

Morphological Description and Histological Structure of Kidney in (White Breasted King Fisher) *Halcyon Smyrnensis* (Linnaeus, 1758)

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Abstract

The result of anatomical examination indicated that the bird of the current study has a pair of kidney that take asymmetrical position on both side of vertebral column in a bony depression called renal fossa within the synsacrum, each kidney composed of three lobes, cranial, middle and caudal lobe, the result of present study indicate that there is a difference in the location of the cranial lobe of left kidney between male and female, whereas the caudal lobe is the largest kidney lobe. The kidney surrounded by a thin capsule of connective tissue, the basic unit of the kidney is the lobule , each lobule consist of cortical and medullary tissue, the lobules looks pear shape and surrounded from two side by interlobular vein and the intralobular vein located in the center of lobule , the kidney consist of two areas cortex and medulla, the cortex occupies more space than the medulla, the cortex contain glomerulus , proximal convoluted tubules and distal convoluted tubule , while the medulla contain thin and thick of Henle-s loop, collecting tubule and collecting duct.

Keywords: *Kidney, White breasted king fisher, Morphological description, Histological structure.*

Introduction

The kidney in both Mammalia and birds are principle organ concert with maintaining the unchanging nature of the internal environment by providing a balance between glomerular filtration, renal tubular secretion volume, osmolrity, ionic content and pH of the body fluid [1,2].However, during the development of kidney in the avian embryo the pronephros, mesonephros and metanephros. The mesonephros is the functional kidney for fish and amphibians while the metanephros is the functional kidney of reptiles, birds and mammals [3, 4, 5].

The kidneys in birds are larger in size than the kidneys in Mammalia ranging from 1-2.6% of body weight according to bird races. The kidney are large in small bird which have significant metabolic activity as well as in races that have salt gland [6,7].In birds generally the kidneys lie symmetrically in bony depression of the synsacrum, the renal fossa. They reach the lung cranially and the end of the synsacrum caudally [8].

Avian kidney normally consists of three lobes cranial, middle and caudal lobe [8, 10].

In many studies that previously talked about avian kidney demonstrated as uniqueness in structure among vertebrate kidney in having two types of nephrons: those with and without a loop of Henle (looped and loop less respectively) [11, 12, 13]. The loops less nephrons stay in cortex while looped nephrons extend from cortex into descript medullar areas called cones. This study has designed to explain the morphology and histology of kidney in white breasted king fisher.

Materials and Methods

Collecting of Samples

In this study used samples of whit breasted king fisher which is belong to the family (Alcedinidae) [14]. Samples were obtained from local market within geographical area of Baghdad city; the samples were classified depending on the available taxonomic keys [15].

In order to get kidney , the birds were dissecting and the kidney lying were identified and their morphological properties were then removed the kidney from lying,

then the kidneys were fixed by fixer (Aqueos Bouin's fluid) for a period 24 hours.

Histological studies

Followed in the preparation of slides for histological study method of embedded with paraffin wax with agree of fusion (58-60C) according to method [16] and the sectioning colored by Haris's Haematoxylin & Eosin according to [17].

Results and Discussion

The results of the anatomical examination indicated that the bird of the current study has a pair of kidney that take asymmetrical position on both side of vertebral column in a bony depression called renal fossa within the synsacrum , each kidney composed of three

lobes : cranial, middle and caudal lobes, and possesses an ureter that arises from the depth of the cranial lobe and extends over the ventral surface of middle and caudal lobe, the ureter enters the cloaca to open directly at the urodeum , there is no urinary bladder (Fig1 a, b).

This finding is consistent with many studies [18, 23]. The results of the present study indicate that there is a difference in the location of the cranial lobe between male and female where the cranial lobe of the left kidney in female away from the middle and caudal lobe and this probably because of the location of the ovary, which works to remove the cranial lobe of the left kidney from its position (Fig1 a, b).

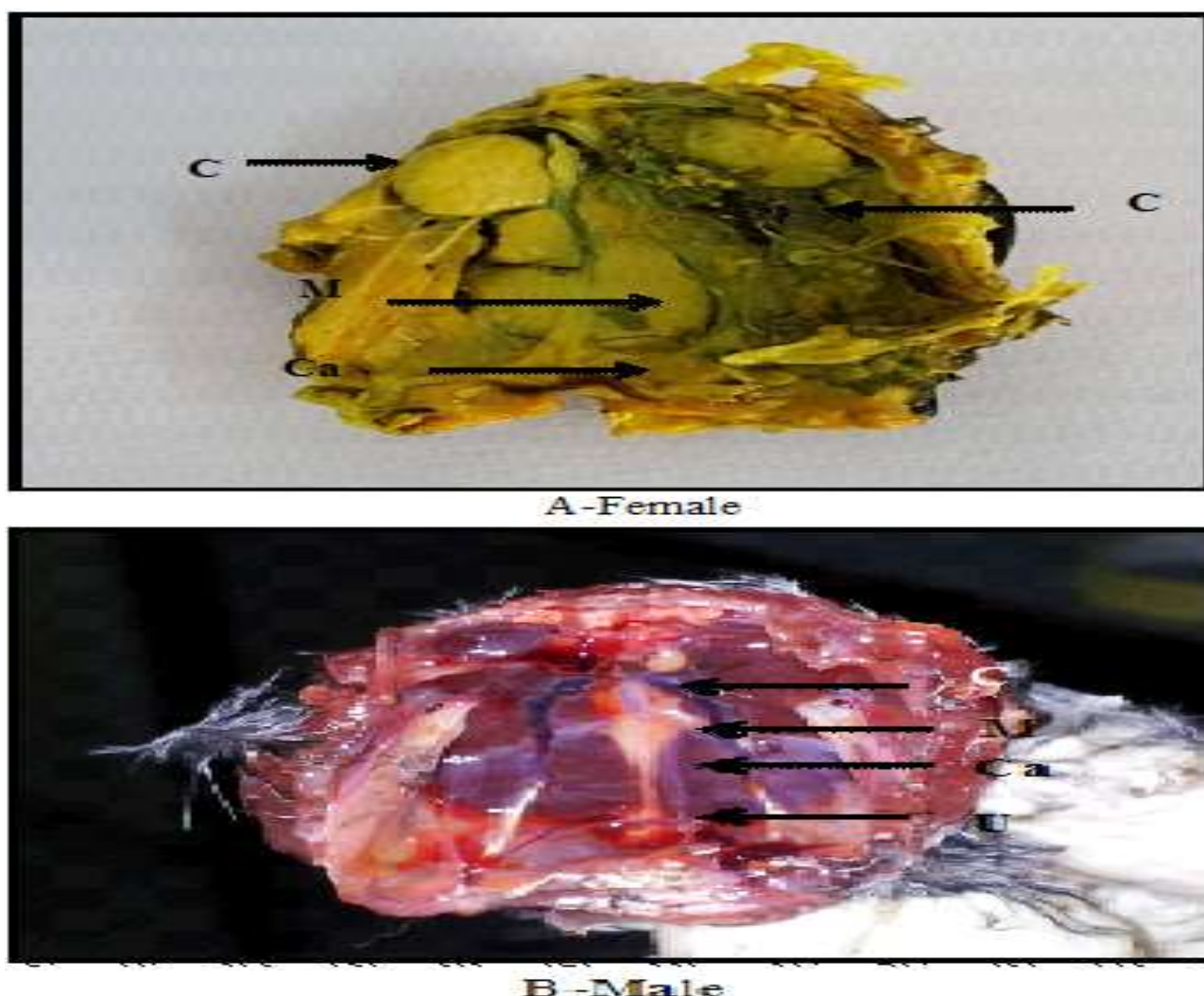


Figure 1: Kidney in (white breasted king fisher) *Halcyon smyensis* showing C- Cranial lobe , M- Middle lobe, Ca- Caudal lobe, U- Ureter

The results of the current study indicated that the caudal lobe is the largest kidney lobes, this is consistent with many studies that indicated that the caudal lobe is the largest (18, 22, 24). Other researchers pointed out that the cranial lobe is the

largest and this is disagreement with the current study [20, 21, 23]. The kidney is surrounded by a thin capsule of connective tissue (Fig 2), this is consistent with many studies [18, 19, 23, 25, 26].

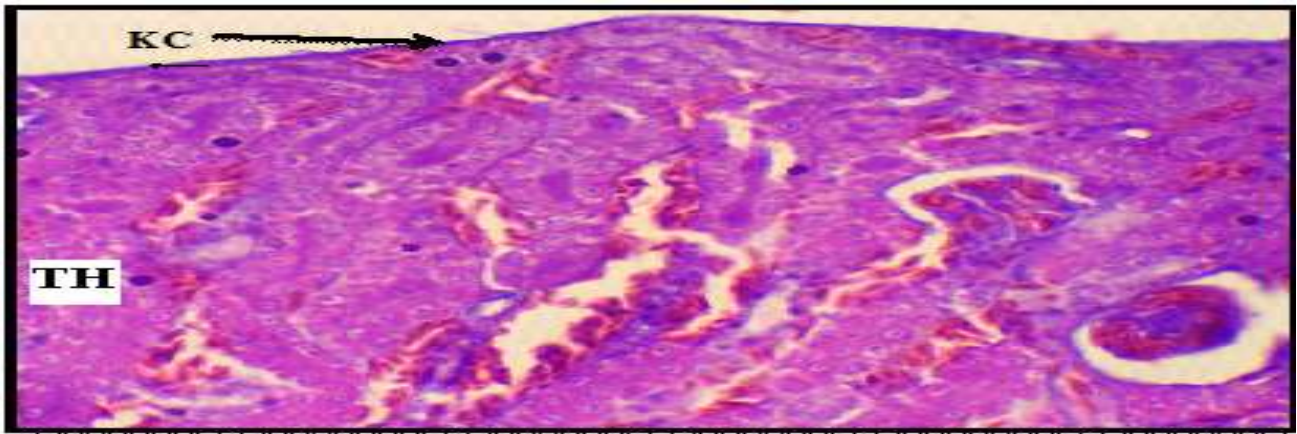


Figure 2: Cross section through kidney (white breasted king fisher) *Halcyon smyensis* showing KC- Kidney capsule (H&E400x)

The basic unit of kidney is the lobule , each lobule consist of cortical and medullary tissue, with the cortical component lying essentially peripherally to the medullary

component (Fig.3) , this finding is consistent with the observation of many researchers [8,18,19,23,25,27,28,29].

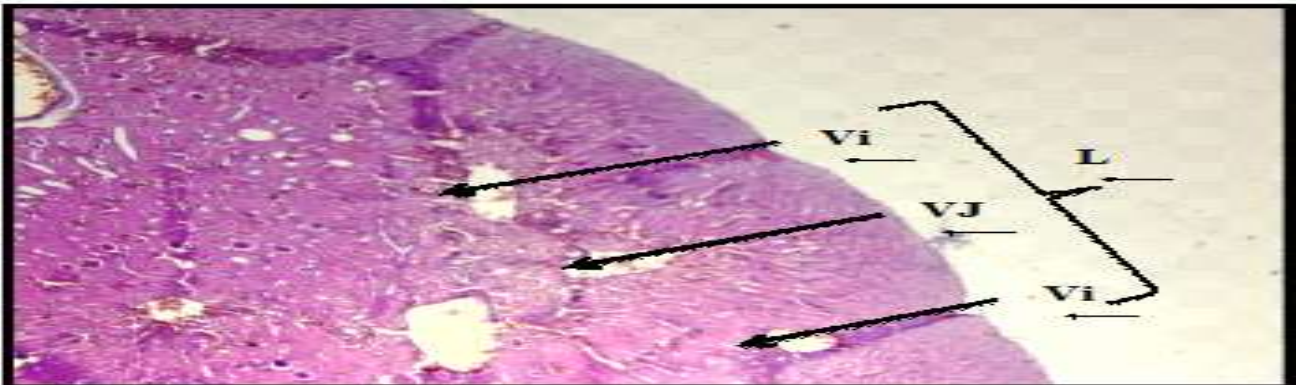


Figure 3: Lobule in kidney (white breasted king fisher) *Halcyon smyensis* showing Vi-Inter lobular vein, Vj- Intralobular vein (H&E40x)

The lobules in the birds are the subject of the current study looks pear shape is surrounded from two sides by interlobular vein , the interlobular vein located in the center of lobule, the results of current study agreement with [8,28,29] in domestic fowl and [23] in barn owl. At this time, this does not correspond to the researcher's observation [23] regarding the Iraqi black partridge where the lobules were oval. The

tissue examination showed that the kidney consists of two areas cortex and medulla, the cortex occupies more space than the medulla and the medulla is in the form of island (Fig.4). The cortex contains glomeruli, proximal convoluted tubule and distal convoluted tubule (Fig.5), this results agreement with many studies [8, 18, 19, 22, 23, 25, 27, 28, 29].

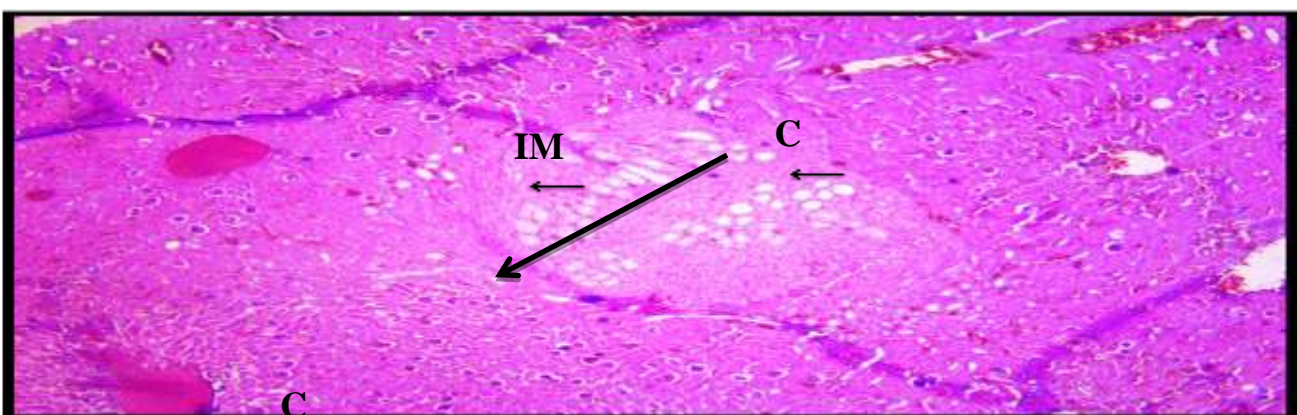


Figure4: Cross section through kidney (white breasted king fisher) *Halcyon smyensis* showing C- Cortex, IM- Island of medulla (H&E40x)

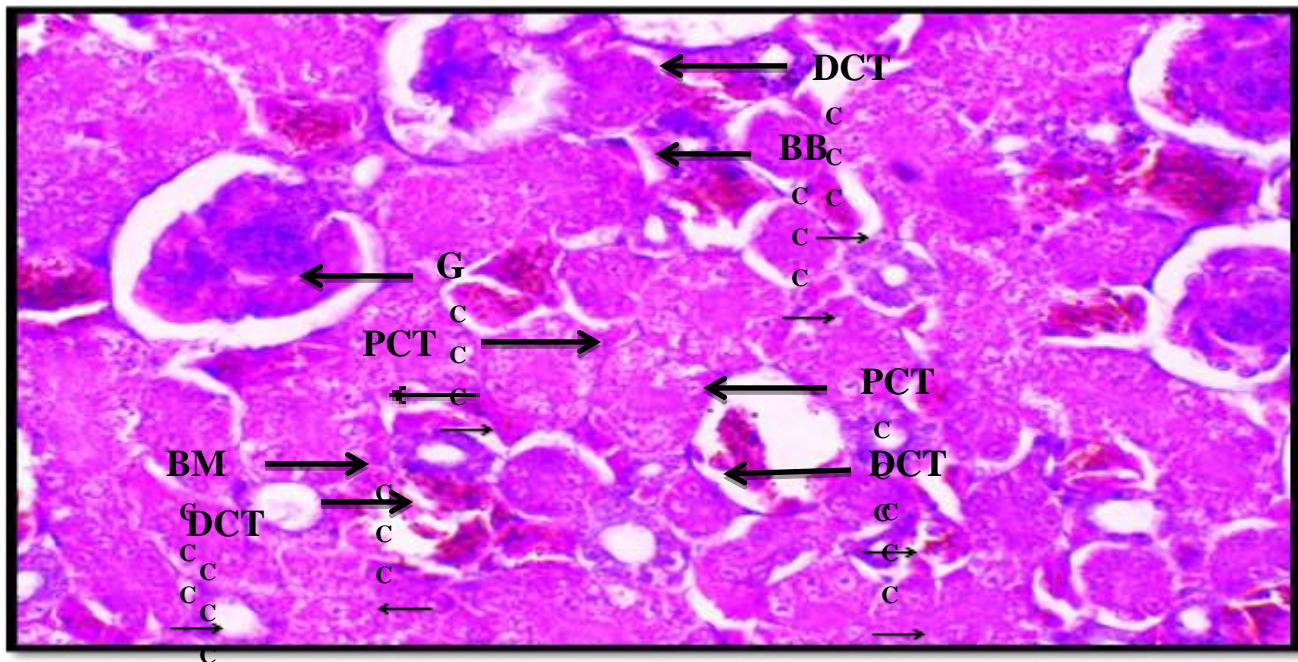


Figure5: Cross section through kidney cortex (white breasted king fisher) *Halcyon smyensis* showing G-Glomerulus, PCT-Proximal convoluted tubule, DCT-Distal convoluted tubule, BM-Basement membrane (H&E400x)

The results of present study showed that the glomeruli spread within the kidney tissue at random and may be present in a single or double or four groups (Fig.6), this result is consistent with [8, 18, 23], and agreement with notes of research [23] in Iraqi black partridge with a slight differences with the results of same researcher in the barn owl, where she pointed to the existence of three groups of glomeruli. The glomeruli are in the form of spherical structures , the center of glomerulus is composed of the mesenchyme

cells and each glomerulus is surrounded by the Bowman's capsule , this capsule is composed of two layers parietal layer of simple squamous epithelial tissue and visceral layer , there is a capsular space between two layers called Bowman's space , each glomerulus possesses two poles , vascular pole and urinary pole, and the macula dense is located at the vascular pole of renal corpuscle (Fig.7)., these results agreement with [19,20,21,23,25,27,30].

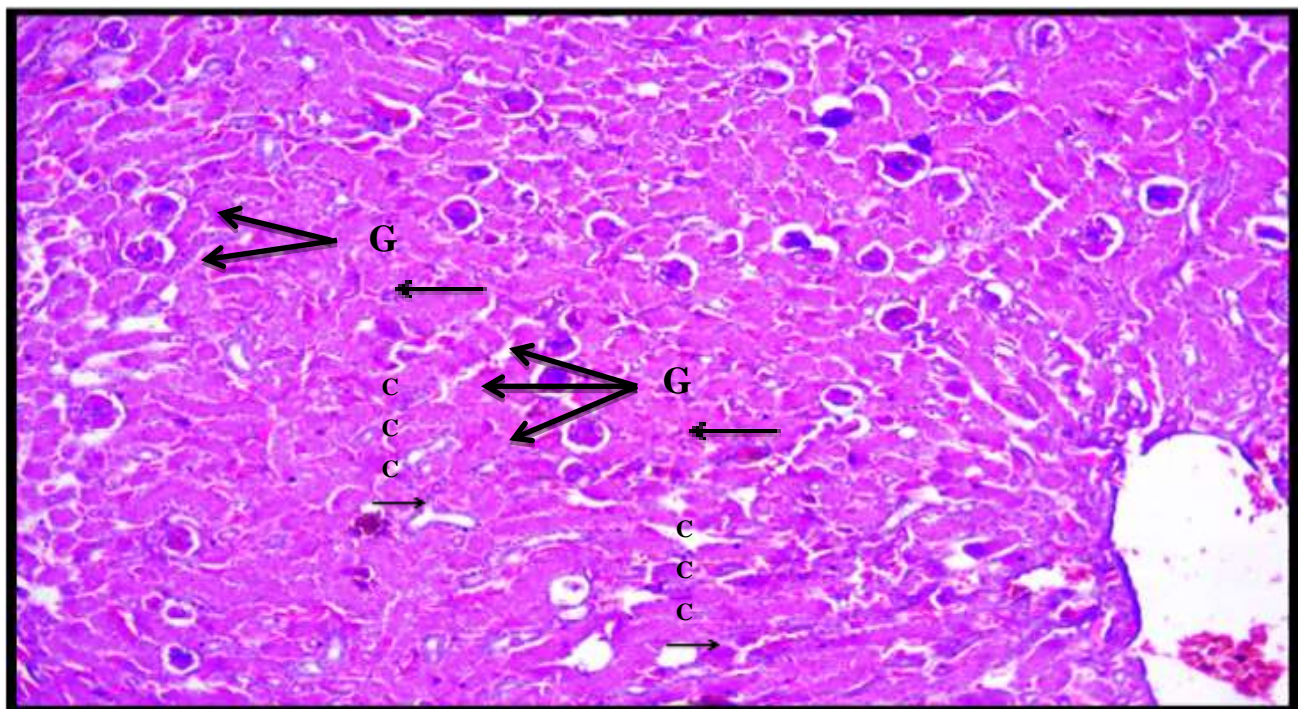


Figure6: Cross section through cortex (white breasted king fisher) *Halcyon smyensis* showing G-Glomerulus (H&E100x)

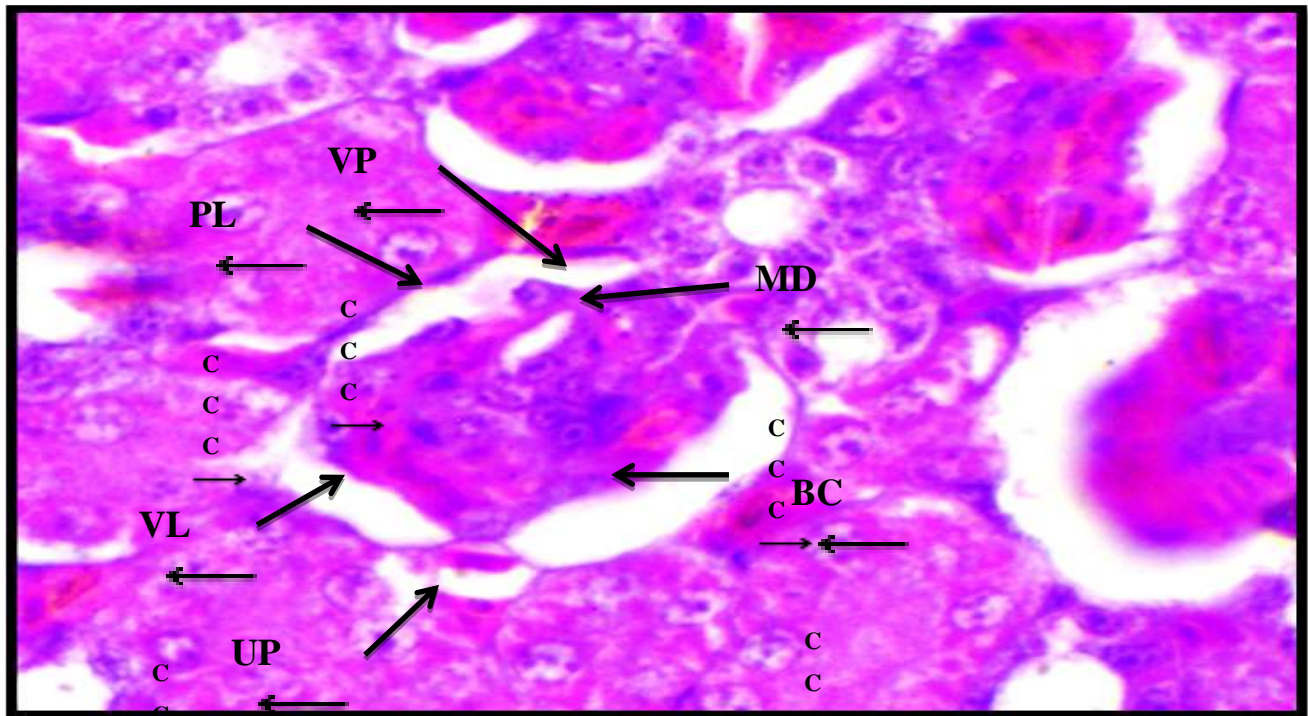


Figure7: Histological structure of glomerulus (white breasted king fisher) *Halcyon smyensis* showing PL-Parietal layer, VL-Visceral layer, VP-Vascular pole, UP-Urinary pole, BS-Bowman,s space, MD-Macula densa (H&E400x)

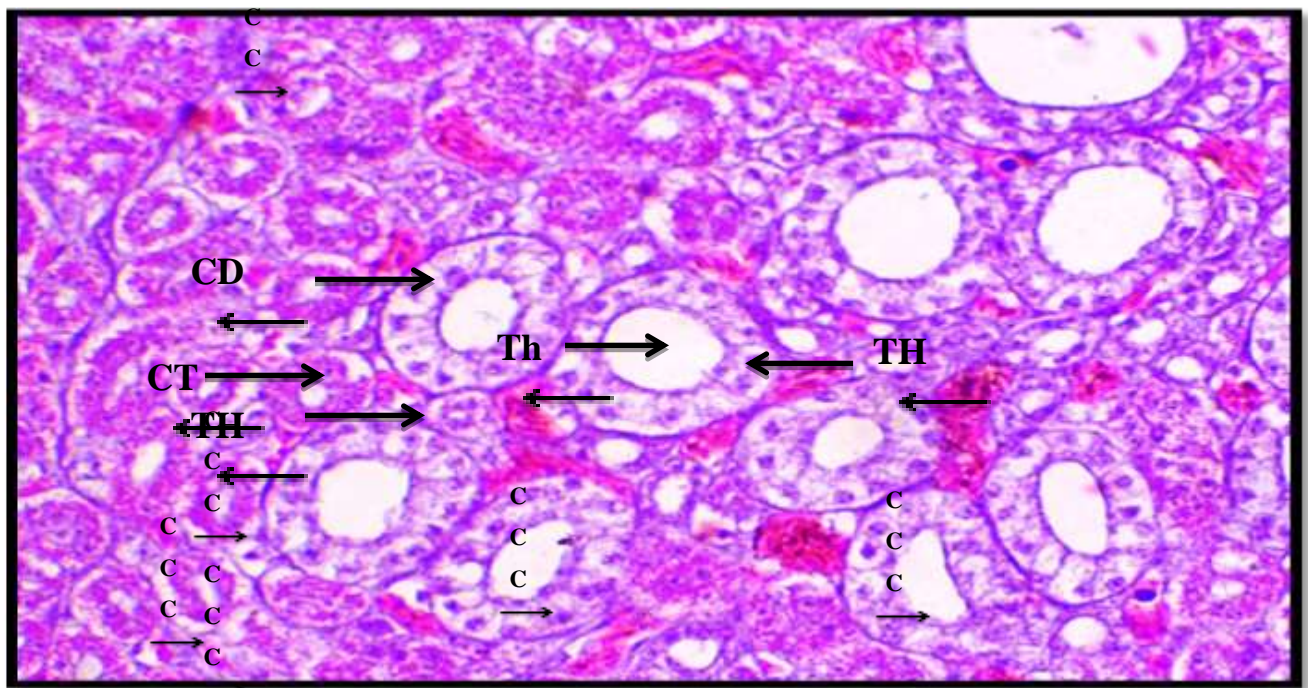


Figure8: Cross section through kidney medulla (white breasted king fisher) *Halcyon smyensis* showing Th-Thin segment, TH-Thick segment, CD-Collecting duct (H&E400x)

The results of the present study showed that the proximal convoluted tubule lining with simple cuboidal epithelial tissue with a brush border in the free surface of the cells , the cells are based on the basement membrane, the nuclei of cells are circular and central location (Fig.5) , this results agreement with many studies [2,8,19,20,21,23]. The results of the present study showed that the distal convoluted tubule lining with simple cuboidal epithelial tissue, cells are based on basement

membrane (Fig.5), this result agreement with many studies [1,18,19,20,21,23,31,32]. The medulla contains thin and thick segment of Henle's loop, collecting tubule and collecting ducts(Fig.8) , this results agreement with observation of many researchers [33,36]. The results of the current study showed that the thin and thick segment of Henle's loop lined with simple cuboidal epithelial tissue , the cuboidal cells in the thick segment look thicker than the thin segment of Henle's loop

, nuclei of cell circular and central location (Fig.8), this result agreement with many researchers observations[8,18,19,20,23,25,28,29]. The results of current study showed that the collecting tubule lined with simple cuboidal

to columnar epithelium and the nuclei of the cells are closer to the base than the center , Collecting duct lined with simple columnar epithelial tissue , the nuclei of cells basic site (Fig.8), this result agreement with many studies[18,19,20,23].

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