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Morphological anatomical and histological study of the normal kidneys in the House Mice (*Mus Musculus*)

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Abstract

The house mice kidneys lay on each side of the upper lumbar vertebra in the abdominal cavity behind the peritoneum. The right kidney was situated more cranially than the left. The shape of two kidneyswas bean like structure. The mean weight of the right kidney was 0.076±0.013gm while, the left kidney was 0.072±0.011gm. The mean length, width and thickness of the right kidneys were 7.4±0.647mm, 5.098±0.427mm, 3.624±0.198mm respectively while those of the left were 6.8±0.518mm, 4.768±0.481mm, 3.468±0.123mmrespectively. The kidneys consist of two distinct regions, the outer cortex is reddish brown in color and inner medulla, and both terminate bysingle elongated renal papillae. The house mice kidneys were covered by a thin dense connective tissue capsule with adipose tissue. The nephron composed of large and small rounded or irregular renal corpuscle; each The renal corpuscle is forms the glomeruli that enveloped by Bowman's capsule, and the proximal convoluted tubules, loop of Henle and the distal convoluted tubules. The cortex consists from renal corpuscles, proximal convoluted tubules and distal convoluted tubules. The proximal convoluted tubule arises from the parietal epithelium of Bowman's capsule of the urinary pole of the renal corpuscle lined by simple high cuboidal epithelium. The distal convoluted tubules were lined by simple low cuboidal epithelium. The part of the distal convoluted tubule in contact with glomerular root has the macula densa. The medulla of each kidney is formed from thick parts lined bysimple cuboidal epithelium and thin parts of the loops of Henle lined by simple squamous epithelium and the thin limb had a distinct rounded lumen and collecting tubules are lined by pale cuboidal epithelium with rounded nuclei and

basophilic cytoplasm. The terminal portion of these tubules is lined by columnar epithelium and is called papillary ducts.

Key words: house mice,kidneys, nephrons, glomerulus, tubules

Introduction

The house mouse is a small mammal of the order Rodentia, characteristically having a pointed snout, small rounded ears, and a long naked or almost hairless tail. It is one of the most numerous species of the genus Mus. Although a wild animal, the house mouse mainly lives in association with humans.The house mouse has been domesticated as the pet or fancy mouse, and as the laboratory mouse, which is one of the most important model organisms in biology and medicine[1].The kidneys are organs formed by the renal tubules, surrounded by fat and partially covered by peritoneum on its ventral surface. Anatomically, the lateral margin has a convex curvature, and the medial, nearly straight, where is an opening called hilum, through which, blood vessels, nerves from kidneys and ureters are communicating [2]. These organs have an important role in blood filtration, ensuring the homeostasis of body fluids, through mechanisms of glomerular filtration, reabsorption and tubular secretion performed in nephron [3 and 4]. According to [5 and 6], the kidney of mammalian species has typical bean-shaped appearance characteristic of the unipolar mammalian kidneys, the nephron is the functional unite of the kidney; each nephron consists of corpuscle, proximal convoluted tubules, loope of Henle, distal convoluted tubules and collecting tubules. The mammalian kidneys control the concentration of the body fluids. Some arid-adapted small mammals are efficient at concentrating urine in order to reduce water loss.Their unilobular kidneys have elongated renal papillae, i.e. thicker medulla [7 and 8]. The physiological adaption of small rodents to arid conditions is achieved mainly through concentrating ability of their kidneys[9].The conservation of water by the kidney is of crucial importance for the kangaroo rat, which does not drink and can obtain water only from catabolism while, other desert rodents obtain water from their

diet[10].Additional functions include filtration and excretion of waste products from the processing of food, drugs, and harmful substances; regulation of blood pressure; and secretion of certain hormones [11and12].

Materials and methods

For anatomical and histological study taken ten adult clinically healthy house mouse, weighing 10 - 15gm (5 male and 5 female) were collected from Samawa city, south of Iraq. The animals were anaesthesized with gaseous chloroform in a closed container, after which a simple explotary laparotomy procedureby its extremities were fixed to the dissection board with drawing pins and a vertical midline incision was done from the xiphoid process down to the pubic symphysis under the skin, abdominal muscles to the abdominal cavity and the viscera were retracted and the kidneys were exposed. Kidneys were released from their fatty covering connective tissue and gently removed, weighed by balance and measured (length, width and thickness) by vernier caliper. The kidneys were cut along the mid dorsal plane and immediately fixed in 10% neutral formalin. The tissue was washed in tap water and processed by routine histological techniques, starting with an dehydrated in ascending grades of ethyl alcohols, cleaned in xylene and finally embedded in paraffin wax at 60^{o}C. The paraffin sections at 5-6µ in thickusing digital microtome (Hestion ERM 4000 Germany) were prepared and stained with Haematoxylin and Eosin according to [13].The diameters of each Bowman's capsule, glomeruli, proximal convoluted tubules(PCT), segments of the loop of Henle(LOH), distal convoluted tubules(DCT) and collecting ducts(CD), were measured by using an ocular micrometer following acalibration of the microscope with a stage micrometer as described by [14].

Results and Discussion

Anatomical and Morphometric observation:

The mean body weight of house mouse was (13.23±2.351gm). The house mice kidneys lay on each side of the upper lumbar vertebra in the abdominal cavity the retroperitonial(fig.1). The result is similar to the result of [15] who registed that the paired kidneys of the two

investigated rodents were bean shape and dark red bodies located in the dorsal wall of abdominal cavity. The right kidney was situated more cranially than the left(fig.1), this result is similar to [16]. The right kidney is located more cranial than the left kidney and was related to the liver while the left was related to the stomach, pancreas, descending colon, spleen and small intestine(fig.1). This result agreement with [17]in albino rats and [2] in mice.The kidney of the house mice was bean like structure, smooth and possess convex and concave borders and had dorsal and ventral surface, medial and lateral borders, the lateral border was convex while, the medial border was concave, indented hilus, and an upper and lower pole(fig.2). This result agreement with[18] whom they noted also that the kidneys of African gaint rat and wistar rat were bean shape and smooth. The hilus and sides of the kidney of house mice were surrounded by adipose tissue. The mean weight of the right kidney in this research was 0.076±0.013 gm while, the left kidney was 0.072±011gm. The mean length, width and thickness of the right kidney were 7.4±0.647mm, 5.098±0.427mm, 3.624±0.198mm respectively while those of the left were 6.8±0.518mm, 4.768±0.481mm, 3.468±0.123mm respectively.This study was in agreement with[2 and 19], who mentions the length and thickness of the right kidney of mice is relatively larger than the left kidney while this result disagreement with[20], who reports the mean weight of kidneys 0.95g and the length of the right kidney of the rat was 1.35cm and the left was 1.49cm, and with [17], who mentions the mean weight, length, width, and thickness of right kidney of albino rat is 1.1gm, 1.28cm, 0.88cm and 0.81cm respectively while the mean weight, length, width, and thickness of left kidney is 0.96gm, 1.23cm, 0.85cm and 0.79cm respectively. The kidneys of the house mice were unipyramidal consist of two anatomical distinct regions, the outer cortex is reddish brown in color and inner medulla, both terminate bya single elongated renal papillae(fig.3,4), this result agreement with[6]in true desert rodents and [17]in albino rats and[21]in spiny mice, who mentions the renal papilla was markedly sharp pointed, longer and extended down into the renal pelvis comparing to the corresponding

papillae of both the hedgehogs and the guinea pigs which were relatively shorter and blunt and also with [22], who mention, the kidneys of the argentine desert rodents has single renal papillae and amedulla divided in two zones and the delicate mouse, *Salinomys delicatus*,(murid) and red vizcacha rat, *Tympanoctomys barrerae*, among the octodontids, has the most elongated papillae but in *Octomys mimax* (octodontid) and *Akodon molinae* (murid) has shorter less development renal papillae are associated with lower renal indices.The broad (blunt) papillae may be necessary to produce alarge urine volume, whereas a narrow pointed papilla may be better adapted to concentrate urine down to a small volume[21].The present study showed the pelvis was a single cavity with no subdivision to major and minor calyces and has pelvic recesses extended between the cortex and medulla(fig.3,4).This result agreement with [17]in albino rats and[21], which mentions, the renal pelvis appeared as a dilated cavity of the proximal end of the ureter, lodged in the sinuse and facing the renal papilla which are complex and well- developed secondary fornices (pelvic recesses)in hedgehogs, and highly developed evaginations that extended between cortical and medullary tissues as in the spiny mice. Histological observations:

The house mice kidneys were covered by a thin dense connective tissue capsule with adipose tissue that was adherent to sub capsularconnective tissue (Fig.5, 6). This result agreement with[23] in small mammals,[17] in albino rats and[6], also reported that each kidney is enclosed by a fibro connective tissue capsule. Each kidney is of connectivetissue which may contain a distinct layer of smooth muscle in its deepest portion(Fig.6). Thehistological sections of each kidney showed the kidney of house mousewere unipyramidal consists oftwo regions, the outer cortex and the inner medulla(Fig.7). This result agreement with [6], in true desert rodents while disagreement with [17], who mention,the cortex and medulla arearranged into more pyramidal shape called renal pyramids and the apex of the eachpyramid is called renal papilla. The basic unit of the house mice kidney is the nephron;eachnephron can be subdivided into number

of distinct parts in the cortex and medulla.Thenephron composed of renal corpuscle and the proximal convoluted tubules, loop of Henlewhich arranged into ascending and descending limb and then the distal convolutedtubules(Fig.7,8,9,10). The means diameters of the lumen of the proximal convoluted tubules,the distal convoluted tubules, thick, and thin loop of Henle were 11.5±4.183µm, 16.5±2.850µm, 12.6±1.596µm, 18.6±1.294µm respectively. The cortex consists from large and small renal corpuscles, proximal convolutedtubules and distal convoluted tubules(Fig.7,8). The renal corpuscle is a rounded or irregularstructure which forms the glomeruli that enveloped by Bowman's capsule is formed of two layer, the outer parietal layer was consists of a flat single layer of squamous epitheliumenclosing a narrow space or the urinary space is continuous with the lumen ofproximal convoluted tubule and thesecond layer, the visceral layer(podocytes) was formed of flattened squamous epithelial cells is surrounding the glomerularcapillaries(Fig.8). The visceral pole of renal corpuscle communicates with arteries ofglomeruli(Fig.8). The means diameters of the glomeruli near the capsule and bowman's space were42.68±4.058µm, 63.05±4.850µm, while glomeruli near the medulla and bowman's space were 68.41±4.710µm, 82.65±4.660µm respectively. This research agreement with [24] in desert gerbil,[17 and 6], while disagreement with(25, 26, 27, 28 and 29), who mentions the parietal layers of renal corpuscle in males mice are comprised of cuboidal epithelium, whereas in agreement parietal layer of females mice which consist of a squamous epithelium. The proximalconvoluted tubule and distal convoluted are the initial and terminal parts of thenephron. The proximal convoluted tubule arises from the parietal epithelium ofBowman's capsule of the urinary poleof the renal corpuscle andexhibit a small, uneven lumen were lined by simple cuboidal epithelium(Fig.8). However, theproximal tubular cells were stained with more eosinophilic,granular cytoplasm and the lumen of the proximal tubules were narrower caused by cellular microvilli at the apical border(brush border). This research agreement with [17] in albino rats and[30] in African Grasscutter,while

disagreewith (31), who reported that the proximal convoluted tubules are lined with columnarepithelial but in agreement with that proximal tubule is more narrow than the distalconvoluted tubule. The distal convoluted tubules werelined by simple cuboidal epitheliumanddiffers from the proximal tubules in that the cells lining were of pale simple cuboidal epithelium withrounded and large nuclei andhave a smooth internal surface, and absent of the brush border and their lumen were larger than those of theproximal tubules and more clearly defined (Fig.8), this result agreement with [17,30 and 32]. The distal convoluted tubules tend tobe rather shorter than the proximal convoluted tubules and are fewer in number in theregional cortex (Fig.1, 4).This result agreed with [33], who registered that the distal convoluted tubule is fewer in number and may be recognized by the pale cuboidal epithelial cells. The lumen diameters of distal convoluted tubules and collecting duct were larger than proximal convoluted tubules.This result similar to [30], whereas this resultdisagreement with [34], who observed the luminal diameter of the proximal convoluted tubules was greater than those of the distalconvoluted tubules andcollecting duct in rats. The larger sizes in the diameters of thedistal convoluted tubules and collecting duct suggest that urine flows more slowly in the larger tubules[35].The part of the distal convoluted tubule in contact withglomerular root has rather modified appearance than the rest of these tubules; thisregion is identified as the macula densa that had elongated lining cells closely packed with faintly stained cytoplasm(Fig.8). This result agreement with [36], who mention the macula densa in Malayan Pangolin kidney was found as the packed epithelial cells on one side of distal tubule adjacent to afferent arteriole near of the vascular pole of renal corpuscle.The medulla of each kidney is formed from thick parts lined by simple cuboidal epithelium and thin parts of the loops of Henle lined by simple squamous epithelium and the thin limb had a distinct rounded lumen (Fig. 9,10,11). It could be clearly distinguished fromthe other parts of the nephron on the bases of its low lining epithelial squamous cellsand the cytoplasm was homogenous eosinophilic. The thinner wall of this limbresembles the capillaries or small venules in

their luminal. The thick descending portionin medulla is similar to the proximal convoluted tubules in cortex, while the thickascending portion of medulla is similar to distal convoluted tubules in the cortex. Theascending limb of loop of Henle appears large in size than that of the descending limband is enclosing a wider lumen. This is in agreement with [31 and 17].The means diameter of the collecting tubules was 14.5±1.118µm and these tubules are not part of the nephron. These tubules are lined by pale cuboidalepithelium with rounded dark and light nuclei and basophilic cytoplasmand the cell boundaries was clear when compared with the cells of the proximal and distal convoluted tubules in progress toward the renal papilla (Fig. 12,13). This result agreementwith [32 and 17] as they noted that the epithelial cells of the collecting tubules are pale and varyform cuboidal to columnar close to the papilla and the cell boundaries are normally clearwhen compared with the cells of the proximal and distal convoluted tubules in progresstoward the renal papilla. The terminal portion of these tubules is lined by columnar epithelium and is called papillary ducts(Fig.13). This result agreement with[17]in albino rats and [30] in African Grasscutter, and [36] in Malayan pangolin, who mentions the cells of collecting tubules were cuboidal which lower than distal tubule. The papilla of house mice is lined by a stratified covering epithelium. This result agreement with [37]. The renal pelvis appeared as adilated cavity at the proximal end of ureter lodged in of sinus and facing the renalpapilla. This result agreement with [17] in albino rats.

References

Gregory, S.G., Sekhon M., Schein J., Zhao S., Osoegawa, K., Scott, C.E., Evans, R.S. et al. (2002). "A physical map of the mouse genome". Nature 418: 743–750. doi:10.1038/nature00957. PMID 12181558.

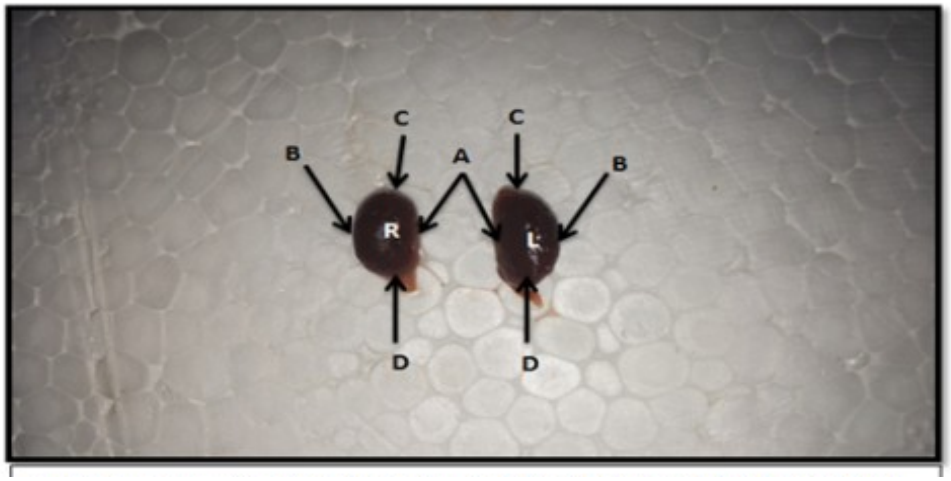
DYCE, KM., SACK, WO. and WENSING, CJG.(2010): TratadodeAnatomaveterinaria. 4.cd. Rio de Jancrio: Guanabara Koogan, P:834.

GATTI, A. (2007): Estudo da função glomerular em Golden Retrievers normais, portadores e afetadospeladistrofia

muscular progressive (GRMD). São Paulo: Universidade de São Paulo,.p.97 [Dissertação de mestradoemCiência Animal].
Charmi, A., Bahmani, M., Sajjadi, M.M. and Kazemi, R. (2009). Morpho-histological study of kidney in farmed juvenile Beluga, Husohuso (Linnaeus,1758). Pakistan Journal of Biological Sciences, 12(1):Pp: 11-18.
Zaki Z T; Basuony M I and Ibrahim I G (1994): Ecological significance of anatomical and histological structure of some mammalian kidney. Egypt. J. Histol., 17(1): Pp:193–208.
El-Salkh, A. B.; Zaki, T.; Mohammad, I. &Khidr, H. A. (2008). Anatomical, Histological and Histochemical studies on some organs of true desert rodents in the Egyptian Habitats. The Egyp. J. of Hosp. Med., 33:Pp: 578- 306.
MacMillen, R.E. & Lee, A.K. (1969). Water metabolism of Australian hopping mice. Comparative Biochemistry and Physiology, 28:Pp: 493-514.
Brooker, B. & Withers, P. (1994). Kidney structure and renal indices of dasyuridmarsupials.Australian Journal of Zoology, 42:Pp: 163-176.
El-Gohary, Z. M. A.(2009): Structural-functional adaptations in the kidneys of two rodent species inhabiting different habitats. Egypt. J. Zool.,52:Pp:337-362.
Bozinovic, F.; Gallardo, P. A.; Visser, R. H. and Corte's, A. (2003): Seasonal acelimatization in water flux rate, urine osmolality and kidney water channels in free-living degus: molecular mechanisms, physiological process and ecological implications. J. Exp. Biol., 206: Pp: 2959-2966.
Cutler, R. E. (2006). Kidney: Biology of the Kidneys and Urinary Tract. In: The Merck Manual Home Edition. Retrieved From http://www.merck.com/mmhe/sec11/ ch141/ ch141b.html on 29/12/09 at 13: 23 GMT +1West Africa.
Onyeanusi, B. I., Adeniyi, A. A., Ayo, J. O. and Nzalak, J. O. (2007). Morphometric studies on the kidneys of the African giant rat (Cricetomysgambianus Water-house). Journal of Animal and Veterinary Advances, 6(11): Pp:1273-1276.
Luna, L.G.(1960). Manual of Histologic Staining Methods of the Armed Forces Institute of Pathology. 3rd ed. McGraw-Hill. New York. P.258.

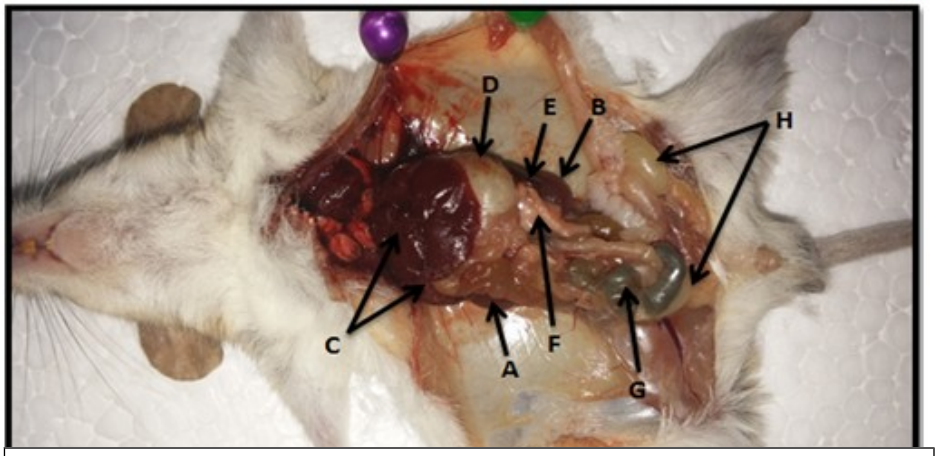
Reid, W. M. (1968). A diagnostic chart for nine species of fowl coccidian. Department of Poultry Science College Station Athens, Georgia, USA. Technical Bulletin, 39:Pp: 17-18.
Young, Z. J. (1975). The Life of Mammals; Their anatomy and Physiology, second edition, claredom press Oxford. U. K.
David, M. M. (2000). Laboratory animal medicine and science series II. Health Sci.Coni.Edu. Resources. Washington Uni. U.S.A.
Al-Samawy, E. R. M.(2012): Morphological and Histological study of the kidneys on the Albino rats. Al-Anbar J. Vet. Sci., Vol.: 5 No. (1).
Onyeanusi, B. I.; Adeniy, A. A.; Ayo, J. O.; Ibe, G. S. &Onyeanusi, C. G. (2009). Acomparative study on the urinary system of the African Giant rat and the wistar rat. Pakistan. J. Nutr., 817: Pp:1043-2047.
Oliveira, DM.1, Santos, AC.1, Bertassoli, BM.2, Viana, DC., Prado, AAF. and AssisNeto, AC.(2013):Comparative study of the kidneys from dystrophic mice. J. Morphol. Sci., vol. 30, No.3, Pp:186-190.
Gulnaz, M.; Tahir, B. &Munir S. M. (2010) Protective effects of garlic oil on acetaminophen induced nephrotoxicity in male albino rats. Department of Anatomy, University of Health Sciences, Lahore.
El-Gohary, Z. M. A.;Khalifa1,S. A.; Fahmy,A. M. E. and Tag,Y. M.(2011): Comparative Studies on the Renal Structural Aspects of the Mammalian Species Inhabiting Different Habitats.Journal of American Science;7(4).
Diaz, G. B. andOjeda, R. A.(1999): Kidney structure and allometry of Argentine desert rodents. Journal of Arid Environments; 41: Pp:453–461.
El-Beltagy, A.(2002). Studies on functional comparative anatomy of the kidney in some small mammals. M.Sc. Thesis, Mansora Fac. of Sci., Mansora Uni.
Safer A M; Al-Ajami N and Bou-Resli M N (1990): Presence of vesicular bodies and thick basal laminae in the nephron of the desert gerbil, Merionescrassus. Acta Anat., 137: Pp:261–271.
Yabuki A., Suzuki S., Matsumoto M. and Nishinakagawa H. (2002): Sex- and strain-dependent histological features of the proximal convoluted tubular epithelium of mouse

kidney: association with lysosomes containing apolipoprotein B. Histol. Histopathol. 17:Pp: 1-7.
Messow C., Gärtner K., Hackbarth H., Kangaloo M. and Lünebrink L.(1980). Sex differences in kidney morphology and glomerular filtration rate in mice. Contr. Nephrol. 19, Pp:51-55.
Ahmadizadeh M., Echt R., Kuo C.H. and Hook J.B. (1984). Sex and strain differences in mouse kidney: Bowman's capsule morphology and susceptibility to chloroform. Toxicol. Lett. 20, Pp:161-172.
Barberini F., Familiari G., Vittori I., Carpino F. and Melis M. (1984). Morphological and statistical investigation of the occurrence of Tubule-like cells' in the renal corpuscle of the mouse kidney induced by sex hormones. Renal. Physiol. 7, Pp:227-236.
Yabuki A., Suzuki S., Matsumoto M. and Nishinakagawa H. (1999). Morphometrical analysis of sex and strain differences in the mouse nephron. J. Vet. Med. Sci. 61, Pp:891-896.
Ajayi,I. E.; Ojo, S. A.; Ayo,J. O. and Ibe,C. S.(2010): Histomorphometric Studies of the Urinary Tubules of the African Grasscutter (*Thryonomysswinderianus*). J. Vet. Anat. Vol.3 No 1, Pp: 17 – 23.
Junqueria, L. C., Carneiro, J. (2005). Basic histology. 11th ed. Rio de Janeiro, U.S.A., Pp:373-390.
Basuony, M. I. (1997). Ecological variability and kidney structure of eight rodents. Egypt. J. Histol., 20:Pp:417-434.
William, J. B. & Linda, M. B. (2000). Color atlas of veterinary histology. 2nd Ed. Lippincott Williams & Wilkins.
Bentley, M. D., Jorgensen, S. M., Lerman, L. O., Ritman, E. L., Romero, J. C. (2007).Visualization of three-dimensional nephron structure with microcomputed tomography. The Anatomical Record, 290(3): Pp:277-283.
Endo, M. and Kimura, M. (2005). Histological and enzyme histochemical studies on the nephrons of the fresh water fishes, *Cyprimscarpio* and *Carassiusauratus*. Journal of Morphology, 173(1): 29-33.
Pongchairerk, U.; Kasorndorkbua, C.; Pongket, P. and Liumsiricharoen, M. (2008): Comparative Histology of the Malayan Pangolin Kidneys in Normal and Dehydration Condition. Kasetsart J.(Nat. Sci.) 42:Pp:83 – 87.

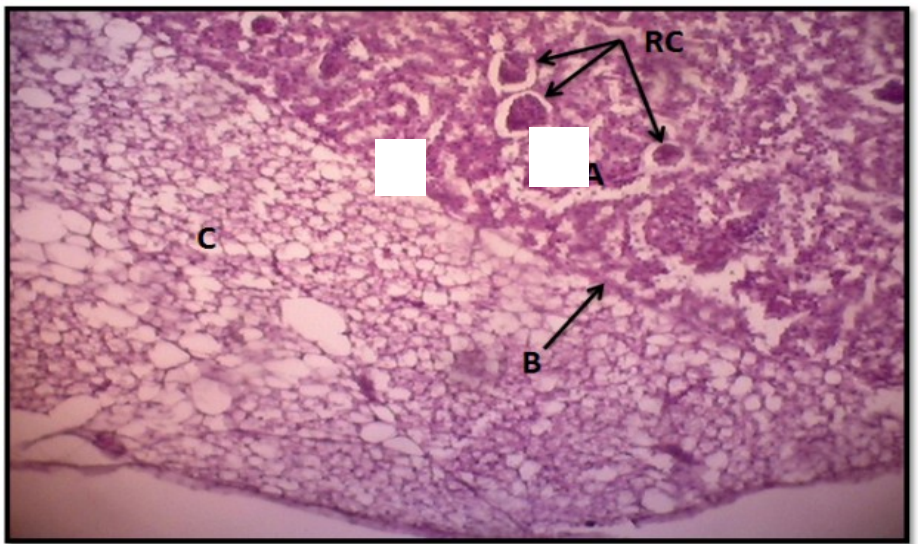


Eroschenko, V.P. (2008). Di Fiores atlas of histological with functional correlations. 11th ed.Lippincott Williams & Wilkins, U.S.A. Pp:355-381.

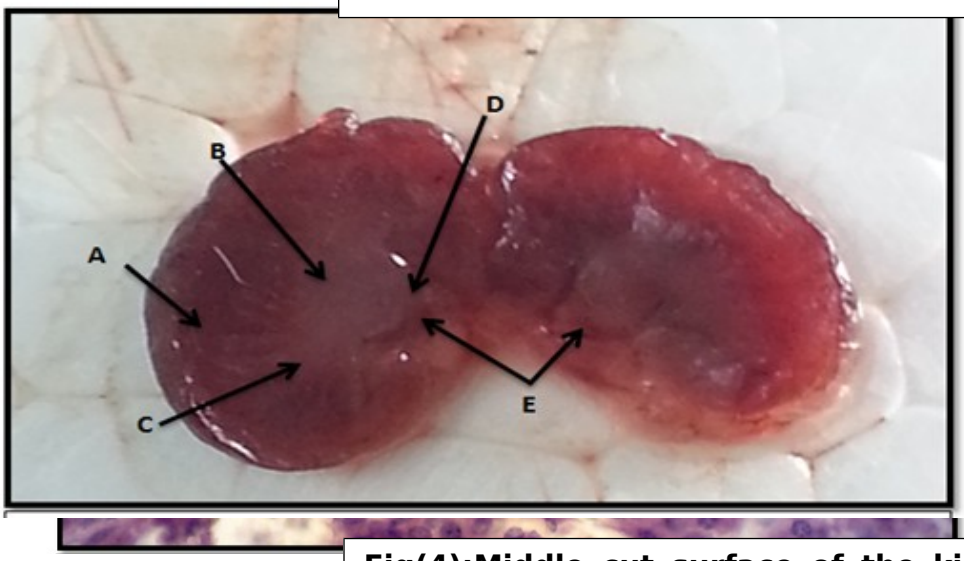
Fig(1):Gross appearance showing: A- right kidney, B- left kidney, C-liver, D- stomach, E- spleen, F- small intestine, G- large intestine, H- testes in



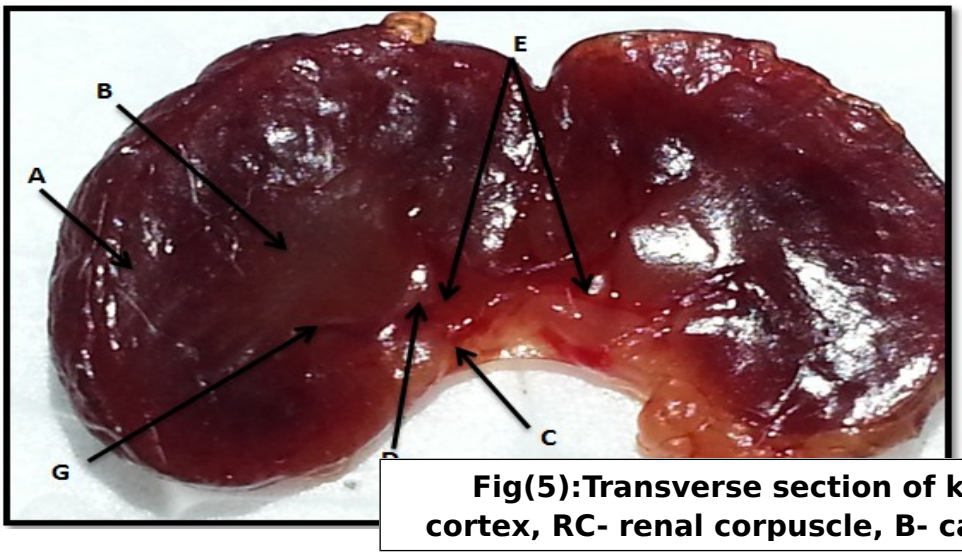
Fig(2):Gross appearance showing: R-right kidney, L-left kidney, A-medial border, B- lateral border, C-.upper pole, D- lower pole, in house mouse



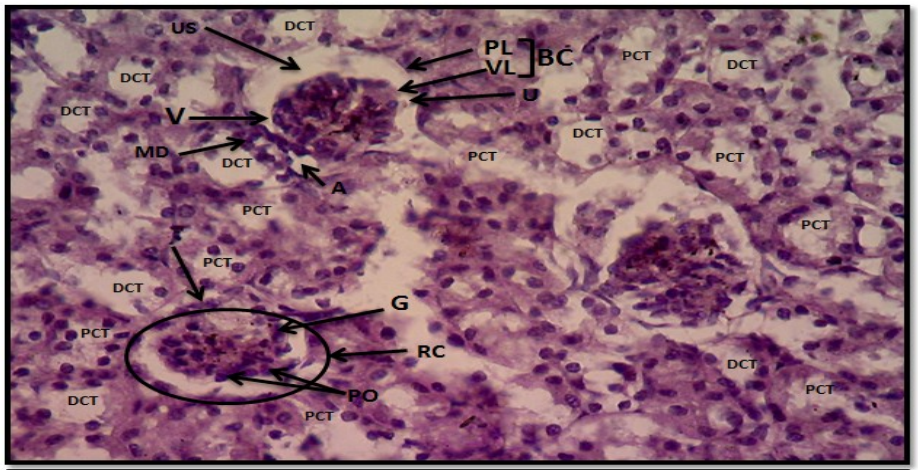
Fig(3):Middle cut surface of the kidney showing: A-cortex, B-medulla, C- renal pyramid, D- renal papilla, ..E- renal pelvis



Fig(4):Middle cut surface of the kidney showing: A-cortex, B-medulla, C- hilum of kidney, D- renal



Fig(5):Transverse section of kidney showing: A-cortex, RC- renal corpuscle, B- capsule, C- adipose



Fig(7):Transverse section of kidney showing: A-cortex,B-medulla, RCL- large renal corpuscle, RCS- small renal

Fig(6):Transverse
cortex, CA- capsule, SM- smooth muscle cells. (H&E

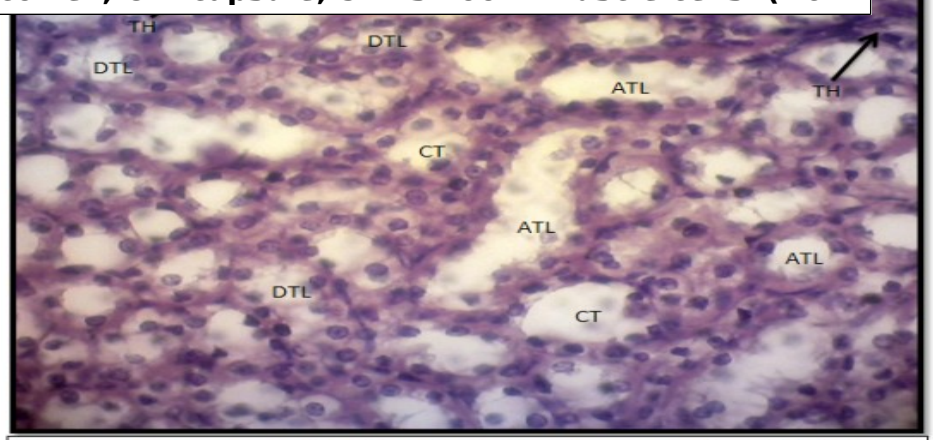
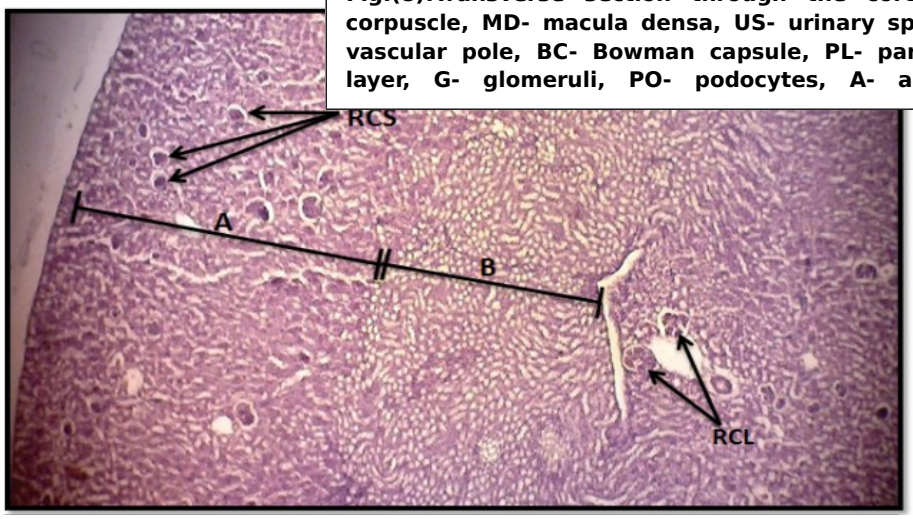


Fig.(8):Transverse section through the cortex showing: RC- renal corpuscle, MD- macula densa, US- urinary space, U- urinary pole, V- vascular pole, BC- Bowman capsule, PL- parietal layer, VL- visceral layer, G- glomeruli, PO- podocytes, A- arteriole, PCT- proximal



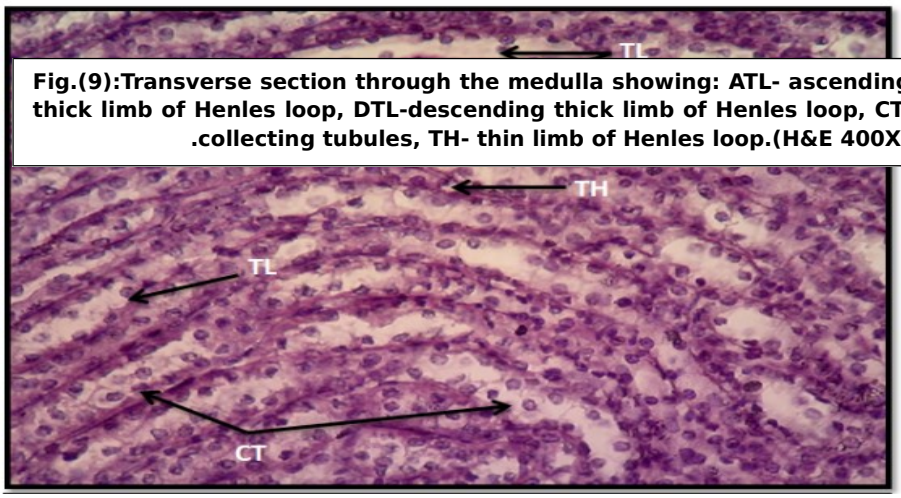


Fig.(9):Transverse section through the medulla showing: ATL- ascending thick limb of Henles loop, DTL-descending thick limb of Henles loop, CT- .collecting tubules, TH- thin limb of Henles loop.(H&E 400X)

Fig.(10):Transverse section through the medulla showing: ATL- ascending thick limb of Henles loop, DTL-descending thick limb of Henles loop, CT- collecting tubules, TH- thin limb of Henles loop.(H&E

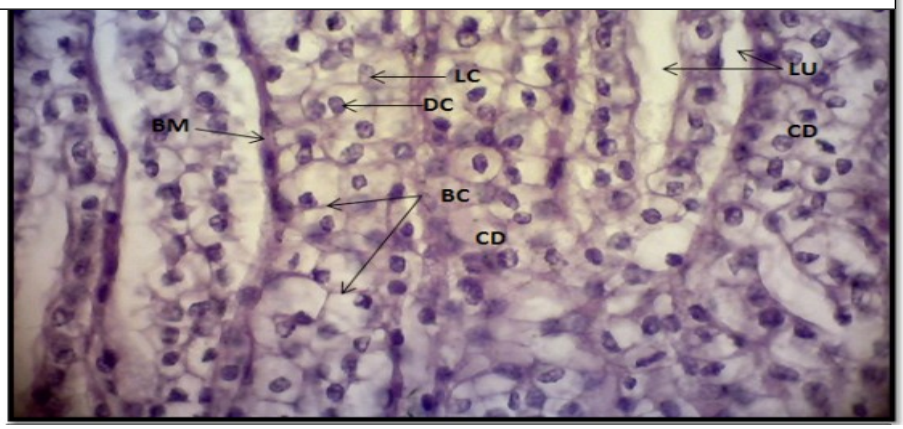
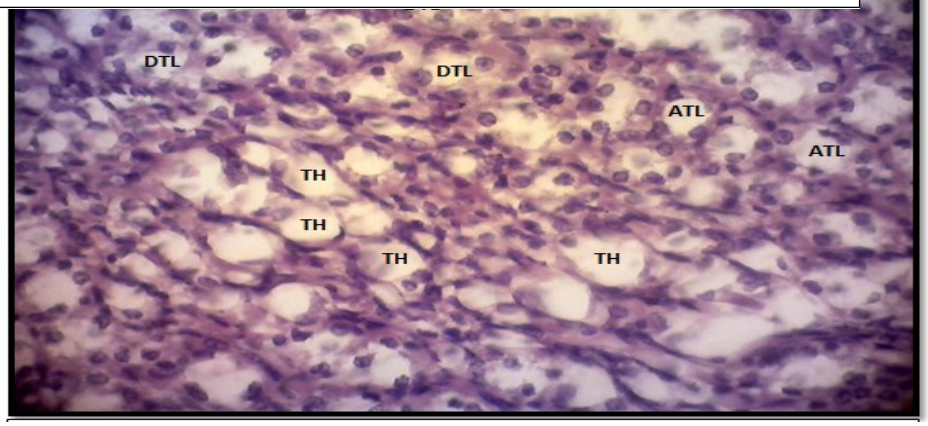


Fig.(11):Longitudinal section through the medulla showing: TL- thick limb of Henles loop, TH- thin limb of Henles loop, CT- collecting



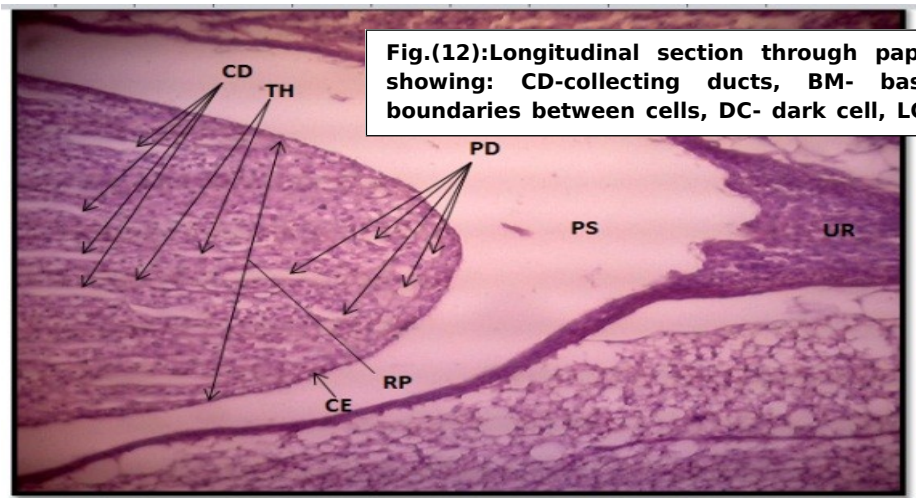


Fig.(12):Longitudinal section through papillary region of medulla showing: CD-collecting ducts, BM- basement membrane, BC- boundaries between cells, DC- dark cell, LC- light cell, LU- lumen of

Fig.(13):Longitudinal section through medulla showing: RP- terminal part of renal papillae, CD- collecting ducts, TH- thin segments of Henles loop, PD- papillary ducts, CE- covering

دراسة مظهرية تشريحية و نسجية للكلى في الفئران المنزلية *(Musmusculus)*

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الخلاصة
كلى الفئران المنزلية تقع على جانبي الفقرة القطنية العليا في تجويف البطن خلف الصفاق. وتقع الكلية اليمنى اماميا أكثر من اليسرى. كان شكل الكليتين يشبه الفول. كان متوسط وزنالكلية اليمنى 0.076 ± 0.013غرام بينما كانت الكلية اليسرى 0.072 ± 0.011غرام. وكان متوسططولوعرض وسمك الكلى اليمنى 7.4 ± 0.647ملم، 0.427 ± 5.098 ملم، 3.624 ± 0.198ملم على التوالي في حين أن اليسرى كانت 6.8 ± 0.518ملم، 0.481 ± 4.768ملم،±3.468 0.123ملم على التوالي. الكلية تتكون من منطقتين متميزتين، القشرة الخارجيةذات اللون البني المحمر واللب الداخلي، وكلاهما تنتهي بواسطة الحلمة الكلوية المتطاولةالمفردة. كانت كلى الفئران المنزلية مغطاةبكبسولة كثيفة من النسيج الضام الرقيق مع الأنسجة الدهنية. الوحدة الكلوية تتكون من اجسام كلوية كبيرة و صغيرة دائرية أو غير منتظمة؛ كل جسيم كلوي متكون من الكبيبة المحاطة بواسطة كبسولة بومان, الأنابيب الملتوية الدانية، عروة هنلي والأنابيب الملتوية القاصية. القشرة تتكون من الجسيمات الكلوية، الأنابيب الملتوية الدانية والأنابيب الملتوية القاصية. النبيب الملتوي القريب ينشأ من الظهارة الجدارية من كبسولة بومان من القطب البولي من الجسم الكلوي ومبطن بواسطة ظهارة

عالية مكعبه بسـيطه. تبطـن الأنـابيب الملتويـة القاصـية بواسـطة ظهـارة منخفضة مكعبة بسيطة. الجزء النبيبي الملتوي القاصي الـذي فـي اتصـال مـع الجــذر الكبيــبي يمتلــك البقعــة الكثيفــة. يتكــونلب كــل كلــى مــن الاجزاءالسميكة التي تبطن بواسطة ظهارة مكعبـة بسـيطة والرقيقـة مـن عروة من هنلي المبطنة بظهارة حرشفية بسيطة والاطراف الرقيقـة كـان لها تجويف مستدير واضح والأنـابيب الجامعـةالتي تبطـن بواسـطة ظهـارة مكعبـة باهتـة مـع نـواة مسـتديرة و سـايتوبلازم قاعـدي. وتبطـن الاجـزاء الطرفيـة مـن هـذه الأنـابيب بواسـطة ظهـارة عموديـة وتسـمى القنـوات الحليمية.