Research article

**Anatomical and histological study of the thymus gland in native rabbits
(*Oryctolagus cuniculus*)**

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Abstract

The aim of this study is to add the available information of the anatomy and documenting the normal microscopic features of the thymus gland in rabbits, for this reason ten rabbits from the local breed aged between (5-7) weeks breeding in animal house. After anesthetic the healthy animals intramuscularly in the thigh, the thoracic cavity opening by surgical scissor, to entering the thymus to study it anatomically and collected the specimen for histological study. The animals divided into two groups: first group for the anatomical a study and the second group for histological study, the results appear that thymus of rabbit occupy most the thoracic inlet, pyramid in shape, white to yellowish in color, located rostral of the mediastinum area which covered the large vessel of the heart and aortic arch. The thymus is lobulated organ invested by capsule contain from loose connective tissue each the lobe consist of two different area, peripheral area was deep stain called cortex and inner pale area called the medulla, which contain different cells of lymphocyte and epithelial cells which noted arranged in concentric layers forming Hassall's corpuscles.

Keywords: Anatomy, Gland, Histology, Rabbits, Thymus.

Introduction

Rabbits represent one of the most economically important mammal species. Wild *Oryctolagus cuniculus* a popular game animal, especially in Europe. (1, 2). The rabbit appears rodent like with respect to some morphological features, protein sequence data have led some to suggest that rabbits may be more closely related to primates than to rodents(3). The thymus is one organ of the immune and lymphatic responsible for produce T-lymphocytes (3, 4). There have been many article state the mammalian thymus as dog, cattle and horse (5). The main function of the thymus is the secretion of the polypeptide hormones and other soluble factors which regulated T cell maturation, proliferation and function within the thymus and peripheral tissue. The

hormones secreted by thymus include thymulin, thymopoietin & 1 and B4 thymosin (6). The thymus is the first organ responsible to produce T-cell and make immunological function (6, 7, 8). The thymus in Japanese white stain rabbit was very development after birth (3), (9), they previous studies were reported development of the thymus in rat during prenatal and postnatal (14) and during the postnatal as rabbit; (10) rat (11) and Swiss male mice (7). The anatomical site of the thymus in rodent in the pericardium mediastinum rostrally to the large vessels of the aortic arch and near the base of heart (3, 7, 11, 12). Thymus covering by capsule of connective tissue divided into two distinct area cortex and medulla (3,) (7) (13), (14) which form of population of lymphocyte and

thymic epithelial cells (7) (14), (13), (15). In rat, thymic epithelial cells noted contribute while in medulla remained sparse (16). Some articles stated the histological structure of the thymus during take the drug like Novel Antibodies in rat (17) and dexamethasone in beef cattle (18).

Materials and Methods

Ethical approval

The Animal Ethical Committee of Veterinary Medicine College, University of Al-Qadisiyah, Iraq, has approved the present study under permission No: 412

Ten rabbits from the local breed weight (350 ± 0.22 gm), aged between (5-7) weeks breeding in animal house, after anesthetic the

Results

Anatomical Study:

Gross morphological study of the thymus in new born rabbits age between 5-7 week weighted 350 ± 0.22 is large organ, occupy most the thoracic inlet rostrally of mediastinum area which covered the large vessel of the heart and aortic arch, it lobulated structure, composed from two large lobes right and left, triangular in shape, white to pale yellowish color, which related with trachea, heart and lymph node (deep cervical lymph node) Figure (1).

Histological Study:

Thymus is a lobulated organ covered by capsule, which was very thin composed of loose connective tissue Figure (2) from which the interlobular trabeculae extended that contained the blood vessel. The parenchyma of thymus gland was composed of two distinct zones the outer zone: the cortex that take the deep color and the inner zone: the medulla, which take the pale color Figure (3). The cortex composed of a density of the small lymphocytes in different stages, in the other hand epithelial cells network can be observed characterized by poorly stain, cannot distinguished easily and can noted microphage cells which were large, pale cells Figure (4). Few numbers of epithelial reticular cell noted arranged in concentric layers forming Hassall's corpuscles.

healthy animals intramuscular in the thigh then, the thoracic cavity opening by scissor, to entering the thymus so as study and collected the specimens, these animals divided into two groups: first group the anatomical study and second group take the suitable spacemen to histological study, put in the 10% of the buffer formalin for three days then dehydrated in concentrated series of increasing-grade ethanol (70, 80, 90 , 95%) and clearing then embedded in paraffin. Sections were obtained through the area of largest diameter of the thymus. Then embedded in xylene 1, xylene 2 and staining by hematoxylin and eosin stain (H&E) (routine stain) (19).

Figure (1): showed the thymus in rabbits pyramid in shape consist of two lobe rests on the base of the heart TR: right lobe, TL: left lobe of thymus, Tr: trachea, H: heart, TR: right lobe, TL: left lobe, Di: diaphragm. LL: Left lung

Figure (2): photomicroscope of the thymus in rabbit note the thymic lobules: A, show interlobular connective tissue, Cap: capsule, S: septa separated between the lobules, cortex: C, medulla: M, Hassall's corpuscles: H (H&E stain x50).

Figure (3): photomicroscope illustrates cortex surrounding by septa: S contain the fat: F, show the density of lymphocyte: L, arrow Macrophage: M and epithelia cells fewer than lymphocyte poorly stain (H&E stain x400).

Figure (4): photomicroscope illustrates the thymic medulla (inner area), showing Hassall's corpuscle: H, epithelia cells: E, the arrow the macrophage: Ma (H&E stain x 400).

Discussion

Anatomical Study:

Thymus of rabbit is bi-lobed organ locating anteriorly to the pericardium, this result accordant with (3) in SCID mice; (7) in Swiss mice; (11) in rat, (9, 10) in rabbit and different from mammals like the ruminant and pig consist of two parts cervical and thoracic parts are connected together by the middle parte at the thoracic inlet (5). The color of the thymus whitish to pale yellowish this result disagreement with (12) in dog, the thymus is the lymphatic and immune organ system .In newborn rabbits at (5-7) week of age, located on either side of the neck ventrolateral. Which divided into two portions left and right, pyramid in shape, it was occupied most the thoracic inlet rostrally of mediastinum area which it was covered the large vessel of the heart and aortic arch, it was lobulated structure, composed from two large lobes right and left triangular in shape which related with trachea covered the distal part can be observed, similar findings in animals like the cat and dog (5).

Histological Study:

Thymus is a lobulated organ covered by capsule of loose connective tissue was very

thin, the lobes separated by interlobular trabeculae (septa) which divided the stroma into the lobules, the septa containing the blood vessel and sometimes present fat this result accordant with the (16) in rat. Each lobule is compose of two distinct zone .The outer zone cortex take the deep color and the inner zone take the pale color called medulla these result agreement with (3, 13)in the rat and mice ,(6) in mice, (10) in rabbits. The cortex composed of a density of the small lymphocytes in different stages. Epithelial cells network can be observed characterized by poorly stain, cannot distinguish easily and appearance the macrophage in cortex and few in medulla this result according with (3) in Swiss mice, (6, 16) in dog, while the medulla feature consist of the lymphocytes few than cortex. Last noted the arrangement of epithelial reticular cell in concentric layers called Hassall's corpuscles with few number, this result agreement with (3, 6), in rat and human (11, 20).

Conclusion This study a thymus in rabbits is immune organ contain many of the lymphatic cells. It was large organ during the young and decrease in adult due to replace by the fat.

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