

Histological Analysis of Thyroid Gland Structure in Chicks of Breeder Hens

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Abstract— Objective: The purpose of this study is to comprehend the structural features of the thyroid gland in chicks, identifying its cellular components, follicular organization, and vascularization. For this study, ten broiler chickens that were one day old had their thyroid glands removed. 10% neutral buffered formalin, the standard stain used in this investigation, was applied to all specimens. The study's histological features revealed that the thyroid glands parenchyma contained a large number of follicles, all of which were filled with jelly-like colloid. Simple cuboidal cells lined the follicles; these cells looked dense. The para-follicular cells (C-cells) spread interstitial space, appeared polygonal in shape, pale stain, these cells found in fewer numbers. more massive and more pale. Their nuclei were round and the cytoplasm was faintly dyed. Follicles, the primary organs and structures of the thyroid gland, made up the majority of the samples taken from chicken thyroid glands. fortunately there were significant differences in dimensions and spatial arrangement, the follicles within the glandular parenchyma of the newborn broiler chick were already well developed. There were sporadic larger follicles, but the majority had small to medium diameters. A single layer of epithelial (follicular) cells lined the follicles, which were typically spherical in shape. Conclusion, with many colloid-filled follicles, a cuboidal epithelial lining, and few parafollicular cells, the thyroid gland in one-day-old chicks is structurally well developed, demonstrating early functional readiness and active endocrine organization.

Keywords — Histology, thyroid, one day, chicken.

INTRODUCTION

Thyroid gland secretes hormones related to thyroid function in anticipation of thyroid-stimulating hormone (TSH), and these kinds of proteins can be discovered not merely in TH targeted cells but additionally in barrier-establishing cells, including the endothelial cells in the capillaries that form the blood-brain barrier, where they permit particular movement of various iodothyronines (1,2). They control many biological processes in vertebrates, such as muscle fibers generation (3-6),

developmental processes, differentiation, and development of the brain (1,2).

Also, affect immunity (7), regulate the equilibrium of energy and antioxidant activity (8,9), and are essential for the regulation of temperature (10,11). The hormones released by the thyroid have an impact on reproduction in birds as well (12,13). Thyroxine, the main hormone secreted by the thyroid gland, converts to triiodothyronine and then primarily acts biologically in peripheral tissues (14,15).

Through relationships among neurological substances and cellular receptors, in addition to via interactions between extracellular matrix and their receptors in the ovary, the thyroid's activity can influence duck laying of eggs (16). The Anseri-formes family of ducks, which have numerous varieties and breeds with varying body sizes, the production of eggs, meat flavor, and maturity ages, are extensively domesticated for profit-making reasons. Thyroxine, which is mainly secreted by the thyroid gland in birds, is changed by deiodinases that are found in peripheral tissues to 3,3',5-triiodothyronine.

In order to clarify the structural-functional relationships in endocrine oversight, this investigation aims to explore the extremely small framework of the chicken thyroid gland, alongside a focus on follicular organization, epithelial properties, and stromal elements. Three distinct kinds of deiodinases (DIO1, DIO2, and DIO3) have been determined and their gene sequences have been isolated and characterized as selenoproteins. (17).

MATERIALS AND METHODS

Following hatching, ten broiler breeder chicks weighing between fifty and seventy grams were used in this study. The thyroid gland is taken immediately and the tissue specimens were sectioned from the neck region at the thoracic inlet. The specimens were about three millimeters in size, and stored for seventy-two hours in 10% neutral buffered formalin. Hematoxyline and Eosin stain was used in conjunction with standard histological techniques to identify tissue components (18).

RESULT AND DISCUSSION

Histological evaluations

An beforehand nevertheless highly functioning period in avian endocrine growth is represented by the thyroid gland of a young broiler chicken. Thyroid hormones play an essential part in the regulation of temperature growth, promptly organ development and metabolic adaptation to extra-embryonic life of newly hatching chicks. At this point in time histology examination shows structural characteristics that are compatible with both spontaneous production of hormones and developmental maturation. The hormones released by the thyroid like thyroxine, also known as T4, and triiodothyronine, also called T3, aid in controlling additional reproductive characteristics, such as weight, digestion of lipids, body temperature, and development in birds (19,20).

Thyroid follicles constitute the majority of the gland's histology, with inter-follicular connecting tissue supporting them. As a result of continuous after hatching development (Figure,1). These finding corresponding with (21,22) who stated that the parenchyma of thyroid gland had several of follicles filled with colloid homogenous distribution.

Thyroid Follicles

The follicles were the fundamental structural and functional component of the birds thyroid gland. Follicles were found within the gland of a newborn broiler chick, although their dimensions and arrangement vary. Although occasionally greater follicles might be seen, the majority of follicles had a diameter of small to medium in size. Just one layer of cells called epithelial cells lines the follicles, which are often round-oval in shape. Whenever treated with (H&E), the colloid that was identified in the lumen inside these follicles seems as an uniform, fluid-like substance. The quantity of colloid differs in day-old chicks, several follicles have relatively little, while others may seem partially full, indicating rapid manufacturing of hormones after hatching (Figure,2). These results agreement with (23,24) mention the colloid constitutes a semi-liquid or jelly-like material that comes into relationship with the follicular epithelium. However, the colloidal substance might contract, leaving an uninterrupted and frequently uneven distance between the two. It could take place in chambers or colloid pockets.

Colloid Characteristics

Thyroglobulin, the precursor to thyroid hormones makes up the majority of the colloid found in the thyroid follicles of a one-day-old broiler chick. From a histological perspective, it appears as a smooth, eosinophilic material that fills the follicular lumen. Colloid quantity may be moderate rather than abundant in chicks that have just hatched. These investigations similar with (25) who state that the certain follicles have a lesser quantity of colloid, indicating active turnover, others may appear enlarged. The fluctuation in colloid density and size indicates active thyroid gland activity, which is necessary for post-hatching metabolic improvements (Figure, 3).

Para-follicular (C- Cells)

Even though they may be somewhat small and less apparent on standard H&E coloration, parafollicular cells, also referred to as C cells, were present in the thyroid gland of broiler chicks. These cells are usually found at the edge of follicles or in the

interfollicular spaces, within the basement membrane and follicular epithelium, but they do not extend to the lumen. Compared to nearby follicular cells, C cells appear more massive and more pale. Their nuclei were round and the cytoplasm was faintly dyed (Figure,4). The current study akin with (26) Light cells, whose size is about 1.5 times bigger than follicular cells in size and have enormous nuclei and light-colored cytoplasm, are crucial endocrine cells that are present within epithelial cells or between epithelial cells and parafollicular cells, either singly or in clusters of several cells.

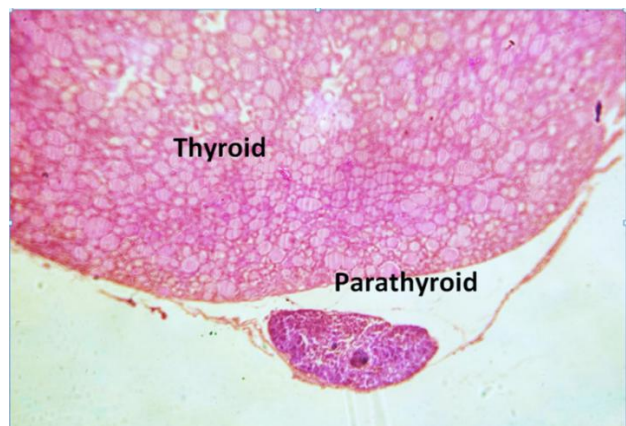


Figure 1. Histological section of thyroid gland in chicken (1 – age) showing the thyroid gland had numerous of follicles and parathyroid gland. 10X. H&E stain.

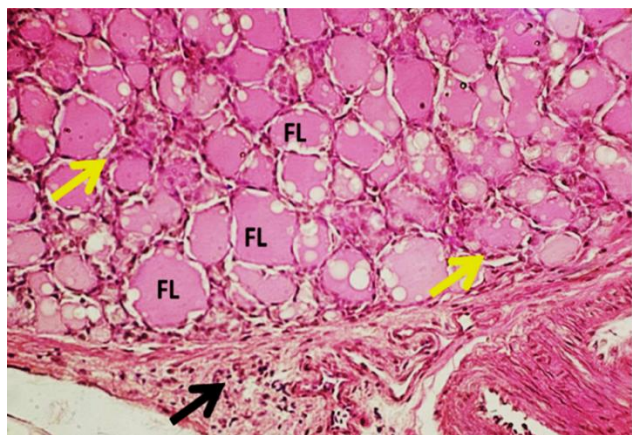


Figure 2. Histological section of thyroid gland in chicken (1 – age) showing thyroid gland surrounded by thick layer of capsule (black arrow) the parenchyma had a large numbers of follicles (FL) lined by cuboidal follicular cells (yellow arrows). 10X. H&E stain.

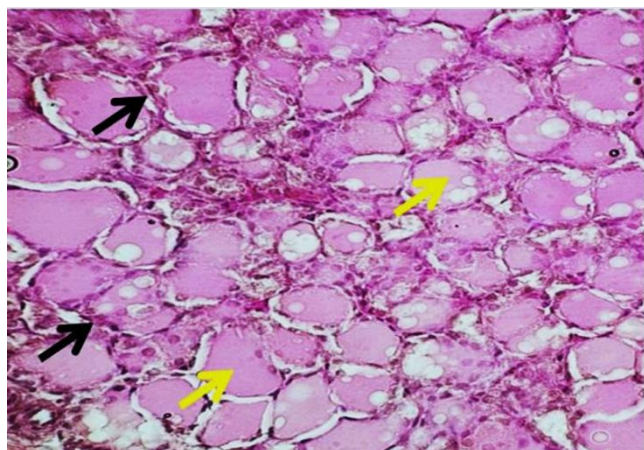


Figure 3. Histological section of thyroid gland in chicken (1 – age) showing follicles filled by jelly- like colloid (yellow arrows). These follicles lined by dense follicular cells. 40X. H&E stain.

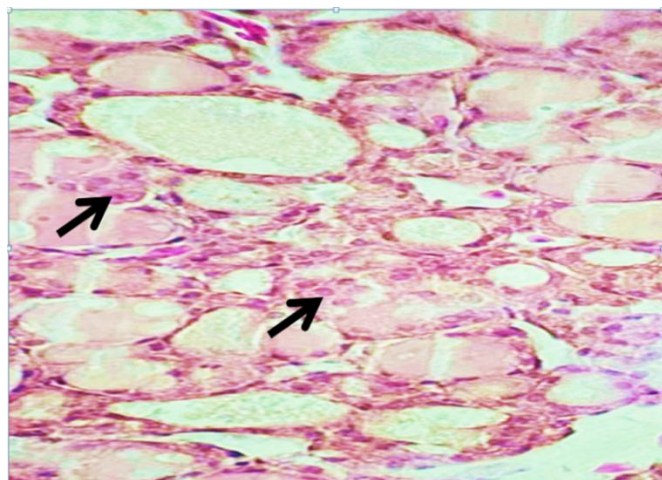


Figure 4. Histological section of thyroid gland in chicken (1 – age) showing Para- follicular cells (C- cells) appeared pale stained located inter- follicular space (black arrows) . 40X. H&E stain.

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