Histological and Morphomterical Features of Domesticus Duck Testes (Anas Platyrhynchos)

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ABSTRACT

This study examine the testis's histology in males, total of ten adult males (Anas platyrhynchos) were used in this study, the histologicalexamination showed that adult duck testescovers via dense irregular connective tissue referred to as tunica albuginea with mean thickness of (52.12 ± 0.33) micrometer, the seminiferous tubules surrounded by connective tissue fibers, seminiferous tubules mean diameters (127.78 ± 1.55) micrometer, the epithelium lining related to seminiferous tubule have 2 supporting cells types *(*Sertoli cells*)* and spermatogenic cell which that is producing the sperms, spermatogenic cells including spermatogonia as well as primary spermatocytes with mean diameter of $(9.1 \pm 0.21, 13.3 \pm 0.30)$ micrometer, also there is a difficulty in determining secondary spermatocytes because of the remaining short time, since they are quickly converse to spermatids, the diameter of spermatid and spermatids nuclei $(7.4 \pm 0.28, 4.2 \pm 0.18)$, micrometer respectively, the mean diameter of Sertoli cells was (10.4 ± 0.23) micrometer. Among the seminiferous tubules, there are a large number of interstitial cells(Leydig cell) the mean diameter, (9.4 ± 0.22) µm, and the Diameter of interstitial cell nuclei (4.5 ± 0.19) micrometer.

KEYWORDS

Morphomterical, Features, Domesticus, Duck.

Introduction

The Testis is the male reproductive gonad. The testisrelated to the majority of vertebrates were enclosed in testicular tissue capsule through which the nerves and vessels of blood and entering and leaving the organ's substance. Histologically, it consists of 3 layers of tissue, referred to as the outermost layer, tunica serosa, that was obtained from the peritoneum, thickest and middle layer, tunica albuginea, also badly differentiated and the innermost layer, tunica vasculosa. In all animals investigated to this date, tunica albuginea form the bulk related to the testicular capsule, and consists of collagen, abundant fibroblasts and elastic fibres(Raziet al., 2010, Gartner andHiatt., 2014) The changes in testicular tissue of birds are determined by two primary factors – the age (Gerzilovet al., 2015) and the season (Leskaet al., 2012; Islam et al., 2013). In a lot of birds, the testes are undergoing dramatic yearly changes in the size and as such, were considered to be among the major physiologically and anatomically plastic organs indicated in the adult vertebrates (Devicheet al., 2011). The seasonal dynamics of morphological testicular change in birds consistofthe restoration of spermatogenesis at the beginning of the breeding season,

succeeded via a period of normal spermatogenesis until the occurrence of the spermatogenous tissue regression during the nonbreeding season (Leska*et al.*, 2012). Spermatogenesis can be defined as a process of division as well as differentiationthrough which the spermatozoa are created in seminiferous tubules. In addition, a measure of effectiveness related to spermatogenesis was evaluated through the number of spermatozoa created in each day for each gram of the testicular parenchyma, while the seminiferous tubule consists of somatic cells (Sertoli cells and Myoid cells) as well as germ cells (Spermatids, Spermatocytes and Spermatogenia) (Mescher, 2016) (Denk and Kempenaeres,2006). In male birds, the male's reproductive system includes mating organs, ducts deferens, ejaculatory region, epididymis, and testes(Obidi*et al.*, 2008). Recently, a lot of researchers conducted studies on birds as they are representing a good nutritional source. There are many traditional descriptions of the male reproductive tract, with the target to establish correlations with sexual maturity, testicular size, shape, and age (Patricia *et al.*, 2007). This work aims for examining the histology related to seminiferous tubules of an adult duck (Anas platyrhynchos) associated with the birds that might be significant for more researches.

Materials and Methods

Ten apparently healthy (Anasplatyrhynchos)duck was used in this study. The birds were sacrificed by dislocation of the cervical vertebrae after anesthetized with chloroform. The dislocation related to neck vertebrate as well as abdomen is opened immediately. Also, the testes' location is analyzed before their removal from the abdominal cavity. The samples of tissue for histological study are acquired from the testis. The testes of each bird were cut into thin slices, fixed in 10% formalin solution for 48 hours till the preparation of histological sections, and then dehydrated by using a series of ascending grade of alcohol (70%, 80%, 90%, 100%, 100%) solution, cleared in the xylene, embedded in paraffin wax, and sectioned at a thickness of 5 μ m as well as being stained with Eosin and Hematoxylin (for general histological picture) (Suvarna *et al.*,2013). An ocular micrometer applied for measuring the diameter of seminiferous tubules (Galigher and Kozoloff,1964).

Result

This histological study in the testis of the ducks (Anas platyrhynchos)consists of lobules, each of them is containing more seminiferous tubules that are round- or irregular-shaped and arranged in the testicular lobule, located in interstitial connective tissue blood vessels as well asthe clusters of epithelial interstitial cells (Leydig cells) (Fig.1). In addition, the testis' internal structure is revealed seminiferous tubule, while the average diameter related to round seminiferous tubule is (127.78 ± 1.55) micrometer and the mean diameter regarding interstitial cell as well as their nuclei are $(9.4 \pm 0.22, 4.5 \pm 0.19)$ micrometer in (Table 1).In addition, the seminiferous tubule is lined througha multilayer of germinal epithelium and surrounded externally by peritubular tissue with a lumen of the seminiferous tubule. The shape of the Leydig cells was highly variable and ranged from round, oval) Fig.2). In addition, the spermatogonia are resting on basal lamina or basement membrane. Over a spermatogonia's single layer, there were the developmental stages of primary spermatocytes with large cell and large rounded nuclei, the average diameter of spermatogonia and nuclei (13.3 \pm 0.30,6.1 \pm 0.20)micrometer. (Table 1) (Fig.3).Each primary spermatocyte divided and produces secondary spermatocytes and they divided into 2

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spermatids, each of the spermatids might be differentiated via the small diameter and nuclei with the opaque chromatin as well as the situation related to spermatids near the lumen of seminiferous tubulesand the diameter of spermatid with nuclei $(7.4\pm 0.28, 4.2\pm 0.18)$ in (Table 1). Also, the new spermatid had a pale nucleus, whereas the nucleus regarding old spermatid is darkly stained. Sertoli cells are triangular shaped with ovoid or elongated nuclei, the average diameter of Sertoli cell (10.4 ± 0.23) in (Table 1), Some spermatozoa were observed in the lumen of seminiferous tubules (Fig.3).The testes of the Anas platyrhynchos are surrounded by a testicular capsule(tunica albuginea)consist of a dense irregular connective tissue, the capsule which sends trabeculae through the parenchyma of the testes divided into compartments containing the numerous seminiferous tubules (Fig. 4). The mean average thickness of the testicular capsule in the duck was(52.11 ± 0.33) µm(Table 1).



Figure1.Histological section in the testesshowsseminiferous tubule (thick arrow), Interstitial cell(red arrow), blood vessel (thin arrow).(H & E stain 100X)



Figure2.Histological section in the testesshowing seminiferous tubule(thick arrow),Interstitial cell(red arrow), lumen of seminiferous tubule(star), epithelial germ cell(---). (H & E stain 200X)



Figure3. Histological section in the testes showing seminiferous tubule(thick arrow), Interstitial cell(red arrow), Spermatogonia (thin arrow),primary spermatocytes(), Sperm(star), spermatid(blue arrow), sertoli cell (arrow) (H & E stain 400X)



- **Figure4.** Histological section in the testesshowsseminiferous tubule(thick arrow), Capsule (tunica albuginea) (thin arrow), (H& E stain 200X)
 - **Table 1.** Capsule thickness, diameters of seminiferous tubules, a diameter of spermatogenic cells.Sertoli cell, and interstitial cell with a diameter of their nuclei in testes.

Parameters	Mean ± SD
The diameter of seminiferous tubule	127.78 ± 1.55
Diameter of spermatogonia	9.1 ± 0.21
The diameter of spermatogonia nuclei	4.7 ± 0.20
The diameter of primary spermatocytes	13.3 ± 0.30
The diameter of primary spermatocytes nuclei	6.1 ± 0.28
Diameter of spermatids	7.4 ± 0.28
The diameter of spermatids nuclei	4.2 ± 0. 18
The diameter of Sertoli cells	10.4 ± 0.23
The diameter of interstitial cells	9.4 ± 0.22
The diameter of interstitial cells nuclei	4.5 ± 0.19
Capsule thickness	52.12 ± 0.33

±SD: standard deviation

Discussion

In general, the present study showed that the parenchyma of testes consists of numerous seminiferous tubules which are lined with the stratified epithelium of most cells of spermatogenesis and Sertoli cell, the mean diameter of seminiferous tubules (127.78 \pm 1.55) µm According to Jamieson (2007) reported in the adult ducks, the mean diameter124 µm. This corresponds to the previous results reached via (Dellmanetal., 2006; Marilena, 2007). They were lined through germinal epithelial cells as well asexternally surrounded via peritubular tissues the observation was in agreement with (Razi et al., 2010), the present into revealed that Sertoli cells vary in shape and size and the base of Sertoli cell adhere to the basal laminaof seminiferous tubules, while the apical surfaces extend into the lumen of the seminiferous tubule, this is in agreement with (Salwaet al., 2013). In this study, the results are indicated the Leydig cells which occupied the spaces between tubules in the male ducksranged from round, oval and clusters of within the connective tissue which filled the spaces between the seminiferous tubule and the diameter in Table (1), continues blood vessel, such results are in accordance with the results of Salwaet al., (2013) In Sudanese duck with Gerzilov et al., (2016); InKhakiCampbell duck by Khatun et al., (2019). Furthermore, in this work, testes are surrounded through thick capsule representing tunica albuginea, such histological findings were comparable to the previous study when described the testicular capsule of other birds reported in Sudanese duck by Aire, (1997), Jamieson, (2007), and Salwaet al.,(2013), the tunica albuginea was comprised of dense connective tissue which is consisting, mainly of collagenous fibers, the thickness of capsule in the table (1), the finding was similar to that has been reported for the Kaki Campbell duck (51. 12± 6.10) µm byKhatun et al., (2019), and lower than that has been by Aire and Ozegbe, (2007).

Conclusion

The results of this work indicated that the testes divided into compartments containing the numerous seminiferous tubules,Leydig cells were commonly founds,in groups within the connective tissue of the interstitial space,Germ cells and Sertoli cells were presentwithinthe seminiferous epithelium. Inthisstudy, itwasrevealed thatthere is asimilarity betweenthe histological structure of testes of adult Anas platyrhynchos duck and otheravianspecies.

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