

## ANATOMICAL AND HISTOLOGICAL STUDY OF ADRENAL GLAND IN THE QUAIL (*COTURNIX COTURNIX*)

Samera. A. DA'AJ, Mohammed Abbas Ali and Nadhim Azeez Shehan\*

Department of Anatomy and Histology, College of Veterinary Medicine, University of Basrah, Iraq.

(Received 11 November 2019, Revised 7 January 2020, Accepted 26 January 2020)

**ABSTRACT :** This study was aimed to study the anatomy and histology of the adrenal gland in quail. The study was designed to describe the anatomy and histological characteristics of the quail's adrenal gland. Ten samples from adrenal glands were used in the study. They were collected from ten adult Japanese quail. The anatomical features of glands have paired glands located in the abdominal cavity at the anterior end of the kidneys. The right and left adrenal glands are small and yellowish brown in colour. They are flattened organs with an irregular outline and their shape can vary from oblong to oval to pyramidal. The histochemical observation in quail revealed that the adrenal gland was encapsulated by connective tissue fibres and parenchyma that constituted three main components: the inter-renal tissue or cortical tissue; chromaffin or medullary tissue and sinusoid. The capsule of the adrenal gland was strongly positive for PAS, while the inter-renal cells of the quail adrenal were moderately positive to PAS in Mallory Phosphotungstic Acid Haematoxylin Method Stain (PTAH) that cause the collagen to appear with a red colour. While the nuclei and fibrin appear with a blue colour, in Weigert's iron, haematoxylin appears as the elastic fibres in the gland.

**Key words :** Anatomical, histological, adrenal gland, quail (*Coturnix coturnix*).

### INTRODUCTION

Adrenal glands are important organs in all animals. They help to maintain homeostasis as well as play important roles in all types of stress response (Freeman, 1985) and are one of the most important glands of the endocrine system (Randall *et al*, 2002; Humayun *et al*, 2012). The function of the adrenal gland is different according to their cortical and medullary cells (Kober *et al*, 2012). The right and left adrenal glands are small and yellowish brown in colour in birds (Carsi and Harvey, 2000). This is a flattened organ with an irregular outline, and the shape can vary from oblong to oval to pyramidal. The adrenal gland is encapsulated by connective tissue fibres and the parenchyma is constituted of three main components; the inter-renal tissue or cortical tissue; chromaffin or medullary tissue and the sinusoids (Sabiha *et al*, 2008; Jafar *et al*, 2015).

### MATERIALS AND METHODS

Ten quails were collected from Basra city. The materials for the study were collected from Japanese quails. After sacrificing the birds, the glands were collected immediately under aseptic measures and using

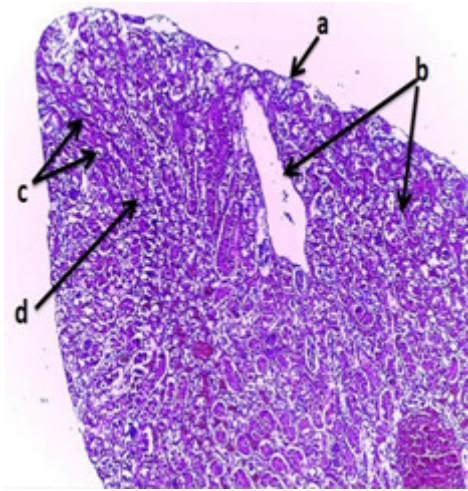
a scalpel. For the histological examination, a tissue pieces from adrenal glands were collected. For the histological study of the adrenal glands, samples were taken directly after the birds were killed and were fixed in 10% formalin and left for 72 hours. After fixation, the specimens were washed with tap water and processed using a routine histological technique including the following steps: dehydration; clearing and embedding and finally cutting and staining by using haematoxylin and eosin (Luna, 1968).

Histological images of different histological sections were captured using a special digital camera attached to the light microscope and using special stains for samples like PAS, Weigert's Iron Haematoxylin and Mallory Phosphotungstic Acid Haematoxylin Method (PTAH).

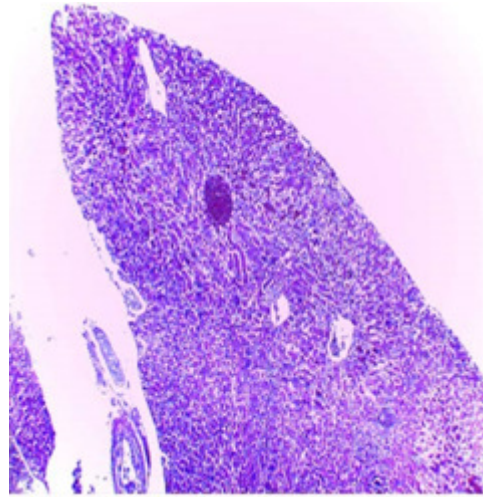
### RESULTS AND DISCUSSION

Anatomically, the adrenal gland is a small, paired organ lying in the abdominal cavity at the anterior end of the kidneys. The right and left adrenal glands are small and yellowish brown in colour. They are flattened organs as shown in Fig. 1. Histologically, the adrenal gland is encapsulated by connective tissue fibres as shown in Figs. 2, 3. These results are the same as the result of Sabiha *et al*, 2008). The interstitial tissue of the adrenal gland is

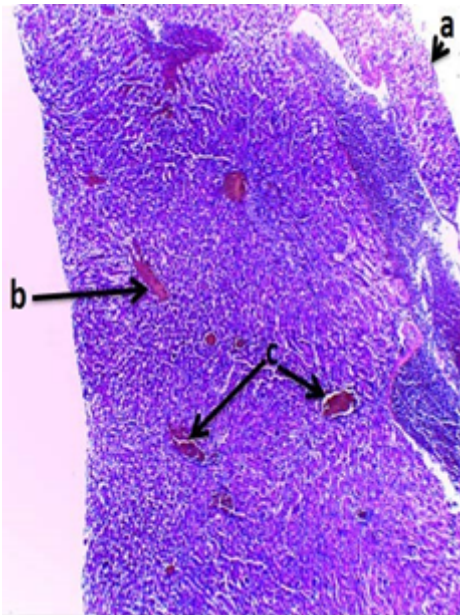
\*Corresponding author



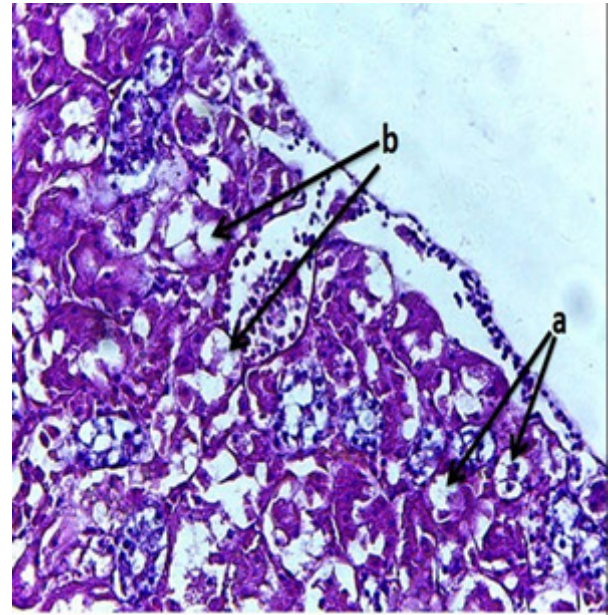
**Fig. 1 :** Cross-section of Adrenal gland of Japanese quail : a) Capsule. b) Collagen fiber. c) Blood sinusoids. d) Parenchyma of gland (H & E. X20)



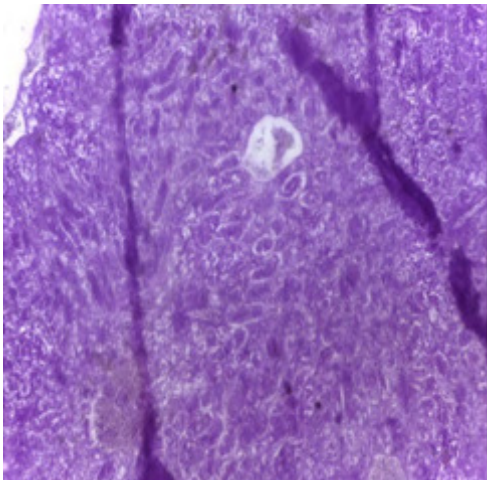
**Fig. 2 :** Cross-section of Adrenal gland of Japanese quail (H & E. X4).



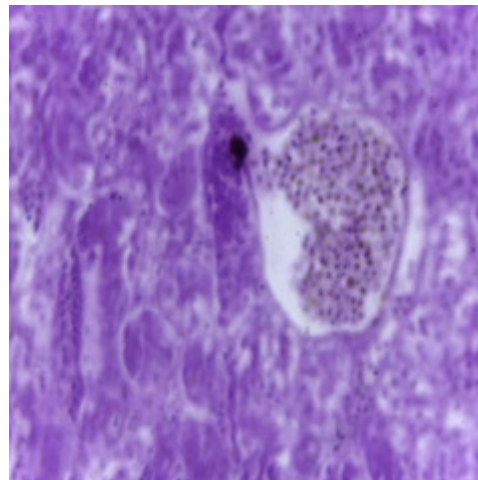
**Fig. 3 :** Cross-section of Adrenal gland of Japanese quail : a) Capsule. b) Central inner zone. c) Blood sinusoids (H & E. X4).



**Fig. 4 :** Cross-section of Adrenal gland of Japanese quail : a) Chromaffin cells. b) Blood Sinusoids (H & E. X40).

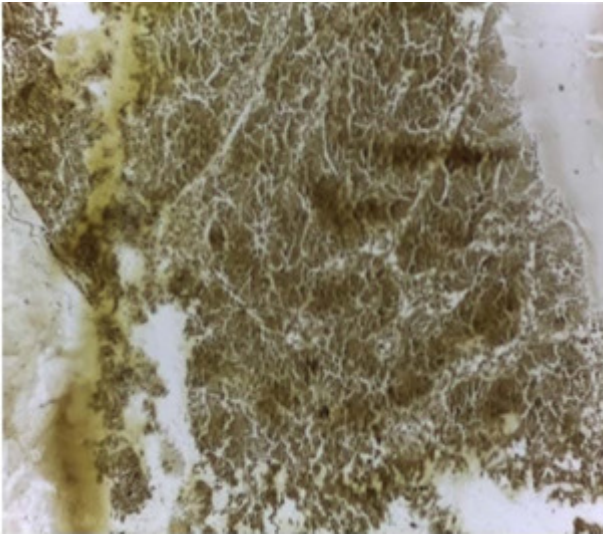


**Fig. 5 :** Cross-section of Adrenal gland of Japanese quail (PAS. X10).

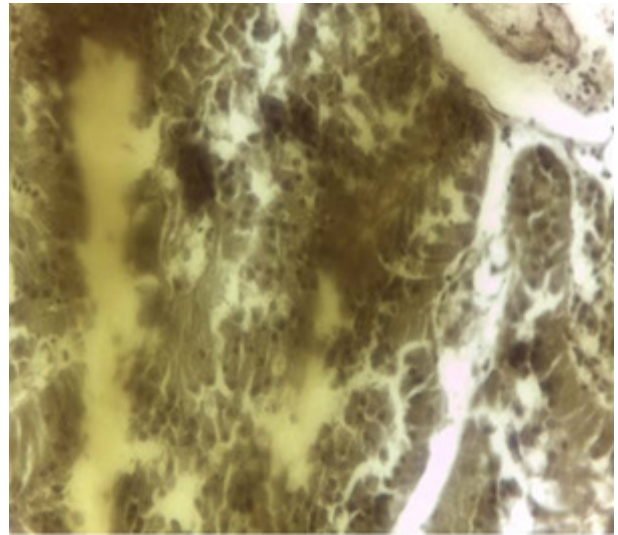


**Fig. 6 :** Cross-section of Adrenal gland of Japanese quail (PAS. X40).

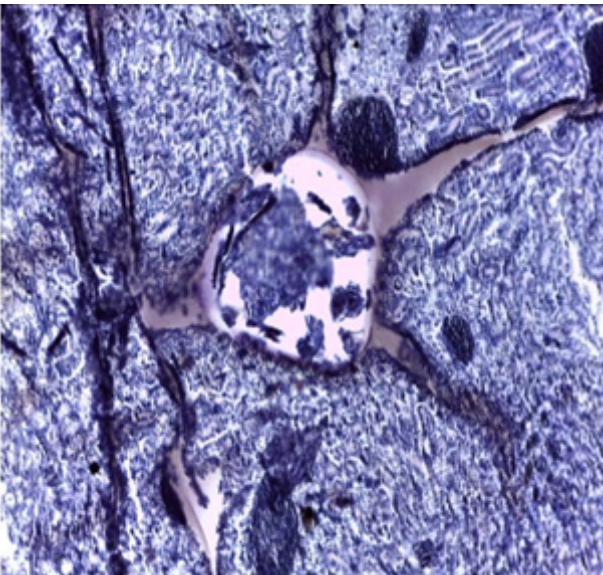
Anatomical and histological study of adrenal gland in the quail



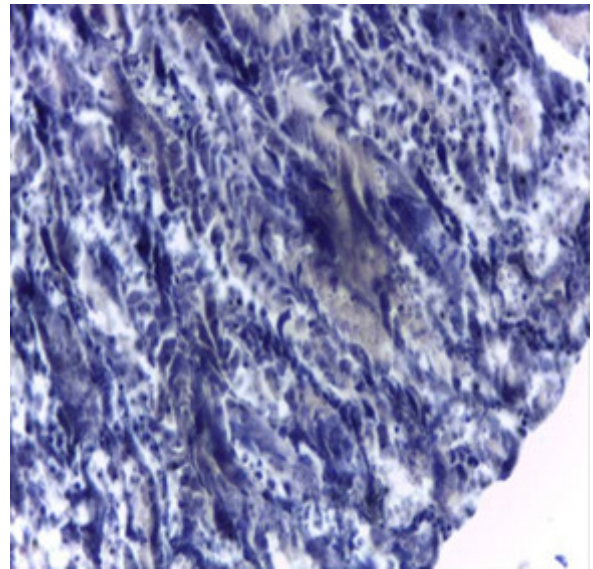
**Fig. 7 :** Cross-section of Adrenal gland of Japanese quail (Weigerat. X10).



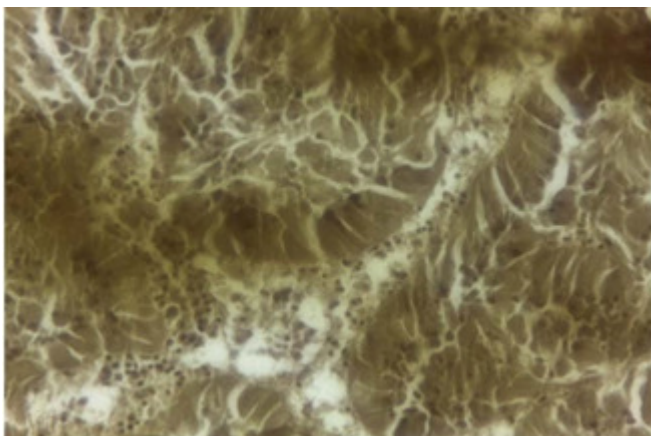
**Fig. 8 :** Cross-section of Adrenal gland of Japanese quail (Weigerat. X40).



**Fig. 9 :** Cross-section of Adrenal gland of Japanese quail (Mallory. X10).



**Fig. 10 :** Cross-section of Adrenal gland of Japanese quail (Mallory. X40).



**Fig. 11 :** Cross-section of Adrenal gland of Japanese quail (Weigerat. X40).

rich in blood vessels, collagen and reticular fibres containing sinusoids and more than one type of cells (Fig. 4). These results are the same as the results of Jafar *et al* (2015). These parenchyma were constituted of three main components: the inter-renal tissue or cortical tissue; chromaffin or medullary tissue and sinusoids. These results are same as the results shown in Sabiha *et al* (2008) and Jafar *et al* (2015).

The capsule of the adrenal gland was strongly positive for PAS, while the inter-renal cells of the quail adrenal were moderately positive to PAS and contain glycogen and appear rose coloured in a section as seen in Figs. 5, 6.

These results are the same as the results obtained

by Sabiha *et al* (2008). Results of Weigert's Iron Haematoxylin revealed the presence of elastic fibres that appear in Figs. 7, 8, 11, while Mallory's phosphotungstic acids Haematoxylin methods (PTAH) revealed the presence of collagen that appeared red in the section, with the nuclei appearing blue and fibrin appearing blue in the section (Figs. 9, 10) (Bancroft and Stevens, 1996).

### REFERENCES

- Bancroft J D and Stevens A (1996) *Theory and Practice of Histological Techniques*. IV Edn. Churchill Livingstone, New York.
- Carsi R V and Harvey S (2000) Adrenal glands. In: *Sturkie's avian physiology* (Shittow G C ed). Fifth edition. Pp. 489 - 537. Academic Press, New York.
- Freeman (1985) Stress and the domestic fowl: physiological fact or fancy. *World's Poult. J.* **41**, 45- 51.
- Humayun K A K M, Moyama M and Sugitas (2012) Morphological and Histological studies on the adrenal gland of the chicken (*Gallus domesticus*). *J. Poult. Sci.* **49**, 39-45.
- Jafar Chazi Abbas Al-Jebori, Ali Kadhém Homadyal, Ahmed Obead Hossain and Zinashakir Mahmood Al-Tamimi (2015) Histomorphological study of Adrenal gland in local adult female Duck (*Anas platyrhynchos*) Copyright Bas. *Vet. J.*
- Kober A K M Humayun, Masato Aoyama and Shoei Sugita (2012) Morphological and Histological studies on the Adrenal gland of the chicken (*Gallus domesticus*) Copyright C, Japan Poultry Science Association.
- Luna L G (1968) *Manual of Histologic Staining Method of Armed Forces Institute of Pathology*. 3rd ed. McGraw- Hill book Co. New York.
- Randall D, Burggren W and French K (2002) Glands and Hormones. In: *Animal physiology: Mechanisms and Adaptations*. Fifth Edition pp 332 - 339. Freeman and Company. New York.
- Sabiha H Basha, S Venkatesan and Geetha Remesh (2008) Histochemical reaction of the adrenal gland in Japanese quail (*Coturnixcoturnix japonica*). *Indian J. Anim. Sci.* **78**(1), 47 - 50.