Research Article

BASJVETRES

BASRAH JOURNAL OF VETERINARY RESEARCH, 2025, 24(1):164-178.
https://bjvr.uobasrah.edu.iq/

Comparative Morphological Study of the Kidney in the Domestic Dogs and Cats

Huda Ahmed Sharif, Thaer R. Mhalhal, Mohammed A. Ali.
Department of Anatomy and Histology, College of Veterinary Medicine, University of Basrah, Basrah, Iraq.
Corresponding Author Email Address: pgs.huda.ahmed@uobasrah.edu.iq
ORCID ID: https://orcid.org/0009-0001-1321-1013
DOI: https://doi.org/10.23975/bjvr.2025.157910.1204
Received: 1 March 2025 Accepted: 30 March 2025.

Abstract

The objective of the present study was to conduct a comparative analysis of the renal anatomy in dogs and cats. A sample of twenty healthy adult subjects (ten domestic cats and ten domestic dogs). Regardless of sex, it was utilized for this investigation. The average weight of the local feline population was recorded at (2 ± 0.4 kg), whereas the local canine average weight was significantly higher at (20 ± 3 kg). The anatomical and morphometric attributes of the kidneys were examined post-slaughter. Observations from the gross anatomical assessment revealed that the canine kidney is characterized as a single, bean-shaped renal organ with a smooth surface, possessing a solitary renal papilla. The renal cortex exhibited a reddish-brown hue, while the renal medulla was distinguished by two zones: an outer, darker zone and an inner, lighter zone. Both kidneys are encapsulated and situated against the dorsal abdominal wall within the lumbar region, lateral to the vertebral column. In contrast, the kidneys of cats may exhibit either an oval or bean shape with a reddish coloration. However, bilaterally, they typically maintain a symmetrical configuration in both size and shape, positioned directly behind the ribcage. The kidney is composed of a fibrous outer capsule, along with an inner cortex and peripheral medulla. In conjunction with the surrounding cortex, the medulla is organized into multiple pyramidal structures, each constituting a renal lobe.

Keyword: kidney, domestic feline, domestic canine, kidney measures, renal artery

Introduction

The urinary systems of dogs and cats consist of several key structures, including the kidneys, bladder, ureters, and urethra. Positioned on either side of the body, the kidneys reside in the back region, nestled between the ribs and the pelvis. As blood is filtered through the kidneys, it generates a liquid waste product called urine. The ureters function to transport this urine to the bladder, where it is temporarily stored

before being expelled through the urethra, a tubular conduit leading to the outside of the body (1). In the development stage, the metanephric blastema and ureteric bud converge to create the nephron and collecting duct (CD), which ultimately develop into the mammalian kidney. Each nephron encompasses essential structures such as Bowman's capsule and both ascending and descending loops of Henle, along with proximal tubules (PTs) (2). The urinary system divides itself into two segments: the upper urinary tract, comprising the kidneys and ureters, and the lower urinary tract, which includes the bladder and urethra. Serving as a vital organ, the kidney performs multiple roles in filtering and removing waste, producing urine through this filtration process. Beyond waste management, the urinary system also plays a crucial role in maintaining balance in blood pressure, calcium levels, pH, ions, and water. Blood flows to the kidneys through the renal artery, with both organs situated within the abdominal cavity, typically receiving blood supply from paired renal arteries branching off from the abdominal aorta (3). The kidney operates with a sophisticated system of filtration units, meticulously regulating the amounts of salts, water, and other small compounds in the filtrate. Urine is stored in the bladder until the urinary nerve system signals its release through the urethra during urination (4).

Surrounding each kidney is a robust, fibrous renal capsule that provides structure and protection to the organ. The outer layer of the kidney is referred to as the renal cortex, where the functional units known as nephrons reside to carry out the blood filtration process. Located anterior to the renal medulla, this cortex houses structures called renal pyramids, which, with their funnel-like shape, contribute to urine production along with blood vessels in the medulla (5). Within the kidney exists the funnel-shaped renal pelvis, which collects urine and channels it from the nephrons to the ureter and the bladder. The renal pelvis further includes the renal calyx, serving as the collection point for urine being transferred from the renal pyramids (6). This study aims to provide a comprehensive comparative morphology of the kidneys in domestic dogs and cats.

Material & Methods

Experimental Animals: Twenty healthy adult animals (ten local cats and ten local dogs), regardless of sex, were chosen for this study. The mean weight of local cats is (2 ± 0.4 kg). The mean weight of local cats is (2 ± 0.4 kg) In contrast, the average weight of the local canines was (20 ± 3 kg) between the ages of 1 and 3 years. Kidney samples were collected from twenty normal cats and dogs (males and females), animals were obtained from Basra city. A physical checkup verified each dog's and cat's health.

Sampling Methods for Anatomical Study: Ten samples of local dogs were taken for anatomical study. Ten cats were caught using a special American-made Havahart 1045 trap designed to catch live animals without harming them. The Ethics Committee of the College of Veterinary Medicine, University of Basrah, approved all procedures used in this study in accordance with License No. 71/2024.

These animals were anesthetized with ketamine 10% and xylazine 2% by intramuscular injection (7). After that, the animals were sacrificed by bleeding in the carotid artery and emptying the blood using a catheter. Then, the samples were injected with a mixture of ammonia and latex at a ratio of two parts ammonia to three parts latex, to which carmine powder was added to give the mixture a red color (8). After that, latex was injected through a catheter to show the blood supply to the kidneys. The abdomens of all animals were opened. Then, the viscera were removed carefully. A weight balance (WANT Balance Instrument) was used to weigh the kidneys after they had been properly removed from the animals and their fat had been cleaned. They were then submerged in formaldehyde (10% buffered formalin for 24-48hrs) for post fixation. A measuring tape was used to take measures of the kidneys' length, width, thickness, and weight after they were all collected. The width is measured at the kidney's extremities and midpoint, while the length is measured from the cranial extremity to the caudal extremity. Vernier caliber is used to quantify the thickness of the cortex and medulla; this measurement is finished before the fixation stage (9).

Photograph (1): Vernier Caliber

Photograph (2): a cat trap model Havahart1045

Measuring and Static Analysis

1.Weight (gm): each kidney's weight was measured using a sensitive balance (digital weight balance).
2.Volume (cubic centimeter) of kidneys' volume were measured using the water displacement method.
3. The relative weight of the kidneys to the body weight was massed.

Results

Anatomical Study of the Domestic Dog and cat:

According to the current study, the urinary system consists of the kidneys, renal pelvis, ureters, bladder, and urethra. (Fig. 1) A dog's kidney is bean-shaped, smooth, and contains a single renal papilla (Fig. 6). The left kidney is slightly more caudally, whereas the right kidney is located between T12-13 and L2-3. Normal kidneys are positioned close to the vertebral column and are similar in size and shape on both sides (Fig 2,9). Cat kidneys can be oval or bean-shaped. Smooth, and contains a single renal papilla. In cats, the cranial portion of the kidney was larger than the caudal portion, whereas, in dogs, the cranial portion was smaller than the caudal portion (Fig. 3,4). In cats, the kidney's fibrous outer, inner, and peripheral layers are called the renal capsule, cortex, and medulla. A renal lobe comprises the medulla and the surrounding cortex, which is divided into numerous pyramidal structures (Fig. 7).

There are two zones in the renal medulla (inner lighter and outer dark) and a reddish-brown renal cortex (Fig. 6). The lumbar area, which is lateral to the spine and against the back of the abdominal wall, contains the two kidneys, which are encapsulated organs. Figure 1 Two layers of fat provide extra protection, and the kidneys' soft tissue is supported by the fibrous renal capsule that covers them (Fig. 5). The renal pelvis was longitudinal in dogs, whereas in cats, it was transverse. While the dogs' cortex is larger than the cats', the cats' medulla is larger. Cats are red (Fig 6,7), while dogs are reddish-brown (Fig 1,2). The kidneys are supplied via the left and right renal arteries, which branch off the abdominal aorta. The right renal artery leaves the abdominal aorta before the left renal artery. The right renal artery is longer than the left. The renal arteries divide into dorsal and ventral branches when they enter the kidney. Other sources, however, assert that the renal arteries in cats and dogs divide into several branches. The renal arteries sprang from the abdominal aorta anatomically as a single artery left laterally (Fig.3,4, and 5). It was also noted that the outer cortex of the kidney in cats has many clear veins compared to dogs (Fig. 8 and 9). The adrenal glands are located above the kidneys. The kidneys are paired retroperitoneal organs typically located between the transverse processes of the T12-L3 vertebrae. The left kidney is often slightly higher than the right (Fig. 1, 2). The kidneys are covered in three layers on the outside. The renal fascia is the tightest layer of connective tissue at the top. The second layer, known as the perirenal fat capsule, aids in maintaining the kidneys' stability. The renal capsule (Fig. 8) is the third and deepest layer. The kidney's three interior parts are the medulla in the center,

an outer cortex, and the renal pelvis in the area known as the kidney's hilum (Fig 6). A concave part of the bean shape is where blood vessels and nerves enter and depart, and the hilum is where the ureters exit the kidney (Fig 5). The kidney's internal structure includes the location of its ureter, vein, and renal artery (8). An outer cortex, a medulla in the center, and a renal pelvis in the area known as the kidney's hilum comprise the kidney's internal structure. As the ureters exit the kidney, the hilum, the concave portion of the bean, is where blood vessels and nerves enter and exit the kidney (Fig. 7). The right kidney weighed 50.05±5.44 grams on average. The left kidney's average weight (53.97±7.42) The right kidney's average length was (5.18±1.87)) cm. The left kidney's average length was 5.36±2.18. The dogs' mean total weight was 25.15 ±3.89. The width of the right kidney was 3.47±0.68 cm, whereas the width of the left kidney was 4.23±1.20 cm (Table 1). The left kidney weighed an average of 39.31±13.56 grams, whereas the right kidney weighed an average of31.749±11.47 grams. The right kidney was 4.49 ± 1.05 cm in length on average. The left kidney's mean (4.34±1.05) The average kidney width was 3.64±0.74 cm for the right kidney, 3.76±0.62 cm for the left kidney, and 3.3±0.74 cm for the cat's overall weight (Table 2).

Table 1: Mean±S.E. of length, width, and the dogs' right and left kidney weights (in grams).

	Length	**Width**	**Weight**
Right kidney	5.18±1.87	3.47±0.68	50.05±5.44
Left kidney	5.36±2.18	4.23±1.20	53.97±7.42

There is no significant difference between the left and right kidneys at p≤0.05

Table 2: Mean±S.E. of length, width, and the cats' right and left kidney weights (in grams).

	Length	**Width**	**Weight**
Right kidney	4.49±1.05	3.64±0.74	31.749±11.47
Left kidney	4.34±1.05	3.76±0.62	39.31±13.56

There is no significant difference between the left and right kidneys at p≤0.05

Table (3): Explain the significant differences at level p<0.05 between the right and left kidneys of dogs and cats.

Right kidney				**Left kidney**			
	Weight	Length	Width	Weight	Length	Width	Body weight
Dog	50.05±5.44[a]	5.18±1.87	3.47±0.68[a]	53.97±7.42	5.36±2.18	4.23±1.20	25.15±3.89
Cat	31.749±11.47[b]	4.49±1.05	3.64±0.74[a]	39.31±13.56	4.34±1.05	3.76±0.62	3.3±0.74

(a)At p≤0.05, there was no significant difference, while (b) At p≤0.05, the difference is significant.

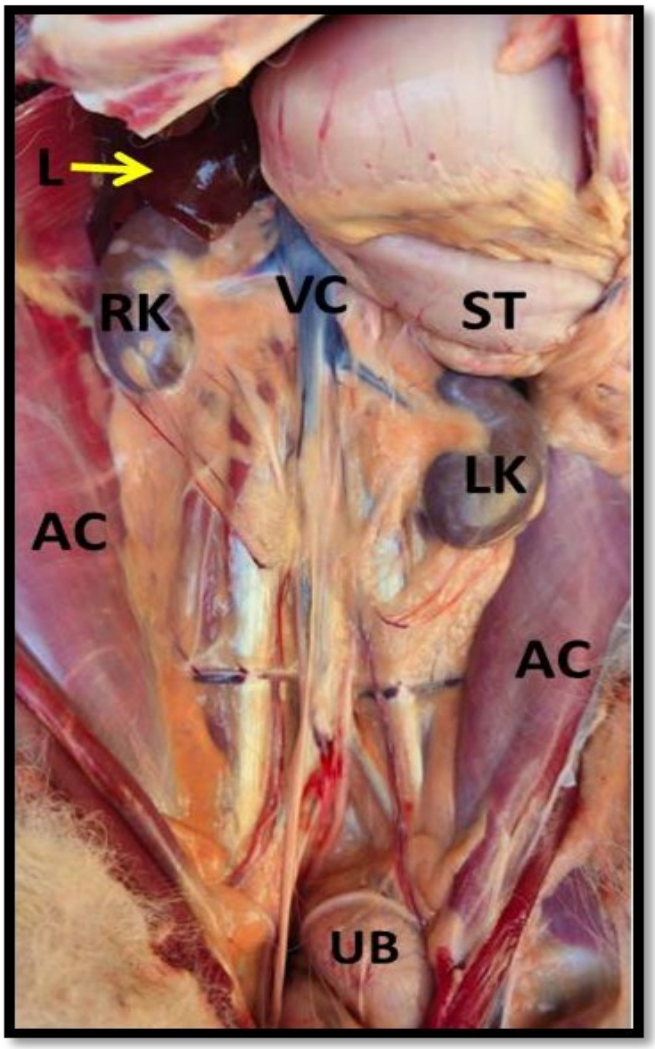


Figure (1): abdominal cavity in dog show the right kidney (RA).left kidney (LK).and liver yellow raw (L).stomach(S). urinary bladder (UB). Abdominal cavity (AC) vein cava(VC).

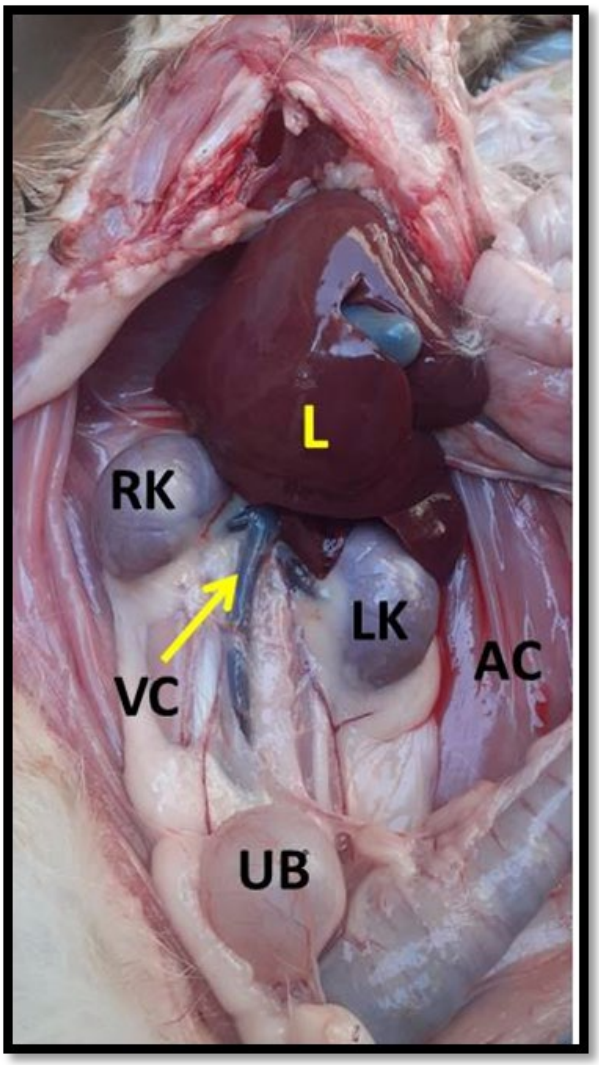


Figure (2): abdominal cavity in cat show the right kidney(RA), left kidney (LK), liver(L), urinary bladder(UB), Abdominal cavity(AC) and vein cava(VC)

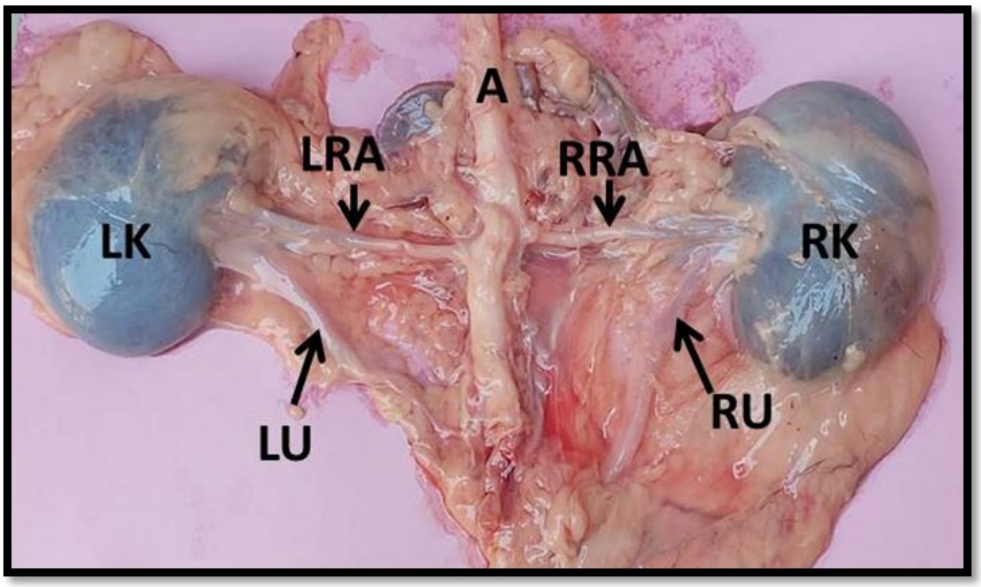


Figure (3): Aorta (A), Right Renal Artery (RRA), Left Renal Artery (LRA), Right Ureter (RU), Left Ureter (LU), and Right Kidney (RK) are depicted in Figure 3.in canines

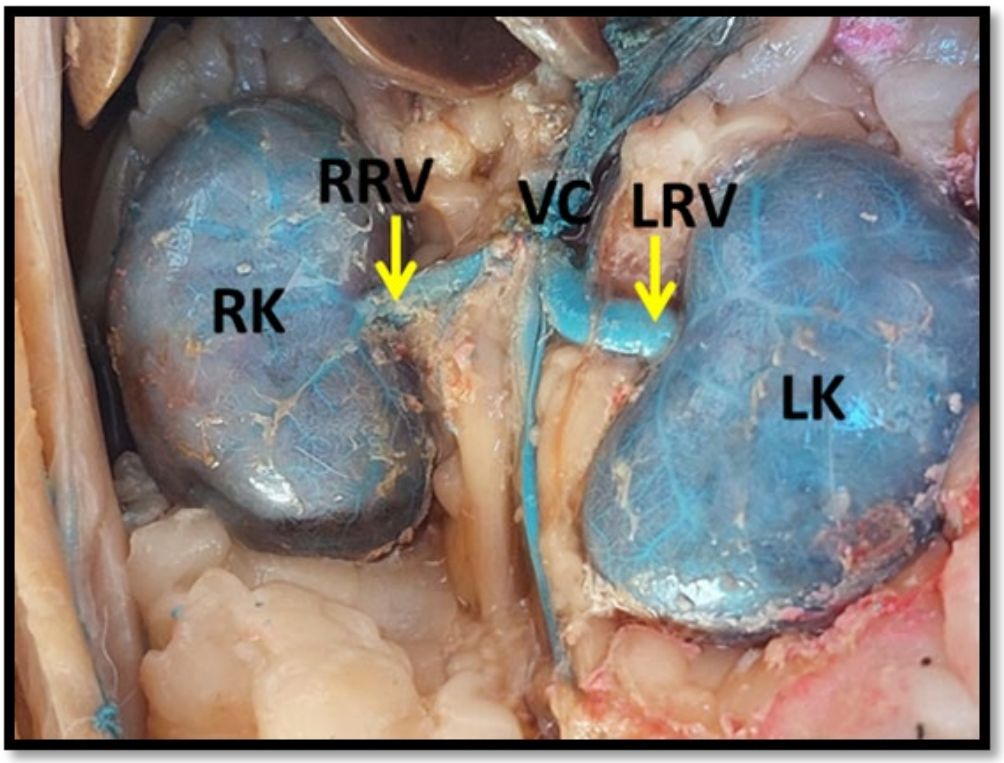
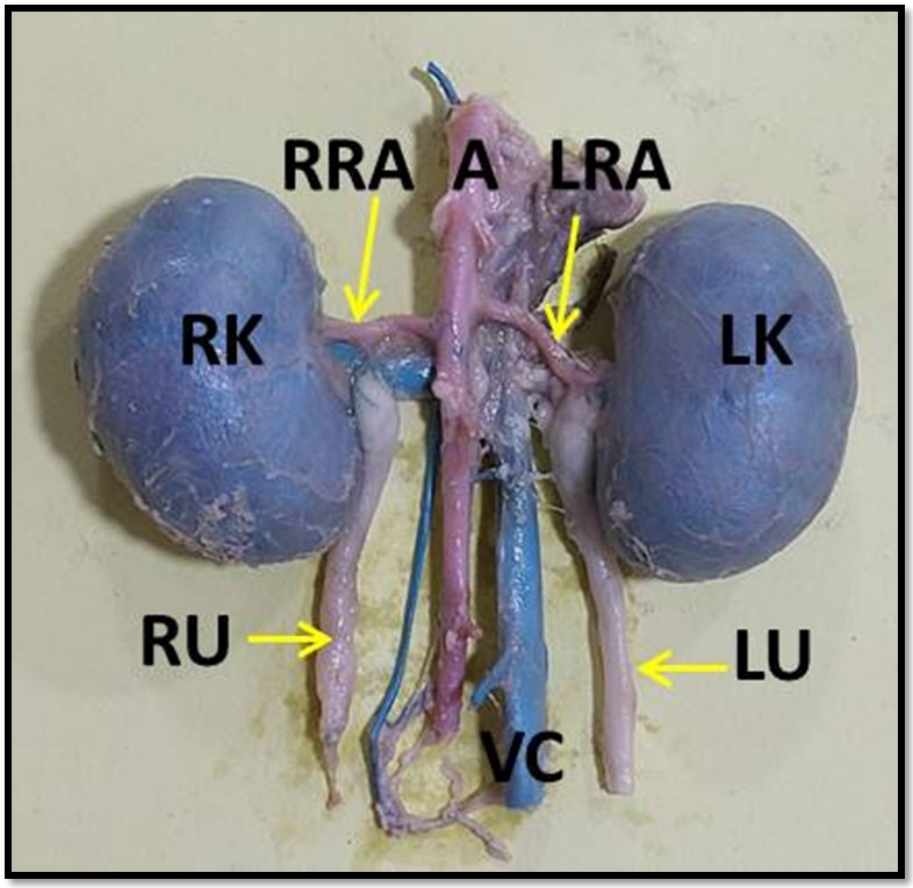


Figure (4) show The vena cava (VC), right kidney (RK), left kidney (LK), right renal vein (RRV), and left renal vein (LRV).



Figure(5) show right kidney (RK),left kidney(LK) right renal artery(RRA) , aorta(A) vein cava(VC) right ureter (UR) left ureter (LU) left renal artery (LRA) in cat.

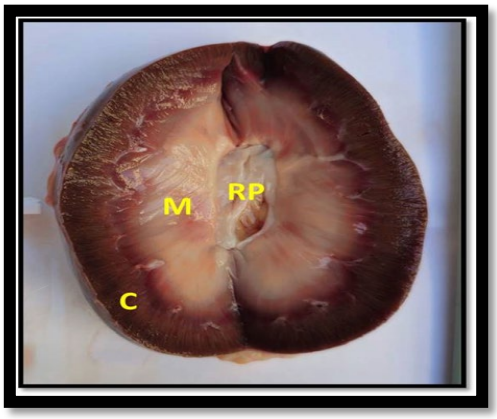


Figure (6) longitudinal section of kidney in dog. Cortex(C), medulla(M) renal pelvis (RP).

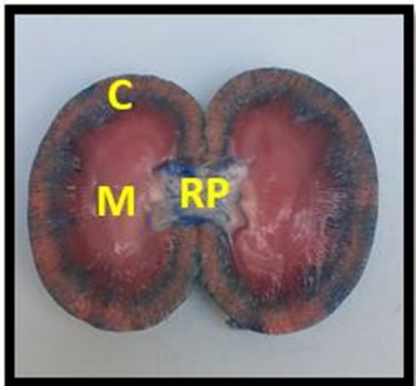


Figure (7) show kidney in cat Cortex(C),medulla(M)renal pelvis (RP).

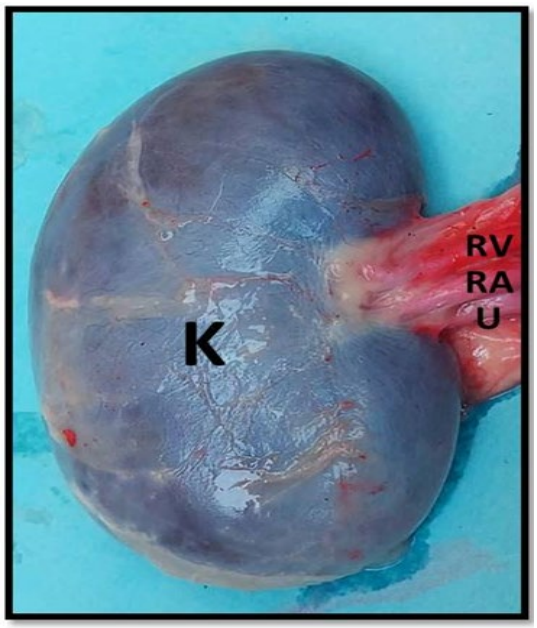


Figure (8) longitudinal section of kidney in dog show renal vein (RV) renal artery (RA) ureter(U).

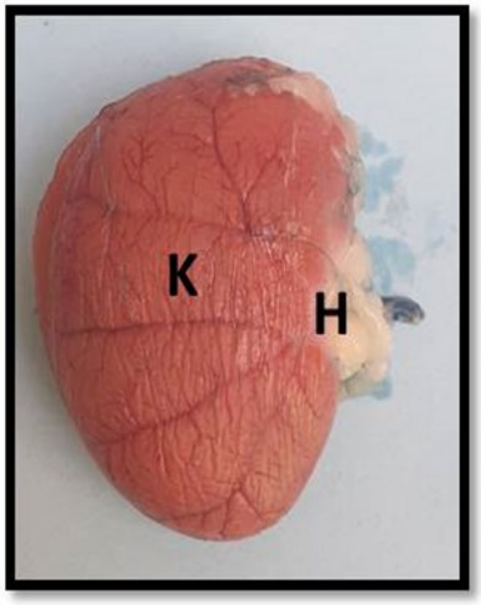


Figure (9) longitudinal section of kidney in cat hulis (H)

Discussion

Urine formation and secretion, as well as waste removal from the circulation, are the urinary system's functions, which help maintain the volume and composition of bodily fluids, even though its effects are widespread. A mammal's urinary system typically consists of the kidneys, ureters, bladder, and urethra. The kidneys are the main organs that filter blood and produce urine, while the other parts are only auxiliary structures used for urine storage and transportation. Our results showed some morphological-histological differences between domestic cats and dogs.

A Comprehensive Examination of Canine Urinary Anatomy: The urinary system comprises several components, including a bladder, a urethra, two kidneys, and two ureters. The kidneys are located on both sides of the spinal column in the lower abdominal cavity, positioned retroperitoneally. This study aligns with the research conducted by(10), which also focused on a test subject. The current study reveals that a dog's kidney has a distinctive bean shape, characterized by a smooth surface and a single renal papilla. This observation aligns with the findings of (11), who also described the kidneys of dogs in similar terms, emphasizing their bean-like form and smooth exterior with a solitary renal papilla. The results indicate a

consensus among researchers. Notably, both kidneys exhibit this smooth, bean-shaped morphology and are enveloped by a delicate fibro-muscular capsule. This conclusion is further supported by the research of (4, 12-15), all of which corroborate these anatomical characteristics disagree with (16). The left kidney is slightly further back in the abdomen, the right kidney lightly further back in the abdomen, and the right is positioned between the T12-13 and L2-3 vertebrae. Typically, healthy kidneys are found near the vertebral column, exhibiting comparable size and shape on both sides. This observation aligns with the findings of (17), indicating that the right kidney tends to be located further towards the front compared to the left in dogs.

The renal medulla is characterized by two distinct zones: an outer layer that appears darker and an inner layer that is noticeably lighter. Surrounding this medulla is the renal cortex, which exhibits a reddish-brown hue. The findings of this study align with the observations made by (18). Thus, the renal cortex stands out with its reddish-brown color, contrasting with the two-toned zones of the renal medulla-one dark and the other paler.The kidneys are sheltered by two protective layers of fat, which serve as an extra line of defense. Meanwhile, the fibrous renal capsule envelops these organs, supporting their sensitive tissues. (13) reported similar observations in ruminants, noting that this fatty layer can sometimes entirely obscure the kidneys. As a protective barrier, the fat cushions the body against the compressive pressures from neighboring organs. As explained by (4), adipose tissue wraps around the slopes and sides of the kidneys. Consistent with the studies conducted by (4) and (19), a clearly defined ureter can be seen prominently emerging from the center of the kidneys' unique renal pelvis.

The kidneys are supplied via the left and right renal arteries, which branch off the abdominal aorta. The right renal artery leaves the abdominal aorta before the left renal artery. The right renal artery is longer than the left. The renal arteries divide into dorsal and ventral branches when they enter the kidney. The result of the study is similar to (20). (21). According to the literature, the renal arteries emerged from the abdominal aorta on both sides. The dorsal and ventral branches of the renal arteries were separated (4) (17). Two interlobar arteries were sent to the ventral surface from the dorsal branch, while one was sent to the dorsal surface from the ventral branch. (20,22).

The renal arteries in cats and dogs divide into several branches. The renal arteries sprang from the abdominal aorta anatomically as a single artery left laterally. The result of the study agrees with showed that the cat's right dorsal branch produced three to five segmental arteries, its right ventral branch four to six segmental arteries, its left dorsal branch three to six segmental arteries, and its left ventral branch three to four segmental arteries (20). Perched atop each kidney are the adrenal glands, small but vital endocrine organs. The kidneys themselves, which are two in number, are situated in the retroperitoneal space, resting against the back wall of the abdominal cavity. These organs typically lie between

the transverse processes of the T12 to L3 vertebrae. Notably, the left kidney is often positioned slightly higher than its right counterpart.

Three distinct layers on their exterior envelop the kidneys. The outermost layer the renal fascia, consists of tightly woven connective tissue that provides robust support at the uppermost section. Beneath this, the second layer is called the perirenal fat capsule, which plays a crucial role in ensuring the kidneys' stability within the abdominal cavity. The innermost layer, the renal capsule, closely encases the kidneys. Internally, the kidneys are structured into three primary components: the medulla, which is centrally located. The outer cortex that surrounds it; and the renal pelvis, situated in an area named the hilum of the kidney.

The right and left kidneys are positioned at the levels of the second or third lumbar vertebrae, along with the twelfth or thirteenth thoracic vertebrae, extending from the first to the third lumbar vertebrae (23). At the same anatomical level, the aorta branches into the renal arteries on both the left and right sides. According to (15), it was noted that the right renal artery is consistently longer than its left counterpart, while the left renal vein surpasses the right in length. This study indicates that the renal arteries emerge from both sides of the abdominal aorta, aligning with findings in existing literature (17,20). According to (24), the renal arteries emanate from the ventral surface of the aorta. In various animals, such as dogs (25), cats (26), and guinea pigs (27), these arteries divide into two or more distinct branches. While some studies (20,22) have indicated the presence of an additional third branch in certain specimens, (28) demonstrated that in cats, the dorsal and ventral branches further divide into four branches. In contrast, in dogs, they produce just two branches. The current study presents specific measurements of the kidneys, revealing that the average length of the right kidney is approximately 5.18 ± 1.87 cm, while the left kidney measures about 5.36 ± 2.18 cm. Furthermore, the width of the right kidney is recorded at 3.47 ± 0.68 cm, contrasted with the left kidney's width of 4.23 ± 1.20 cm. In terms of weight, the right kidney averages 50.05 ± 5.44 grams, and the left kidney weighs around 53.97 ± 7.42 grams. These findings diverge significantly from the results presented by(29), which indicated the length of the right kidney to be 5.87 ± 0.97 cm and the left kidney 5.95 ± 0.98 cm. Additionally, the widths in (29) study were noted as 3.01 ± 0.42 cm for the right kidney and 3.40 ± 0.47 cm for the left kidney. The weights reported were considerably lower, with the right kidney at 38.64 ± 17 grams and the left at 38.86 ± 19.50 grams.

The current investigation reveals that the kidneys of cats may exhibit either an oval or bean-like configuration. This observation aligns with the findings of (30), which indicated that the kidneys of squirrels presented a semi-bean shape. At the same time, e, which characterized those of mice. In both species, the kidneys displayed a smooth surface devoid of any lobulation or fissuring. These results are also consistent with the research conducted by (31), which described the kidneys of mole rats as having

a bean shape, a smooth texture, and a reddish-brown coloration.In felines, the kidneys possess distinct layers, including the fibrous outer layer known as the renal capsule, the inner region referred to as the cortex, and the central part called the medulla. The medulla forms each renal lobe and the encompassing cortex, which is segmented into multiple pyramidal structures. The findings presented align with previous studies conducted by (32) across all mammals and those by (33) focusing on desert rodents.

The kidneys receive their blood supply from the left and right renal arteries, which emerge from the abdominal aorta. Notably, the right renal artery branches off from the abdominal aorta prior to the left renal artery. This leads to a longer course for the right renal artery than its left counterpart. Upon entering the kidneys, the renal arteries bifurcate into dorsal and ventral branches. In cats and dogs, these renal arteries branch out into multiple subdivisions. Anatomically, the renal arteries originate as a singular artery from the abdominal aorta, which extends laterally. This observation aligns with the findings of previous studies (20) (22) (31) (32) The abdominal aorta is responsible for delivering blood flow, with each abdominal aorta is responsible for delivering blood flow, with each kidney generally receiving its blood supply from a distinct artery. Given that the left kidney is positioned further away from the median plane than the right, the right renal artery appears shorter than the left. Ultimately, the renal artery is divided into right and left branches.The current study presents detailed measurements regarding kidney dimensions, noting that the average length of the right kidney is 4.49 ± 1.05 cm, while the left kidney measures 4.34 ± 1.05 cm. Furthermore, the width of the right kidney is reported to be 3.64 ± 0.74 cm, and the left kidney has a width of 3.76 ± 0.62 cm. In terms of weight, the right kidney averages 31.749 ± 11.47 grams, contrasted with the left kidney, which weighs 39.31 ± 13.56 grams. These findings differ significantly from those reported by (29), where the length of the right kidney was found to be 3.83 ± 0.46 cm and the left kidney 3.82 ± 0.32 cm. Additionally, the study by (29)recorded the width of the right kidney at 2.42 ± 0.22 cm and the left kidney at 2.48 ± 0.31 cm. Regarding weight, (29)reported the right kidney's average weight as 11.14 ± 3.31 grams and the left kidney's average weight as 12.05 ± 3.48 grams.

Conflicts of interest

The authors declare that there is no conflict of interest.

Ethical Clearance

This work is approved by The Research Ethical Committee.

Conclusion

The present study observed that the kidneys of dogs were larger and heavier than those of cats, with a dark red-brown coloration. The kidneys of both dogs and cats were recorded as bean-shaped in dogs, while in cats, they were either bean-shaped or oval.

References

1-Sisson and Grossman (1975). Cat Anatomy and Physiology, The Anatomy of Domestic Animals, 5th Edition, Sisson and Grossman, WB Saunders Co., Philadelphia.

2-Shunnosuke Kira (2024). Species-specific histological characterizations of renal tubules and collecting ducts in the kidneys of cats and dogs. *journal library medicine. PloS one, 19*(7), e0306479.

3-Dyce KM, WO Sack and CJG Wensing (2002). Textbook of Veterinary Anatomy. 3rd edition, Saunders, Philadelphia.

4-Salehi, E. and Morovati, M. S. (2012). Kidney Morphogenesis during Prenatal Development in Camelus dromedaries Embryoes. *J. Anim. Vet. Adv.1*(6): 822-825.

4-Zuasti A, Jara JR, Ferrer C, Solano F.Pigment. (1989). Occurrence of melanin granules and melanosynthesis in the kidney of *Sparus auratus*. Cell Res*., 2*(2):93-9. https://doi.org/10.1111/j.1600-0749.1989.tb00168.x

5-Grupp, C., Stelmach, R., Troche, I., & Müller, G. (1999). A bumetanide-sensitive, apically localized Na+ 2Cl–K+ cotransport in the rat inner medullary collecting duct. *Pflügers Archiv, 439,* 174-185. https://doi.org/10.1007/s004249900147

6-Landry J, Maza P. (2020). Effectiveness of the anesthetic combination of tiletamine, zolazepam, ketamine and xylazine for the sterilization of street dogs in field clinics, *Vet Rec Case Rep, 8*(2): e000953. https://doi.org/10.1136/vetreccr-2019-000953

7-Hassan, A. R., & Sawad, A. A. (2021). Comparative study between two types of plastination techniques in pelvic of dogs. *Turkish Journal of Physiotherapy and Rehabilitation, 32*(3), 15921-15927.

8-Ashley, R., & Reynolds, J. S. (1994). Overall and zonal energy end use in an energy conscious office building. *Solar energy, 52*(1), 75-83.

9-Yousif, R. R., & Rabee, F. O. (2019). Anatomical and histological study of kidney, ureter and urinary bladder in male guinea pig (*Cavia porcellus*). *The Iraqi Journal of Veterinary Medicine, 43(1),* 75-84.

10-Bundars K.D., Mcarthy P.H. and Frike W. E. (2010). Anatomy of kidney: Anatomy of the dog. *6thed,* schluterscheverlagese. Germany. pp:62.

11-Smuts, M.M.S and Bezuidenhout A.J (1987): Anatomy of the Dromedary Oxford Clarendon Press, pp133-134.

12-ZEUS collaboration, Derrick, M., Krakauer, D., Magill, S., Mikunas, D., Musgrave, B., ... & Notz, D. (1995). Measurement of the diffractive structure function in deep inelastic scattering at HERA. *Zeitschrift für Physik C Particles and Fields, 68,* 569-584. https://doi.org/10.1007/BF01565257

13-Dowelmadina, I. M.; Elhashmi, Y. H. and Bakhiet, S. (2013). Morphometric studies of kidneys in one humped camel (*Camelus dromedarius*) in Sudan. *International Scientific Conference of Camel Research and Production (ISCCRP),* Khartoum-Sudan, 17th -18th.

14-Christensen, G.C. (1952). Circulation of blood through the canine kidney. *Am. J. Vet. Res. 13: 236-245.*

16. Sawad, A. A. (2006). Functional anatomy of the kidney of the

buffaloes. *Basrah Journal of Veterinary Research, 5(2).*

17-Jain R.K., Singh Y. (1987): Vascularization of kidneys in bovine calves. *Indian Veterinary Journal, 64*, 1059– 1062.

18-Faidh Baragoth, A., Ghazi, H. A. A. M., & AbdZaid, K. (2014). Histological study to the nephrons of the kidney in Dogs (*Canis familiaris*) in midlle of Iraq. *Kufa Journal for Veterinary Medical Sciences, 5*(1), 98-103.

19-Sarma, K. and Ahmed, B. (2007). Morphogenesis of kidney in crossbred pig *(Sus scrofa) foeti. Int. J. Morphol, 25*(1): 129- 132.

20-Aksoy G., Ozudogru Z. (2003): A macroscopical investigation on the intrarenal segmentation of the renal arteries in the Van cat (in Turkish*). Journal of Faculty Veterinary Medicine, University of Kafkas, 9,* 9–13.

21-Mhalhal, T. R., Washington, M. C., Heath, J. C., & Sayegh, A. I. (2021). Effect of vagotomy and sympathectomy on the feeding responses evoked by intra-aortic cholecystokinin-8 in adult male sprague dawley rats. *Endocrine Research, 46(2),* 57-65. https://doi.org/10.1080/07435800.2020.1861621

22-Aslan K. (1995): Macroanatomic investigations on the intrarenal segmentation of the renal artery in the mongrel dog (in Turkish). *Journal of Faculty Veterinary Medicine, University of Selcuk, 11,* 149–154.

23-Smith, B.J. 1999. Canine Anatomy. Philadelphia: Lippincott Williams. 441-446.

24- Ghoshal N.G. (1975): Carnivora heart and arteries. In: Getty R. (ed.): Sisson and Grossman's the Anatomy of the Domestic Animals. 5th ed. W.B. Saunders Company, Philade. 960-1022

25. Reis R.H., Tepe P. (1956): Variations in the pattern of renal vessels and their relation to the type posterior vena cava in the dog (*Canis familiaris*). *The American Journal of Anatomy, 99,* 1–15. DOI: https://doi.org/10.1002/aja.1000990102

26-Rieck, A. F., & Reis, R. H. (1953). Variations in the pattern of renal vessels and their relation to the type of posterior vena cava in the cat (*Felis domestica). American Journal of Anatomy, 93*(3), 457-474.https://doi.org/10.1002/aja.1000930307

27-Shively M.J., Stump J.E. (1975): The systemic arterial pattern of the guinea pig: The abdomen. Anatomical Record, *182,* 355–366. https://doi.org/10.1002/ar.1091820309

28-Fuller P.M., Huelke D.F. (1973): Kidney vascular supply in the rat, cat and dog. *Acta Anatomica, 84,* 516–522. https://doi.org/10.1159/000143960

29-Maurya, H., Kumar, T., & Kumar, S. (2018). Anatomical and physiological similarities of kidney in different experimental animals used for basic studies. *J Clin Exp Nephrol, 3(*09). http://dx.doi.org/10.21767/2472-5056.100060

30-Abdalla, M. H. (1974). Mycoflora of groundnut kernels from the Sudan. Transactions of the *British Mycological Society, 63(*2), 353-359. https://doi.org/10.1016/S0007-1536(74)80180-4

31-Yoldaş, A., Aydın, A., & İlgün, R. (2014). Macroscopic distribution of the renal artery and intrarenal arteries in mole rats (*Spalax leucodon*). *Veterinarni Medicina, 59,* (8): 382–387. http://dx.doi.org/10.17221/7658-VETMED

32-Young, Z. J. (1975): The Life of Mammals; their anatomy and Physiology, second edition, claredom press Oxford,pp: 177.

33-El-salkh, B.A. ; Zaki ,Z.K ;Basuony , M.I. and Khidr,H.A. (2008): Anatomical, Histological And Histochemical Studies On Some Organs Of True Desert Rodents In The Egyptian Habitats. *Egyptian Journal of Hospital Medicine, 33:* 578– 306. https://dx.doi.org/10.21608/ejhm.2008.17622

دراسة شكليه مقارنة للكلى في الكلاب والقطط المنزلية

هدى أحمد شريف، ثائر رمضان مهلهل، محمد عباس علي.

قسم التشريح والأنسجة، كلية الطب البيطري، جامعة البصرة، البصرة، العراق

الخلاصة

كان الهدف من هذه الدراسة إجراء تحليل مقارن لتشريح الكلى لدى الكلاب والقطط. تم استخدام عينة مكونة من عشرين حيوانا بالغًا سليمًا (عشرة قطط منزلية وعشرة كلاب منزلية). بغض النظر عن الجنس، تم استخدامها في هذا البحث. تم تسجيل متوسط وزن القطط المحلية عند (2 ± 0.4 كجم)، في حين كان متوسط وزن الكلاب المحلية أعلى بكثير عند (20 ± 3 كجم). تم فحص السمات التشريحية والشكلية للكلى بعد الذبح. كشفت الملاحظات من التقييم التشريحي الإجمالي أن كلية الكلب تتميز بأنها عضو كلوي واحد على شكل حبة الفاصولياء ذو سطح أملس، يمتلك حليمة كلوية وحيدة. أظهرت القشرة الكلوية لونًا بنيًا محمرًا، بينما تميز النخاع الكلوي بمنطقتين: منطقة خارجية أغمق ومنطقة داخلية أفتح. كلتا الكليتين مغلفتان، وتقعان على جدار البطن الظهري في منطقة أسفل الظهر، على جانب العمود الفقري. في المقابل، قد تتخذ كليتا القطط شكلًا بيضاويًا أو شبيهًا بحبة الفاصولياء بلون أحمر، مع أنها عادةً ما تحافظ على شكل متماثل من حيث الحجم والشكل على الجانبين، وتقعان مباشرة خلف القفص الصدري. تتكون الكلية من كبسولة خارجية ليفية، إلى جانب قشرة داخلية ونخاع محيطي. ينتظم النخاع، مع القشرة المحيطة به، في عدة هياكل هرمية، يُشكل كل منها فصًا كلويًا.

الكلمات المفتاحية: الكلى، القطط المنزلية، الكلاب المنزلية، قياسات الكلى، الشريان الكلوي.