University of Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2025) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 *https://doi.org/10.54174/utjagr.v13i1.323*

Histological and histochemical study of neurohypophysis of pituitary gland in HEDGEHOG*(Hemiechonus auritus*)

[1]Hiba M. Abd Alrahman , [2]Zainab A. Musa , [3]Nadhim A. Shehan , [4]Mustafa S. Ghaji , [5]Ashraff W. Abdulrazaq.

[1,2,3,4,5]Department of Anatomy and Histology, College of Veterinary Medicine, University of Basrah, Basrah, Iraq.

Email: heba.mohammed@uobasrah.edu.iq

Abstract

In this designated study , five sample of pituitary gland (neurohypophysis) was collected from HEDGEHOG*(Hemiechonus auritus*). Isolated and prepared for histological and histochemical studies. Results revealed a thin connective tissue capsule was enclosed pars nervosa containing mainly fine reticular and collagen fibers stained red to purple with H&E stain . the parenchyma containing two types of pituitycytes (astrocytes ,associated glial cells) and located between the sinusoids. Un myelinated nerve fiber originated from the hypothalamus and arranged in different direction and surrounded the sinusoids, hearing bodies appear as a large secretory granules for hormone storage resemble to the cell structure but without a nucleus found in the posterior part of the pituitary gland.

I. Introduction

Hemiechinus auritus is a long eared hedgehog species of native Central Asian and Middle East countries . This animals lives in burrows that it either build or finds and is characterized by long ears. It is the smallest Middle Eastern hedgehogs. The insects, small vertebrates and plants are the source of the feeding for this species (1) and (2).

The most important of physiological process in the body is regulated by the pituitary gland that result from the interaction between the nervous and endocrine systems(3).

The embryological development of the pituitary gland is differ according to structure type Of which it consists,its involved two part: the adenohypophysis that originated from Rathke's pouch (probably ectoderm from the roof of the mouth), and the neurohypophysis that developed from the infundibulum (an outgrowth of the brain).(4)and (5).

Many activities in the body is controlling by hormones released from an endocrine structure within pituitary gland such as growth, metabolism and sexual function. Because it has physiological effect on other gland indirectly therefor is called master gland. The hypothalamus released soluble mediators that in turn controlled the activity of this gland .The anterior lobe of the pituitary gland supplied by these mediator via a capillary network called the **hypothalamo-**

University of Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 https://doi.org/10.54174/utjagr.v13i1.323

pituitary portal system. The posterior lobe directly connected with the hypothalamus a bundle of nerve fibers named the **hypothalamo-hypophyseal tract (6)and(7).**

The location of this gland within sella turcica of the basisphenoid bone body and consisted of adenohypophysis and neurohypophysis, the dura mater covered the pituitary gland was completely and surouded by capsule by called (diaphragm sella) , except for a small opening, which allows passage of pituitary stalk ,(8), (9) and (10). Neurohypophysis: The posterior hypophysis ceribri consists of neural lobe, the infundibular stem and the median eminence was composed of thin non-myelinated nerve fibers and associated neuroglial cells(11).

II. Materials and methods

The samples for this study was collected from five HEDGEHOG*(Hemiechonus auritus*) after dissected all the structures **that surround it and removed gently then fixed for** 2-3 days **in** neutral buffered formalin10% , a serial dilution of alcohols used for dehydrated from 70% to 100% and then used xylene and paraffin wax for cleared and embedded respectively (12). Haematoxylin and eosin stain were used to stained the prepared and cutting tissues for general structures, special stains (Alcian blue, PAS(periodic acid- schiff stain and Mellory stain to demonstration of specific structures (13)(14)and (15).

III. Results:

this study was focusing on the neurohypophysis of pituitary gland of the **HEDGEHOG*(Hemiechonus auritus*)** , this part of the gland enclosed by a thinner layer of connective tissue capsule consisting mainly of collagen fibers stained red to purple with H&E stain figure(1) , The fine reticular fibers that can distinguished in the capsule of gland that appeared blue color with mallory stain (2), neurohypophysis composed of pars nervosa, the infundibular stem and the median eminence and its parenchyma composed of pituicytes and non-myelinated nerve fibers .The pituicytes is a type of astrocytes (associated glial cells) and located between the sinusoids that are not filled with blood and divided into two types :protoplasmic astrocytes that was elliptical or elongated in shape and large in size and more abundant, other one was the fibrous astrocytes which oval in shape, smaller in size and less abundant with lipid droplets and pigments that was seen with hematoxlyine and eosin stain figure(1) and (3)

un myelinated nerve fibers is originated from the hypothalamus and arranged in different direction extended from the internal to external neurohypophysis and stained deeply with H& E figure(3).

Herring bodies are large neurosecreatory granules resemble to the cell structure but without a nucleus found in the posterior part of the pituitary gland. this granules is a termination of the axone from the hypothalamus and serve as a

storage for the hormone temporarily before secreted figure (3).

University of Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 *https://doi.org/10.54174/utjagr.v13i1.323*

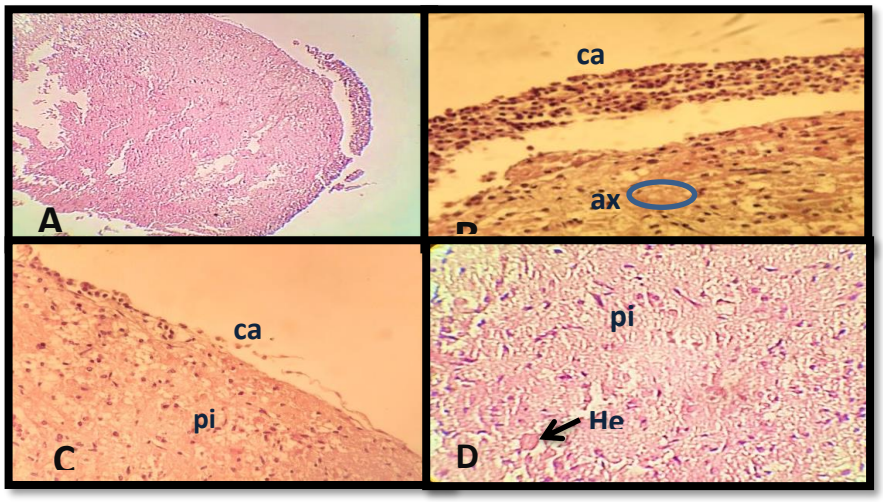

Figure 1: Histological structure of the pars nervosa of HEDGEHOG *(Hemiechonus auritus*) pituitary gland in ca: capsule, pi: pituitcytes (protoplasmic and fibrous), ax: axon of unmyelinated nerve fibers,

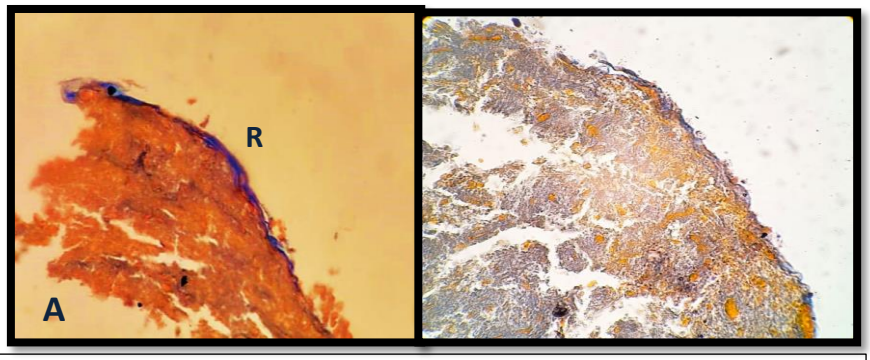

Figure 2: light microscopic structures of neurohypophysis of the pituitary gland in **HEDGEHOG*(Hemiechonus auritus*) : A,B: Re:** Reticular fiber blue in color .Mallory stain. 10X.

University of Thi-Qar Journal of agricultural research

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 *https://doi.org/10.54174/utjagr.v13i1.323*

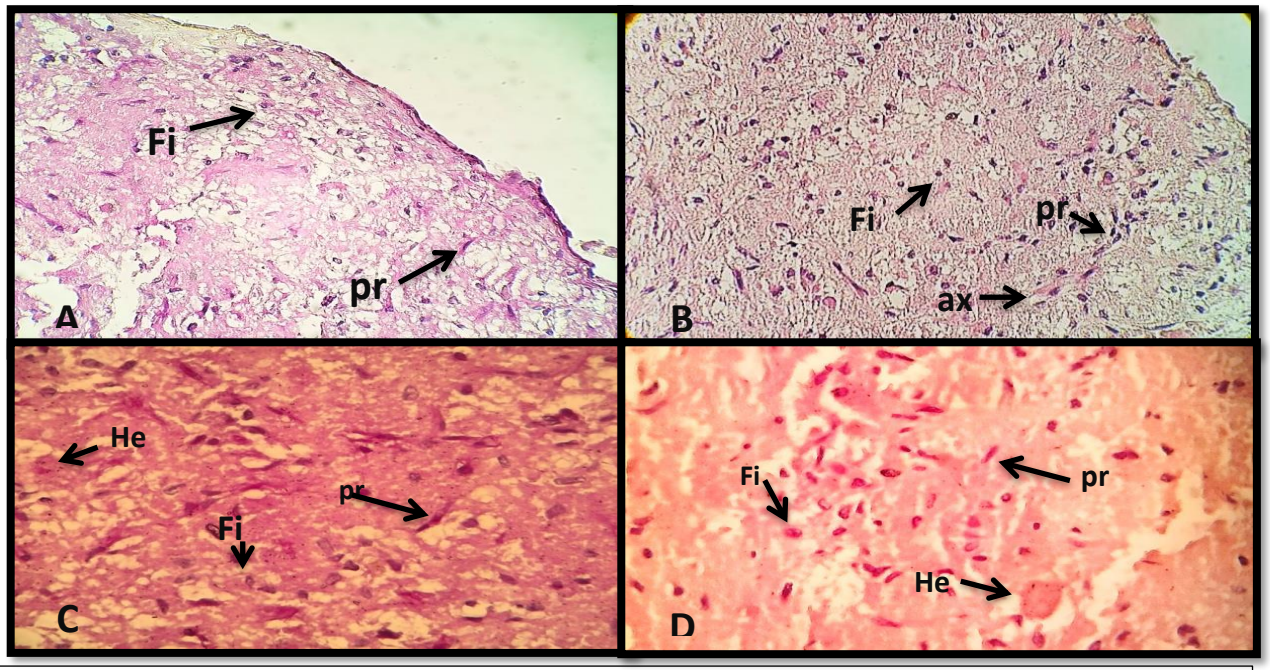

Figure 3: light microscopic structure of pituitary gland in **HEDGEHOG*(Hemiechonus auritus)*, p**itucytes (Fi:fibrous, Pr: protoplasmic),ax: axon of un myelinated nerve fiber, He: hering bodies. A:Alcin blue stain 10X, B:H&E stain 10X, C:PAS stain 40X, D: H&E stain 40X.

IV. Discussion:

the pituitary gland of **HEDGEHOG*(Hemiechonus auritus)*** located in the bony structures called sella turcica that enclosed by a thick connective tissue capsule extended from dura matter, for these reasons the gland was protected very well so that it covered by a thin connective tissue capsule this diverge with (16) and (17) and agree to the (18), (19)and (20) (21)in Iraqi rats.

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 https://doi.org/10.54174/utjagr.v13i1.323

the pituicytes and the nerve fiber without myeline and sinusoids was located in pars nervosa of parenchyma part of the of pituitary gland in the HEDGEHOG *(Hemiechonus auritus*) this agreement with (22) in the adult male donkeys

there are two types of pituicytes : small rounded fibrous pituicytes and and large elongated protoplasmic pituicytes this ressemble to the (23) in the Bactrian camels (*Camelus bactrianus)* .

Herring-bodies can be identified on routine stains as a large distended nerve endings as so-called named after Percy Theodore Herring who described them as the 'physiologically active principle' of the posterior gland in1908 .(24).

The nerve endings of the neurohypophysis containing producing cells of the oxytocin and vasopressin in the hypothalamus (24), (25)and(26) . The supraoptic and paraventricular nuclei of the hypothalamus are the site for The peptide hormones vasopressin and oxytocin synthesized and transported into the circulation by axoplasmic flow of the posterior lobe for subsequent release(27).

V. Referance

1- Qumsiyeh, M. B.. (1996) Mammals of the Holy Land. Texas Tech University Press, Lubbock Texas. pp. 64–66 ISBN 089672364X.

2- Poddar-Sarkar, M.; Raha, P.; Bhar, R.; Chakraborty, A. & Brahmachary, R. (2011). "Ultrastructure and lipid chemistry of specialized epidermal structure of Indian porcupines and hedgehog". *Acta Zoologica*. **92**(2): 134. doi:10.1111/j.1463-6395.2010.00452.x

3-Amera K. Remick, Danielle L. Brown, in Boorman's Pathology of the Rat (Second Edition), 2018

4-Colin G. Scanes, in Sturkie's Avian Physiology (Sixth Edition), 2015

5-H. Maurice Goodman, in Basic Medical Endocrinology (Fourth Edition), 2009.

6- G. AmblerOvergrowth Best Pract. Res. Clin. Endocrinol. Metab.(2002).

7- Paul Johns BSc BM MSc FRCPath, in Clinical Neuroscience, 2014

8-Eurell JA, Frappier BL. Dellmann's textbook of veterinary histology. 6th ed. Iowa, USA: Wiley-Blackwell 2013; 300-306.

9-Montuldo, C; Matta, G., and Marcia, S. (2002). The sellar region: anatomy, pathology and neuroradiological study. Rivista Di Neuroradiologia 13: 327-340

10- Pearse, A. G. (1968). Histochemistry, Theoretical and Applied.Vol. I. J. & A. Churchill. Ltd.

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 https://doi.org/10.54174/utjagr.v13i1.323

11-Bancroft,J.D; Cook,H.C; Stirling,R.W and Turner,D.R (1994): Manual of Histological Techniques and their diagnostic applications , 2nd ed. Churchill Livingstone , Edinburgh, London.

12- Luna , G . (1968) . Manual of histological staining method of the armed forced institute of

pathology . 3rd ed Mc . Graw hill book Co . New York.

13-Elster, A. D (1993). Modern imaging of the pituitary gland. Radiology. PP: 187: 1-14.

14-Dyce, K. M., W. O. Sack, C. J. G. Wensing. (1996). Veterinary Anatomy, 2ndb. Ed., W. B. Saunders Company. Philadelphia, London, New York, St. Luis, Sydney, Toronto.

15-Pearse, A. G. (1968). Histochemistry, Theoretical and Applied.Vol. I. J. & A. Churchill. Ltd. London.

16- Hullinger, R.L. (1993). The endocrine system In: H. E. Evans,ed. Miller s' anatomy of the dog .3ed. phildelphia: W. B. saunders company. pp 561-566.

17- Hussein B. Mahmood.2014. Anatomical and histological study of pituitary gland of the rats in Iraq. Journal of Kerbala University , Vol. 12 No.3.

18-Trautman, A. (1909b). Anatomie und Histologie der Hypophysis Cerebrieiniger Sauger. Archiv. Fur Mikroscopische Anatomie 74:311- 367

19- William, J.B. (1993). Applied veterinary histology (3rd edition). Mosby year book. London. Pp: 408 – 414. Bailey, P. (I928). T

20- Vuković S., Lucić H., Duras Gomercić M, et al. Anatomical and histological characteristics of the pituitary gland in the bottlenose dolphin (Tursiops truncatus) from the Adriatic Sea. Vet Arhiv 2011; 81(1): 143-151.

21- Brien, G.M. (1996). Comparative morphology of pituitary gland in Australian flying foxes (Megachiroplera: genus Pteropus).

22- Nasr M. , Rashed R. , Hassanin A. , Shogy A.,Oct. (2021). Some Macroscopic and Microscopic Observation on The Pituitary Gland of Adult Male Donkey (equas-asinus) Journal of Current Veterinary Research, Volume (3), issue (2),

23- YE W. , Wang H., Wang F, & Wang J. (2018)Morphology and Ultrastructure of the Hypophysis in Bactrian Camels (Camelus bactrianus). Int. J. Morphol., 36(4):1316-1325,.

ISSN Onlin:2708-9347, ISSN Print: 2708-9339 Volume 14, Issue 2 (2024) PP 251-257

https://iasj.rdd.edu.iq/journals/journal/issue/18682 *https://doi.org/10.54174/utjagr.v13i1.323*

24- Larkin S, Ansorge O. (2000). Development And Microscopic Anatomy Of The Pituitary Gland. [Updated 2017 Feb 15]. In: Feingold KR, Anawalt B, Blackman MR, et al., editors. Endotext [Internet]. South Dartmouth (MA): MDText.com, Inc.; 2000-. Available from: https://www.ncbi.nlm.nih.gov/books/NBK425703

25-Decherney A, Naftolin F. (1980) Hypothalamic and pituitary development in the fetus. Clin Obstet Gyneco/;23:749

26-Holmes RL, Ball IN. (1974).The pituitary gland, a comparative account. London: Cambridge University Press,:63-94

27- Pastor F.E., Blazquez J.L. , Toranzo D. , Pelaez B. , Sanchez A. , Alvarez-Morujo A.J. and Ama P. (1 991). Myelinated Herring bodies in the median eminence of the cat. Histol Histopath 6: 161-1 65.