HISTOMORPHOLOGICAL POSTNATAL DEVELOPMENTAL STUDY OF THE OVARIES OF THE LOCAL RABBITS (*Oryctologus Cuniculus*)

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ABSTRACT

This investigation was carried out to point out structural histomorphological changes that take place in the ovaries of female local rabbits at three different postnatal periods of their life that were kitten, immature and mature does. To conduct such project, 24 rabbits were collected (8 for each age) from the local breeders. Rabbits were euthanized, dissected and subsequently ovaries were collected and fixed with 10% neutral buffered formalin then subjected to routine processing such as dehydration, clearing, embedding and block preparation. Finally, sections of 6 µm were prepared and stained with hematoxylin-eosin and Masson's trichrome stains. Gross findings showed two functional bilateral elongated triangular-shaped ovaries situated in the abdominal cavity suspended by mesovarian ligament with absence of true ovarian bursa. Microscopic findings revealed prominent structural changes in the ovaries of immature does compared to those of kittens and mature does indicated that immature does after the period of weaning face great developmental growth and changes. The data showed the presence of pre-ovulatory follicles in the mature does and no signs of ovulation because

these animals are induced ovulators and that does subjected to the study were all virgin and not allowed for mating with the males.

INTRODUCTION

Rabbits are considered small mammals which were included in the family Leporidae establish in several parts of the world. One decade before, rabbits were considered good experimental animal model in researches of various morphological anomalies and diseases in both human and animals. They have been used as experimental model in inducing many diseases and subsequent studies focused on many aspects such as toxicology, pharmacology and surgery at different universities [1]. Accordingly, microscopic structure of different organs of this animal is required deep description and exploration such as ovaries of the reproductive system.

According to the FAO [2], backyard rabbit keeping provides additional income and supplies additional protein for poor rural and urban households with low investment and labour inputs. Rabbits are selected as a source of meat because they have small body size, short interval between generations, high reproductive potential, fast growth rate, genetic diversity, and the ability to utilize forages and by-products as major diet components that make the animal appropriate for small livestock keeping in developing countries [3].

Rabbits are belongs to a few species in which the ovulation is induced by mating, which resulting in a precisely distinct pregnancy and embryonic age just hours or days post coitus. They have a short reproductive cycle and the pregnancy lasts for approximately 31 days, with female sexual maturity occurring at about 4 to 5 months of age depending on strains or breed with ovulation occurring about 10 to 13 hours after mating [4, 5].

In contrast to the huge number of studies on the reproductive system of birds and domesticated animals, few studies on the ontogeny and developmental changes of the rabbit female reproductive organs are available one of them the ovary. Most investigations on the pre- and post-hatching development of the reproductive organs were carried out on avian such as hens [6], Mallard [7, 8], emu birds [9], whereas, in

domestic animal studies were focused on histomorphology of some organs of the female reproductive system such as ovary of golden hamster [10], rat [11], porcupine [12].

Up to date there are no available studies in the previous and present literatures investigated the developmental changes in the ovaries of the female reproductive system of the local rabbit. According to this reason and the importance of this animal species mentioned in the above introduction, the project was performed to study the structural changes of the ovaries of the local rabbits (*Oryctologus Cuniculus*) at different postnatal developmental periods. The obtained data may be of value in the understanding, determine the biological data of the female local rabbits which may further facilitate its domestication, breeding and production.

MATERIALS AND METHODS

Collection of animals

This research was conducted from March - 2017 to April - 2018 approved by the Collge Concil of Veterinary Medicine / Baghdad University. Twenty four female local rabbits (*Oryctolagus cuniculus*) of three different ages were selected to conduct the present investigation. The animals with apparent healthy condition were purchased directly from rabbit's breeders. The obtained rabbits were one week newly born suckling kittens, 8 to 10 weeks aged immature post weaned female rabbits, mature does of 5 months aged (virgin). Animals were left three days under supervision to insure their good healthy condition during such period before their euthanasia and subsequent dissection.

Dissection of animals

Each rabbit was weighed with a sensitive weighing balance and euthanized by intramuscular injection of sodium pentobarbitone (140 mg/kg bw). The rabbit was placed on dorsal recumbency to view the ventral aspect. Thereafter, a mid-line abdominal incision was made cranio-caudally from the xiphoid cartilage to the pubic symphysis in order to expose the structures in the peritoneal cavity. The ovaries were exposed and photographed in situ and later dissected out. The organs were temporarily kept in glass container to keep them moist in physiological saline solution. Then after, each ovary was transferred to filter paper to dry before weighing with the aid of

sensitive balance. The length and weight were measured using weighing balance with a sensitivity of 0.0001 g and vernier calipers, respectively. The ovarian length was measured from pole to pole. The data obtained expressed as mean ± standard error (Mean ± SE). Values of $p < 0.05$ were considered significant. All measurements were listed in table.

Histological preparation of specimens

The ovaries as a whole were washed with normal saline and then eventually immersed in 10% neutral buffered formalin for 72 hrs. For future staining with Masson's trichrome stain, some specimens were fixed by Bouin's solution. Next to fixation, specimens were dehydrated through ascending series of ethyl alcohol (70%, 80%, 90% and 100%) each for 2 hrs , then cleared with xylene for ½ hr. Specimens were infiltrated with paraffin wax (58 – 60 ºC) then embedded with paraffin wax to obtain blocks of paraffin. Paraffin sections of six micrometers were obtained by using rotary microtome. Follicles of ovary were photographed using the colour USB 2.0 digital image system (Scope Image 9.0) which is provided with image processing software applied for the measurements of follicular diameters. Tissues were processed by paraffin technique and cut by microtome; 6 µm thick slices were obtained and stained by hematoxylin and eosin as well as Masson's trichrome stains.. Classification of ovarian follicles was conducted according to the reference [13].

Statistical analysis

All data of both macromorphometric and micromorphometric measurements were analyzed by ANOVA and student *t* - test using SPSS software (version 14).

RESULTS

Gross findings

Gross examination of the female genital system of kittens, immature rabbits, and five months aged virgin mature does revealed that it comprised of right and left ovaries (Fig. 1). The ovaries were elongated and somewhat triangular in shape organs with white to slight yellowish color. They were fixed in the abdominal cavity by the mesovarian which was continuous with mesosalpinx. Both cranial and caudal poles were rounded and the ovaries were situated caudally to their corresponding right and left kidneys. Left

one was away for a short distance from the left corresponding kidney, whereas, the right ovary was of considerable distance away from the right kidney. Ovaries and the beginning parts of the uterine tubes with their associated mesovarium, mesosalpinx (respectively) were located on both sides of the midline where the abdominal aorta and caudal vena cava were existed. Blood vessels come into the ovaries and left out at the attached border of their cranial poles (Fig. 2).

Morphometrical measurements such as weight and length were listed in table 1. The means of lengths and weights of the ovaries of female kittens were 1.0 ± 0.01 mm and 0.8 ± 0.01mg, respectively. These measurements were changed into 7.0 ± 0.01 mm and 4.0 ± 0.02 mg in immature does. Similarly, these measurements were jumped into 10.0 ± 0.10 mm and 7.0 ± 0.04 mg, in mature does (Table 1).

Microscopic findings

Microscopic examination revealed similar microscopic structures for both right and left ovaries. They were covered by a layer of simple cuboidal cells displayed what usually known as the germinal epithelium. This layer was absent at the hilus of the ovary, the site where the blood vessels were entered or left the organ. Underneath the germinal epithelium, a layer of dense irregular collagenous connective tissue fibers represented the tunica albuginea (Fig. 3, 4).

Ovaries showed two regions that were outer cortex and an inner medulla. The cortex showed different types of follicles distributed in the region next to tunica albuginea extended to the interior of the organ, whereas, the medulla was constructed of irregular dense collagenous connective tissue stroma filled prominently with blood vessels. The vessels were obviously surrounding the large developed follicles.

The ovaries were distinctly separated into cortex and medulla in female kittens (Fig. 3), but not in the subsequent ages such as immature and mature does, where they were difficulty distinguished due to well developed medium and large ovarian follicles in the interior of the ovary during such periods. As a result of that ill-defined medulla appeared represented by scanty masses of dense irregular collagenous connective tissue stroma filled with distinct blood vessels that were surrounding such developed follicles (Fig. 5, 6).

Ovaries of female kittens

Obviously, the ovaries of female kittens showed cortical zone filled of different types of follicles according to the classification made previously by Pederson and Peters (1968). The small follicles primarily present that were type a, b and 3a and for lesser extent two types of medium-sized follicles were recorded namely type 3b and type 4. In fact, type 1 follicles were the primordial oocyte characterized by large nucleus and nucleolus. No cells were attached to the surfaces of these cells which were invested in the surrounding connective tissue. Type 2 follicles were numerous in number as in case of type 1. They were characterized by the presence of incomplete ring of squamous follicular cells attached to the surface of each oocyte. Similar to the above types, follicles of type 3a were numerous in number. They were characterized by the presence of complete ring of cuboidal follicular cells attached to their surfaces. The number of the follicular cells in such rings was less than 20. Lesser number of medium-sized follicles recorded in ovaries of female kittens compared to those of the small follicles. These follicles were only type 3b and 4. Type 3b follicles characterized by an oocyte surrounded completely by one layer of cuboidal follicular cells with a number more than 20 cells, whereas, type 4 showed two layers of follicular cells surrounding the oocyte (Fig. 7, 8).

Medulla of female kittens was distinctly separated from the cortex. Its stroma was constructed of irregular dense collagenous connective tissue fibers with large number of fibroblasts. Large number of blood vessels was observed in this stroma. Relatively, larger vessels of arteries and veins were detected at the sub-cortical areas, whereas, smaller vessels and capillaries were existed in the central areas. The blood vessels sent branches found in the connective tissue of the cortical region intervening between ovarian follicles.

Micromorphometric analysis showed that the diameters of type 1, 2, 3a, 3b and 4 ovarian follicles were 19.81µm ± 0.02 SE, 30.11 µm ± 0.30 SE, 45.93 µm ± 0.10 SE, 65.54 µm ± 0.31 SE and 72.70 µm ± 0.11 SE, respectively (Table 2).

Ovaries of immature does

Microscopic examination of the ovaries of immature does revealed single cuboidal cellular layer covered the ovaries under which present tunica albuginea of dense irregular connective tissue. Adjacently to this tunica, numerous types of small and few

medium sized and large ovarian follicles were recognized. The distribution and pushing of the medium and large follicles from the outer cortical region toward the interior or medullary area caused difficult distinguishable medulla from the cortex as the case recorded in the ovaries of the previous age i.e. the female kittens. As a result the medulla showed thin masses of stroma intervened between such follicles accompanied with rich blood supply (Fig. 9, 10).

The outer region of the ovary, the cortex revealed different types of ovarian follicles situated in the sub-cortical areas beneath recognizable tunica albuginea. Small follicles such as type 1, 2 and 3a as well as medium-sized follicles such as 3b, 4 and 5a were recorded. The latter type of follicle as well as large ovarian follicles such as type 5b and 6 were recorded for the first time in such age i.e. the immature does. In these does, ovaries showed rarely the early stage of type 7 of ovarian follicles (Fig. 9, 10).

Type 5a of ovarian follicles were characterized by an oocyte covered by three layers of follicular cells, whereas, type 5b were surrounded by many layers of follicular cells which may called granulosa cells. The appearance of small cavities filled with follicular fluid called antrum pockets in the granulosa cells gave rise to the 6th type of ovarian follicles. Granulosa was separated from the surrounding theca by the prominent basement membrane. This basement membrane was positively stained with PAS stain indicated its component of glycoprotein. Granulosa cells were numerous, small rounded cells characterized by their darkly stained nuclei with acidic cytoplasm filled with fine granules, whereas, theca was constructed of two layers that were theca interna and theca externa. The theca interna was constructed of dense layer of larger glandular fusiform cells than those of granulosa characterized by larger faintly stained cytoplasm and less darkly stained nuclei with prominent nucleoli, whereas, the theca externa was formed of circularly arranged bundles of collagen fibers. Seldomely, sections of ovary at this age showed the early formation of the cumulus oophorus which is the characteristic feature of type 7 of ovarian follicles (Fig. 11).

The medulla showed irregularly dispersed dense bundles of collagen fibers that were surrounded the developed medium and large ovarian follicles so that it showed high vascularization of both arterial and venous blood vessels.

Micromorphometric analysis showed that the diameters of type 1, 2, 3a, 3b, 4, 5a, 5b and 6 ovarian follicles were 20.90 µm ± 0.06 SE, 30.88 µm ± 0.30 SE, 45.81 µm ± 0.22

SE, 74.85 µm ± 0.31 SE, 88.04 µm ± 0.21 SE, 157.59 µm ± 0.11 SE, 260.96 µm ± 0.43 SE and 406.88 ± 0.08 SE, respectively (Table 2).

Ovaries of mature does

Ovaries of mature does were covered by single layer of simple cuboidal cells represented the germinal epithelium. Irregular bundles of dense connective tissue were constituted the tunica albuginea beneath the germinal layer. Numerous small, medium and few large follicles were identified filling the outer cortical region of the ovaries (Fig. 6). Distinctly, type 8 follicles were identified in this period of life of the does. About one to three of such follicles were recognized in most sectioned matured ovaries. Atretic follicles were observed close to the medulla region. Type 6^{th} and 7^{th} were present in plenty number relatively higher than those present in ovaries of immature does. Later stage of the 7^{th} type was evident and superficially situated. These follicles showed few small antrum pockets and the appearance of antrum filled with follicular fluid and the beginning of stalk formation of cumulus oophorus. The medulla formed of dense connective tissue bundles running between follicles in the interior region of the ovary. Numerous blood vessels were distributed in the medullary stroma (Fig. 12, 13, 14).

Micromorphometric analysis showed that the diameters of type 1, 2, 3a, 3b, 4, 5a, 5b, 6 7 and 8 ovarian follicles were 20.30 µm ± 0.20 SE, 31.28 µm ± 0.21 SE, 46.20 µm ± 0.33 SE, 74.55 µm ± 0.20 SE, 102.60 µm ± 0.43 SE, 177.01 µm ± 0.32 SE, 270.70 µm ± 0.18 SE, 486.70 µm ± 0.36 SE, 505.50 µm ± 0.32 SE and 550.80 µm ± 0.07 SE, respectively (Table 2).

DISCUSSION

Macroscopic data of the present investigation showed in the ovaries, age related changes. There were slight gross changes in their shapes and colours. The ovaries were elongated in female kittens and approximately triangular in both immature and mature does. In fact, these changes reflected interior developmental changes in the structure of the ovaries such as development of new ovarian follicles and changes the connective tissue stroma as well as intensity of the required blood supply. The ovarian surfaces appeared smooth even in the mature does which their ovaries possessed large ovarian follicles and no signs of follicular bulging which is feature of the pre-ovulation.

In the past decade, [12] recorded that the ovaries of porcupine were bean-shaped which was different compared to the studied rabbits in the present study. Ovaries in female kittens, immature and mature does were elongated triangular in shape with their bases directed cranially and were yellowish – whitish in color. In addition to that such findings were different to other animal's species such as African giant rat, in which the ovaries were pinkish in colour and kidney-shaped. But similar to these rats, the ovaries in rabbits were situated caudally to the kidneys, with the right ovary being located more cranially than the left and they were similarly suspended by the mesovarian ligament to the lumbar muscles. Other similar findings were the presence of two surfaces (lateral and medial), two borders (mesovarian and free borders) and a hilus .on medial or attached border. The free border was convex, while the mesovarian border was concave and indented at the hilus [14].

Ovaries of the studied does and female kittens were found suspended in the abdominal cavity by the mesovarian ligament to the sublumbar muscles and such anatomical observations were not parallel with those recorded in women. In Indian women, [15] studied their ovaries and they recorded different shapes of ovaries such as rod shape, "S" shape, oval shape and almond shape in the fetal, prenatal and postnatal ages, respectively and these ovaries were located entirely in the pelvic cavity. However, both women and does have two bilateral functional ovaries i. e. right and left ovaries.

Ovaries in the local rabbits were not located in a true ovarian bursa as recorded or described in some carnivore and rodent species but were usually surrounded by a mass of fat which certainly surrounds the mesovarium and the beginning region of the mesosalpinx [16, 17].

The lengths of ovaries in the local studied female kittens, immature and mature were 0.1 cm, 0.7 cm and 1 cm, respectively and these measurements were distinctly shorter compared to those recorded previously in the mixed breeds of rabbits by [18]. The latter reference recorded higher length of ovaries up to 1.8 cm in those mixed breeds of rabbits of California x Chinchilla x Newzealand White rabbits. The weights of ovaries of these mixed breeds were higher too up to 0.229 ± 0.02 g whereas, in the local rabbits the weights were lower and the highest recorded weight was 0.07 g to ovaries of mature does.

Ovaries of the current local rabbits were paired similar to other small sized mammalian species such as female agouti (*Dasyprocta leporina*) which are related to guinea pigs, but differently the colours of ovaries of these animals were yellowish and their shapes were ovoid with a mean length of 10.4 ± 2.1 mm longer than those estimated in different aged local rabbits [19]. Lengths of ovaries in the local rabbits were longer compared to those recently recorded in the hamster, where ovaries found ovoid in shape with very short length not more than 3 to 4 mm that were completely enclosed in a bursa [20].

Ovaries of the local different studied ages were located differently than those of guinea pigs. Locations of bilateral ovaries in guinea pigs were different in which the right ovary located caudolateral to the right kidney and the left ovary located craniolateral to the left kidney, whereas, rabbits ovaries were both caudally located to the corresponding kidneys. Also the length was shorter compared to local rabbits as it was estimated just 3 to 6 mm [21].

Microscopic present data showed distinct structural development in the cortex and medulla of the ovaries. Cortex and medulla were easily identified in the female kittens, whereas, not in immature and mature does because of new formation and development of the medium-sized and large ovarian follicles that were occupied more spaces of the cortical and medullary regions. These changes caused indistinct separation of these two regions. Arbitraries of the blood vessels were localized obviously around the large types of follicles which could play their role in subsequent stages of follicular maturation and ovulation.

Ovaries of immature does were not fully developed because only two of the four types of large follicles were developed. Plenty of large follicles were observed in this age which could develop to be the large graafian follicles (type 8). In ovaries of the mature does, the development and function of the pituitary endocrine organ specifically pars distalis could takes place causing the development of the types 7 and 8 ovarian large follicles in addition to the other types of medium and small sized follicles. Type 8 large follicles were remains inside cortical region under the ovarian surface and not bulging. This picture is due to the fact that female rabbits have no oestrus cycle and they are induced ovulators. Once coitus takes place, post 10 to 13 hours, the ovarian follicle type

8 (Graafian follicle) will be filled with electrolytes oozing from the rich blood vessels surrounding such follicle. The changes in blood pressure as a result of high producing of gonadotrophic hormones by pituitary gland. The antral fluid will be increased and subsequent explosion will takes place of the follicle and oocyte with associated radiata cells will be expelled [4, 5]. This process was not observed in the mature does as they were virgin does and no mating was allowed to them.

The current data provided important scientific knowledge on the interior follicular occurrence in different periods of life of the female local rabbits which should kept in mind of the researchers in fields of physiology, pharmacology and pathology when conducting their research on the female reproductive system of this animal species.

Past records showed that the thecal cells were fundamental for the follicular growth by the providing androgens required by the developing follicles for conversion into estrogens by the granulosa cells. Their function can be enabled by the organization of a vascular system providing communication with the pituitary axis throughout the reproductive cycle and delivering essential nutrients to these highly active cells. Actually, the majority of follicles undergo atresia during the development and the theca cells are often the final died follicular cell type. For those follicles that do ovulate, the theca cells then undergo hormone-dependent differentiation into luteinized thecal cells of the corpus luteum so that the theca is an essential component of follicle development and ovulation [22].

CONCLUSIONS

The current study which was conducted on the ovaries of the female reproductive system of the local rabbits revealed obvious specifications of these animal species compared to other mammalian species. They lack regular or seasonal estrous cycle so they must be induced by mating with their males to stimulate ovarian preovulatory follicle type 8 (graafian) to maturate quickly and rapture giving rise female gametes directed toward the uterine tubes for fertilization. Gonadotrophic hormones produced by the pituitary gland were not enough even in mature does unless they stimulated by the act of coitus by mating with the males to provide enough FSH and LH to act on follicles. These hormones will stimulate the endocrine cells of theca interns and

granulosa, for more accurate knowledge the theca cells provide androgen to the granulosa cell which will produce sex hormones.

Conflict of Interests

The authors have not declared any conflict of interests.

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Table 1. Gross measurements of the ovaries of female kittens, immature and mature does

Organ	Different ages of rabbits	Measurements	
		Length (mm)	Weight (mg)
Ovaries	Female kittens	1. 0 ± SE 0.01	0.8 ± SE 0.01
	Immature does	7. 0 ± SE 0.01	4.0 ± SE 0.02
	Mature does	10. 0 ± SE 0.10	7.0 ± SE 0.02

Note; SE = standard error

Table 2. Micromorphometric measurements showed diameters of different types of ovarian follicles in female kittens, immature and mature does

Types of ovarian follicles		Different ages of female rabbits		
		Kittens	Immature does	Mature does
Small follicles (primary)	Type 1	19.81 µm ± 0.02 SE	20.90 µm ± 0.06 SE	20.30 µm ± 0.20 SE
	Type 2	30.11 µm ± 0.30 SE	30.88 µm ± 0.30 SE	31.28 µm ± 0.21 SE
	Type 3a	45.93 µm ± 0.10 SE	45.81 µm ± 0.22 SE	46.20 µm ± 0.33 SE
Medium sized follicles (secondary)	Type 3 b	65.54 µm ± 0.31 SE	74.85 µm ± 0.31 SE	74.55 µm ± 0.20 SE
	Type 4	72.70 µm ± 0.11 SE	88.04 µm ± 0.21 SE	102.60 µm ± 0.43SE
	Type 5a	absent	157.59 µm ± 0.11SE	177.01 µm ± 0.32SE
Large follicles (tertiary)	Type 5b	absent	260.96 µm ± 0.43SE	270.70 µm ± 0.18 SE
	Type 6	absent	406.88 ± 0.08 SE	486.70 µm ± 0.36 SE
	Type 7	absent	absent	505.50 µm ± 0.32 SE
	Type 8	absent	absent	550.80 µm ± 0.07 SE

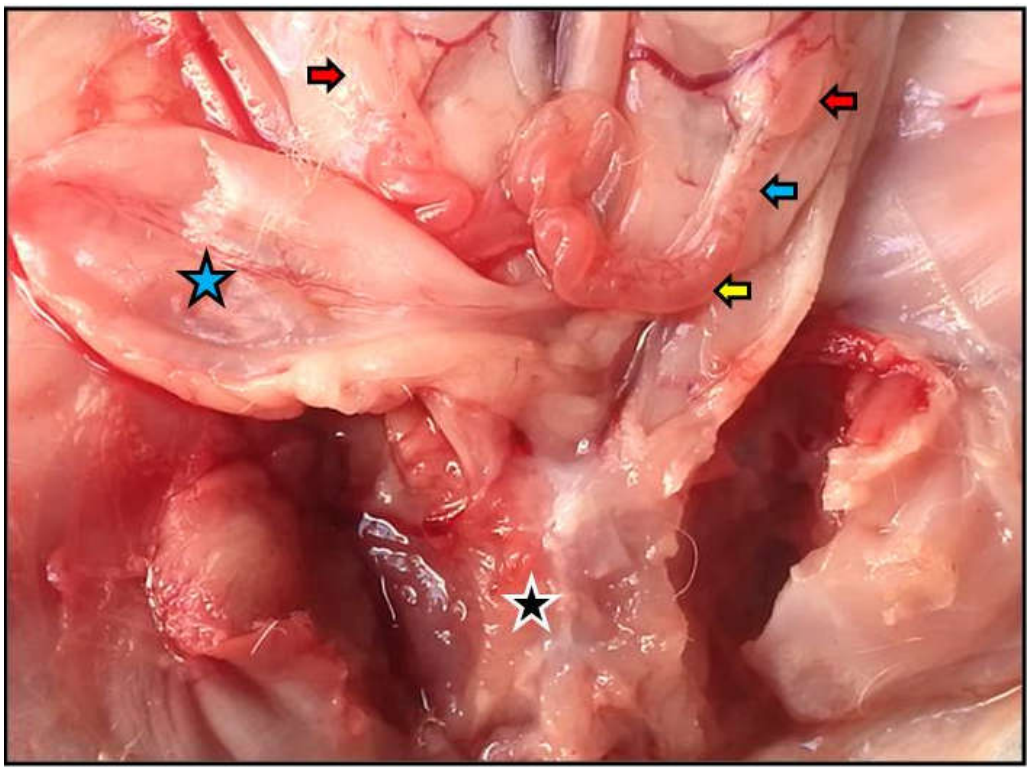

Fig. 1. Right and left ovaries (red arrows) of the female kitten in situ. The figure showed the related uterine tube (blue arrow) uterine horn (yellow arrow), urinary bladder (blue star) and the pelvis (black arrow).

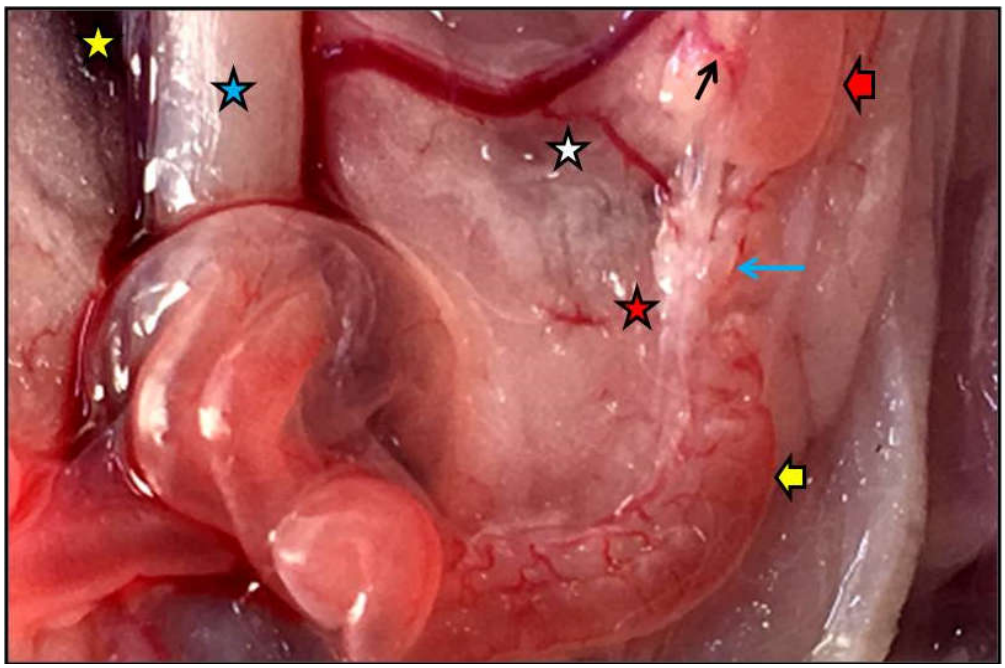

Fig. 2. Left ovary (red arrow) of female kitten in situ with its related uterine tube (blue arrow) and uterine horn (yellow arrow) situated at the left side of the abdominal aorta (blue star) and caudal vena cava (yellow star). The figure showed also entrance of ovarian blood vessels (black arrow), mesovarian (white star) and mesosalpinx (red star).

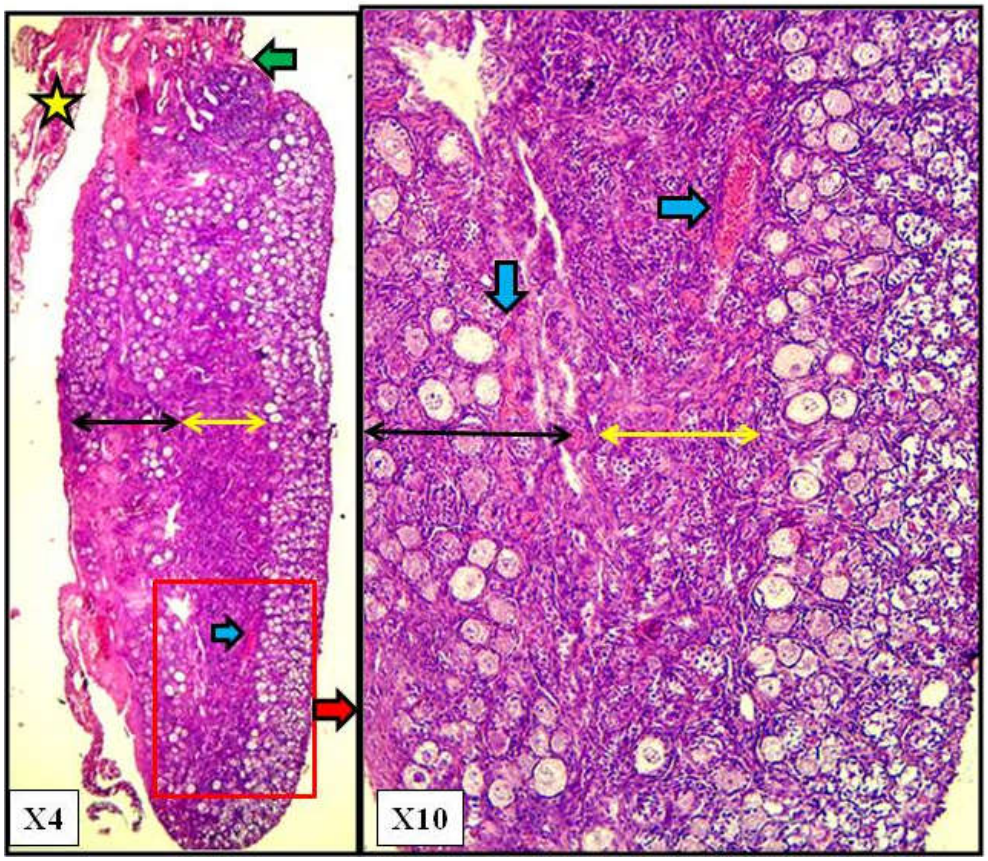

Fig. 3. Ovary of female kitten showed hilus at the attached border near the cranial pole (green arrow), part of mesovarium (yellow star), cortex (black double heads arrows) showed different types of follicles, medulla (yellow double heads arrows), blood vessels (blue arrows). H&E, X4, X10

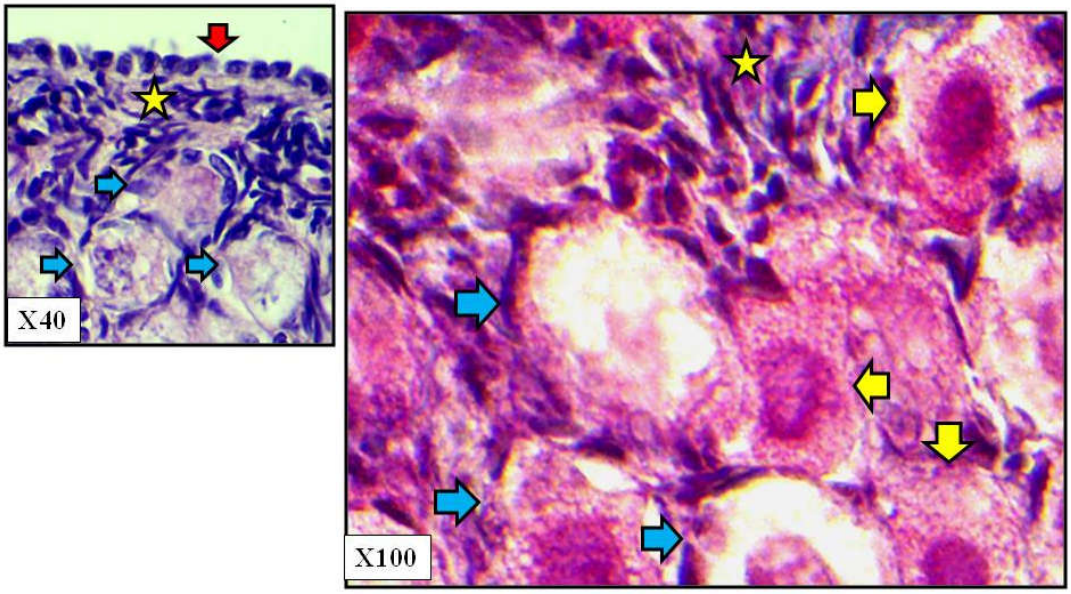

Fig. 4. Ovary of female kitten showed small follicles of type1 (yellow arrows), type 2 (blue arrows), simple cuboidal of germinal epithelium (red arrow), tunica albuginea (yellow star). X40, X100, H&E

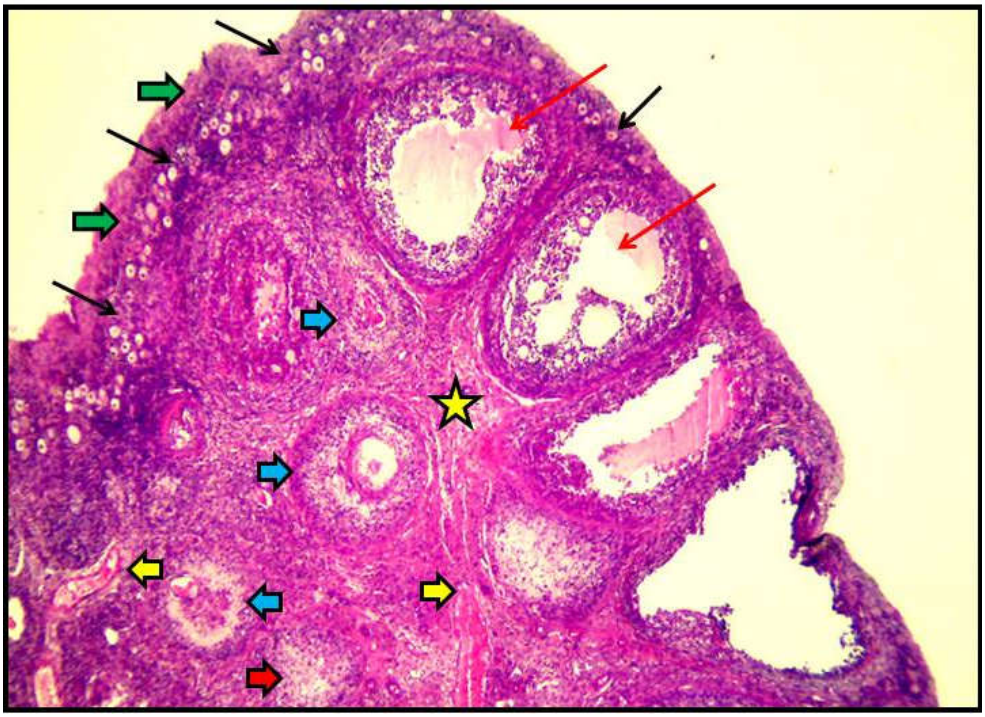

Fig. 5. Ovary of immature doe showed small (black arrows), medium-sized (blue arrows) and some of large follicles (red arrows), medullary stroma (yellow star), atresia (red arrow), blood vessels (yellow arrows), sub-germinal tunica albuginea (green arrows). X4, MTC

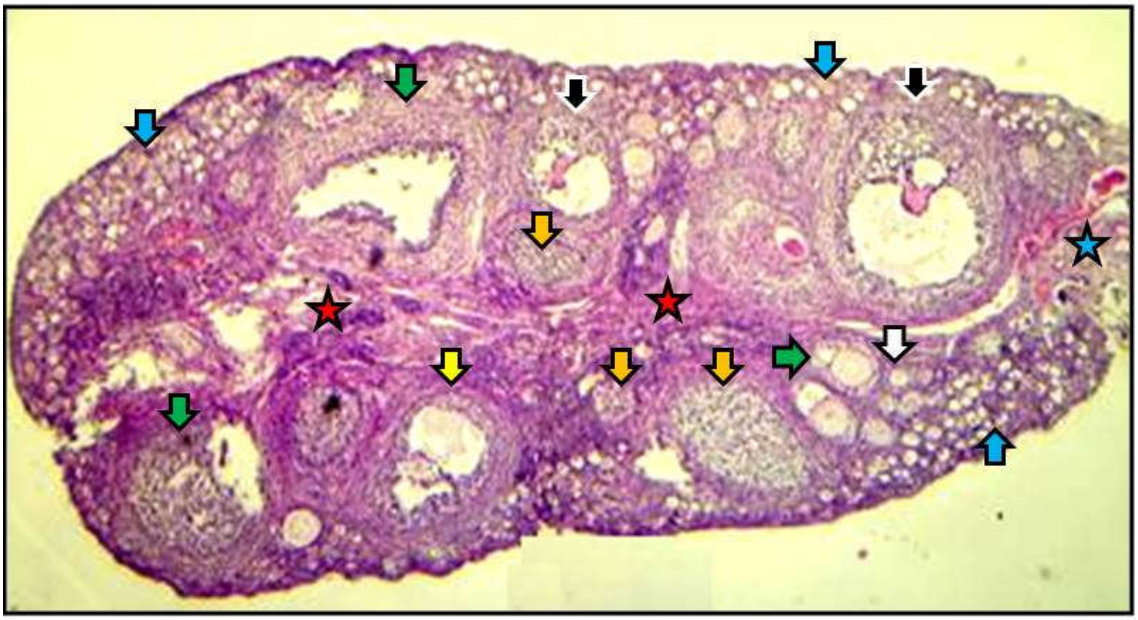

Fig. 6. Mature ovary showed small (blue arrows), medium-sized (white arrows) and some of large follicles such as type 6 (green arrow), type 7 (black arrows) and type 8 follicles (yellow arrows), medullary stroma (red stars) filled by blood vessels, atretic follicles (orange arrows). X4, H&E

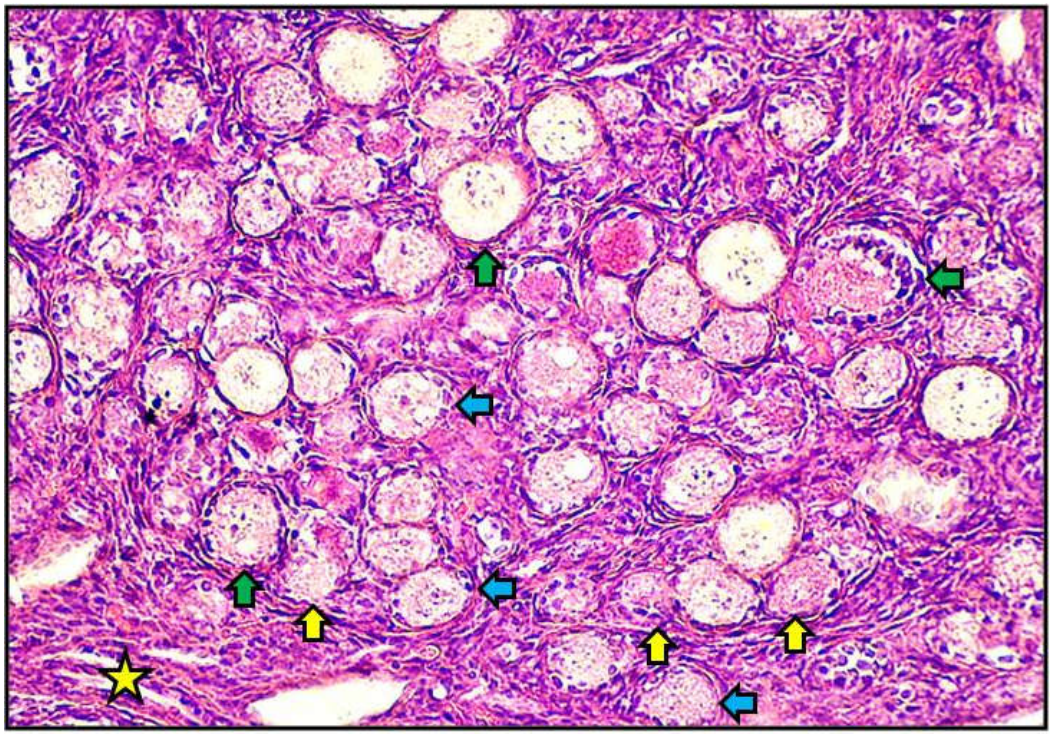

Fig. 7. Ovary of female kitten showed cortex with different types of small follicles that were type 1 (yellow arrows), 2 (blue arrows), 3a (green arrows), tunica albuginea (yellow star). X20, H&E

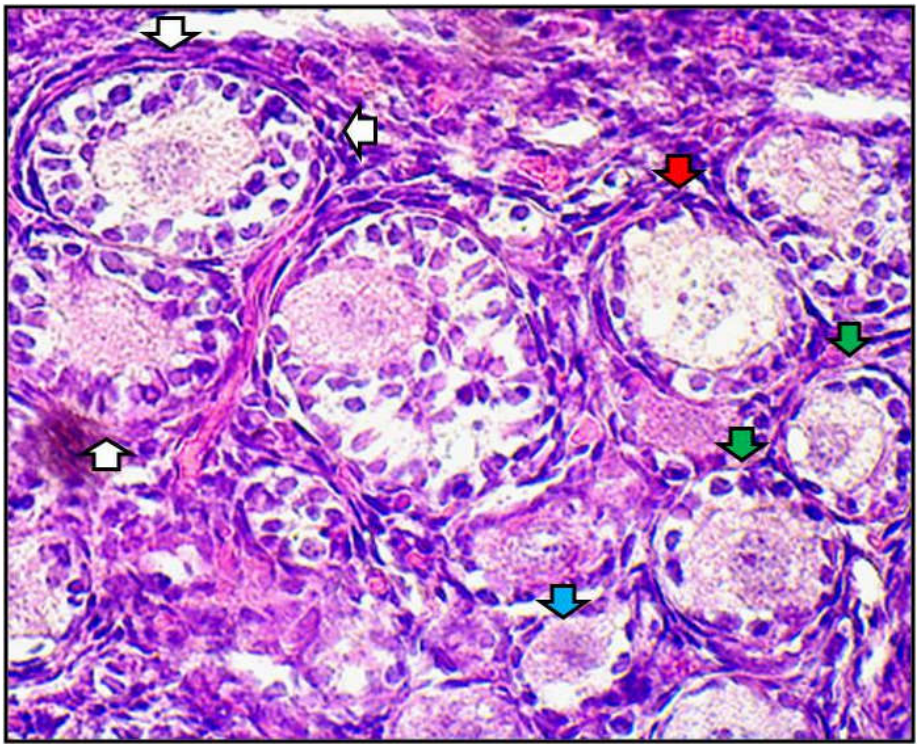

Fig. 8. Ovary of female kitten showed cortex with different types of small follicles that were type 2 (blue arrows), type 3a (green arrows) and medium-sized such as type 3b (red arrows) and type 4 (white arrows) X40, H&E

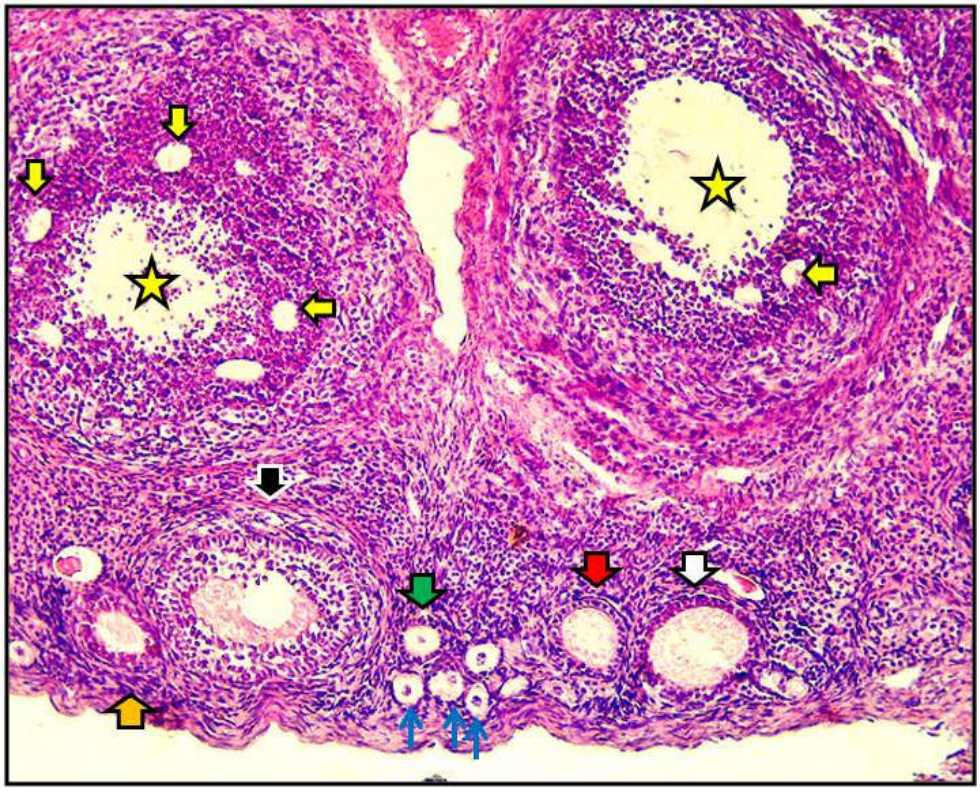

Fig. 9. Ovary of immature doe showed small follicles: Type 2 (blue arrows), 3a (green arrow). Medium-sized: 3b (red arrow), type 4 (white arrow). Large follicles: type 5b (black arrow), type 6 (yellow stars) with antrum pockets (yellow arrows), tunica albuginea (orange arrows) . X10, H&E

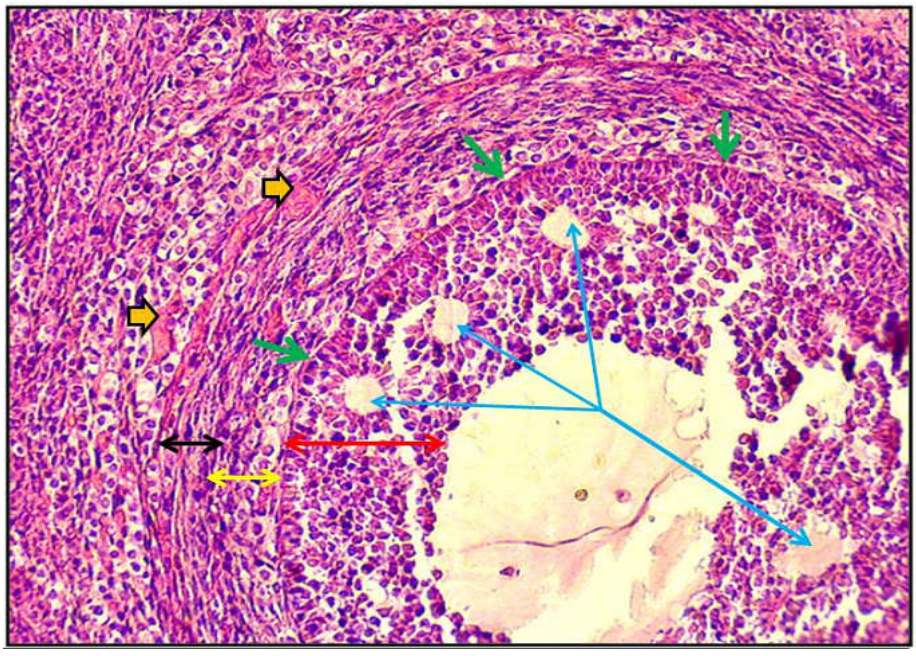

Fig. 10. Ovary of immature doe showed large follicle (Type 6): granulosa (red arrow), theca interna (yellow arrow), theca externa (black arrow), basement membrane (green arrows), cavities formation called antrum pockets (blue arrows), blood vessels (orange arrows). X20, H&E

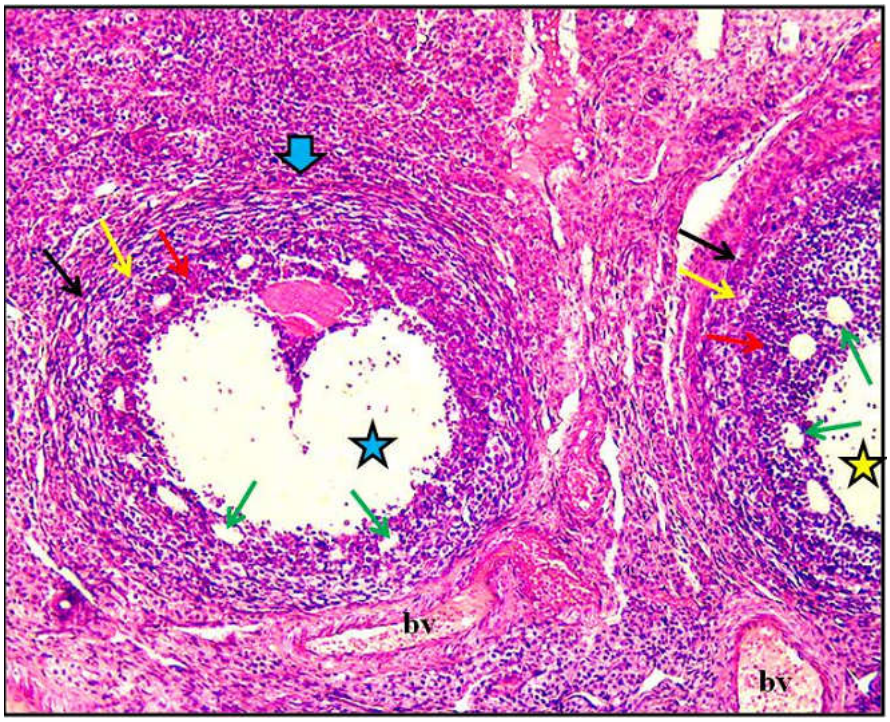

Fig. 11. Ovary of immature doe showed large follicles (Type 6) (yellow star) and late stage of type 7 (blue arrow): granulosa (red arrow), theca interna (yellow arrow), theca externa (black arrow), antral pocket formation (green arrow), antrum (blue star). X10, H&E

Fig. 12. Ovary of mature doe showed small follicles: Type1 (yellow), type 2 (blue), type 3a (white), medium sized follicles: type 3b (red), type 5a (green). H&E, X40

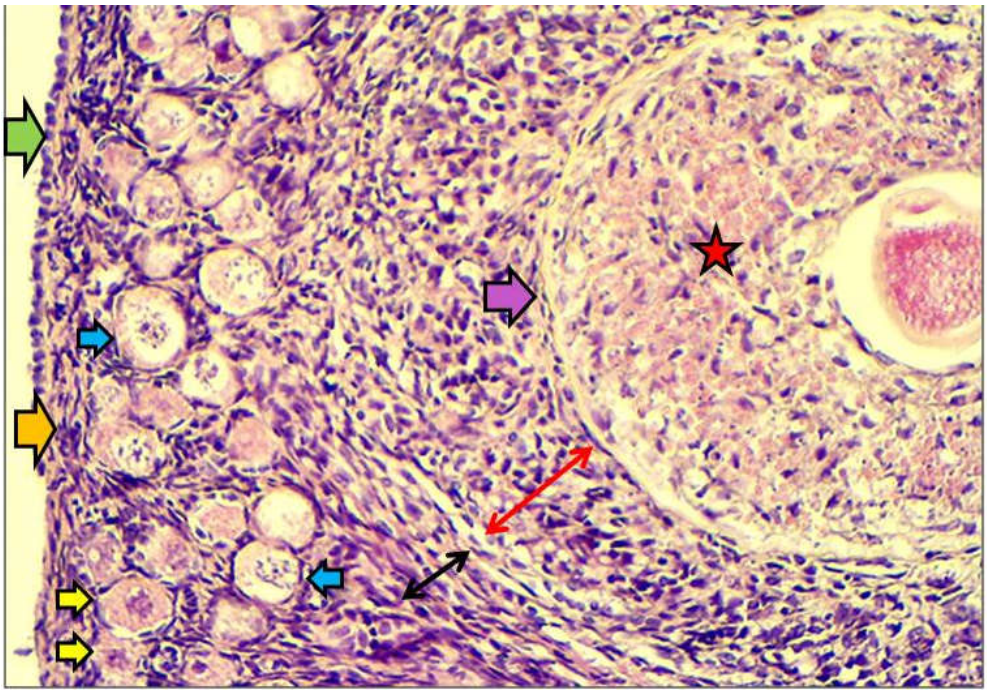

Fig.13. Ovary of mature doe showed large follicles (Type 5b) of many layers, basement membrane (purple arrows) between granulosa (red star) and theca interna (red arrow), theca externa (black arrow), tunica albuginea (orange arrow), germinal epithelium (green arrow), small follicles of type 1 (yellow arrows) and type 2 (blue arrows). H&E, X20

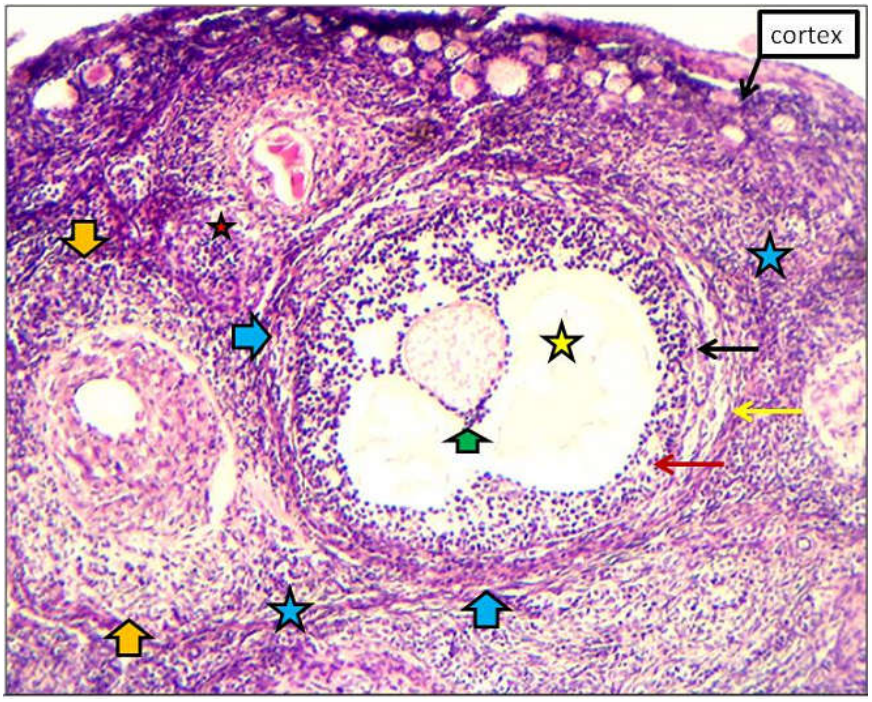

Fig. 14. Ovary of mature doe showed large follicles (Type 5b) (orange arrow), late stage of type 7 follicle (blue arrow): corona radiata (green arrow), antrum (yellow star), granulosa (red arrow), theca interna (black arrow), theca externa (yellow arrow), stroma (blue stars), atresia (red star). H&E, X10

دراسه شكلية نسيجيه لتطور المبايض بعد الولاده في الارانب المحليه

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الخلاصه

أجريت هذه الدراسة للاستدلال على التغيرات الشكليائيه-النسجيه التي تحدث في مبايضإناث الأرانب المحلية في ثلاث فترات عمريه محتلفه ما بعد الولادة في حياتهم والتي كانت الهريرة الصغيره والغير ناضجة والناضجة.

تم جمع ٢٤ من الأرانب (٨ لكل عمر) من المربين المحليين لإجراء هذه الدراسه.

تم قتل الأرانب بشكل رحيم ، ومن ثم تشريحها ،بعدها تم جمع المبايض وثبتت باستخدام ١٠٪ من الفورمالين المتعادل ، وثم اخضاع النماذج للتقنيات النسيجيه الروتينية مثل التجفيف ، الترويق ، التطمير بالشمع وإعداد البلوكات منها. وأخيرًا ، تم إعداد المقاطع المكونة من ٦ ميكرون واصطبغت بصبغات هيماتوكسيلين-إيوسين والماسون ثلاثة الكروم.

أظهرت النتائج العيانيه وجود مبيضين مثلثتي الشكل ومتواجدين في التجويف البطني يعلقهما الرباط المبيضي وبدون وجود الجراب المبيضي الحقيقي.

بينت النتائج المجهريه أن التغييرات التركيبيه البارزة تكون في مبايض الغير الناضجة بالمقارنة مع تلك التي فيالهريرات الصغيره والقطط الناضجة وتحدث النتائج البارزه في الغير ناضجه بعد فترة الفطام التي تواجه تغيرات نمو كبيرة.

وأظهرت البيانات وجود جريبات ما قبل التبويض وفي حالة النضج ولا توجد علامات على وجود الإباضة لأن هذه الحيوانات التي خضعت للدراسة تبيض بحافز التزاوج وكانت كلها عذراء ولم يسمح لها للتزاوج مع الذكور.

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