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A REVIEW OF ANATOMICAL AND HISTOLOGICAL FEATURE OF THE ADRENAL GLAND IN DIFFERENT SPECIES OF BIRDS

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ABSTRACT

The adrenal glands have an important impact on many physiological behaviours in vertebrate animals such as birds, due to the roles that hormones produced by adrenal glands play in influencing growth and differentiation of tissues, regulating metabolism, resisting infection, toxicity, and stress, and tolerating cold. Therefore, examining the morphological features associated with avian adrenal glands has numerous implications for poultry production, veterinary medicine, and ornithology.

The purpose of this article is to review and summaries the scientific literature regarding the importance of adrenal glands in avian species while also highlighting recently completed studies related to avian adrenal gland morphology, and demonstrating how these studies have examined changes that take place within avian adrenal glands because of interspecific variation and biological diversity.

Anatomically, birds have two adrenal glands located at the cranial end of each kidney. The adrenal gland is usually oval, triangular or pyramidal in shape and varies in color from yellow to brown depending on how much carotenoids the adrenal gland contains.

Microscopically, the avian adrenal gland has very specific morphological characteristics. The adrenal gland has a connective tissue capsule surrounding it made up of collagenous and elastic fibers and contains ganglia of the autonomic nervous system. The parenchyma of the adrenal gland is made up of both cortical and medullary tissues that are intermixed. There are significant individual differences in morphometric characteristics such as thickness of capsule, size of nuclei of cortical and medullary cells and relative area of cortical tissue compared to medullary tissue.

In addition, several studies report that the adrenal gland's morphology and physiology are affected by environmental factors which include the level of functional activity and seasonal variation in adrenal hormone secretion.

KEYWORDS: *Adrenal gland, Morphology, Histology, Anatomy, Birds.*

INTRODUCTION

Birds are valuable animal species, including domestic animal species, because they have economic value; birds have a significant amount of biological control by reducing insect and rodent populations that pose a risk to national economics (AL-Kafagy et al., 2019). Due to their importance, bird studies have been carried out on the body's various systems, including Abed (2020) who analysed White Chock Broccoli, Hamad et al. (2021) who examined ova tissue of quail, as well as Obaid & Al-Bakri (2024) on kidney function. In addition, there have been other studies on the function of adrenal glands and how they regulate various hormones that help regulate critical bodily functions like stress response, metabolism and immune functionality (Taher & Arak, 2016; Kadhim & Khaleel, 2022; Batah & Mirhish, 2019; Kadhim & Khaleel, 2021).

The adrenal cortex creates three main classes of corticosteroid hormones. These types are mineralocorticoids, glucocorticoids, and androgenic sex hormones. Examples of mineralocorticoids are the hormones aldosterone and deoxycorticosterone, which control the balance of electrolytes/water in your body. Some examples of classic glucocorticoids include cortisone, cortisol, and corticosterone, which are important to metabolic processes, response to stress, and anti-inflammatory effects (Alwan, 2014; Kadhim & Khaleel, 2021).

The purpose of this article is to review the scientific literature for the morphological description of the adrenal gland, present a summary of the morphological changes associated with biological diversity and interspecific variation among birds, and to give an overview of the histological structure as well as the effects of environmental conditions on the morphology and function of the adrenal gland.

ANATOMICAL DESCRIPTION OF THE ADRENAL GLAND

SHAPE AND DIMENSIONS OF THE ADRENAL GLAND

The adrenal gland is an essential endocrine organ for the animal body; it produces several hormones and plays multiple vital roles in the animal body. The adrenal glands are just as critical in birds as they are in mammals, with birds being incapable of surviving (death occurring within about 60 hours after adrenalectomy (Kober et al., Greco, 2017; Ahmed & Dauod, 2016; Humayun, 2012; Kigata & Shibata, 2017)). Each of the paired (right and left) adrenal glands is located cranial (anterior) or medial to the cranial lobe of the kidney (cephalic lobe). The shapes of the adrenal glands range from elongated/oval-shaped to triangular, and in some species (e.g., rhea and ostrich) they can be so closely positioned they may even be fused (Ritchic, 2008; De Matose, 2008). The adrenal glands are relatively small compared to the rest of the bird and generally have a yellowish-brown appearance due to the presence of carotenoid pigments.

Different species have been noted to have significant differences regarding both weight and shape. In studies conducted on weight and shape of the little brown bird, Obaid & Al-Bakri (2025), Sadoon (2018), and Suzan (2012), stated that the pin-tailed sandgrouse contained small paired adrenal glands within the abdominal cavity at the anterior pole of the kidneys which have a soft creamy yellow color. Da'aj et al. (2020), based on their research of the quail, reported that the adrenal glands were also small paired organs, located within the abdominal cavity at the anterior (end) of the cranial lobe of the kidney. The quail's adrenal glands had a yellowish-brown color and were flat shaped (Figure 1).

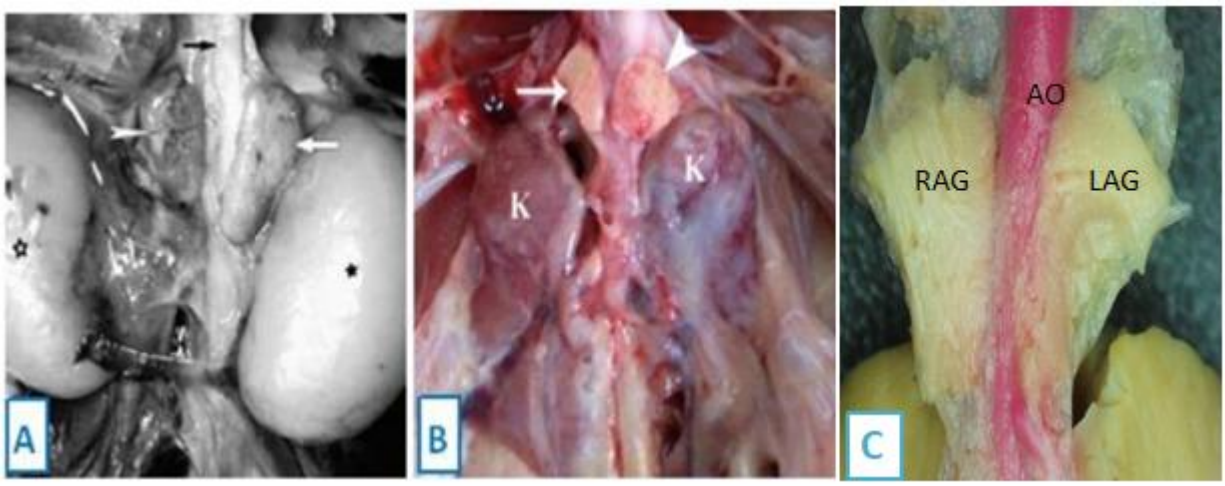

Figure 1: Anatomical position of the adrenal gland in chicken. (A) White arrowhead: right and left adrenal glands; black-and-white star: right and left testes; black arrow: vena cava (Kober et al., 2012). (B) White arrowhead: right and left adrenal glands; K: kidney (Moawad & Randa, 2017). (C) RAG, LAG: right and left adrenal glands; AO: aorta (Obaid & Al-Bakri, 2025).

According to Jabbar (2021), the adrenal gland of the Muscovy duck, as well as that of the guinea pig, possesses a colour ranging from yellowish to red/yellowish. Each gland is located in the abdominal cavity of the duck or guinea pig above the cranial lobe of its right or left kidney. The left gland has a triangular shape; the right is long and narrow.

The adrenal glands of chickens are relatively small and have a yellow brownish to yellow white colour. They lie on either side of the midline of the chicken's body at the level where the caudal vena cava splits near the testes in males and near the ovaries in females. The right adrenal gland is pyramidal with its apex pointing caudally; it is attached to the anterior end of the cranial part of the right kidney. The left adrenal gland is elongated and follows the medial side of the left kidney (Humayun et al., 2012).

According to Al-Jebori et al. (2016), the adrenal glands of female Iraqi ducks are found inside the abdominal cavity at the front of the kidneys, with colors ranging from grey / yellow through red / yellow. The shape of each adrenal gland is distinctive: the right adrenal gland is pyramid-shaped and the left adrenal gland is triangular.

Fathima and Lucy (2014) reported that there is an age-related change in the shape of duck adrenal glands. At one day of age, the adrenal glands of ducklings were small and situated on the cranial lobe of each kidney within the body cavity of the duckling, immediately behind the lungs. At this age, both adrenal glands were rounded in shape; however, as the ducklings grew older, the right adrenal gland became pyramidal and the left adrenal gland became elongated. After hatching, the adrenal glands were creamy to yellow in color, eventually turning brown (Figure 2).

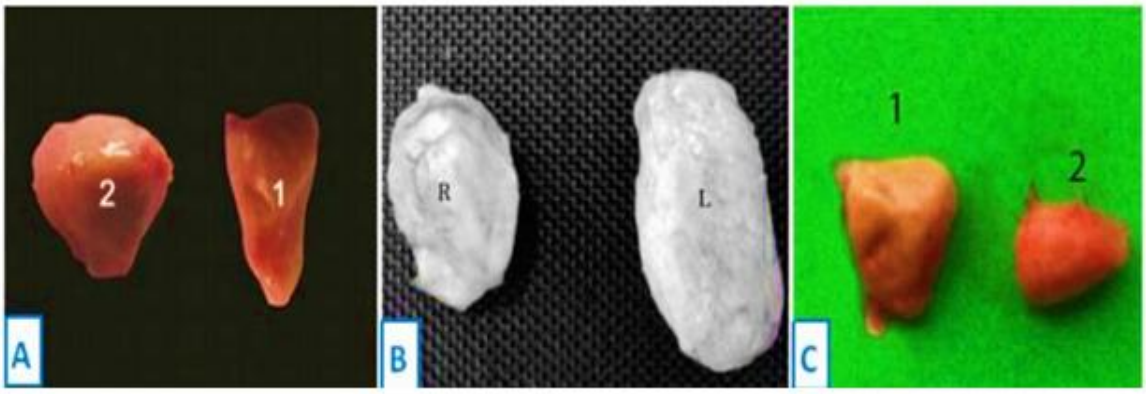

Figure 2: Shape of the adrenal gland in ducks. (A) 1: left adrenal gland; 2: right adrenal gland (Fathima and Lucy, 2014) in chicken. (B) L: left adrenal gland; R: right adrenal gland (Kober et al., 2012) in chicken. (C) 1: left adrenal gland; 2: right adrenal gland (Kot & Prokopento, 2020).

There is variation in the size/weight of the adrenal glands of various bird species, which may be due to the type of species, physiological condition, age and other outside factors (Tang et al., 2009). Tang et al. (2009) also studied African ostriches and found that the length (L) of the adrenal glands (right and left) ranged from 2.0 cm to 3.0 cm and the width (W) of 0.6 cm and thickness (T) of 0.3 cm in birds 40 days post-hatching.

A study conducted with chickens by Sarkar et al. (2014) measured the weight of the adrenal glands in male and female birds. Males had an average weight of (0.07 ± 0.005 g) for the right adrenal gland and (0.04 ± 0.004 g) for the left adrenal gland; females had a right gland weight of (0.09 ± 0.005 g) and left gland weight of (0.11 ± 0.011 g).

Jabbar et al. (2021) examined the adrenal glands of Guinea fowl and Muscovy ducks and noted that the left and right adrenal glands showed significant differences between these two types of birds, with Guinea fowl having right adrenals ranging in length from 5.201 mm to 6.67 mm and left adrenals ranging in length from 7.15 mm to 6.11 mm, whereas Muscovy ducks had right adrenals ranging from 3.977 mm to 5.43 mm and left adrenals from 5.50 mm to 5.82 mm.

According to Prokopenko and Kot (2021), domestically avian animals have a greater mass of their left adrenal gland relative to the right. In addition, Ahmed and Dauod (2016) discovered significant differences between the weights and lengths of both glands of black Iraqi partridge birds, while Obaid and Al-Bakri (2025) research on the Iraqi pin-tailed sandgrouse, as well as Alkazarji *et al.* (2025) research on geese confirmed the same thing (see Table 1 for comparisons).

Table 1: Mean weight and length of the right and left adrenal glands in different bird species.

Species	**Left adrenal gland**		**Right adrenal gland**	
	(Weight (g)	**Length (mm)**	**Weight (g)**	**Length (mm)**
Bird species	**Right gland weight (g)**	**Right gland length (mm)**	**Left gland weight (g)**	**Left gland length (mm)**
Black Iraqi partridge	0.044 ± 0.002	6.167 ± 0.60	0.052 ± 0.009	7.33 ± 0.760
Iraqi pin-tailed sandgrouse	0.015 ± 0.00	5.20 ± 0.37	3.60 ± 0.24	0.014 ± 0.44
Swan geese	0.13 ± 0.30	11.51 ± 0.30	0.30 ± 0.05	15.82 ± 1.55

HISTOLOGICAL AND HISTOCHEMICAL FEATURES OF THE ADRENAL GLAND CAPSULE

gland of birds has a capsule of collagenous, reticular and elastic fibrous connective tissue with blood vessels. There are also numerous autonomic ganglia at the cranial and caudal poles of the adrenal gland. In their study on adult Egyptian chicken strains, Moawad and Randa (2017) describe a dense capsule of connective tissue around the adrenal gland that contains many blood vessels. They also describe short septa of connective tissue that extend from the capsule into the parenchyma of the adrenal gland, which contain multipolar ganglion nerve cells that make up the autonomic ganglia found in the capsule of the adrenal gland.

Using Masson's trichrome and Verhoeff's stains, histological assessment of the adrenal capsule demonstrated that it is made up of a dense regular connective tissue characterized by collagenous fibers, arranged in a parallel configuration with some fibroblasts clearly identifiable. Elastic fibers mostly occur at the outer portion of the capsule and continue to extend inwards through the capsule into the adrenal gland as short and often discontinuous septa within the cortical parenchyma. Blood vessels are also found in the capsule.

A positive reaction to Periodic acid-Schiff (PAS) stain and also to combined PAS and Alcian blue (AB) staining demonstrated that neutral and acidic mucopolysaccharides are present within the capsule. Both stains produced strong positive results in autonomic ganglia, producing an intense reaction to PAS and AB (Obaid and Al-Bakri) (Figure 3).

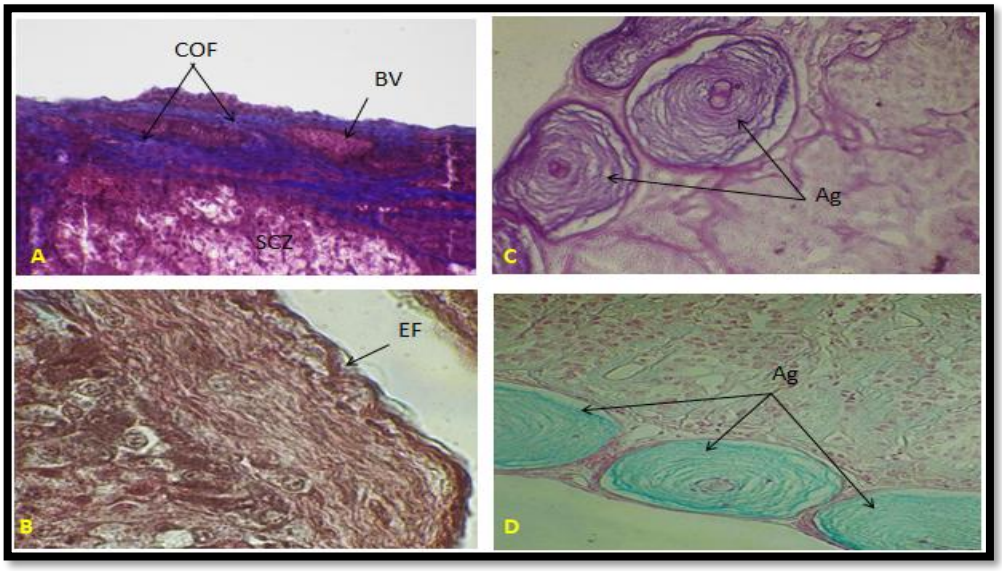

Figure 3: A cross-section of the adrenal gland in the Iraqi pin-tailed sandgrouse. Collagen fibers (COF), blood vessels (BL), elastic fibers (EF), and autonomic ganglion nodes (Ag). (A) Masson's stain, ×40. (B) Verhoeff's stain, ×100. (C) Alcian blue stain, ×40. (D) Combined Alcian blue and PAS staining, ×40 (Obaid & Al-Bakri, 2025).

INTERNAL TISSUE OF THE ADRENAL GLAND

Histological studies have shown that the structure of the adrenal gland varies greatly among different species of birds and is dissimilar to that of any other vertebrate species worldwide. In the adrenal glands of vertebrate species other than birds, there are two distinct regions (two separate parts) within each gland, with the medulla occupying the innermost position and surrounded by the cortex, which has three separate zones of hormone production (glomerulosa, fasciculata, and reticularis).

However, the tissues of the adrenal gland in birds do not demonstrate this same clear differentiation between an outer cortex and an inner medulla. Rather, there are two separate but intermingling components of glandular tissue that produce different hormones with very different morphological and functional properties. These components include the larger portion of the gland, called the adrenocortical tissue- this component (the adrenocortical tissue) produces steroid hormones-and the smaller portion of the gland, referred to as the chromaffin (adrenomedullary) tissue (Humayun et al., 2012).

According to Moawad and Randa (2017), Ghosh et al. (2001) in chickens, and Gulmez et al. (2004) in French geese, the adrenal gland consists of two main regions: the cortex which is divided into two areas (a peripheral and central) and the medulla. Furthermore, the medulla contains two types of chromaffin cells. Type 1 has large polyhedral (multi-angled) shapes, with either centrally or eccentrically located nuclei and a cytoplasm that contains black-stained, basophilic (blue-stained) granules. The second type is larger than the first, with the nuclei located eccentrically and the cytoplasm not as darkly stained (less basophilic).

Al-Jebori et al. (2016) found in their study of female ducks that the central portion of the adrenal parenchyma consists of cells arranged in irregular cords with basally located nuclei and acidophilic cytoplasm. Also present in the central portion are chromaffin cells with basophilic (blue) cytoplasm that are arranged in small, dark-stained groups of cells found adjacent to blood sinusoids and among the acidophilic cells when stained with H&E stains.

Tang et al., (2009) studied the African Ostrich Chicks and Sadoon (2018) studied the Domestic Pigeons, both stated that the adrenal glands consist of two morphologically and functionally different parts (tissues). The functional significance of the larger amount of cortical tissue is primarily related to enhancing the production of Cortical Hormones (corticoids), particularly in birds living in arid environments where conserving water is critical.

Obaid & Al-Bakri (2025) reported that the Iraqi Pin-tailed Sandgrouse has a large percentage of cortical tissue since it is also a migratory species and very prone to stress. When exposed to stress, the adrenal glands produce and release hormones into the body to adapt to new surroundings and make changes based on these differences.

Humayun et al., (2012) said that the cortex has about equal ratios to the medulla of the adrenal glands of chickens, as domestic birds do not need to conserve a lot of water compared to the migratory birds, which have more cortical than medullary tissue in their adrenal glands (Refer to Figure 4).

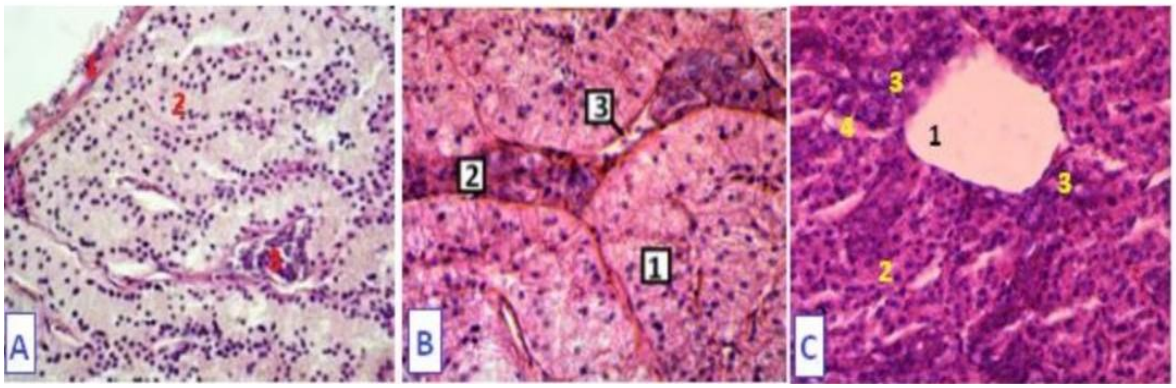

Figure 4: Photomicrographs of the adrenal gland in different bird species. (A) Ducks: 1: capsule; 2: cortical tissue; 3: medullary tissue (H&E, ×150; Plakhotniuk et al., 2021). (B) Geese: 1: cortical tissue; 2: medullary tissue; 3: hemocapillary (H&E, ×400; Prokopenko & Kot, 2021). (C) Chickens: 1: lumen of the venous sinus; 2: cortical tissue; 3: medullary tissue; 4: hemocapillary (H&E, ×100; Kot and Prokopento, 2020).

According to Basha et al. (2008) with respect to studies conducted on Japanese quail and El-Zoghby (2010) regarding Egyptian ducks, both found a positive reaction to Periodic Acid-Schiff (PAS) or a combination of PAS and Alcian Blue (AB) with either acidic or neutral mucopolysaccharides within the capsule, trabecular structures, internal tissues, and basement membranes of both birds. Thus, both studies demonstrated a histochemical response from the adrenal gland with both stains.

Kot et al. (2023) made reference to histochemical analyses performed on several species of migratory birds, such as house sparrows (*Passer domesticus*), rock doves (*Columba livia*), house crows (*Corvus splendens*), common mynas (*Acridotheres tristis*), jungle mynas (*Acridotheres ginginanus*), and cattle egrets (*Bubulcus ibis*), during the breeding season showed that the adrenal glands contained large quantitates of alkaline phosphatase enzyme; glycogen; acidic mucopolysaccharides such as hyaluronic acid; and lipids.

The amount of vitamins and ascorbic acids found in the subcapsular area was moderate compared to other areas of chromaffin. Biochemical parameters measured in the chromaffin cells were fairly constant throughout the calendaryear except that there was an increase in the phosphatase activity of chromaffin cells during the breeding season.

Basha et al. (2009) characterized the internal tissues of domestic quail and determined that internal tissues were high in glycogen, lipids, cholesterol, mucopolysaccharides, and ascorbic acid during the breeding season.

Moawad and Randa (2017) studied domestic chickens and observed that the use of Sudan Black B stain and Sudan III allowed them to determine the maximum lipid content in the adrenal subcapsular region (see Figure 5)..

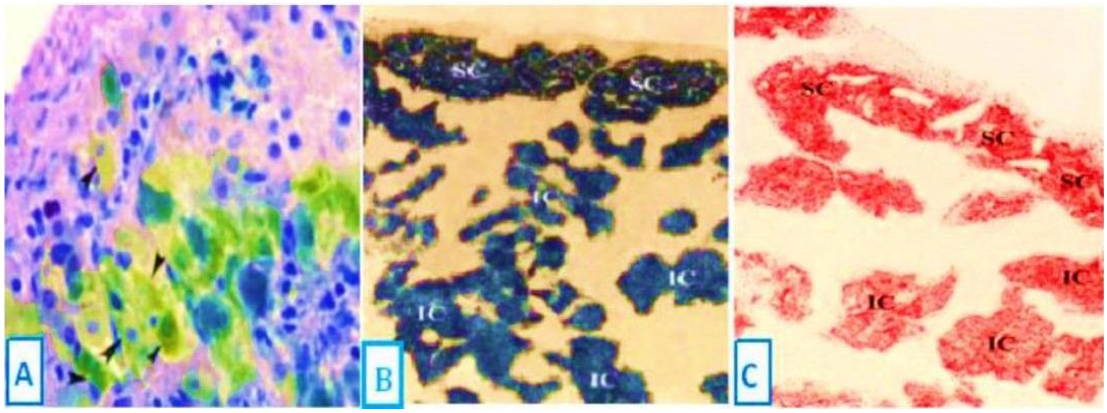

Figure 5: Photomicrographs of the adrenal gland in chickens. (A) Black arrowhead: strong and moderate chromaffin reaction showing greenish-yellow coloration in the medulla (Giemsa stain, ×1000). (B) SC: intense sudanophilic substances in subcapsular cortical cells; IC: less intense sudanophilic substances in inner cortical cords (Sudan Black B stain, ×100). (C) SC: strong positive reaction in subcapsular cortical cords; IC: moderate reaction in inner cortical cords (Sudan III stain, ×200; Moawad and Randa, 2017).

HISTOLOGICAL MEASUREMENTS OF THE ADRENAL GLAND

Research conducted on adrenal capsule thickness analysis has demonstrated that there is substantial variation among various bird species. Obaid (2024) stated that, in male Iraqi pin-tailed sandgrouse, the average adrenal capsule thickness was 42.69 ± 1.81 micrometers. Sarkar et al. (2014), examining male chickens, reported that their adrenal capsule thickness measured 20.94 ± 1.143 micrometers. Kot and Prokopenko (2020) examined males and reported an adrenal capsule thickness of 18.14 ± 1.82 micrometers. Prokopenko (2022) documented that pigeons had an adrenal capsule thickness of 13.46 ± 0.67 micrometers. Kot and Prokopenko (2022) indicated that adrenal capsule thickness varies from species to species within birds, including: 13.46 for pigeons; 27 for geese; 24.82 for ducks; 21.3 for Muscovy ducks; 28.53 for turkeys; 20.12 for domestic chickens; and 10.82 for domestic quail.

According to Alkazraji et al. (2024), the average thickness of the left capsule of the adrenal gland in male geese was found to be 2.14 ± 0.21 µm and the average thickness of the right adrenal gland capsule was found to be 3.71 ± 0.11 µm in male geese. The average thickness of the capsules for females was also measured, with left adrenal gland capsule having a thickness of 5.87 ± 0.64 µm and the right adrenal gland capsule measuring 4.82 ± 0.82 µm.

With respect to the size of nuclei in the cells of the adrenal gland, numerous research efforts have documented statistically significant differences exist in the sizes of nuclei of the various zones of the adrenal gland, and these data are presented in Table 2.

Table 2: Mean nuclear diameters of adrenal gland cells in different bird species (µm ± S.E.)

Bird species	Subcapsular zone	Peripheral zone	Central zone
Pterocles alchata	7.60 ± 0.63	4.94 ± 0.40	6.84 ± 0.4
Domestic quail	11.83	17.00	25.3
Domestic chicken	5.1 ± 0.0	5.0 ± 0.0	5.1 ± 0.0
Domestic duck	20.00	19.00	20.83
Domestic pigeon	21.33	20.17	26.00

In the study conducted by Sarkar et al. (2014), it was found in male and female chickens that cortical cell nuclear diameters were 4.26 ± 0.166 µm and 3.69 ± 0.087 µm. The average nuclear diameter of male and female medullary cells were 4.39 ± 0.359 and 3.84 ± 0.326, respectively.

EFFECT OF ENVIRONMENT ON ADRENAL GLAND FUNCTION

The seasonal changes in bird hormones are determined by various environmental factors including the day length of the year, the temperature of their environment, and food availability. These factors have an effect on both the hypothalamic pituitary adrenal (HPA) axis and the hypothalamic pituitary gonadal (HPG) axis. As a result of all of these influences, birds will produce more than enough of the necessary hormones for survival or reproduction to occur. For instance, when birds have longer periods of daylight, they will produce more glucocorticoids and epinephrine, both of which will support bird reproduction and migration (Wingfield, 1998).

During the cold months, birds will produce less corticosterone in order to conserve energy, if they are to be able to survive once the warmer season arrives, they will produce more hormones than they would during the colder months. The hormone melatonin is also produced by birds as they are influenced by photoperiod, and melatonin is a hormone that helps birds synchronise their biological activities with the seasons of the year (Dawson et al., 2001).

According to Sudhakumar et al. (2001), increased daylight (photoperiod), temperature and rainfall have a positive correlation with adrenal and gonadal function in the jungle bush quail (*Perdicula asiatica*). In addition to being produced by both sexes during the breeding season, there was an increase in adrenal gland size for both the male and female birds during this time.

In tropical regions, there are a lot of different things in your environment that change how humid it is, how much rain falls, and what the temperature is outside. These different things can make your adrenal glands work harder. For example: If you are in an area where the summer gets really hot, there will be more secretion of adrenal hormones but if it rains heavily, this will make it difficult for birds to migrate. However, the adrenal gland will function normally during all of these conditions.

The adrenal glands are very important to help maintain balance inside birds. Adrenal hormones help to determine how tissues develop, how they grow; they regulate metabolism; and how to resist diseases, toxic substances, stress, and low temperatures. So, external changes in the environment such as temperature and rain will cause the adrenal gland to change how many hormones are released into the bird's body (Yaillouris et al., 2024; Montaruli et al., 2021).

Research has shown that corticosteroid levels in circulating blood show diurnal patterns or patterns of fluctuation due to the time of day (the highest levels are during the period of darkness). The primary reason for this difference between the two periods is related to the circadian rhythm of the animal and provides the animal with energy for endothermic feeding or activity during the dark period. Researchers have reported that nocturnal birds like owls appear to have a better correlation between their hormone levels with their activity levels than with the amount of light or dark (Westerhof, 1998).

In their research on seasonal variation in serum corticosterone levels of broiler chickens, Sarma et al. (2022) observed that the average level of circulating corticosterone for 42-day-old chicks during the monsoon (approximately June to September) period was 7.12 mean ± 0.03 due to increased ambient temperature and heat stress on chicks (and chickens in general). The mean value of serum corticosterone for these birds was 7.12 ± 0.03 ml/dl in June until it dropped approximately 50% to about 3.66 ± 0.02 ml/dl in September (Sarma et al., 2022).

Sohail et al. (2010) reported that heat stress increases corticosterone levels. Under conditions of heat stress, your body requires more energy and this results in increased production of glucose from non-carbohydrate sources through the breakdown of muscle protein. The hypothalamus stimulates the release of ACTH, which causes the secretion of cortisol into the bloodstream.

Majekodunmi et al. (2016) also stated that exposure of chickens to high temperatures increases the secretion of adrenocorticotropic hormone (corticosterone) by the adrenal cortex. Thus, heat stress is a major environmental factor that negatively impacts the secretory activity of hormones in various avian species (Nawab et al., 2018; Sesay, 2022).

CONCLUSIONS

Avian species have bilateral adrenal glands located on the right and left kidneys, and they are located in the anterior epithelial region of the cranial lobe of the kidney. The adrenal glands are partially covered by the gonads. The avian adrenal glands have been studied in both anatomy and histophysiology (both refer to the functional structure of an organ). The studies show that the tissue within each gland is comprised predominantly of cortical tissue compared to medullary tissue, which indicates that there is a physiological difference between these two types of gland tissue based on the difference in the respective functional secretions. The adrenal glands consist of zones of intermingling cortical and medullary gland tissues. The zonation of the adrenal cortex has been classified into two general areas, while the adrenal medulla is classified into a series of small, irregular shaped cells that are positioned within the distribution of the adrenal cortex. Endocrine glands are responsible for regulating metabolism, and therefore play an essential role in managing stress and maintaining metabolic homeostasis. Understanding how species have survived over time (under a variety of environmental stressors) and how they will continue to survive will allow researchers to investigate the relationship between birds and the endocrine system – to ensure that both birds continue to survive as a result of the influences of birds and the endocrine system.

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مراجعة للخصائص التشريحية والنسجية للغدة الكظرية في أنواع مختلفة من الطيور

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الخلاصة:

تؤدي الغدة الكظرية دوراً مهماً في اجسام الحيوانات ومنها الطيور حيث تؤثر هرموناتها على النمو وتمايز الانسجة وتنظيم الايض بالاضافة الى مقاومة اجسام الطيور للعدوى والتسمم والاجهاد وانخفاض درجة الحرارة، وتعد دراسة الخصائص الشكلية للغدة الكظرية في الطيور من الامور المهمة في تربية الطيور الاقتصادية والطب البيطري وعلم الطيور، هدفت هذه المقالة الى تلخيص الادبيات العلمية حول اهمية الغدد الكظرية في الطيور والتعرف على الدراسات الحديثة ضمن هذا المجال وكيفية استعراضها للتغيرات التي تحدث في الغدد الكظرية من جراء التنوع البايلوجي للطيور واختلاف الاجناس بينها، التركيب التشريحي للغدد الكظرية اظهر ان جميع الطيور تمتلك زوجاً من الغدد عند مقدمة الفص القحفي للكليتين يتراوح شكلها بين البيضاوي او المثلث او الهرمي ولونها يتراوح بين الاصفر الى البني ويعتمد ذلك على تشبع انسجة هذا العضو بالكاروتينات، تتميز الغدة الكظرية في الطيور بخصائص مميزة في بنيتها النسجية، تحاط الغدة بمحفظة من نسيج ضام تظهر فيه الالياف الكولاجينية والمرنه وتحتوي على عقد الجهاز العصبي اللاإرادية، اما نسيج الغدة فمؤلف من نسيجي القشرة واللب المتداخلين مع بعضهما وتختلف البيانات المتعلقة بقياسات الغدة الكظرية من حيث سمك المحفظة واقطار انوية خلايا منطقتي القشرة واللب ومساحة الانسجة القشرية واللبية للغدة الكظرية، كما اوضحت الادبيات ان للظروف البيئيه تأثيرعلى تركيب ووظيفة الغدة الكظرية منها زيادة النشاط الوظيفي للغدة وحدوث تقلبات موسمية في هرمونات الغدد الكظرية.

الكلمات المفتاحية: الغدة الكظرية، الخصائص الشكلية، التشريح، الطيور.