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ANATOMICAL AND MORPHOMETRICAL STUDY OF THE ADULT BLACK-TAILED GAZELLE (*Gazella Subgutturosa*) MALE KIDNEY.

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ABSTRACT

This work conducted on six healthy adult male (*Gazella Subgutturosa*) brought from natural reserve in Qusaybah. The animals were slaughtered and the kidneys were quickly removed. The Renal width, lengths at superior and inferior poles, thickness and the volume were measured. A digital vernier caliper was used for performing the measurements. The right and left kidneys were weighted by digital electrical balance. The data were statistically analyzed. The left and right kidneys were bean in shape, solid in texture and red to brown in color with smooth surface. Each kidney was covered by renal fascia and thin fibrous capsule, Para and pre-renal large amount of adipose tissue were predominant. The mean weight of the right kidney was heavier than the left kidney, the left kidney was located more caudally, the kidney/Body weight ratio was (1/303).The cortex medulla index was (1/4). The kidney of gazelle was anatomically similar to the kidney of sheep and goat; the cortex medulla index revealed that the black-tail gazelle was efficient for water conservation. The present study has provided important information on the renal morphometry which will be use for wild animal medicine and surgery.

INTRODUCTION

The deviation of renal parameters from established normal values is an important criterion in study the normal and diseased kidney (1, 2). In the textbook of anatomy and the research of some others, the normal parameters of the kidney was described, In ox the length was(200-225)mm the width was (100-120)mm.(3,4)

The kidney of dog was (6-7) cm. in length, (4 – 5) cm .in width and (3 – 4) cm .in thickness. The weight is (25-35) gm. (5). In sheep the right kidney is (5.58 cm) length (3 cm) width, thickness of cortex 0.59 cm, medulla 0.89 cm. The left kidney was 3.7 cm. length, and 2.1 cm. widths (6). In arid animals like camel the renal length (170-210) mm. and (700-1000) gm. in weight (7)

In wild and domestic animals the kidney plays great role in homeostasis (8). Kidney takes large attention as important tool for environment adaptation and water conservation (9). This study designed because there are no data available in the literature on renal morphometry of (*Gazella Subgutturosa*) gazelle kidney**.**

MATERIALS AND METHODS

A number of six healthy adult (2-3) years old male gazelle (*Gazella Subgutturosa*), were used in the study. The animals were obtained alive from governmental reserve in Kusaybah. The gazelle were weighed alive by using hook scale then the animals were sacrificed. The abdomen was incised from the midline of the abdomen. The visceral organs were removed to get easy access to the kidney. All the fat tissue and the renal fascia were removed. The parameters like length, weight, thickness, and width of kidney were measured by using measuring tape, sensitive balance and caliper vernier. The volume of the kidney was calculated by water displacement method.

RESULTS AND DISCUSSION

Shape, position and structure

Both kidneys of gazelle (*Gazelle Subgotturosa*) were bean shaped, sub lumber in position. The kidney of gazelle was relatively sold, reddish brown in color; Each kidney had anterior and posterior rounded end, carved ventral, slightly flat dorsal surfaces, lateral curved border and medial concave border, which occupied by the renal hilus .The renal hilus was the sited in which the renal artery inter and the renal vein and ureter were exit. There was a space in the median part that represent the renal sinus that was filled with adipose tissue that covering the blood vessels and ureter. The surfaced of the organ was smooth and no superficial vascularization was noticed (Fig.1). The gross observation in the current study was in agreement with what was mention by (10, 11), Whom study the gross anatomy of kidney in spotted deer, and stated that the kidney was bean in shape, Lobulations were absent, Both kidneys were sub lumber in position, and the results of (12) in musk deer.

In study of the anatomy of the kidneys in one humped camel (13) reported that both kidneys were firm, reddish-brown organs. The Brown red color of gazelle kidney was due to the large amount of arterial and venous blood flow in the kidney, the kidneys responsible for filtration of circulating blood. (14) Mentioned that the kidney received about 20% of circulated blood and it had very complex blood supply, these facts proved by (15) who study the morphological characteristics of renal artery in rat and the results of (16) who described the distribution and branching of renal blood vessels in the kidney of ox.

The renal capsule was thin and loosely attached, and it was easy to spelt because the capsule of the kidney had no trabeculi send to the parenchyma of the organ, therefore there were no strong attachment between the capsule and underneath renal parenchyma.

The current study revealed large amount of adipose tissue depositions surrounds the kidney. The renal adipose tissue was found in three regions the adipose tissue which deposit superficially to the renal fascia which called Para-renal fat, the adipose tissue which deposit between the renal fascia and renal capsule is called peri-renal fat and the adipose tissue which occupy the renal sinus and surrounded the renal vessels and ureter (Fig.1, 2). Similar findings were reported in other animals like ox (16) and in the kidney of New Zealand rabbit (17).

The presence of adipose tissue and tough connective tissue renal fascia act as additional support and protection for the delicate renal capsule that proved the finding of (18).

The longitudinal section of kidney revealed two distanced areas outer most dark brown granulated area the cortex and the inner or deep area called the medulla which consisted of two region the outer dark medulla and inner paler medulla with shallow striation, The medulla consisted of (8-10) pyramids, there base facing the cortex and the apex end forming papillary structures in which all the collecting ducts opened. Each medullar pyramid papilla fit in a cup like dilatation of the renal pelvis, the renal crest was absent. The renal pelvis was a funnel-like structure connected with ureter. (Fig.). These results were in compatible with the findings of (19) in the kidney of small ruminant and the findings in dog (20), and it was similar in some way to the findings of (16) in ox and in (21), 2006 in buffalo in which minor calices were permanent structures .

Biometrical data:

As in the table there were a little difference between the right and left kidneys,

The left kidney was weighed (66.61±11.3) gram while the right one was (67.53±11.0) gm. The volume and the mass of the right kidney were higher than that of the left kidney. These results were identical with the results of (12) in musk deer kidney and the result of (22) in goat kidneys. This difference related to the anatomical position of left kidney which is pushed caudally by the rumen and that's lead to increase in the length of left renal artery while the right renal artery is short which affect the blood flow of each kidney which affected the growth of the left one.

The ratio of live body weight to the kidney of gazelle was 1/307, while in ox was 1/600 (16) and in horse and dog was 1/300, 1/200 respectively as recorded by (3) and (19) while in African giant rat was 1/405 (23) this ratio was important value to describe the functional capacity of the kidney in related to metabolic needed of the animal ,The animal with higher body weight had heavy kidney as reported by (24). The thickness of cortex was (4.28) mm, and the thickness of the medulla was (19.76) mm. In the current study the cortex medulla index was 1/4. in camel was 1:4 as was measured by (25) while in buffalo was 1:3 (21, 26) .where the index of cortex medulla in the African giant rat which have no appealed to live in arid area, It was 1/2 the animal

could not conserved water as what was mention by (23) because the kidneys of rat had narrow renal medulla in which the major water reabsorbing occurred. The lower cortex and medulla index of gazelle (1/4) describe the high ability of kidney to conserve water and excrete concentrated urine.

The length of right kidney was (62.1±2.33)mm., while the length of the left kidney was 63.4 ±0.39 mm., The width of the right kidney was (32.5±0.39) mm. while the left kidney was(32.2±0.37) mm .the thickness of the right was (23.8±0.44) mm. and the left one was(25.1±0.48) mm. The circumference of the right kidney was (98.7±0.92) mm. and the left one was (98.3±0.93) mm. The mean length of the lateral border of the left kidney was (118.8±1.45) mm .while the right one was (118.95±1.32) mm. The mean length of medial border of the left kidney was (108.1±1.33). While the right one (108.1±1.33) mm. The mean volume of the right kidney was (53), the mean volume of the left kidney was (50) cc

Table (1) shows the biometrical findings of left and right kidneys of male gazelle

Length/mm	Left Right	63.4 ±0.39 62.1±2.33	-2.24 -2.24	## ##
Width/mm	Left Right	32.2±0.37 32.5±0.39	-0.66 -1.59	## ##
Thickness/mm	Left Right	25.1±0.48 23.8±0.44	1.68 1.69	N.S N.S
Circumference mm	Left Right	98.3±0.93 98.7±0.92	1.35 1.35	## ##
Length of medial border mm	Left Right	108.7±1.25 108.1±1.33	0.15 0.15	N.S N.S
Length of lateral border mm	Left Right	118.8±1.45 118.95±1.32	0.09 0.09	N.S N.S
Weight (gm)	Left Right	66.61±11.3 67.53±11.0	0.45 0.45	N.S N.S

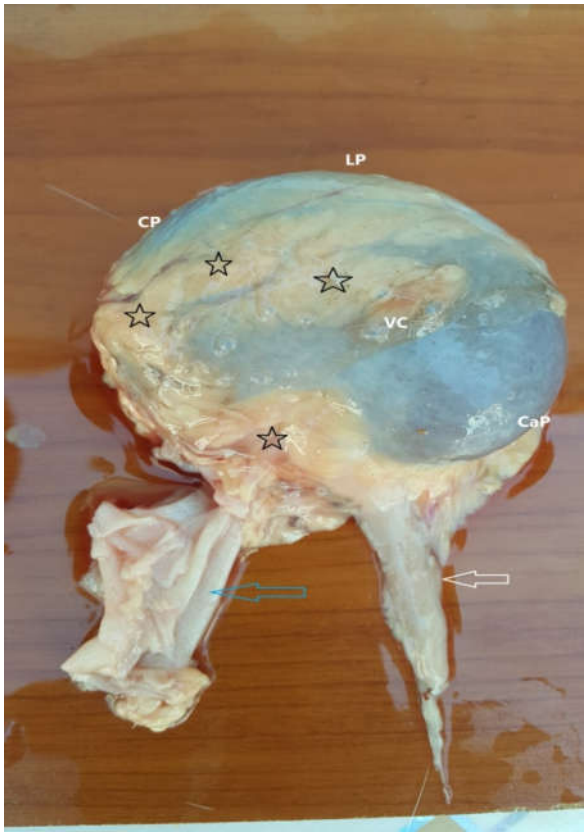

Figure 1 Macrograph of gazelle kidney shows: CP-cranial pole, Cap-Caudal pole, Lb- lateral border, VC-Ventral surface, renal fat capsule (stars)

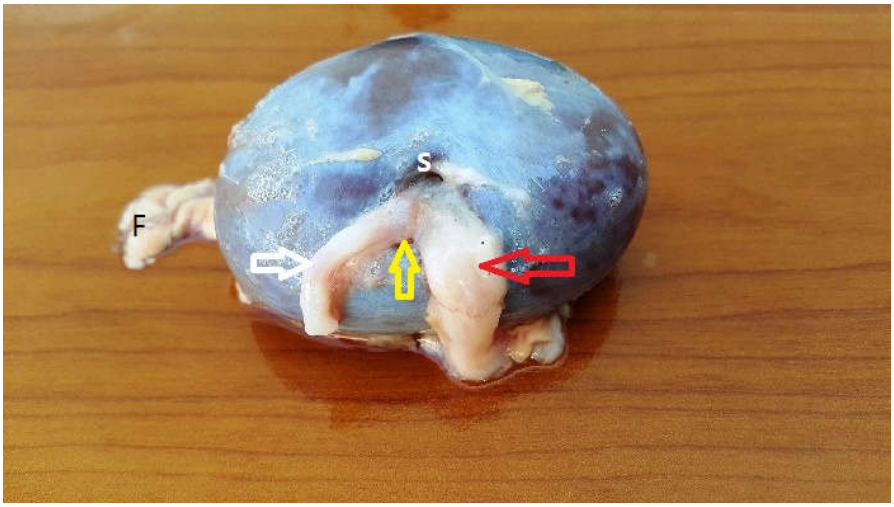

Figure (2) Macrograph of gazelle kidney shows : Ureter (white arrow),renal blood vessels (red arrow), Renal hilus(yellow arrow) ,S- Renal sinus

Figure(3) Gross longitudinal section shows ,C-renal cortex ,Mex- medulla external Min-Medulla internal , Rp- renal pyramid, P-papilla ,Black arrows- pelvis recess (minor calyx) .

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