

Histological study of the renal medulla in Japanese quail *

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Regulation of optimum osmotic balance of body fluids is essential for normal functioning of each and every system of body. Kidneys are one among the important homeostatic mechanisms of the body. They are the prime centers for excretion of nitrogenous waste products, excess water, inorganic salts and toxic substances produced during metabolism. Little literature is available about the histological studies of renal medulla of Japanese quails. Hence the present study was undertaken.

The study was made on kidneys collected from 25 adult Japanese quails of 7–8 weeks of age. Fresh specimens were preserved in fixatives like 10% neutral buffered formalin, Bouin's solution and Zenker's solution. The tissue pieces were processed by routine paraffin embedding technique. Serial sections of 5–7 µm thickness were stained by Mayer's Haemalum-Eosin-Phloxine method (Singh and Sulochana 1996), Van-Gieson's method (Singh and Sulochana 1996) and Wilder's method for reticulum (Luna 1968).

In the present study, the renal medulla appeared as cone shaped medullary lobules as observed by Emery *et al.* (1972) in budgerigar kidney. Compared to cortical lobules, numbers of medullary lobules were less. The bulkiness of medullary tissue was less compared to that of cortical tissue. The medullary lobules were enclosed by a thin connective tissue sheath made of collagen fibers similar to the findings of Nicholson (1982) in starling kidney. The medullary lobules were located at varying depths similar to the observations of Casotti and Richardson (1992) in honey eater kidney. Single medullary lobule received collecting ducts from more than

one cortical lobule (Fig. 1).

Each medullary cone in Japanese quail consisted of numerous collecting ducts, thick and thin loops of Henle of juxta medullary nephrons and capillary loops, vasa recta (Fig. 2). This observation was in agreement with the findings of Wideman and Nissley (1992) in kidney of White Leghorn birds. Contrary to the present finding, King (1975) mentioned that in avian kidney, medulla contained only loops of Henle and collecting ducts.

Medullary collecting ducts were lined by columnar cells of increasing height with distinct cell boundaries and contained a basal spherical nucleus with well developed nucleolus and light stained cytoplasm as observed by Fitzgerald (1969) in coturnix quail. Contrary to this, Casotti and Richardson (1993) reported the presence of cuboidal cells in collecting tubules of honey eater kidney. In the present study, collecting ducts were distributed in an irregular fashion within medullary lobule whereas, Kurihara and Yasuda (1978) described rosette or clump like aggregations of collecting ducts in fowl kidney. Towards distal part, the collecting ducts fused within medulla to form large collecting ducts (Fig. 3) similar to the findings of Nicholson (1982) in avian kidney. But, the numbers of collecting ducts were few towards distal part. Larger collecting ducts from different medullary lobules united to form still larger collecting ducts and they ended in urethral branches (Fig. 3).

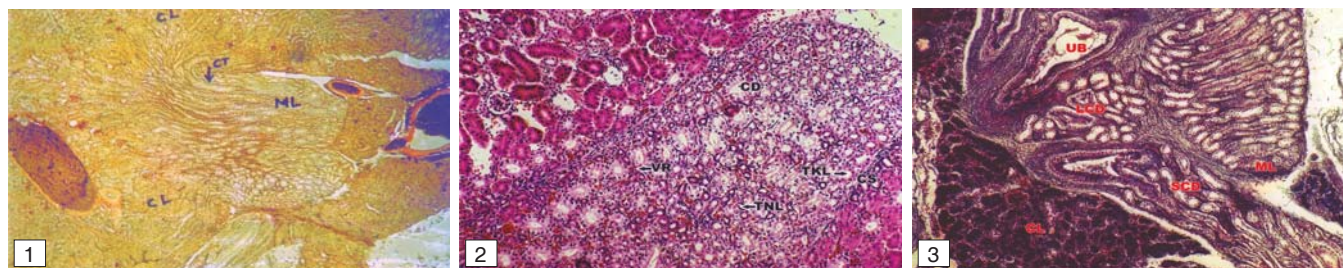
Renal medulla showed majority of thin limbs of Henle, vasa recta and collecting ducts centrally whereas thick limbs of Henle peripherally as observed by King and Mc Lelland (1975) in avian kidney. Thick limbs of Henle were having wider lumen and were lined by cuboidal cells with eosinophilic cytoplasm, central spherical nuclei and well developed nucleolus. Thin limbs of Henle were lined by flattened cuboidal cells with dark staining scanty cytoplasm and oval nuclei. Similar observations were made by Casotti and Richardson (1993) in honeyeater birds. But, Fitzgerald (1969) observed light staining simple squamous cells in thin limb of Henle and tall pyramidal form of simple columnar cells in thick limb of Henle in coturnix quail.

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Figs 1–3. **1.** Kidney of Japanese quail showing draining of collecting tubules from different cortical lobules into single medullary lobule. Van-Gieson's method. X13. CL-cortical lobule, ML-medullary lobule, CT-collecting tubule. **2.** Kidney of Japanese quail showing a medullary cone. H & E. ×50. CS- connective tissue sheath, CD- collecting ducts, TKL- thick limb of loop of Henle, TNL- thin limb of loop of Henle, VR- vasa recta. **3.** Kidney of Japanese quail showing union of small collecting ducts to form large collecting ducts and ureteral branches. Wilder's reticulum. ×32. SCD-small collecting duct, LCD-large collecting duct, UB- ureteral branch, ML-medullary lobule, CL-cortical lobule.

Medullary tract formed by union of 2 or 3 medullary lobules, separated by connective tissue could be observed (Emery *et al.* 1972) in budgerigar kidney. Within medulla, small collecting ducts united to form large collecting ducts, which in turn united to form ureteral branches. The medullary interstitium showed the presence of reticular and collagen fibers.

SUMMARY

Kidneys collected from 25 adult Japanese quails were used for this study. Fresh specimens fixed in 10% neutral buffered formalin, Bouin's and Zenker's solutions were processed by routine paraffin embedding technique. Sections were stained by Mayer's Haemalum -Eosin-Phloxine method, Van-Gieson's method and Wilder's method. The renal medulla was observed as cone shaped medullary lobules. Each medullary lobule was enclosed by a thin sheath of connective tissue and contained numerous collecting ducts, thick and thin loops of Henle and capillary loops-vasa recta. Medullary collecting ducts were lined by columnar epithelial cells with basal spherical nucleus and well developed nucleolus. Thick limbs of Henle had light stained simple cuboidal cells with central spherical nucleus and well developed nucleolus. Thin limbs of Henle were lined by flattened cuboidal cells having dark staining scanty cytoplasm and oval nucleus. Two or three medullary lobules united to form medullary tracts. The medullary interstitium showed the presence of collagen and reticular fibers.

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