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Gross Anatomical Study on Normal Kidneys of Adult Goat

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Abstract: The research work was conducted on 80 adult goats, 40 from each male and female, slaughtered at different slaughterhouses of Hyderabad city. The mean length, width and thickness of right kidney of male goat was 6.10±0.40, 3.60±0.50 and 2.29±0.44 cm while that of the left kidney was 6.30±0.39, 3.59±0.47 and 2.20±0.11cm respectively. The circumference, length of medial and lateral border of right kidney of male goat was 9.54±1.10, 10.88±1.2 and 11.87±1.33cm and that of left kidney was 9.49±0.99, 10.83±1.19, 11.80±1.36cm respectively. The mean length, width and thickness of right kidney of female goat was 6.18±2.30, 3.24±0.39 and 2.36±0.42cm while that of the left kidney was 6.32±0.38,3.19±0.36 and 2.87±0.45cm respectively. The circumference, length of medial and lateral border of right kidney of female goat was 9.88±0.90, 10.79±1.3 and 11.93±1.29cm, while that of left kidney was 9.84±0.92, 10.85±1.21 and 11.87±1.40cm. The mean weight of right and left kidney of male goat was 66.41±10.0g and 65.67±9.97g respectively. The mean weight of right and left kidney of female was 66.34±10.98g and 65.40±11.0g respectively. Present research showed significant difference in the mean length and thickness of right and left kidney of male goat and also in the mean length of right kidney of female goat. All other parameters regarding biometry of right and left kidney of both sexes remained non-significant.

Key words: Kidney, left, right, normal, biometry, goat, male, female

Introduction

Pakistan is the second largest sheep and goat producing country in the Near East region. Small ruminants such as sheep and goat are important to the economy of Pakistan. They are the major source of livelihood for over a million livestock farmers especially in the arid regions where crop production and dairy farming are not possible. The total value of sheep and goat meat is greater as it is preferred meat and priced higher than beef. The small ruminants such as goat and sheep are raised to produce slaughter stock. The increasing demand for red meat during the last decade has been the drive that resulted in annual growth of 4% in small ruminants and almost 9% growth in their meat output (Hasnain, 1985). In comparison with other domestic animals, goat are often victims of prejudice and neglect, but they have nevertheless fulfilled a most useful task in supplying a part of human population with milk, meat, hair, leather and other products (Fisher, 1983). In spite of their importance, Goat and sheep have received little scientific attention. Therefore the present research project is design to study the normal anatomical account of kidneys of goat.

The principal function of urinary system is maintenance of water and electrolyte homeostasis, which require that any input into system be balanced by an equivalent output. The urinary system provides the mechanism by which excess water and electrolytes are eliminated from the body. The second major function of this system is the excretion of many toxic metabolic waste products particularly the nitrogenous compounds urea and creatinine. The affection of urinary system, thus responsible for the alteration of excretion of waste products from body which disturb the homeostasis; this not only causes damage to the organs of the urinary system but also affects whole body. Kidneys are responsible for the filtration and excretion of waste products such as urea, creatine, creatinine and ammonia from the body (Chauhan, 1995). Selective reabsorption and conservation of useful substances, e.g. Glucose and sodium chloride also occur in the kidney.

Knowledge regarding biometry of kidney of small ruminants such as goat and sheep has been carried out in the other region of the world (Sisson and Grossman, 1964 and Bone, 1979) but literature regarding the anatomy of kidney of local breeds of goat is yet scanty in this country and as such it was considered necessary to undertake the present study. The present study would also helpful to veterinarians to differentiate the normal and abnormal status of kidneys while diagnosing and treating the animals, which are affected with different urinary tract diseases.

Materials and Methods

Eighty normal kidneys of male and female goats in equal number of different age groups were collected from different slaughterhouses of Hyderabad city for this biometric study. The organs having no gross

Table 1: Biometrical observation of Left and Right kidney of male goat (n=40 each)

Parameter (cm)	Kidney	Mean	T-values	Remarks
Length	Left	6.30±0.39	-2.23	**
	Right	6.10±0.40	-2.23	**
Width	Left	3.59±0.47	-0.67	N.S
	Right	3.60±0.50	-0.67	N.S
Thickness	Left	2.20±0.11	2.18	**
	Right	2.29±0.44	2.18	**
Circumference	Left	9.49±0.99	1.10	N.S
	Right	9.54±1.10	1.10	N.S
Length of medial border	Left	11.80±1.36	0.32	N.S
	Right	10.88±1.2	0.32	N.S
Length of lateral border	Left	11.83±1.19	0.17	N.S
	Right	11.87±1.33	0.17	N.S
Weight (g)	Left	65.67±9.97	0.40	N.S
	Right	66.41±10.0	0.40	N.S

** = Significant at 5% N. S. = Non Significant

Table 2: Biometrical observation of Left and Right kidney of Female goat (n=40 each)

Parameter (cm)	Kidney	Mean	T-values	Remarks
Length	Left	6.32±0.38	-2.23	**
	Right	6.18±2.30	-2.23	**
Width	Left	3.19±0.36	-0.67	N.S
	Right	3.24±0.39	1.58	N.S
Thickness	Left	2.87±0.45	1.67	**
	Right	2.36±0.42	1.67	**
Circumference	Left	9.84±0.92	1.33	N.S
	Right	9.88±0.90	1.33	N.S
Length of medial border	Left	10.85±1.21	0.11	N.S
	Right	10.79±1.3	0.11	N.S
Length of lateral border	Left	11.87±1.40	0.07	N.S
	Right	11.93±1.29	0.07	N.S
Weight (g)	Left	65.40±11.0	0.40	N.S
	Right	66.34±10.98	0.40	N.S

** = Significant at 5% N. S. = Non Significant

normalities or pathological lesions were removed from carcasses. Packed into polythene bags and brought to the laboratory of department of Anatomy and Histology, Faculty of Animal Husbandry and Veterinary Sciences, Sindh Agriculture University, Tando Jam. Before taking various measurements, all unnecessary tissues are removed and were placed on surgical table in their normal position. The measurement of kidney were taken by the technique followed by May (1964) and subsequently followed by Ommer and Harshan (1995). The measurement for the length, width and thickness of right and left kidney were taken with the help of Verneire caliper. The circumference of kidney was measured with measuring tape in centimeters. The weight of right and left kidneys was taken with electric balance in gram. The data collected regarding biometry of right and left kidneys were arranged in tabular form and statistically analyzed as per MSTAT-C microcomputer programme. Further more the measurement was computed for analyzing the data such, standard deviation and student's paired t-test was applied to specify the difference between means.

Results and Discussion

The mean weight of right and left kidney of adult male and female goat is summarized in Table 1 and 2.

The mean weight of right and left kidney of male recorded during the present survey was 66.41±10.0 and 65.67±9.97 gm respectively. While the mean weight of right and left kidney of female goat was 66.34±10.98 and 65.40±11.0 g. The present investigation revealed that sex has no significant effect on mean weight of right and left kidney.

The measurement regarding the length, width and thickness of left and right kidney of adult male and female goat are represented in Table 1 and 2. The mean length, width and thickness of right kidney of male goat were 6.10±0.40, 3.60±0.50 and

2.29 ± 0.44cm while that of the left kidney were 6.30 ± 0.39, 3.59 ± 0.47 and 2.20 ± 0.11cm respectively. Similar findings regarding these parameters observed for right kidney of female goat were 6.18 ± 2.30, 3.24 ± 0.39 and 2.36 ± 0.42cm while that of the left kidney were 6.32 ± 0.38, 3.19 ± 0.36 and 2.87 ± 0.45cm respectively. The findings regarding the mean length of lateral and medial border and circumferences of both kidney of male and female goat are represented in Table 1 and 2. The mean length of lateral and medial border of right kidney of male goat were 11.87 ± 1.33 and 10.88 ± 1.2 while that of left kidney of male goat were 11.80 ± 1.36 and 10.83 ± 1.19cm. The circumference of right and left kidney of male goat were 9.54 ± 1.10 and 9.49 ± 0.99 cm. The mean length of lateral and medial border of right kidney of female goat were 11.97 ± 1.29, 10.79 ± 1.3 while that of left kidney of male goat were 11.87 ± 1.40, 10.85 ± 1.21m. The circumference of right and left kidney of female goat were 9.88 ± 0.90 and 9.84 ± 0.92cm.

The present findings regarding length, width and thickness of right and left kidneys of both sexes of goat are coincided with those of May (1964), Kim-Myun Cheol *et al.* (1993), Frandson (1986) and Omer and Harshan (1995). May measured the average length, width and thickness of kidney 15cm, 2cm and 2.5cm respectively. Kim-Myun Cheol *et al.* (1993) observed the maximum size of the left kidney of goat as 5.9, 3.6 and 3.2cm in length, width and thickness respectively. Frandson (1986) reported the average length; width and thickness of kidney of sheep were 7.5, 5.0 and 2.5cm respectively. Ommer and Harshan (1995) measured the length of kidney that range from 5.5 to 7.0cm while the width and thickness were 5 and 3cm respectively. The finding regarding the mean weight of kidney of both sexes in the present study is in close agreement to those of May (1964), Sisson and Grossman (1964) and Ommer and Harshan (1995).

May (1964) weighted the kidney that varied from 90 to 150 gm. Sisson and Grossman (1964) recorded the average weight of right and left kidney of goat 110.8 gm. Ommer and Harshan (1995) weighed the kidney of goat in the range of 100-160gm. The result obtained in this study regarding the biometry of kidney are in line with those of the above workers for adult goat.

During the present anatomic study, a significant difference was observed in length and thickness of both kidneys in male goat. The results obtained from the present study also indicate significant difference in the length of right kidney of female while all other parameters regarding the biometry of kidney remained non significant.

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