

## COMPARATIVE MORPHOLOGICAL AND HISTOLOGICAL STUDY OF THE HARDERIAN GLAND IN THREE SPECIES OF BIRDS

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**ABSTRACT :** The aim of study is to determine the comparative morphohistological features of harderian gland of three species of birds, the birds were Native chicken (Ch), Coot bird (Co) and Quail (Qu). Thirty healthy adults from both male and female were taken (10 birds for each species) the birds scarified then the dissected and removed the gland that grossly examined and morphometric measurement (length and width) of gland were done and prepare the gland for histological study The study noticed the color of three glands were light brown to pink and they are different in size and shape in each other. In (Co) the gland was the larger and ameba shape , in (Ch) was elongated and small, the smaller one was in (Qu) it teardrop in shape. The histological harderian gland in three species of birds was covered by thin connective tissue capsule that send septa to divided the gland into many lobes .Harderian gland was consist of acino tubular unite these lined with simple columnar epithelial cells and their ducts lined by simple cuboidal cells and its secretion seromucus material. In summarized the three harderian gland in three species were different in shape and size and it have the same histological picture except the absent of Russell bodies in harderian gland of coot bird.

**Key words :** Native chicken, coot bird, quail, harderian gland, morphological, histology.

### INTRODUCTION

Harderian gland occurs in the orbit of all vertebrates except fishes completely aquatic amphibians and primates (Maxwell, 1979). It is associate with third eyelid its secretion enters the conjunctiva bulbar on the surface of third eyelid (Wight *et al*, 1971; Dyce *et al*, 2010). In birds harderian gland lies behind the eyeball in ventral and postero-medial part of orbit and it the major exocrine paraocular gland of the domestic fowl (Mobini, 2012). Avian harderian gland has great role in response to infection and vaccination (Zakeri and Kashefi, 2011; Salam *et al*, 2003). Relatively harderian gland is large in the fowl and it much large than lacrimal gland, its function is to lubricate the surface of the eye ball and nictitating membrane (Sakai, 1989; Chieffi *et al*, 1993; Payne, 1994).

### MATERIALS AND METHODS

Harderian gland tissue were collected from thirty healthy adult birds males and females (10 coot bird, 10 chicken, 10 saman). The birds were sacrificed and their heads dissected. Immediately removed the glands of three types of birds the gross morphology (color and shape) and biometry (length and wide) were recorded for each glands birds and mean values were established for each

group of glands. For histological study, the samples were fixed in neutral buffered formalin 10% and routine specimen preparative procedure involved dehydration in ascending graded ethanol, in filtration and embedment in paraffin sectioning, mounting and staining by standard haemotoxylin and eosin (H, E) procedure (Kiernan, 1999).

### RESULTS

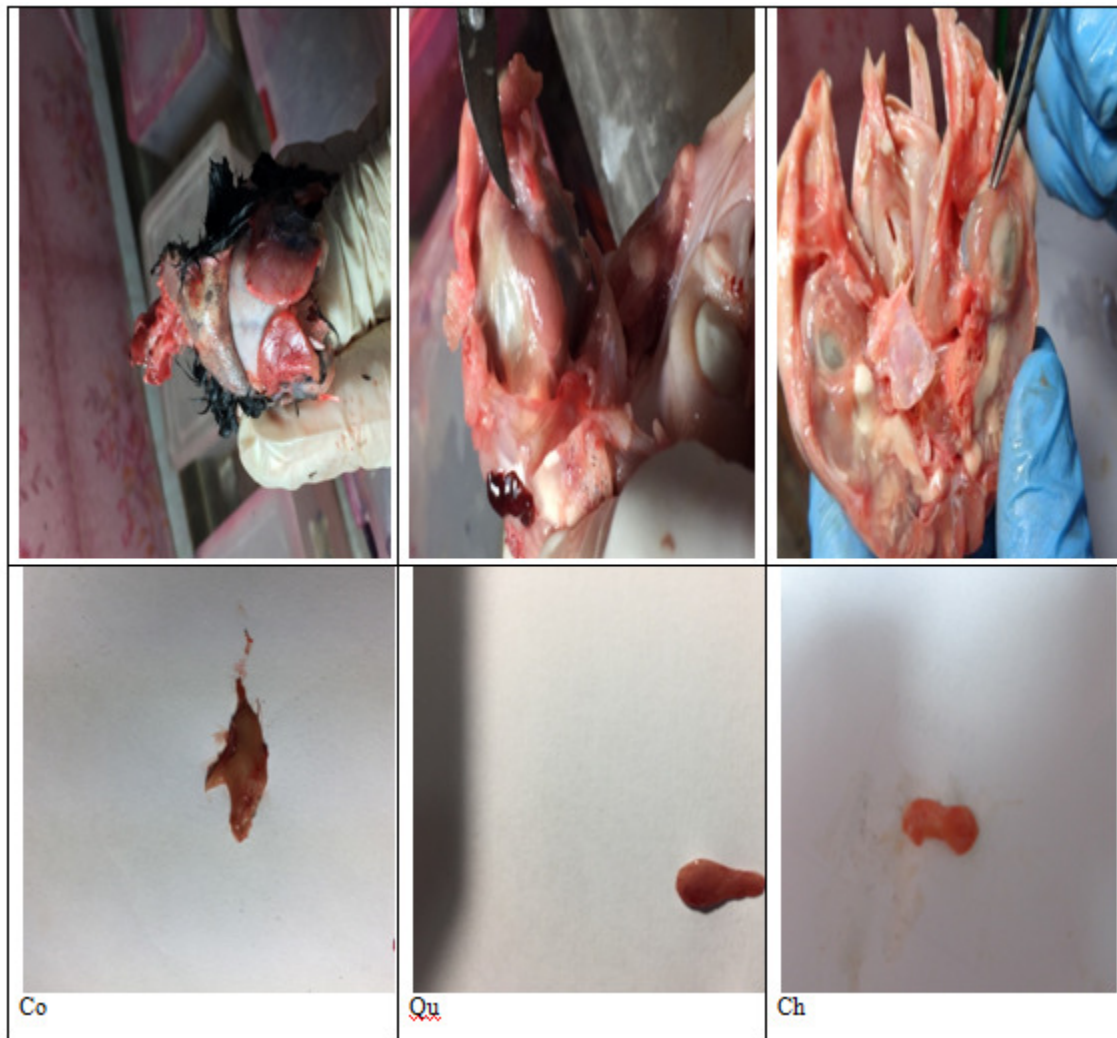
The present study revealed the location of the harderian gland in three species of birds chicken(ch), coot bird (co) and quail (Qu) were at the orbital cavity in the ventromedial around the posterior of eye ball. Harderian gland in three birds were light brown to pink in color .their shape was in chicken elongated where as in coot bird the gland was irregular and it was ameba shape. The third gland was teardrop in shape in quail (Fig. 1).

Parameters appeared the mean length of harderian gland was  $1.01 \pm 0.15$  cm; width  $:0.58 \pm 0.07$  cm in (ch), but in (co) length was  $1.24 \pm 0.126$  cm; width  $0.70 \pm 0.06$  cm, lastly in (Qu) length  $0.65 \pm 0.09$  cm; width  $0.35 \pm 0.057$  cm.

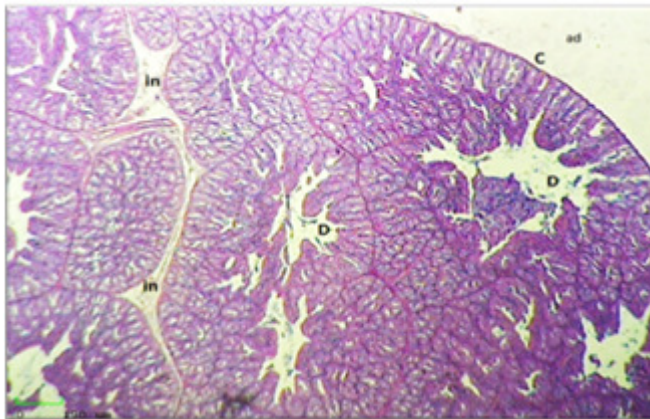
Respectively there was high significant ( $p < 0.05$  ) between all groups in width and length parameters (Table 1).

The histological picture showed that the harderian gland in three species of birds were enveloped by a thin

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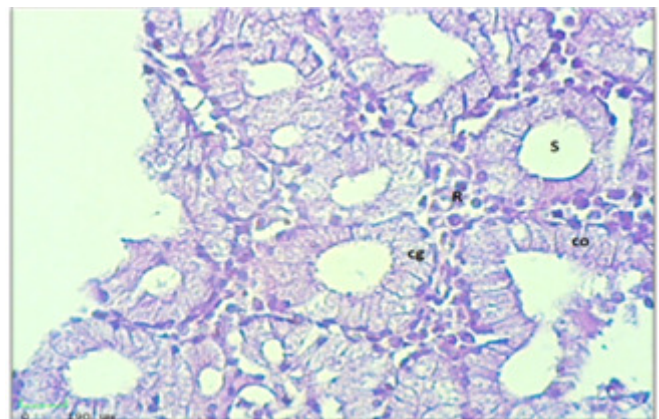
**Fig. 1 :** The harderian gland of native chicken (ch), the harderian gland of quail (Qu), the harderian gland of coot bird (Co).



**Fig. 2 :** Histological section of the harderian gland in native chicken was covered with a thin capsule © which consisted of adipose tissue (ad) inter lobular septa(in) duct (D) (HandE stain x10).

loose connective tissue capsule, which send septa into the gland and divided it for many lobes.

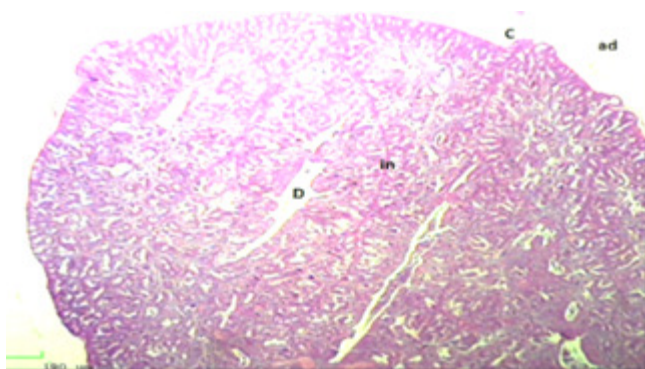
In native chicken (ch ) harderian gland consist of many acinotubular units these lined with simple columnar



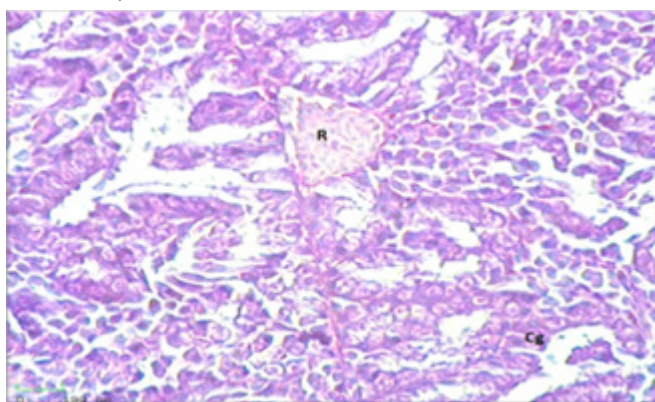
**Fig. 3 :** Histological section of the harderian gland of native chicken was covered with a thin capsule © which consisted of adipose tissue (ad) secretory unite (S) Russell bodies (R) columnar cells lining (co) corpus gland (cg) (H and E stain x40).

epithelium tissue with nucleus at the basement membrane. The acini were at the peripheral region of lobes, which continued with the tubular portion of secretory units. The gland in this type of birds was seromucus secretion and

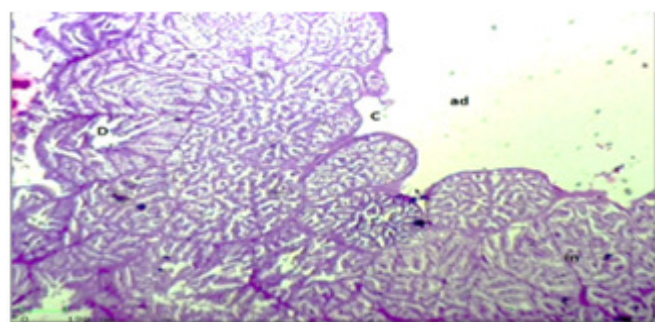




**Fig. 4 :** Histological section of The harderian gland of Quail was covered with a thin capsule © which consisted of adipose tissue (ad) duct (D) inter lobular septa(in) (H and E stain x10).



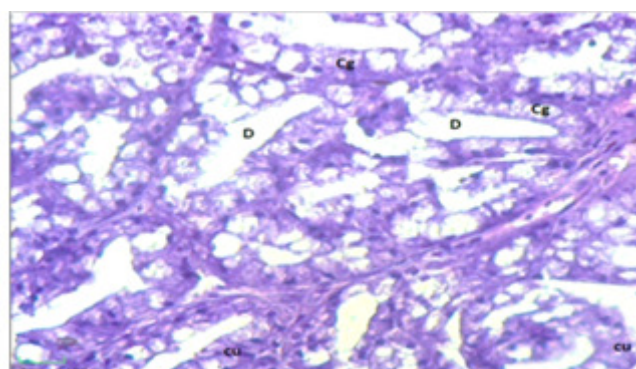
**Fig. 5 :** Histological section of the harderian gland in Quail shows Russell bodies (R) corpus gland (cg) (H and E stain x40).



**Fig. 6 :** Histological section of the harderian gland in Coot bird was covered with a thin capsule © which consisted of adipose tissue (ad) duct (D) inter lobular septa(in) (H and E stain x10).

it emptied its secretion via such duct that lined with simple low columnar epithelium tissue then this secretion conveys by main duct, which lined by low simple cuboidal epithelium tissue. The glandular units surrounded by Russell bodies (Figs. 2, 3).

Harderian gland of coot bird in present study lobulated surrounded by thin bundles of connective tissue fibers every glandular lobule contain compound tubuloacinar secretory unit lined with simple columnar epithelium tissue and its secretion was mucoserous material this convey by lobule duct then by main duct these lined with low



**Fig. 7 :** Histological section of the harderian gland in Coot bird shows duct (D) corpus gland (cg) cuboidal cells lining (cu) (H and E stain x40).

**Table 1 :** Mean of length and width of harderian gland in three species of birds (native chicken (ch) coot bird (co) and quail (Qu).

Group	Width\cm	Length\cm
CH	1.01±0.15B	0.58±0.07B
CO	1.24±0.126A	0.70±0.06A
QU	0.65±0.09C	0.35±0.057C
LSD	0.11	0.22

simple cuboidal epithelium tissue. As well as the parenchyma of glandular lobe was the same in peripheral and central of lobe (Figs. 4, 5).

Histological features of harderian gland in Quail (Qu) showed there was lesser loose connective tissue between interlobular septa than that present in the septa of two glands. The gland observed to be multi-lobular tubular type especially in center of gland. Interlobular duct lined with simple cuboidal epithelium tissue and the main duct lined with simple low cuboidal epithelium tissue. Glandular unit was compound mucus and serous its lining with two types mucus columnar and cuboidal serous secretion. There was aggregation of secretory ducts in deep portion of gland that surrounded by Russell bodies (Figs. 6, 7).

## DISCUSSION

Across examination of the present study showed that the HG of three species of birds was at the orbital cavity in the ventromedial around the posterior part of the eye ball these results are companied with description of Rashag *et al* (2016) in domestic pigeon (Burns and Maxwell, 1979) in fowl and duck and (Mobini, 2012) in native chicken. Those show that HG located at the orbital cavity lying at the ventromedial asset of eye behind the eye ball. Current study noticed HG in three types of birds were light brown to pink in color this is in agreement with result at Rashag *et al* (2016) in domestic pigeon.

The present results indicate that the shape of HG in chicken elongated where as in coot bird the HG was irregular and it was aeloa shape while, it was teardrop in shape in quail on the other hand (Rashag *et al*, 2016) the

shape of HG in domestic pigeon was look like teardrop and had narrow anterior end and wide posterior end with curved flat body and had single main duct while Joana *et al* (2016).

Showed the HG in capercaillie had one efferent duct reaching the lower conjunctiva sac and it was flattened and elongated as well as the HG in Canadian ostrich was an oval flatted shape (Mohammed and Rahmand, 2015). The finding of the present work explains the differenced in size of HG in three birds, it was large in coot bird and the smaller one was the HG of quail were as the mean length was  $35.30 \pm 2.84$ mm and mean width  $15.30 \pm 1.20$ mm in Canadian ostrich (Mohammed and Rahmand, 2015) this may be depend on the weight and size of the species of birds.

Histological picture showed that the harderian gland in three species were enveloped by a thin loose connective tissue capsule, which send septa into the gland and divided it for many lobes these findings are in agreement with that reported by Mobini (2012) in native chicken and Rashag *et al* (2016) in domestic pigeon and Burns and Maxwell (1979) in Turkey, fowl and duck HG was covered with a thin capsule which consist of adipose tissue and other contain of connective tissue. The septa from the capsule penetrated the gland dividing it into elongated lobes of varying size. In present study, HG native chicken and coot bird was consist of many acino tubular units these lined with simple columnar epithelium tissue and its secretion was seromucose material. this excretal with Joana *et al* (2016) in capercaillie and Rashag *et al* (2016) in domestic pigeon and Kozlu and Altunay (2011) in quail as well as in domestic geese a single duct located centrally and having an irregular lumen was observed and the duct epithelium was multi-layered and the cell shape varied, the main duct were polygonal while the once near the lumen were cuboidal (Boydak and Aydin, 2009).

Histological picture of the lining of main duct and interlobular duct in HG in three species of bird were lined with simple cuboidal epithelium tissue in coot bird and quail it lined by low columnar epithelium tissue in chicken on the other hand (Joana *et al*, 2016) in capercaillie and Dimitrov and Genchev (2011) in Japanese quails and Kozlu *et al* (2010) in osprey reported there was wide lumen of primary ducts, which was lined by columnar epithelium cell of different height and secondary duct were lined with a layer of cuboidal cell.

Histological picture of the harderian gland in three bird was the same excepted three was aggregation of secretory ducts in deep portion of gland that surrounded by Russell bodies in HG of native chicken and quail.

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