

MICROMETRY OF THYROID FOLLICLES IN DIFFERENT AGE GROUPS OF BAKERWALI GOAT (*CAPRA HIRCUS*)

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Received: 24.12.2020; Accepted: 01.02.2021

SUMMARY

The present study was conducted on the 36 samples of thyroid gland divided into three groups based on the age of animals and irrespective of sex, viz., Prepubertal (below 1 year), Pubertal (2-3 years) and Senile (above 5 years of age) containing 12 animals in each group. In prepubertal group, small and medium size follicles were observed in both the lobes of gland. In pubertal group, small, medium and large size follicles were seen in both the lobes of gland. However, abnormally size follicles were observed only in senile group in both the lobes of gland. The diameter of thyroid follicles decreased from anterior to posterior region of the gland irrespective of age groups in Bakerwali goat. The diameter of follicles increased with the advancement of age. The diameter of follicles varied from 52.55 ± 2.78 to $137.53 \pm 8.71 \mu\text{m}$ in prepubertal, 53.01 ± 2.84 to $261.46 \pm 13.41 \mu\text{m}$ in pubertal and 61.35 ± 1.79 to $495.80 \pm 23.76 \mu\text{m}$ in senile age group. The luminal diameter showed a declining trend from anterior to posterior part of gland.

Keywords: Follicles, Goat, Micrometry, Thyroid

How to cite: Dar, Y. and Suri, S. (2021). Micrometry of thyroid follicles in different age groups of Bakerwali goat (*Capra hircus*). *Haryana Vet.* 60(2): 301-304.

The endocrine and nervous system play a vital role in maintaining body homeostasis (Jubb *et al.*, 1993). The thyroid gland is one of the largest ductless gland. It is situated on the lateral aspect of trachea. It consists of two lateral lobes and a connecting isthmus as reported by Jain *et al.* (1984) in sheep and goat. The thyroid extends from posterior extremity of larynx to the 5th to 7th tracheal rings and is situated on the dorsolateral aspect of the trachea (Bhardwaj *et al.*, 2006) in Gaddi sheep and Gaddi goat. The lateral lobes are almond shaped (Bhardwaj *et al.*, 2006), elongated oval (Jain *et al.*, 1984) while Sisson (1953) reported thyroid as long elliptical in sheep.

Thyroid hormones have been found to influence the reproduction, growth, milk and fiber properties of domestic animals. However, various factors like breed, age, sex and physiological conditions affect blood thyroid hormone concentrations by modulating the hypothalamus-pituitary-thyroid axis in small ruminants (Todini *et al.* 2007). A body of evidences is available showing the changes in blood thyroid hormone levels for different physiological periods like breeding (Blaszczyk *et al.* 2004), gestation (Manalu *et al.* 1997; Todini *et al.* 2007), postpartum and lactation periods (Okab *et al.* 1993; Tucker, 2000). Paucity of literature on micrometry of thyroid gland in Bakerwali goat prompted this study.

The intact samples of thyroid gland of Bakerwali goat were collected from the slaughter houses in and around Jammu city and then samples were divided into three groups based on the age of animals and irrespective of sex, viz., Prepubertal (below 1 year), Pubertal (2-3 years)

and Senile (above 5 years of age) containing at least 12 animals in each group. The age of the goats were estimated by examining the dentition (Solaiman, 2010). After collection, the samples were immediately carried to the laboratory in ice for performing various studies.

After recording the gross parameters, the thyroid gland was fixed in 10% Neutral Buffered Formalin solution (Luna, 1968). The tissue pieces were taken from anterior, middle and posterior parts of right and left thyroid lobes and were processed for paraffin block preparation by alcohol-benzene schedule (Luna, 1968). Tissue sections of 5 mm were obtained from these blocks on clean glass slides using rotary microtome. The sections were then subjected to Haematoxylin and Eosin staining.

The micrometrical observations were recorded on Hematoxylin and Eosin stained sections with the help of ocular micrometer duly calibrated with stage micrometer. All the recorded data were put to standard statistical procedures (Snedecor and Cochran, 1994).

The parenchyma of thyroid gland of Bakerwali goat was made up of numerous follicles with small amount of interfollicular stroma around them. The follicles were of varying shapes and sizes (round, oval and irregular) shapes. The variation in shape of the follicles may be due to plane of the section of the follicles. The shape of follicles could also be affected by shrinkage. Similar findings were reported by Ali (1987) and Al-Bagdadi (1964) in the camel.

Depending upon their diameters, the thyroid follicles were categorized as: small (25-75 μ), medium (100 - 200 μ), large (200 - 400 μ) and abnormally large (>

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400 μ) as also recorded by Das *et al.* (1965) in bull and bullock. In prepubertal group, small and medium size follicles were observed in both the lobes of gland. The mean values of diameter of different thyroid follicles in prepubertal, pubertal and senile group of thyroid gland are depicted in Table.1.

In pubertal group, small, medium and large size follicles were seen in both the lobes of gland. However, abnormally sized follicles were observed only in senile group in both the lobes of gland. The diameter of thyroid follicles decreased from anterior to posterior region of the gland irrespective of age groups in Bakerwali goat. The diameter of follicles increased with the advancement of age (137.53 \pm 8.71 μ m, 168.65 \pm 4.87 μ m, 173.30 \pm 7.20 μ m in prepubertal, pubertal and senile group, respectively) as reported by Roy *et al.* (1978) in goat. Patil (2000) recorded the diameter of follicles 102.24 \pm 2.19 μ , 127.17 \pm 3.83 μ and 192.35 \pm 3.00 μ in < 1 year, 2-3 year, >5 year of goats, respectively. The diameter of follicles varied from 52.55 \pm 2.78 to 137.53 \pm 8.71 μ m in prepubertal, 53.01 \pm 2.84 to 261.46 \pm 13.41 μ m in pubertal and 61.35 \pm 1.79 to 495.80 \pm 23.76 μ m in senile age group. The mean values of diameter of thyroid follicle in gonadectomised goat were

65 to 132 μ (Singh *et al.*, 1985). The diameter of round thyroid follicles in young buffalo varied from 47.6 \pm 8.64 to 130.3 \pm 21.47 μ m and in adult buffalo diameter varied from 92.6 \pm 2.0 to 351.4 \pm 86.5 μ m (Roy and Yadava, 1975). Bhatnagar *et al.* (1955) recorded the follicular diameter of thyroid between 187.65 to 236.4 μ m in different seasons in buffalo. The diameter of the thyroid follicles ranged from 74.9 to 238 μ m and 141 to 379 μ m in winter in the left and right thyroid lobes, respectively, whereas in summer, the range of follicular diameter varied between 55.1 to 361.6 μ m and 94.2 to 382.8 μ m in left and in right thyroid lobes in adult goats, respectively (Hamad, 2008).

The mean values of luminal diameter of different thyroid follicles in different age groups were shown in Table. 2. The highest mean value for luminal diameter in all types of follicles was recorded in the anterior part of thyroid gland in all the three age groups followed by middle and lowest in posterior part. The luminal diameter showed a declining trend from anterior to posterior part of gland. In the present study, the follicles were found to be very large and elongated in senile group when compared to prepubertal and pubertal group, as also were reported by Mathur (1971) in Asiatic water buffalo and Sanap *et al.*

Table 1.

Micrometrical observations of diameter of different thyroid follicles (Mean \pm S.E in μ) of Bakerwali goat in different age groups (100X)

Groups	Thyroid gland	Follicles	Anterior	Middle	Posterior
Prepubertal	Right	Small (25-75 μ)	55.16 \pm 2.95 ^a	54.60 \pm 3.51 ^a	52.55 \pm 2.78 ^a
		Medium (100-200 μ)	137.53 \pm 8.71 ^x	134.88 \pm 7.34 ^x	128.06 \pm 9.91 ^x
	Left	Small (25-75 μ)	56.15 \pm 5.53 ^A	49.35 \pm 4.13 ^A	47.68 \pm 5.54 ^A
		Medium (100-200 μ)	132.91 \pm 6.12 ^x	126.03 \pm 4.4 ^x	121.81 \pm 7.05 ^x
Pubertal	Right	Small (25-75 μ)	58.45 \pm 4.42a ^c	56.66 \pm 2.78 ^a	53.01 \pm 2.84 ^b
		Medium (100-200 μ)	168.65 \pm 4.87 ^y	160.01 \pm 9.22 ^{yz}	140.20 \pm 7.34 ^x
		Large (200-400 μ)	261.46 \pm 13.41 ^p	229.75 \pm 6.38 ^p	228.63 \pm 8.08 ^p
	Left	Small (25-75 μ)	58.8 \pm 1.69A ^B	55.61 \pm 3.03 ^{AB}	55.53 \pm 1.78 ^{AB}
		Medium (100-200 μ)	169.53 \pm 4.77 ^y	167.10 \pm 2.96 ^y	166.85 \pm 2.5 ^y
		Large (200-400 μ)	259.23 \pm 8.65 ^p	256.60 \pm 11.56 ^p	236.10 \pm 10.95 ^p
Senile	Right	Small (25-75 μ)	63.38 \pm 2.09 ^c	61.49 \pm 2.02 ^b	61.35 \pm 1.79 ^b
		Medium (100-200 μ)	173.30 \pm 7.20 ^y	169.88 \pm 4.56 ^z	161.26 \pm 6.36 ^y
		Large (200-400 μ)	297.51 \pm 9.85 ^q	269.75 \pm 9.99 ^q	263.31 \pm 6.65 ^q
		Abnormally Large (\geq 400 μ)	469.71 \pm 56.60	465.46 \pm 10.43	451.38 \pm 7.81
	Left	Small (25-75 μ)	62.61 \pm 2.69 ^B	62.06 \pm 2.67 ^B	60.73 \pm 2.64 ^B
		Medium (100-200 μ)	166.21 \pm 8.95 ^y	158.48 \pm 3.63 ^y	150.63 \pm 7.26 ^z
		Large (200-400 μ)	274.21 \pm 5.62 ^p	270.68 \pm 8.36 ^p	269.18 \pm 5.23 ^q
		Abnormally Large (\geq 400 μ)	495.80 \pm 23.76	475.03 \pm 23.77	473.85 \pm 14.27

*Mean with different superscripts differ significantly (P \leq 0.05) within column.

Table 2.

Micrometrical observations of luminal diameter of different thyroid follicles (Mean ± S.E in μ) of Bakerwali goat in different age groups. (100X)

Groups	Thyroid gland	Follicles	Anterior	Middle	Posterior
Prepubertal	Right	Small (25-75 μ)	40.41±4.88 ^a	38.37±2.57 ^a	36.47±2.01 ^a
		Medium (100-200 μ)	108.72±5.30 ^x	107.81±12.25 ^x	89.46±11.29 ^x
	Left	Small (25-75 μ)	39.33±0.82 ^A	37.81±1.26 ^A	35.08±1.89 ^A
		Medium (100-200 μ)	119.13±6.92 ^x	108.89±10.68 ^x	105.20±8.47 ^x
Pubertal	Right	Small (25-75 μ)	46.26±3.30 ^a	36.88±4.77 ^a	36.66±2.29 ^a
		Medium (100-200 μ)	137.61±4.67 ^y	130.89±3.79 ^x	128.81±4.76 ^y
		Large (200-400 μ)	230.69±6.95 ^p	226.65±4.99 ^p	221.85±9.33 ^p
	Left	Small (25-75 μ)	41.67±4.00 ^{AB}	41.03±3.33 ^{AB}	38.38±3.09 ^{AB}
		Medium (100-200 μ)	136.50±3.84 ^y	133.77±7.57 ^{xy}	128.72±5.88 ^y
		Large (200-400 μ)	246.69±9.90 ^p	236.08±7.67 ^p	233.78±5.75 ^p
Senile	Right	Small (25-75 μ)	49.06±6.42 ^a	46.29±4.25 ^a	39.02±2.22 ^a
		Medium (100-200 μ)	148.85±5.90 ^y	146.62±4.66 ^y	139.73±6.15 ^y
		Large (200-400 μ)	293.31±11.32 ^q	264.29±6.48 ^q	255.73±10.29 ^q
		Abnormally Large (≥ 400 μ)	513.05±36.34	462.14±74.42	448.22±15.42
	Left	Small (25-75 μ)	51.30±5.38 ^B	44.48±2.35 ^B	43.76±1.62 ^B
		Medium (100-200 μ)	158.25±4.39 ^z	154.21±6.12 ^y	148.50±3.96 ^z
		Large (200-400 μ)	297.24±7.33 ^q	294.20±4.96 ^q	261.83±10.05 ^q
		Abnormally Large (≥ 400 μ)	557.57±50.79	452.65±10.64	451.77±22.67

*Mean with different superscripts differ significantly (P≤0.05) within column.

(1998) in cattle.

CONCLUSION

The study showed that the diameter of thyroid follicles decreased from anterior to posterior region of the gland irrespective of age groups in Bakerwali goat. The diameter of follicles increased with the advancement of age.

ACKNOWLEDGEMENT

Authors are highly thankful to Director Research, Sher-e-Kashmir University of Agricultural Sciences & Technology Jammu (SKUAST-J), Dean, Faculty of Veterinary Sciences, SKUAST-J and HOD, Department of Science and Technology (DST), New Delhi, Department of Veterinary Anatomy, Faculty of Veterinary Sciences and Animal Husbandry, R.S. Pura, Jammu.

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