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Grossly and Microscopically Description Ovary and Oviduct in the Female Local Duck

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Abstract | The purpose of this study was to assess grossly and microscopically ovary and oviduct of local duck (*Anas platythynchos*). For this purpose, a total of nine mature ducks were used and assessed for morphometrically parameters including length diameter and weight. Microscopic structures analysis had revealed that the left ovary was big and unequal with several follicles visible at various stages of development. The adult left oviduct, which extended from the ovary to the cloacae had five fully mature parts including magnum, infundibulum, isthmus, uterus, and the vagina. The current study demonstrated that the mature duck ovary is coated with two separate internal areas (cortex and medulla) of simple cuboidal germinal epithelium. Several follicles (primordial, primary, secondary, and tertiary follicles) in various developmental phases can be found in the cortical peripheral regionand the microscopic structures of oviduct lining epithelium was pseudo stratified columnar (non-ciliated and ciliated) secretory, with lamina propria containing glands, blood arteries, and two layers of smooth muscle with the inner circular and outer longitudinal layers growing in thickness. The duck tunica serosa oviduct formed by loose connective tissue covered by mesothelium. These finding showcase the local duct breed and may be used as markers for characterization and breed preservation.

Keywords | Local duck, Female, Genital system, Histology

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INTRODUCTION

The domestic ducks (*Anas boschas domesticus*) belongs to family Anatidae and genus Anas (Bruce *et al*., 1992). Ducks are the highest resistance against different avian diseases. The Mesopotamian marsh lands are imperative sites of several migratory birds (Jalaludeen *et al*., 2004; Patki and Lucy, 2012). The most well-known of these are the Al-Hammer and Al-Hweaza marshes (UNEP, 2005).

Avian reproductive system consists of ovary and oviduct. The ovary of avian occupies the dorsal part of the mid-region in colon. It connects caudally to the left kidney's cranial and cranially to the base of the lung (GeHy,1975). Histologically, avian ovary composes of two regions, the cortex and medulla. The medulla is surrounded by the ovarian cortex, with the exception of the hills (Bradley, 1960). The cortex's outer surface is made up of cuboidal simple epithelium, which is a super-facial epithelium supported by connective tissue with weak cell density. The cortex of ovarian surrounding the medulla except at the hills (Bradley, 1960). The cortex outer surface is a super-facial epithelium classified as cuboidal simple epithelium sustained by poor cell connective tissue (Gilbert, 1979).

During the development of an egg, the oviduct of an avian

goes through a number of hormonal, neutral, biochemical, and cellular changes (Yaniz, 2005). Infundibulum, magnum, foremus, tubular shell gland or uterus, and vagina make up the five regions of the avian oviduct (Kelany *et al*., 1993). The infundibulum is divided into two distinct sections: The first section has a funnel shape and a cranially wide thin wall. However, the second part was the caudal narrow tubular located around the yolk of egg (Al-Saffar, 2015) and the fibrous membrane of their isthmus surrounding the egg white. The uterus finally creates an eggshell, and the vagina attaches it to the cloacae (Chousalkar and Roberts, 2008).

The tunica mucosa's epithelium, which is made up of secretory cells (both ciliated and non-ciliated), can be found in all oviduct areas. The glands that make up the lamina propira are tightly packed together and have characteristics unique to the uterus, isthmus, and magnum (Fouad, 1970). The tunica mucosa develops primary, secondary, and tertiary branches of convolutions that protrude toward the lumen. They are mostly lined with secondary cells in the basal region, which are ciliated cells along the luminal surface (Balachandran *et al*., 1985; Ozen *et al*., 2009; Lei *et al*., 2022; Arif *et al*., 2023; Margiana *et al*., 2022; Bashar *et al*., 2023; Lafta *et al*., 2023; Abbas *et al*., 2023; Hjazi *et al*., 2023; Hussein *et al*., 2017; Althomali *et al*., 2023; Gupta *et al*., 2023; Sane *et al*., 2023; Al-Jassani *et al*., 2022; Al-Dolaimy *et al*., 2023; Al-Hawary *et al*., 2023; Gaffar *et al*., 2023; Muzammil *et al*., 2023; Al-Safi and Qasim, 2023).

The current study aimed to describe observation of the female reproductive organs ducks and can be used as a guide line in the cultivation efforts.

MATERIALS AND METHODS

A total of eight adult females of about 35-55 weeks of age and biological mallard ducks (Ana'splatythynchos) were used in this study. The birds collected from local supplier in Basrah city-Iraq. The birds were kept for two weeks under normal conditions and allowed to access feed and water ad-lib s to eliminate whose have the signs of illness. The birds were eventually killed, and an abdominal dissect was performed to reveal the viscera, which was then removed to view the morphological and histological structure of reproductive organs. Then specimen were washed with 0.91 normal saline and fixed for 48 hours, 10% formalin solution. After that, the samples was washed with running tap water for 4-5h.

The specimens (ovary and oviduct) were dehydrated by alcohol to eliminate all extractable water from them and cleared by xylene for infiltration. The specimens were then moved to molten paraffin and left for two hours in an oven set at 58 °C. The collected specimens were blocked with paraffin wax and processed into sections that were precisely 5-6 m thick from the center and margin of each specimen using a rotary microtome.

The piece was removed from the bath and mounted on a slide that included mayor's album (egg albumin mixed with glycerin). Slides were then dried in an oven set to 40 °C for 24 hours and stained to show the general tissue structure with Harris hematoxylin and Eosin stain (Luna, 1968).

RESULT

Morphological characteristics of ovary

The left ovary was huge and had a variety of shapes, it consisted of up of several follicles of different sizes, giving it a shape resembling a bunch. By their stalks, large follicles had been suspended and joined to the ovary. Near the cranial division of the left kidney, the peritoneum (mesovarium) fold connected the ovary to the dorsal section of the coelom near the midline of the body (Figure 1A, B).

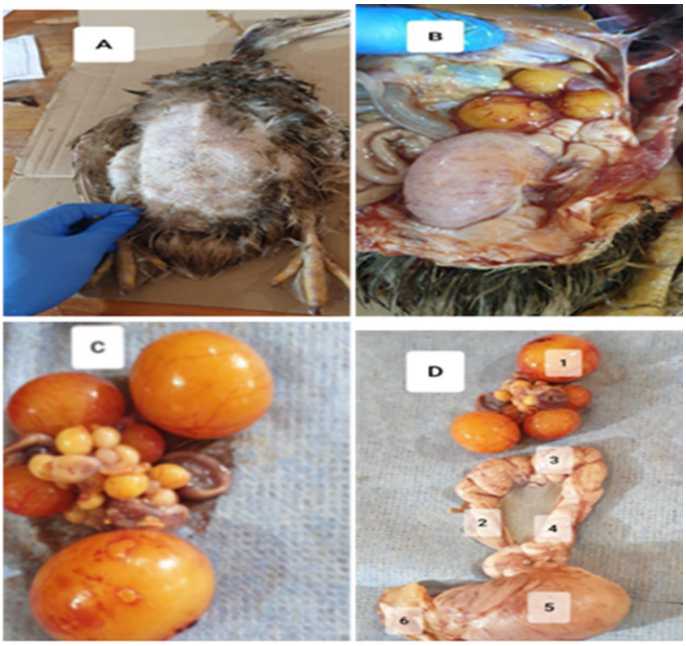

Figure 1: A: mature female duck. B: cross appearance of laying female body. C: ovary, number of mature yellow follicles. D: 1- ovary2-infundibulum 3-magnum 4-itshmus 5-uterus containing egg 6-vagina.

It was firmly attached dorsally to the caudal vena cava and abdominal an aorta. Figure 1C, D showed that the average ovary measured 3.5 +0.03 cm.120.8+1.2g in weight and 11.2+0.12 mm in diameter.

The mature left ovary's morphology resembled a cluster of grapes due to the existence of many follicles. The results showed that there was no relationship between the weight of duck ovaries and body weight. Additionally, the size of the birds increased along with their ovary weight as they grew

older. Results demonstrated that the left oviduct had five regions (the infundibulum, magnum, isthmus, and uterine junction region with vagina) and was fully developed. The adult oviduct's average length was 40.85+0.4 cm, its average diameter was 18.66+4.4 mm, and its average weight was 54.8+3.5 gm. The morphological findings of this period's mature duck.

Histological analysis

It was discovered that the duck's ovary was internally covered in two distinctive areas of simple cuboidal epithelium (germinal epithelium). Numerous follicles in various developmental phases, including primordial, primary, secondary, and tertiary follicles, were present in the cortex's periphery. The medulla, a more center area, is made up of loose connective tissue, is abundant in blood arteries, and contains smooth muscle fibers (Figure 2).

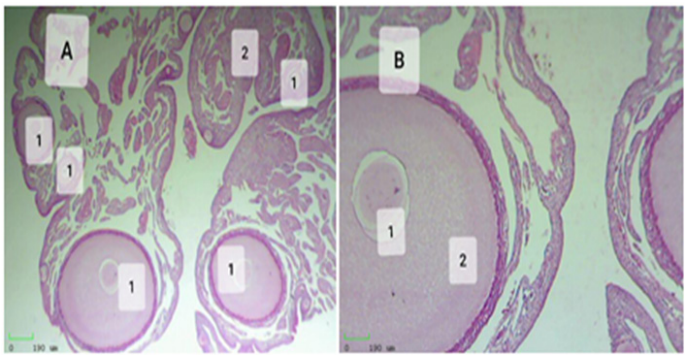

Figure 2: Transverse section of the ovary in duck showing (A) ovarian follicle development 1-with medulla. (B) showing oocyte nucleus 1-with oocyte and 2- yolk –lader cytoplasm. H and E stain X100, X400.

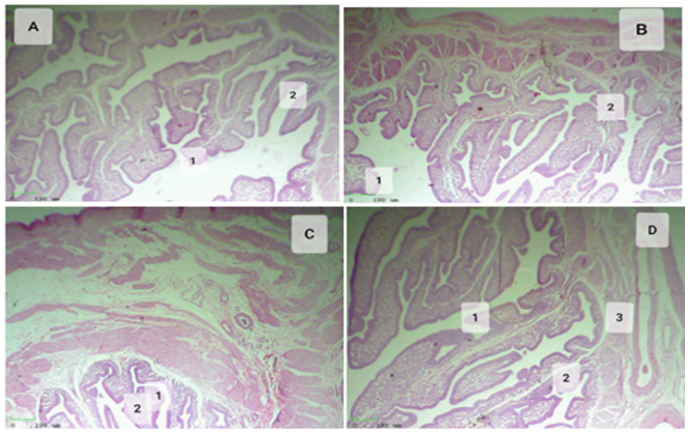

Figure 3: Transverse section of the ovary in duck showing (A) 1-mucosa region lined with simple cuboidal epithelium 2-with folds. (B) showing 1- neck of infundibulum region lined with ciliated columnar cells 2-supperted on lamina properia. C) magnum region 1- lined with epithelium 2-lamina propria. D) showing isthmus region lined with 1- pseudostratified columnar ciliated epithelial 2-restedon lamina propria 3-musclaris layer. H and E stain 100X.

The oviduct in both species was separated into five parts for histological assessment, including the tunica serosa, tunica muscularis, and tunica mucosa. Convulsions of the tunica mucosa protruded into the lumen. The pseudo-stratified (non-ciliated and ciliated secretory cells) epithelium. In the mucosa of laying ducks, the epithelium and cilia longitudinally produced folds that spiralled down the length of the oviduct and varied in height and thickness (Figures 3 and 4). The musculares tunica layer very developed particularly layer the thickest part of the vaginal wall sphincter same the outer longitudinal smooth muscle fiber serousa consist of loos connective tissue.

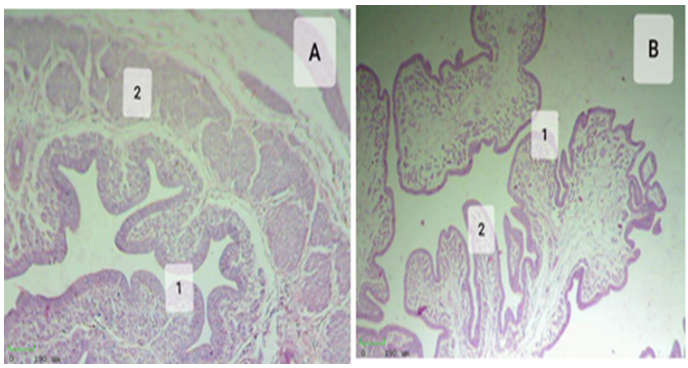

Figure 4: Transverse section of the uterus and vagina showing (A) mucosa region lined with 1- epithelium 2-musclaris layer in uterus. (B) showing vagina were lined with 1- stratified.

DISCUSSION

The female genetic system of local duck consists of two parts, the ovary and oviduct. Identical to those observed in growing hens (Pollock and Orosz, 2002; Mohammed, 2010). Only the left ovary and oviduct were working in most avian species. Same comprise geese the right ovary and oviduct behave embryological debasement through development growth left over in mature avian (Rahman, 2013).

This study showed that the average ovary measured between 3.5 +0.03 cm and 120.8+1.2g in weight and 11.2+0.12mm in diameter. At this mature age, the adult oviduct's average length was 40.85+0.4 cm, its average diameter was 18.66+4.4 mm, and its average weight was 54.8+3.5 gm. The morphological findings of this period's mature duck agree with finding in the turkey. The left oviduct in current study consists of five sections (infundibulum, magnum isthmus, uterus and vagina this came in line with fowl bird (Saber ASM, Emara S, etc).

The duck's ovary was internally covered into two distinctive areas of simple cuboidal epithelium (germinal epithelium). Numerous follicles in various developmental phases, including primordial, primary, secondary, and tertiary follicles, were present in the cortex's periphery.

The medulla, a more center area, is made up of loose connective tissue, is abundant in blood arteries, and contains smooth muscle fibers resemble chicken (Deka A, ETC). The size of the birds increased along with their ovary weight as they grew older, which was similar to what was recently postulated for pigeon ovarian weight (Sivachelvan and Yahaya, 2010).

The oviduct in both species was separated into five parts for histological assessment, including the tunica serosa, tunica muscularis, and tunica mucosa. Convulsions of the tunica mucosa protruded into the lumen. The pseudo-stratified (non-ciliated and ciliated secretory cells) epithelium. In the mucosa of laying ducks, the epithelium and cilia longitudinally produced folds that spiraled down the length of the oviduct and varied in height and thickness (Figures 4 A and B). This result compatible with result (Mohammedpour etc). The uterus mucosa was similar and branch leaf like lamellae lining by pseudostratified culomnar non-ciliated and ciliated.

CONCLUSION

From this study, we conclude that the female reproductive system in the common duck is highly developed and consists of two parts: The ovary and the oviduct. The oviduct is composed of five parts, and the ovary itself consists of two layers: the cortex and the medulla. Primary, secondary, and mature developmental stages are found on the surface of the ovary. The ovary is lined with simple cuboidal tissue, while the oviduct is lined with pseudo-ciliary and non-ciliary columnar tissue.

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NOVELTY STATEMENT

This is the first study in Iraq to study histological and anatomical characteristics of ovary and oviduct in the female local duck.

AUTHOR'S CONTRIBUTION

This study was conducted with the participation of both researchers in the work. Both researchers read and approved the final manuscript.

Generative AI and AI-assisted technology statement

No artificial intelligence tools were used in the manuscript, and the authors bear all responsibility for any future consequences thereof.

Conflict of interest

The authors have declared no conflict of interest.

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