# ANATOMICAL AND HISTOLOGICAL STUDIES OF THYMUS GLANDS IN CHICKS EMBRYO

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## ABSTRACT

**The study designed to investigate the anatomical and histological structures of the thymus gland in chick embryos. Ten healthy, normal embryos at (12th and 20) days old chick embryos was used. They divided into five embryos for each stage.The thymus was well developed at 12th days chick embryo. Anatomically, thymus gland was consisted of 6-8 small, translucent lobe that becomes pale in color at 20 day old embryo, this lobes located on both sides of the neck, positioned parallel to the jugular vein and vagus nerve.**

**Histological structures of developed thymus gland was composed of capsule, cortex and medulla. At 12th days old of chick embryo, the thymus was surrounded by a thin connective tissue capsule which extends septa into the gland stroma to form a lobulation for each lobe. The cortex and medulla was not differentiated at this age. At 20 days old chicks embryo, the lobules begun to recognize and composed of external dark stained cortex with a high population of lymphocytes and internal light stained medulla with less abundant of lymphocytes, reticular fiber and epithelial reticular cells with the appearance of Hassall's corpuscles.**

## INTRODUCTION

**The immunity of the chicken enhancing to avoid the body from disease and assist it to protect extreme creative potential (1). The immune or lymphatic organs of the birds divided into morphological and functional distinct component. The first one is namely "Thymus", that produces T- cells and account for the cellular protection or cell mediated immune (CMI) responses. While bursa of Fabricius account for the producing B- cells that leads to form the humorall protection (2). The thymus and bursa of Fabricius in birds are a sources to be a 'central or chief lymphoid tissues'. Thymus varies from other lymphoid structures as it is suffering from many changes with age (3,4, 5). The thymussis a major lymphoid organs which are the initials of the lymphoid tissues to be shaped and raises directly after the natal in reaction to postnatal microorganism stimulus and required a large amounts of developed T-lymphocytes and solely (6,7,8). The thymus derives from an epithelia-mesenchymal rudiment originated from the 3rd and 4th pharyngeal pouches at the 4th day of incubation, a thin mesenchymal capsule surrounds the endodermal primordium and the mesenchymal cells penterate it (9). The connective tissue, which separates the thymic lobes and lobule, and the pericytes and smooth muscle cell associated wth intrathymic blood vessels are derived from the ectoderm via the neural crest (10). The thymus in broiler thymus derives from an chicken is a lymphoepithelial organ and appears as a pair of chain, lobulated gland. Each chain located on each side of the neck and composed of 7-8 lobes string close to the jugular vein and vagus nerve extending from the third cervical vertebra to the upper thoracic segments (11). The lobes surrounded by a thin connective tissues from which septa is extended and divided these lobes into lobules (12). Each lobule is divided into a histologically separated cortex and medulla, disconnected by a vascular zone between the cortex and medulla. The outer area is stained with dark color and heavily populated by small immature T- cells. Middle area is lightly stained. It's cell population is less in number than the cortex and contains larger, many developed T- lymphocytes noticeable**

**epithelial cells, Hassall"s corpuscles, phagocytic cells and dendritic cells. The medulla is constant among neighboring lobules (13).**

**The anatomical and histological structures of thymus gland of chick embryo at 12th and 20 days old were the aim of this study.**

## MATERIALS AND METHODS

**Twenty eggs were collected from Basra healthy poultry farming (Fadak company) at the beginning of 12th and 20 days old. Embryos of both sexes were extracted from the broken eggs gently and divided into five embryeos for each stage to study the anatomical structures and ten embryos to studay the histological structures of thymus. The anatomical features of thymus gland was studied through making a surgical incision at the ventral aspect of the neck. The thymus gland on both sides of broiler chicken was collected immediately for histological study (14). The thymus was removed from its attachment with adjacent tissues by thymectomy. Then, the collected thymus was transferred to series steps as described by (15, 16). Briefly, the specimens were fixed in 10% formalin for (72) h, rinsed with tap water for (4-6) h dehydrated through a graded series of ethanol dilutions by dehydrated once in 70%,80%,90%,100%,and 100% ethanol in every 2 h, washed in xylene, infiltrated, and imbedded with paraffin wax. Then, the specimens cutting into thin sections by rotary microtome, mounted on to a microscope slide and firmly fixed using Mayer's albumin, and placed on the hot plate to dry (17). After that, stained with (Heamatoxyline and eosin) stains and Masson's Trichrom stain.23**

**RESULTS AND DISCUSSION**

**The thymic lobes in the 12th days of incubation were developed as a small, flat, translucent buds, white to pale in color, parallel to the vagosympathetic trank(Fig.1). This finding is in agreement with (18, 19) in native chicken in Bangladesh and in Partridage respectively. While this result was disagreement with (20). The thymic lobes were differed in number depending on its location. On the right side there was six lobes. However, the left side were eight lobes. This finding is in agreement with (21, 22, 23) in Guinea fowl, in chicken and, Khaki Campbell duck respectively. At 20 days embryo, the individual lobe became more obvious, white to pale in color and the lobes more enlarged (Fig.2). This finding is similar to (24), who stated that the thymus lobes are white to yellowish in color in both stages.**

**The histological structures of thymus gland begun as a network of fibers at 12th days embryo, and then surrounded by a connective tissue capsule (Fig.3, 4). This finding is agrees with (16). Many branches of fine septa were originated from connective tissue capsules to divide each lobe into lobules. These lobules was recognized to the outer zone cortex and inner zone medulla (Fig.5). At 20 days old, embryo founds of Hassall's corpuscles (Fig.6), this results is agrees with (16,17) in Patridge and native chicken of Bangladesh respectively.**

**Figure 1:Llateral view show anatomical structures of thymus gland at 12 day old chick embryo on the left anterior cervical region. (A): lobes (chain) of thymus as a bud. (B): Jugular vein. (C). Vagus nerve.**

**Figure2: Ventro-lateral view show anatomical structure of thymus gland at 20 day old of chick embryo on the right side of the neck extended to the thoracic inlet: show (A) yellow to pale, elongated thymus lobes, (B) Jugular vein.**

**Figure 3:Cross section of thymus gland at 12th day old chick embryo show histological structures Ca- Capsule of thymus gland. Se- Septa extended from the capsule. Lo- Lobules of thymus gland. H&E stain. 10x**

**Figure 4: Cross section of thymus gland at 12th day old chick embryo show the histological structures: Ca- Capsule, Se- Septa between lobules, Fa- Fat tissue (adipose tissue).H&E stain 20x.**

**Figure 5: Cross section of thymus gland at 20 day old chick embryos show histological structures: (Co)-Cortex (dark stained) and (M) Medulla (pale stained) to appear in the thymus gland by H&E stain 10x.**

**Figure 6: Show: Histological structures of thymus medulla at 20 day old chicks of embryo: A- Hassall's corpuscles, B- Epithelial Reticular cells, C- Reticular fiber, (Masson's Trichrom stain 100x).**