

BIOMETRICAL STUDIES ON ADRENAL GLAND OF GOAT IN DIFFERENT AGE GROUPS

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Abstract: The present study was carried out on biometry of adrenal gland of 36 healthy goats in different age groups as Gr. I (1-8 months), Gr. II (8-18 months) and Gr. III (18 months and above). The weight, volume and size of both the glands were recorded. The right adrenal was located in contact with the medial part of the anterior end of right kidney, whereas the left adrenal was observed to be located medial to the caudal venacava and in front of the left kidney. The right adrenal was in the form of a pyramid whereas the left adrenal was slightly curved in young animals and appeared bean shaped in the adults. All dimensions including weight and volume of the adrenal gland showed significant increase with the advancement of age. No significant differences were observed between male and female animals.

Keywords: Adrenal gland, biometry, goat, gross anatomy.

Introduction

Reproduction at a fast and economical rate is the main aim of the research in the animal industry. The adrenal gland plays a very important role in reproduction. The adrenal cortex secretes mineralocorticoids, which maintain necessary electrolyte balance within the body fluids and glucocorticoids which helps in metabolism of carbohydrates, proteins and fats. (Samuelson, 2007). The adrenal medulla is concerned with production of epinephrine and norepinephrine by chromaffin cells. In addition to this, the hormones can affect the temperament, feelings and emotions which may lead to stress on animals e.g. transportation, recovery from injury, starvation etc. There is meager information available in the morphometrical studies on adrenal gland of goat particularly in different age groups. Looking into this an attempt has been made to carry out the present study.

Material and methods

The material for the present study was collected from Nagpur Municipal Corporation Slaughter House. The study was carried out in 36 healthy non-descript goats, equally divided into three age groups as Gr. I (1-8 months), Gr. II (8-18 months) and Gr. III (18 months and above). Each group comprised of 6 males and 6 females.

The adrenal gland of each animal were collected immediately after the slaughter and brought to the laboratory for further processing. The gross anatomical observations such as shape, size, colour, consistency etc. were recorded.

The samples were then carefully dissected and the biometrical observations were made as follows:

1. Weight of the gland (gm) on digital balance
2. Volume of the gland (cc) by Archimedes principle
3. Size (length \times width \times breadth) in cm measured by Verniercallipers

These measurements were subjected for statistical analysis as per method of Snedecor and Cochran (1996).

Results and Discussion

The adrenal gland in goat was dark brown coloured gland located in the roof of the abdomen. The gland appeared to be flattened from side to side. The right adrenal was in the form of a pyramid and was lying in contact with the medial part of the anterior end of right kidney. The left adrenal was slightly curved in young animals and appeared bean shaped in the adults and was observed to be located medial to the caudal venacava and in frontof the left kidney. This confirms the observation of Dangi *et al.* (2008) in goat and Getty (1975) in sheep. It was noted that there was no remarkable variation in the location and shape of the gland in various age groups.

The biometrical observations of the present study are shown in Table 1, 2, 3 and 4. The weight of the left adrenal gland of goat as recorded in the present study was 0.69 ± 0.06 , 1.37 ± 0.09 and 1.46 ± 0.12 gm in group I, II and III, respectively. The weight of right adrenal was 0.80 ± 0.07 , 1.33 ± 0.11 and 1.40 ± 0.06 gm in group I, II and III respectively. The average volume of the left adrenal was recorded as 0.67 ± 0.07 , 1.25 ± 0.22 and 1.37 ± 0.13 cc and that of right adrenal was recorded as 0.79 ± 0.05 , 1.31 ± 0.25 and 1.40 ± 0.11 cc in group I, II and III, respectively. The weight of both the glands showed highly significant increase in different age groups. The volume observed to be increased with the advancement of age.(Table 1, 2, 3 and 4). This correlates with the studies conducted by Dangi *et al.* (2008), Mohamed (1982) in Egyptian buffaloes, and Joshi *et al.* (1967) in Indian buffaloes.

The length of the left and right adrenal of goat was observed as 1.66 ± 0.08 and 1.75 ± 0.09 in group I, 2.03 ± 0.08 and 2.08 ± 0.09 in group II and 2.60 ± 0.05 and 2.37 ± 0.11 cm in group III. Getty (1975) recorded the average length of the adrenal as 2 cm in adult sheep. If we think

about small ruminants, the values recorded in the present study correlates more or less with the Getty (1975) except slight difference may be due to species variation.

The width and thickness of the gland was found to be increased from group I to group III in both the left and right adrenal glands of goat (Table 1, 2, 3 and 4). This is in agreement with the observations made by Mohamed (1982) in Egyptian buffaloes.

It was evident from the above studies that there was significant increase in the dimension of the adrenal gland with the advancement of age of the animal, which is in line with the observations made by Kumar and Sharma (2017). The weight and length showed highly significant results ($P < 0.01$). There were no significant asymmetrical results in the dimensions of the gland between the right and left adrenals, which is in correlation with the observations made by Mohamed (1982). Also, no significant difference observed in the male and female animals except the length of the right adrenal.

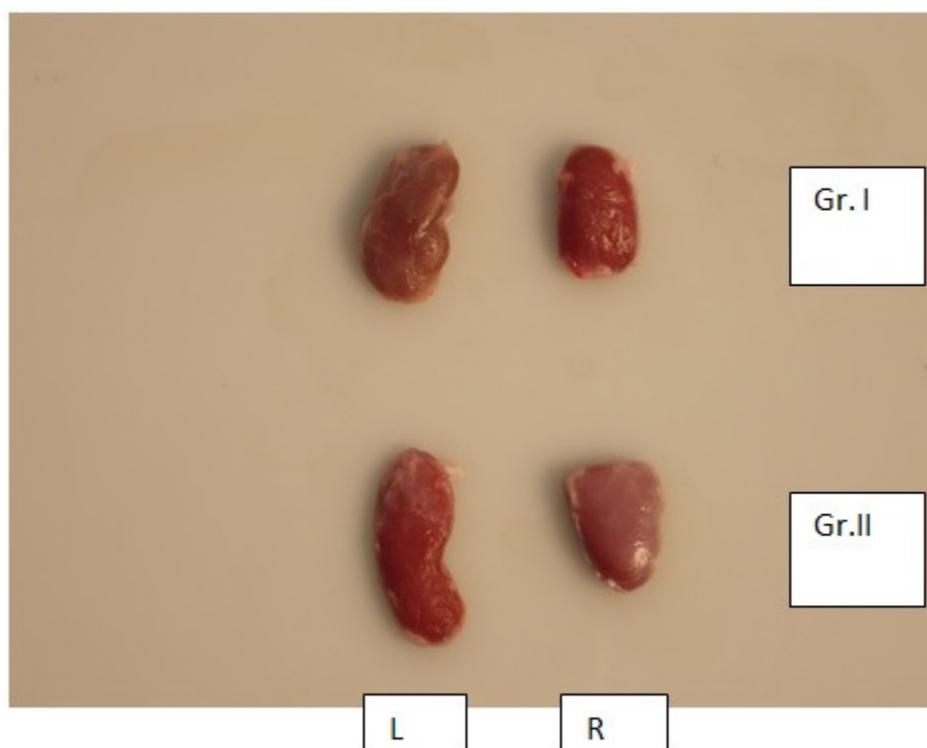


Fig. 1. Adrenal glands of goat (L- Left, R- Right)

Table 1. Biometrical studies on Adrenal gland (Left) of goat in different age groups (Avg. \pm S.E.)

Sr. No.	Parameter/Source	Weight (g)	Volume (cc)	Length (cm)	Width (cm)	Thickness (cm)	
1	Groups	Gr. I	0.69 \pm 0.06 ^a	0.67 \pm 0.07 ^a	1.66 \pm 0.08 ^a	0.91 \pm 0.10	0.66 \pm 0.09
		Gr. II	1.37 \pm 0.09 ^b	1.25 \pm 0.22 ^b	2.03 \pm 0.08 ^b	1.01 \pm 0.05	0.72 \pm 0.04
		Gr. III	1.46 \pm 0.12 ^b	1.37 \pm 0.13 ^b	2.60 \pm 0.05 ^c	1.16 \pm 0.05	0.79 \pm 0.05
2	Sex	M	1.23 \pm 0.13	0.96 \pm 0.15	2.11 \pm 0.11	0.99 \pm 0.05	0.65 \pm 0.02
		F	1.12 \pm 0.10	1.23 \pm 0.13	2.08 \pm 0.11	1.05 \pm 0.07	0.80 \pm 0.07
3	Sex within Group	M ₁	0.72 \pm 0.09 ^a	0.61 \pm 0.12	1.75 \pm 0.13	0.79 \pm 0.05	0.61 \pm 0.05
		F ₁	0.66 \pm 0.09 ^a	0.73 \pm 0.07	1.57 \pm 0.11	1.03 \pm 0.19	0.71 \pm 0.18
		M ₂	1.19 \pm 0.13 ^{bc}	1.23 \pm 0.40	1.93 \pm 0.13	0.93 \pm 0.06	0.65 \pm 0.04
		F ₂	1.54 \pm 0.09 ^{cd}	1.27 \pm 0.23	2.13 \pm 0.07	1.09 \pm 0.09	0.80 \pm 0.06
		M ₃	1.77 \pm 0.16 ^d	1.03 \pm 0.03	2.65 \pm 0.06	1.26 \pm 0.02	0.70 \pm 0.02
		F ₃	1.15 \pm 0.06 ^b	1.70 \pm 0.17	2.54 \pm 0.07	1.05 \pm 0.08	0.89 \pm 0.07

N.B. - Different superscripts within a category and within a column indicates significance

Table 2. Analysis of variance for Adrenal gland (Left)

Source	d.f.	Mean sum of square				
		Weight	Volume	Length	Width	Thickness
Treatment	5					
Group	2	2.111**	1.671*	2.663**	0.187	0.055
Sex	1	0.115	0.683	0.007	0.031	0.201
Interaction	2	0.708**	0.353	0.121	0.174	0.007
Error	25	0.086	0.317	0.071	0.070	0.055

* - P>0.05

** - P>0.01

Table 3. Biometrical studies on Adrenal gland (Right) of goat in different age groups (Avg. \pm S.E.)

Sr. No.	Parameter/Source	Weight (g)	Volume (cc)	Length (cm)	Width (cm)	Thickness (cm)	
1	Groups	Gr. I	0.80 \pm 0.07 ^a	0.79 \pm 0.05 ^a	1.75 \pm 0.09 ^a	0.92 \pm 0.07 ^a	0.59 \pm 0.03 ^a
		Gr. II	1.33 \pm 0.11 ^b	1.31 \pm 0.25 ^a ^b	2.08 \pm 0.09 ^b	0.99 \pm 0.06 ^a	0.73 \pm 0.04 ^b

		Gr. III	1.40±0.06 ^b	1.40±0.11 ^b	2.37±0.11 ^c	1.20±0.06 ^b	0.82±0.05 ^b
2	Sex	M	1.11±0.09	1.16±0.17	1.93±0.06a	0.97±0.04	0.67±0.03
		F	1.25±0.09	1.17±0.10	2.21±0.12b	1.10±0.07	0.76±0.05
3	Sex within group	M1	0.74±0.09	0.80±0.07	1.77±0.08a	0.87±0.04	0.58±0.05
		F1	0.87±0.12	0.77±0.07	1.73±0.17a	0.96±0.14	0.61±0.04
		M2	1.20±0.13	1.42±0.51	1.95±0.13ab	0.91±0.05	0.65±0.05
		F2	1.47±0.16	1.19±0.08	2.21±0.09b	1.07±0.10	0.81±0.05
		M3	1.40±0.09	1.24±0.09	2.06±0.07ab	1.13±0.03	0.79±0.02
		F3	1.40±0.07	1.55±0.19	2.68±0.09c	1.27±0.10	0.86±0.10

N.B. - Different superscripts within a category and within a column indicates significance

Table 4. Analysis of variance for Adrenal gland (Right)

Source	d.f.	Mean sum of square				
		Weight	Volume	Length	Width	Thickness
Treatment	5					
Group	2	1.275**	1.300*	1.143**	0.256*	0.165**
Sex	1	0.165	0.002	0.689*	0.165	0.066
Interaction	2	0.055	0.222	0.324*	0.005	0.012
Error	25	0.093	0.382	0.090	0.054	0.025

* - P>0.05 ** - P>0.01

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