirhish and Nsaif (2013)** and **El sayed (2016)** in turkey that, the magnum was the longest, largest and more coiled portion of oviduct with thicker wall and larger diameter than the infundibulum.

Similar to the finding of, **Wyburn *et al*., (1970)** in white leghorns hen, **Lucy and Harshan (2000)** in Japanese quail, **Parizzi *et al*., (2008)** in rhea, **Mirhish and Nsaif (2013) and El sayed (2016)** in adult turkey, the internal mucosal folds was long, thick and arranged longitudinally. Those folds were considerably taller and wider than the other parts of the oviduct. The mucosal folds ranged from 15-20 in numbers as reported by **Lucy and Harshan (2000)** in Japanese quail and **(El sayed, 2016** in adult turkey**)**.

In agreement with **Nichkel *et al*., (1977), Getty (1975) Blendea *et al*., (2012), Baumel *et al*., (1993)** in fowl, **Parizzi *et al*., (2008)** in rheas, **Özen *et al* (2009)** and **Patki and Lucy (2012)** in duck, **Sharaf *et al*., (2013)** in ostrich, **Mirhish and Nsaif (2013), El sayed (2016)** in turkey, the Isthmus was short, less flexuous tube than magnum. The junction between magnum and isthmus was demarcated internally by thin, bright, narrow constricted translucent zone on the other hand **Robert *et al*., (2011)** in emu who stated that zonula translucence not observed.

Our results revealed that, the mucosal folds of isthmus were arranged longitudinally and were less prominent and thinner than that of magnum. That similar to that of **Nichkel *et al*. (1977)**, **Getty (1975), Baumel *et al*., (1993)** and **Blendea *et al*., (2012)** in fowl, **Parizzi *et al*., (2008)** in rheas, **Özen *et al* ., (2009)** in Pekin duck, **Mirhish and Nsaif (2013)** in adult turkey, but in contrary with **Robert *et al*., (2011)** in emu who stated that, the mucosal folds was similar to magnum. While **El sayed (2016)** in turkey showed that those mucosal folds were spirally oriented

The mucosal fold of isthmus was 30-35 in number. In ostrich **Saber *et al*., (2009) and Sharaf *et al*., (2013)** revealed that, mucosal folds were 31 to 42 in number, in turkey **El sayed (2016)**detected that they ranged from13-18 in number.

Our observation revealed that uterus was a sac or pouch like region between the isthmus cranially and vagina caudally with a thicker wall than that of the isthmus. That statement agreed with **Nichkel *et al*., (1977) and Getty (1975), Baumel *et al*., (1993), Blendea *et al*. (2012)** in domestic fowl, **Mohammadpour *et al*., (2012)** in hens and ducks, **Mirhish and Nsaif (2013)** and **El sayed (2016)** in adult turkey.

The uterus consisted of single large sac in contrast with the finding of **Nichkel *et al*., (1977) and Getty (1975), Baumel *et al*., (1993), Blendea *et al*., (2012)** in domestic fowl, whom described the shell gland divided into three parts, initial cranial tubular portion (red region), pouch like caudal region (pars major uterinus) and funnel shaped region (recessus uterinus), unlike the statement of **Sharaf *et al*. 2013** in ostich, **Mirhish and Nsaif, 2013** and **El sayed, 2016** in adult turkey who showed that uterus divided into two parts; short narrow cranial narrow part and caudal large sac.

The mucosal folds of uterus were numerous arranged longitudinally forming leaf-like lamellae and intersected by 4-5 transverse furrows. That disagreement with **Robert *et al*., (2011)** in Emu, who observed a spiral pattern with an oblique orientation in the cranial two-thirds of the uterus and **El sayed (2016)** in adult turkey that, noted oblique and horizontally arranged uterine mucosal folds.

The vagina was the shorter part of the oviduct, with more thicker wall than that other portions of the oviduct, it was connected the uterus to cloacae, That opinion was approved by **Nichkel *et al*., (1977), Getty (1975), Baumel *et al*., (1993)** and **Blendea *et al*., (2012)** in domestic fowl, **Parizzi *et al*., (2008)** in rheas , **Robert *et al*., (2011)** in emu, **Mohammadpour *et al*., (2012)** in hens and ducks, **Mirhish and Nsaif (2013)** in adult turkey, **Sharaf *et al*., (2013)** in ostrich.

The present study was agreed with **Hodges (1974)** in domestic fowl, the vagina had two curvatures. It had three curvatures in mature rheas **(Parizzi *et al*., 2008)** and one curvature **(Mirhish and Nsaif, 2013** in adult turkey**).**

In that study vaginal mucosa had long folds which arranged transversally in accordance with **Parizzi *et al*., (2008)** in rheas but disagreed with **Fujii (1963)** in hen, **Bezudenhout *et al*., (1995), Saber *et al*., (2009)** in ostrich, **Robert *et al*., (2011)** in emu, **Mohammadpour *et al*., (2012)** in duck, **El sayed (2016)** in turkey who stated that, mucosal folds arranged longitudinally. **Sharaf *et al*. (2013)** in ostrich recorded that those folds were 45 to 46 in number but our research noted 7-9 fold present.

B-Histological study:

In that study the mucosal folds of infundibulum lined with simple cuboidal to columnar secretory ciliated epithelium. Such finding was agreed with **Fouad (1970)** in fayoumi fowl, **Mohammadpour and Keshtmandi (2008)** and **Mirhish and Nsaif (2013)** in turkey, **Patki *et al*., (2013)** and **Deka *et al*., (2014)** in duck. While **Moraes *et al*. (2010)** and **Sari *et al*. (2014)** in duck, **Sharaf *et al*.** (**2012)** in ostrich observed that the infundibulum lining was pseudo stratified columnar ciliated epithelium.

Our examination regarded that lamina propria of both funnel and neck region contained tubular gland. While **Parizzi *et al*., (2008)** in rhea and **Neelam *et al*., (2010)** in quail found that few tubular glands were present in the caudal part of the infundibulum. In contrary **Patki *et al*., (2013)** in duck and **Elsayed (2016)** in turkey defined lamina propria in the funnel region had no gland while the neck region had small tubular gland.

The lamina muscularis of the infundibulum presented inner circular and outer oblique smooth muscle fibers**,** that statement unlike **Mohammadpour *et al*., (2012), Patki *et al*., (2013**) and **Deka *et al*., (2014)** in duck, **Mirhish and Nsaif (2013)** in turkey that found tunica muscularis composed of inner circular and outer longitudinal smooth muscle layers. On the other hand **Elsayed (2016)** in turkey asserted that the musculature was widely separated smooth muscle bundles with different orientation.

In agreement with **Davidson, (1986), Chousalkar and Roberts (2008)** in laying hen, **Berg *et al*., (2001)** and **Neelam *et al*., (2010)** in the quail we noted that mucosal folds of magnum lined with simple columnar secretory cells with alternating ciliated ones. However **Mohammadpour and Keshtmandi (2008)** in turkey and pigeon, **Parizzi *et al*. (2008)** in rheas, **Saber *et al*., (2009)** in ostrich showed pseudo-stratified columnar epithelium with a more ciliated than secretary cells.

The present result observed branched tubular glands in the propriasubmucosa of magnum that was the same as **Davidson, (1986)** and **Chousalkar and Roberts (2008)** in laying hen and **Mirhish and Nsaif (2013)** in adult turkey.

In the current study the tunica muscularis mucosa of magnum constituted of two layers; inner longitudinal and outer oblique smooth muscle fibers. Unlike **Sharaf *et al*., (2012)** in ostrich, **El- Habbak (1990)** in pekinducks, **Das and Bisawal (1968)** in ducks who recorded two layers; a thin inner circular and outer longitudinal smooth muscle fibers. However **Fouad (1970)** in fayoumi fowl reported only one circular muscular layer.

Regarding the mucosal epithelium of isthmus was pseudo-stratified columnar with ciliated cells was the same as **Sharaf *et al.* (2013)** in ostrich, **Sari *et al.* (2014)** in Pegagan duck. Unlike **Das and Bisawal (1968)** in duck, **Mirhish and Nsaif (2013)** in turkey, who revealed simple columnar ciliated and non-ciliated mucus secreting cells.

In accordance with **King and Mclelland (1984)** in domestic fowl, **Mirhish and Nsaif (2013)** and **Elsayed (2016)** in turkey, the lamina propria sub-mucosa of isthmus was loose connective tissue housing branched tubular gland. In contrary with **Das and Bisawal (1968)** in domestic ducks who defined no glandular zone in isthmus. Those glands were simple and coiled as approved by **El- Habbak (1990)** in pekin duck.

Our study revealed that, the tunica muscularis mucosa of isthmus arranged in two layer; inner longitudinal and outer circular smooth muscle fibers. That statement disagreed with **El- Habbak (1990)** in pekin ducks who demonstrate thick inner circular and thin outer longitudinal that were separated by rich vascular connective. Although **Elsayed (2016)** in turkey detected that, the circular smooth muscle bundles was predominated with many different sizes blood vessels.

In accordance with **Fouad (1970)** in fayoumi fowl, **Neelam *et al.*, (2010)** in quail, **Mohammadpour *et al.*, (2012)** in hen and duck and **Elsayed (2016)** in turkey, the mucosal fold of the uterus was lined by pseudo stratified columnar ciliated and non-ciliated secretory cells. Meanwhile **Das and Bisawal (1968)** in domestic ducks found that, lining was alternating ciliated columnar and goblet cells.

The lamina propria defined as loose connective tissue, richly vascularized and housed a convoluted branched tubular. Such statement was agreed with **Hodges (1974)** in domestic hens and **Mirhish and Nsaif (2013)** in turkey.

Our finding revealed that the tunica muscularis mucosa of uterus was thicker than the preceding parts that approved by **Das and Bisawal (1968)** in duck, **Elsayed (2016)** in turkey. Furthermore muscular layer was consisted of thick inner circular and outer longitudinal smooth muscle layer as agreed with **Mirhish and Nsaif (2013)** in turkey, but disagreed with **Fouad (1970)** in fayoumi fowl who mentioned that the inner layer was longitudinal and oblique while the outer one was circular and oblique.

The mucosal folds of vagina lined by pseudo stratified columnar ciliated and non-ciliated secretory cells. That statement agreed with **Fouad (1970)** in fayoumi fowl, **Ozen *et al*,. (2009)** in duck, **Mohammadpour *et al.*, (2012)** and **Elsayed (2016)** in turkey. However different finding detected by **Das and Bisawal (1968)** in duck who mentioned non-ciliated columnar lining epithelium. Our results also unlike **Sharaf *et al.*, (2013)** in ostrich who found ciliated columnar, non-ciliated columnar and basal cells.

Several vaginal epithelial invaginations were recognized forming the sperm host glands, but such gland were recognized by **Ozen *et al.*, (2009)** and **Sari *et al.*, (2014)** in duck in the utero-vaginal junction. In agreement with **Das and Bisawal (1968), Ozen*et al.*, (2009)** and **Mohammadpour *et al.*, (2012)** in duck, lamina propria of vagina hadn't any secretory tubular gland. **Fujii (1963)** in domestic fowl declared simple tubular glands within the mucosal folds.

The muscular coat of vagina composed of thick inner longitudinal and thin outer circular smooth muscle layers. That statement disagreed with **King and Mclelland (1984)** in fowl, **Mohammadpour *et al.*, (2012)** in hen and duck who referred that, muscular coat composed of inner circular and outer longitudinal smooth muscle layers. However **Elsayed (2016)** in turkey showed mainly circularly arranged muscle bundles and longitudinal, oblique bundles form the rest of the muscle layer.

References

Bakst, M. R. (1998): Structure of the avian oviduct with emphasis on sperm storage in poultry. J.Exp. Zool. 282:618-626.

Baumel, J. J., King, A. S., Breazile, J. E., Evans, H.E. and Vandenberge, J. C. (1993): Hand book of avian: Nomina Anatomica Avium. Second Edition, the club; Cambridge, Massachusetts.

Berg, C. Holm, L. Brandt, I. and Brunstrom, B. (2001): Anatomical and Histological Change In The Oviduct Of Japanese Quail, *(Coturnix Japonica)*, After Embryonic Exposure To Ethynylo-Estradiol**.** *Reproduction, 121:155-165.*

Bezudenhout, A. J., Soley, J. T., Groenewald, H.B. and Burger, W. P. (1995): Sperm- storage tubules in the vagina of the ostrich (*Struthio camelus*). Ondersteeport J. Vet. Res., 62:193-199.

Blendea, A., Cazimir, I., Cornilă, N., Irimescu, I. and Damian A. (2012): Anatomohistological study regarding the ovary and oviduct in different age groups in the chicken (*Gallu sdomesticus*).Veterinary Medicine J., 8: 18-27.

Chousalkar, K. K. and Roberts, J. R. (2008): Ultra structural changes in the oviduct of the laying hen during the laying cycle. Cell Tissue Res, 332:349-358.

Das, L. N. and Bisawal, G. (1968): Micro-anatomy of the reproductive tract of domestic duck (*Anas boscas*).Ind.Vet. J., 45:1003-1009.

Davidson, M. F. (1986): Histological studies of changes in the magnum of the domestic hen associated with production" Watery White Eggs".Br. Poult. Sci., 27:353-354.

Deka, A., Baishya, G., Sarma K. and Bhuyan, M. (2014): Comparative anatomical study on infundibulum of Pati and Chara-Chemballi ducks (*Anas platyrhynchos domesticus*) during laying periods. *Veterinary World* 7(4): 271-274.**doi:** 10.14202/vetworld.2014.271-274.

Dyce, k. M., Sack, W. O. and Wensing, C. J. G. (2002): Text book of veterinary anatomy. Third Edition. Saunders, Philadelphia.

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.

El-sayed, A. H. M. A. (2016): Morphological Study on the female genital system of adult female turkey with special reference to its vascular supply. M.V.Sc. Thesis, Faculty of Veterinary Medicine, Cairo University.

EvêncioNeto, J., Evêncio, L. B., Fukumoto, W. K. and Manuel de Jesus Simões(1997):Morphological and histochemical aspects of the luminaroviductal epithelium of the laying and nonlaying muscovy duck.(*Cairina moschata*).Rev. chil. anat., 15 (2):1-12

Fouad, S. M. (1970): Histological studies of the female genital system of the fayoumi fowl broiler and adult. Ph.D. Thesis, Faculty of veterinary Medicine, Cairo University.

Fujii, S. (1963): Histological and histochemical studies on the oviduct of the domestic fowl with special reference to the region of uterovaginal juncture. Arch. Histol. Jap. 23:447-459.

Getty, R. (1975): The anatomy of the domestic animals. Volume 2.Fifth Edition. W.B. Saunders company, Philadephia London.

Hodges, R. D. (1974): Histology of the fowl, London. Academic Press. Pp: 344-349.

King, A. S. and Mclelland, C. E. (1984): Birds:Their Structure and Functional (2nd Ed). Bailliers and Tindall. London: 145-165.

Lucy, K.M. and Harshan, K.R. (2000): Structure and postnatal development of magnum in Japanese quail (*Cotumtxcoturnix japonica*).Journal of Veterinary and Animal Sciences, 31:40-43.

Mirhish, S.M. and Nsaif, R.H. (2013): Histological study of the magnum and vagina in turkey hens *(Meleagris gallopavo*).Global journal of bio-science and biotechnology, 2 (3): 382-385.

Mohammadpour, A.A., Zamanimoghadam, A. and Heidari, M. (2012): Comparative histomorphometrical study of genital tract in adult laying hen and duck. Veterinary Research Forum, 3 (1): 27 – 30.

Mohammadpour, A.A. and Keshtmandi, M. (2008): Histomorphometrical Study of Infundibulum and Magnum in Turkey and Pigeon. World Journal of Zoology 3 (2): 47-50.

Moraes, C., Baraldi-Artoni, S. M., Pacheco, M. R., Nishizawa, M. and Nakaghi, L. S. O. (2010): Morfologia e histologia do oviduct de marrecas Ana boschas. Arq.Bras. The Med. Vet.Zootec., 62(2): 293-301.

Neelam, B., Variender, U. and Devendra, P. (2010): Histomorphological and histochemical studies on the oviduct Punjab White quails. Indian Journal of poultry science. 45 (1):88-92.

Nickel, R., Schummer, A. and Seiferale, E. (1977): Aanatomy of the domestic birds. Verlagpaulparey, Berlin and Hamburg. Printed in Germany by Felgentreff and Goebel, D-1000 Berlin 61.

Özen, A., Ergün, E., Kürüm, A.(2009): Light and electron microscopic studies on the oviduct epithelium of the Pekin duck (*Anas platyrhynchos*). Ankara Üniversitesi Veteriner FakültesiDergisi . 56(3): 177-181.

Parizzi, R.C.; Santos, J.M.; Oliveira, M.F.; Maia, M.O.; Sousa, J.A.;Miglino M. A. and T. C. Santos (2008): Macroscopic and Microscopic Anatomy of the Oviduct in the Sexually Mature Rhea (*Rhea americana).*Anatomia, Histologia, Embryologia, 37(3): 169–176.

Patki, H. S. and Lucy K. M. (2012): Morphological Development of the Isthmus of Kuttanad Duck (*Anas Platyrhynchos Domesticus*) During Postnatal Period.IOSR Journal of Agriculture and Veterinary Science, 1 (6):17-20.

Patki, H. S., Lucy K. M. and Chungath, J. J. (2013): Histological observation on the infundibulum of Kuttanad Duck (*Anas platyrhynchos domesticus*) During Postnatal

Period. International Journal of scientific and research publication. 3(1).

Robert, B., Reed, J., Lee, A., Cope and James, T. and Blackford (2011): Macroscopic Anatomy of the Reproductive Tract of the Reproductivel Quiescent Female Emu (*Dromaius novaehollandiae*). Anat. Histol. Embryol., 40:134-141.

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.

Sari, M. L., Noor, R. R., Hardjosworo, peni S. and Nisa, C. (2014): Characteristic Morphology Female Reproductive system Pegagan duck. International Journal of chemical engineering and application. 5(4):307-310

Sharaf, A., Eid, W. and Abuel-Atta, A. A. (2012): morphological aspects of the ostrich infundibulum and magnum. Bulgarian Journal of Veterinary Medicine. 15(3):145-159.

Sharaf, A., Eid, W. and Abuel-Atta, A.A. (2013): Age-related morphology of the ostrich oviduct (isthmus, uterus and vagina) Bulgarian Journal of Veterinary Medicine 16(3):145−158 .

Wyburn, G. M., Johnston, H. S., Draper, M. H. and Davidson, M. F. (1970): The fine structure of infundibulum and magnum of the oviduct of *Gallus domesticus*. Q. J. Exp. Physiol., 55:213-232.

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