

GROSS ANATOMICAL STUDIES ON TESTIS AND EPIDIDYMIS AT PRE-PUBERTAL AND PUBERTAL STAGES OF TEDDY GOAT

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ABSTRACT

Testes with intact epididymis were collected from 50 apparently healthy Teddy goats (bucks) of 4 to 7 and 8 to 24 months. The purpose of this was to study pre-pubertal and pubertal changes in testes of Teddy Goats. Testis of Goats consists of two surfaces, two borders and two extremities on gross examination. The epididymis was a long tube comprises of three regions; caput, corpus and cauda. The biometrical parameter includes the weight, length, width, thickness and circumference of testicle of pre-pubertal and pubertal stages of Teddy goats. All observed parameter in right and left testicles of pubertal stage were found significantly ($P < 0.05$) higher than that of pre-pubertal stage. The mean weight of right and left epididymis, length and width of right and left corpus-epididymis at pubertal stage was found significantly ($P < 0.05$) increased than in pre-pubertal stage. That means puberty and age significantly ($P < 0.05$) affects the gross anatomical aspects of the testes and epididymis of Teddy male goats. Biometrical measurements including weight, length, width, thickness and circumference of testes and epididymid is significantly increased from pre-pubertal to pubertal stage.

Keywords: Biometry, Puberty, Testes, Epididymis, Teddy goat

INTRODUCTION

Teddy breed of goats are very popular in Pakistan. The home tract of this breed is said to be Punjab (Pakistan). Because of trouble-free handling, docile in nature, low input and improved efficiency it is reared in many parts of the Pakistan such as, Sindh, Azad Kashmir and northern areas. Teddy goat is a small in size goat and some sporadic studies have shown that there exists a wider variation in different traits. Teddy breeds are usually believed to have dominant over the other indigenous goat breeds to thrive in harsh weather conditions in different environments. They are creamy, white, brown and black or patched with these colors. Bucks often have beard and adult male weighing about 30 kg. Teddy goat has gained much popularity recently owing to its early maturity, prolificacy, meat quality and increasing in number of animals at much faster rate (Kuthu et al. 2013).

Puberty is referred as development of sexual organ that show the capability of reproduction (Bielli et al. 2001). It starts when some of the morphological characteristics such as testes weight reach at 6-gram, appearance of somniferous tubules and commencement of spermatogenesis (Delgadillo and Malpoux, 1996; Bielli et al. 2001). Meanwhile, puberty time 3 to 4 months is reported in Teddy goats (Hulet and Shelton, 1980).

The testes and epididymis are very important organs in male reproductive system. Functionally the testis is both exocrine and endocrine in nature producing the spermatozoa

and synchronized with the male sex hormone-testosterone. Available literature indicated that the testes shape, size and location vary species to species but the vital structure of organs is the same (Khan et al. 2014).

It has been observed that males with bigger testis tend to produce daughters that reach puberty at an earlier age and liberate more ovules during each estrous period (Soderquist and Hulten, 2006).

There are some studies reported on gross anatomy of testicles by (Gupta et al. 1992; Rind, 1994, Sarmrah et al. 1997; Nimase et al. 2008) in domestic animals, but based on cited literature there are limited studies reported on pre-pubertal and pubertal stages in testicle of Teddy goat in Pakistan. Therefore, this study was designed to understand the macro-anatomy of testicles of Teddy goat and developmental changes that occur before and after puberty.

MATERIALS AND METHODS

Testes with intact epididymis from 50 apparently healthy Teddy bucks were collected. This study was divided into two groups (Group-A and B). Group-A (Pre-pubertal) aged from 4 to 7 months old bucks and In Group-B (pubertal) aged from 8 to 24 months bucks were used. Testicles were collected immediately after slaughter of the bucks from the private slaughter houses of Tandojam. Ages were determined by dental examinations as suggested by (Vatta et al. 2006). The organs were brought in laboratory of Department of Veterinary Anatomy and Histology. The epididymis was separated from the testes. The organs were cleaned and freed from adhering tissues, which were placed on the surgical table on their normal position. All parts were measured using digital weighing scale, measuring tape and vernier caliper as follows:

Testes weight (gm): Using digital weighing scale. Testes length (cm): Maximum distance from proximal to distal end of the testis using measuring tape. Width (cm): Medio-lateral distance at the middle using vernier caliper. Thickness (cm): Cranio-caudal distance at the middle using measuring tape. Circumference (cm): It was measured by a measuring tape at the area of largest diameter using measuring tape. Epididymis weight in grams was observed using digital weighing scale. Length (cm) of corpus-epididymis: Using measuring tape. Width (cm) of corpus-epididymis: Using vernier caliper.

STATISTICAL ANALYSIS

The means (X) and standard deviation (SD) for each gross anatomical parameter of testes and epididymis were computed using Microsoft Excel Software. Group means of length, width, thickness and circumference, weight of testes and epididymis of Teddy male goats were analyzed using statistical computer software M. Stat-C (version. 6.1.4).

RESULTS AND DISCUSSION

Gross anatomically testis consists of two surfaces, two borders and two extremities (P-1). The medial and lateral surfaces of testis were convex and smooth. Free and attached or epididymal borders were cranial and caudal position of testis. Dorsal and ventral extremities were rounded in shape. The testicles were covered by outer Tunica vaginalis, Tunica albugenia and Tunica vasculosa layers. However, morphologically no considerable difference were found in right and left testicle within group and results are in agreement with (Nimase et al., 2008). The testicles were situated in the prepubic region, enclosed in pandulous structure termed as scrotum. The testis of male goat was found ovoid in shape and comparatively soft in texture. The lower end of organ was slightly thicker and connected to the tail of epididymis. The tunica vaginalis and tunica albugenia of testis were light pink while the

paranchyma was found gray in color. This observation is agreement with (Archana et al., 2014) in all ruminants.

The biometrical study includes the weight of testicle of Teddy goats from pre-pubertal and pubertal stages, mean weight of right testicle, in group A and B was 35.96 and 69.80 gm, in left testicle, it was 36.11 and 68.95 gm, shows highly significant ($P<0.05$) difference (Plate-2). These finding made a strong agreement with the results of (Kabiraj et al., 2012). On the other hand, (Raji et al., 2008) stated the mean testicular weight at one; two and three years of age were 55.00 ± 2.87 , 77.28 ± 1.88 and 103.01 ± 2.23 gms respectively in red Sokoto goats, which was much higher than the present result. This might be due to age or breed difference or nutritional level.

The mean length of right testicle in Teddy goats at pre-pubertal and pubertal stages were 4.72 and 6.97 cm and in left testicle 4.73 and 7.14 cm, respectively. This shows highly significant ($P<0.05$) difference between the mean (Plate- 3), which are in agreement with the findings of (Oyeyemi et al., 2012); (Kabiraj et al., 2012). (Nimase et al., 2008) reported mean testicular length in pre-pubertal and pubertal stage as 2.67 ± 0.13 and 5.03 ± 0.13 cm while width in pre-pubertal and pubertal stage as 1.79 ± 0.04 and 3.17 ± 0.04 cm in bucks, which was lower than the present result. This might be due to breed difference.

The mean values for width of right testicle at pre-pubertal and pubertal stage in Teddy goats were 3.75 and 4.58 cm, in left testicle, it was 3.76 and 4.69 cm, respectively which was highly significant ($P<0.05$) (Plate-4).

The mean thickness of right testicle in group A and B was 1.78 and 3.39 cm, in left testicle; it was 1.78 and 3.49 cm, respectively. There was a highly significant ($P<0.05$) difference observed (Plate-5). The mean circumference of right testicle in group A and B was 4.36 and 11.57 cm, in left testicle, it was 4.36 and 11.71 cm, respectively showing highly significant ($P<0.05$) difference (Plate-6). The mean thickness and circumference obtained from testicle of Teddy male goats at 3-7 months of age in this study were significantly ($P<0.05$) different from those at 8-24 months of age. These finding were more or less similar to the findings of (Khan et al., 2014) in Pakistani adult male goats. According to (Gogoi et al., 2005) in Beetal cross Assam bucks thickness and circumference were significantly affected by age as the present result also indicated that significant changes occur in thickness and circumference as the age goes on. (Nimase et al., 2008) also recorded the mean thickness as 1.21 ± 0.06 cm in pre-pubertal stage and 2.63 ± 0.06 cm in pubertal stage which is slightly lower than the present study which might be due to nutrition or breed differences.

Gross anatomically, the epididymis was found intimately attached with the testis border which was found long head and curved dorsal boundary, Consist of three distinct portions known as head, body and tail. The body was fine and constricted lies beside the lateral part of the attached border of testicle. The tail was long and directly attached at the ventral extremity of the testicle. Color of the epididymis was found pale to yellowish white (Plate-7). This was an agreement with (Kishore et al., 2012); (Devi et al., 2013) and (Wares et al., 2013) in Black Bengal goats.

The mean weight of epididymis of pre-pubertal and pubertal stages was 4.69 ± 0.48 and 6.33 ± 0.41 gm (Plate-8). A significant ($P<0.05$) difference was observed between the two means of both age groups. The present findings were less or more similar to (Wares et al., 2013) they recorded the mean weight as 6.1 ± 0.1 and 6.5 ± 0.0 gm in pre-pubertal and pubertal stage. (Bitto and Egbunike, 2006) reported slightly higher values in pubertal stage which might be due to breed difference as they conducted the study on West African Dwarf goats.

The mean length and width of corpus-epididymis in group A were 3.70 ± 0.44 and 0.244 ± 0.13 cm, while 5.08 ± 0.31 and 0.64 ± 0.06 cm in group B, respectively (Plate-9). This was accordance to the findings of (Devi et al., 2013) as they reported the mean length and width of corpus-epididymis 3.80 ± 0.01 and 0.30 ± 0.00 cm in four months of age, while 5.15 ± 0.01 and 0.53 ± 0.00 cm in 8 months, respectively. The mean length and width of corpus-epididymis increased significantly ($P < 0.05$) with advancement of age. Same were the findings of (Veerabramhaiah et al., 1998) in pigs.

Table 1. Biometrical observations of testis and epididymis of pre-pubertal and pubertal stages of teddy bucks

Groups/Parameters	Pre-pubertal		Pubertal	
	Right	Left	Right	Left
Testes weight (gm)	35.96 ± 9.29	36.11 ± 9.28	69.80 ± 6.65	68.95 ± 6.30
Testes length (cm)	4.72 ± 0.33	4.73 ± 0.58	6.97 ± 0.78	7.136 ± 0.73
Testes width (cm)	3.75 ± 0.20	3.76 ± 0.18	4.58 ± 0.34	4.628 ± 0.36
Testes thickness (cm)	1.78 ± 0.47	1.78 ± 0.46	3.39 ± 0.37	3.49 ± 0.36
Testes circumference (cm)	4.36 ± 1.15	4.36 ± 1.17	11.57 ± 1.76	11.71 ± 1.65
Epididymis weight (gm)	4.692 ± 0.49	4.736 ± 0.46	6.336 ± 0.41	6.4 ± 0.40
Corpus-epididymis length (cm)	3.70 ± 0.44	3.78 ± 0.48	5.08 ± 0.31	5.15 ± 0.36
Corpus-epididymis width (cm)	0.24 ± 0.13	0.30 ± 0.14	0.64 ± 0.06	0.68 ± 0.08



Plate 1: Right testis of goat

Where; (1 shows dorsal extremity; 2 is ventral extremity; 3 for lateral surface and 4 indicate the medial surface)



Plate 2: Weight of testis of goat



Plate 3: Length of testis of goat



Plate 4: Width of testis of goat



Plate 5: Thickness of testis of goat

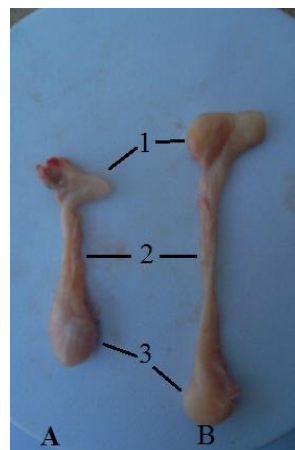


Plate 6: Epididymis of Teddy goat
Where 1 is Head of the bone, 2. Body and
3 indicates tail



Plate 7: Weight of epididymis of goat

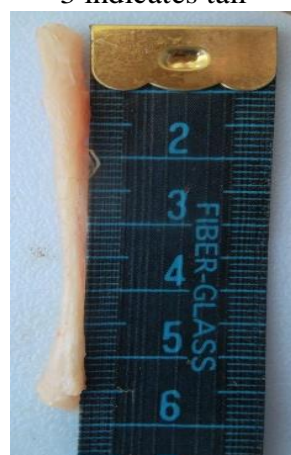


Plate 8: Length of corpus-epididymis of goat



Plate 9: Width of corpus-epididymis of goat

CONCLUSIONS

On the basis of above findings it was concluded that puberty and age considerably affects the macro-anatomical feature of the testicle and epididymis of Teddy male goats. Biometrical measurements including weight, length, width, thickness and circumference of testicle and epididymides significantly increased from pre-pubertal to pubertal stage.

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