

Biometrical Observations on Bovine Epididymis

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Abstract: The present study work was conducted on epididymis of 112 nondescript buffalo males of various ages, divided into two live body weight groups. Group A (67.0-200 kg, n =56), Group B (201.0-400 kg, n =56). The mean length, width and thickness of head of right epididymis in group A buffalo male in present study were 3.44±0.61(2.0-4.20), 2.34±0.67(1.20-3.50) and 0.58±0.17(0.20-0.90) cm, respectively while that of head of left epididymis in group A were 3.46±0.61(2.10-4.30), 2.42±0.65(1.40-3.60) and 0.65±0.17(0.30-1.0) cm. The mean length, width and thickness of body of right epididymis in group A buffalo male in present study were 6.99±0.69(4.80-7.80), 0.74±0.21(0.30-1.10) and 0.54±0.19(0.20-0.90) cm, respectively while that of body of left epididymis in group A were 6.98±0.72(4.90-7.90), 0.80±0.19(0.40-1.10) and 0.58±0.20(0.10-1.00) cm. The mean length, width and thickness of tail of right epididymis in group A buffalo male in present study were 2.14±0.40(1.60-2.80), 1.31±0.21(0.90-1.90) and 0.90±0.21(0.50-1.30) cm, respectively while that of tail of left epididymis in group A were 2.21±0.32(1.50-2.60), 1.42±0.21(1.0-1.90) and 0.93±0.23(0.50-1.40) cm. The mean circumference and mean weight of the tail of right epididymis were recorded as 4.15±0.21(2.10-5.10) cm and 3.90±1.08(2.10-5.70) g, respectively. While that of left epididymis were recorded as 4.21±0.70(2.20-5.20) cm and 3.99±1.08(2.10-5.90) g, respectively. The mean length, width and thickness of head of right epididymis in group B buffalo male in present study were 4.37±0.37(3.80-5.10), 3.71±0.31(3.80-5.10) and 1.05±0.15(0.80-1.20) cm, respectively while that of head of left epididymis in group B were 4.45±0.36(3.90-5.20), 3.81±0.31(3.20-4.30) and 1.12±0.15(0.90-1.30) cm. The mean length, width and thickness of body of right epididymis in group B buffalo male in present study were 8.00±0.39(7.40-8.70), 0.90±0.22(0.50-1.30) and 0.83±0.21(0.50-1.30) cm, respectively while that of body of left epididymis in group B were 7.99±0.38(7.40-8.70), 0.97±0.22(0.60-1.40) and 0.89±0.22(0.60-1.40) cm. The mean length, width and thickness of tail of right epididymis in group B buffalo male in present study were 3.13±0.48(2.40-4.00), 2.10±0.34(1.50-2.70) and 1.65±0.37(1.20-2.40) cm, respectively while that of tail of left epididymis in group B were 3.07±0.45(2.40-3.90), 2.15±0.35(1.50-2.80) and 1.73±0.37(1.20-2.50) cm. The mean circumference and mean weight of the tail of right epididymis were recorded as 5.85±0.52(5.00-6.70) cm and 7.10±1.08(5.20-9.0) g, respectively. While that of left epididymis were recorded as 5.90±0.53(5.10-6.70) cm and 7.20±1.07(5.30-9.10) g, respectively. Statically no significant difference was observed for above parameters in the head, body and tail of right and left epididymis of both groups A and B.

Key words: Male buffalo, epididymis, bovine, body weight and biometry

INTRODUCTION

Sperm remain in the testicular excurrent duct system for varying periods of time before being ejaculated and during this time they achieve their full fertilizing capacity, undergoing certain physiological, biochemical and morphological changes associated with their maturation^[1]. Spermatozoa have little or no fertilizing capacity as they leave the testis but gradually acquire this capacity as they pass through the efferent ductules and epididymis^[2]. Stereological and micro-puncture studies showed that the ductuli efferentes reabsorb most of the fluid leaving the testis^[3].

The mammalian epididymis is an important segment of the reproductive tract that performs a variety of functions^[4]. Because of its importance in relation to fluid and sperm resorption, sperm storage and sperm maturation, the epididymis seems to have received more attention than any other segment of the excurrent duct system of the testis^[5]. Spermatozoa acquire the ability to swim and fertilize eggs, by passing through epididymis^[6,7]. A sperm is considered fully mature when it can successfully fertilize an ovum and the union results in a viable offspring. This author postulated that statistically it is unlikely that a sperm will be able to do this before it reaches the caudal epididymis^[1]. There is general

Table 1: Mean ±S.D values of right and left epididymis of group-A buffalo males (n= 56) below 200 kg body weight

Parts of epididymis	Parameters (cm)	Right	Left	T-value	Significant difference
Head	Mean Length±S.D Range	3.44±0.61 (2.0-4.20)	3.46±0.61 (2.10-4.30)	-0.9882	N.S
	Mean Breadth±S.D Range	2.34±0.67 (1.20-3.50)	2.42±0.65 (1.40-3.60)	-0.6429	N.S
	Mean Thickness ±S.D Range	0.58±0.17 (0.20-0.90)	0.65±0.17 (0.30-1.0)	-2.2735	N.S
Body	Mean Length±S.D Range	6.99±0.69 (4.80-7.80)	6.98±0.72 (4.90-7.90)	0.3202	N.S
	Mean Breadth±S.D Range	0.74±0.21 (0.30-1.10)	0.80±0.19 (0.40-1.10)	-1.7283	N.S
	Mean Thickness ±S.D Range	0.54±0.19 (0.20-0.90)	0.58±0.20 (0.10-1.00)	-1.0321	N.S
Tail	Mean Length±S.D Range	2.14±0.40 (1.60-2.80)	2.21±0.32 (1.50-2.60)	-1.0276	N.S
	Mean Breadth±S.D Range	1.31±0.21 (0.90-1.90)	1.42±0.21 (1.0-1.90)	-2.7862	N.S
	Mean Thickness ±S.D Range	0.90±0.21 (0.50-1.30)	0.93±0.23 (0.50-1.40)	-2.1999	N.S
	Mean Circumference±S.D Range	4.15±0.21 (2.10-5.10)	4.21±0.70 (2.20-5.20)	-0.5036	N.S
	Mean weight (g) ±S.D Range	3.90±1.08 (2.10-5.70)	3.99±1.08 (2.10-5.90)	-0.6822	N.S

n= no of observation S.D = Standard Deviation

agreement that the excurrent ducts are not merely passive conduits for sperm passage, but represent a dynamic system, a fundamental place when sperm attain the ability to fertilize eggs.

Buffalo is part and parcel of village in Pakistan. It is the main dairy animal of Pakistan where per capita milk consumption (150 L per annum) is much better than many developed countries. Buffalo in Pakistan is also the best found in the world. The literature on biometrical values of epididymis of indigenous breeds of buffalo is so far scanty in this country and as such, it was considered necessary to undertake the present study. Thus, the present study describes the anatomy of the epididymis of male buffalo belonging to nondescript breed of sindh province, Pakistan. Furthermore the results obtained in this study will be useful in reproductive anatomy and as baseline research data in reproductive Physiology and reproductive pathology to determine the actual cause of the reproductive failure of the animal leading to great economic losses. Such information will help to design plan for the treatment of animals having various reproductive disorders. The finding of the present research would provide useful information to Veterinarian to differentiate the normal from abnormal conditions of epididymis while diagnosing and treating the male animals suffering from many reproductive disorders.

MATERIALS AND METHODS

The animals were divided in two groups according to the body weight i.e. Group A containing animals with a body weight below 200 kg and group B comprised the animals with body weight above 200 kg. The animals were weighed in platform type Avery in kg just before the slaughter of the animals. One hundreds and twelve testis along with epididymis of male buffalo aged one to five years was collected randomly from different slaughterhouses of Hyderabad districts (Sindh) for this study. Each left and right testicles after procurement was numbered, put into separate polythene bags and brought

such as head; body and tail were marked separately and then straightened out for taking the measurements. to the departmental laboratory. The epididymis was first dissected away from testicular body and its each part Following methodology was adopted^[8,9].

Epididymis

Head (right and left): Length: Head was first dissected and then straightened out and length was measured from anterior to posterior ends along the longitudinal portion.

Breadth: The greater diameter between the lateral and medial borders.

Thickness: From the attachment of head of epididymis to the free surface.

Body (right and left): Length: The body was first dissected and then straightened out and length was measured from anterior end towards posterior ends.

Breadth: The greatest diameter from one border to another border.

Thickness: From the attachment of body of epididymis to the free surface.

Tail (right and left): Length: Tail was first dissected and kept in normal position and length was measured from anterior extremity to posterior extremity.

Breadth: distance between the anterior and posterior borders.

Thickness: From lateral surface to medial surface.

Circumference: The circumference was measured by encircling the tail of epididymis at the mid portion by a graduated nylon type.

Weight: weight was recorded in gram with triple beam balance.

Table 2: Mean±S.D values of right and left epididymis of group-B buffalo males (n= 56) above200 kg body weight

Parts of epididymis	Parameters (cm)	Right	Left	T-value	Significant difference
Head	Mean Length±S.D Range	4.37±0.37 (3.80-5.10)	4.45±0.36 3.90-5.20	-1.2166	N.S
	Mean Breadth±S.D Range	3.71±0.31 3.80-5.10	3.81±0.31 3.20-4.30	-1.6382	N.S
	Mean Thickness ±S.D Range	1.05±0.15 0.80-1.20	1.12±0.15 0.90-1.30	-2.7628	N.S
Body	Mean Length±S.D Range	8.00±0.39 7.40-8.70	7.99±0.38 7.40-8.70	0.1948	N.S
	Mean Breadth±S.D Range	0.90±0.22 0.50-1.30	0.97±0.22 0.60-1.40	-1.6345	N.S
	Mean Thickness ±S.D Range	0.83±0.21 0.50-1.30	0.89±0.22 0.60-1.40	-1.6218	N.S
Tail	Mean Length±S.D Range	3.13±0.48 2.40-4.00	3.07±0.45 2.40-3.90	0.5850	N.S
	Mean Breadth±S.D Range	2.10±0.34 1.50-2.70	2.15±0.35 1.50-2.80	-1.3107	N.S
	Mean Thickness ±S.D Range	1.65±0.37 1.20-2.40	1.73±0.37 1.20-2.50	-1.1549	N.S
	Mean Circumference±S.D Range	5.85±0.52 5.00-6.70	5.90±0.53 5.10-6.70	-1.6689	N.S
	Mean weight (g) ±S.D Range	7.10±1.08 5.20-9.0	7.20±1.07 5.30-9.10	-0.8264	N.S

N.S= Non significant n = number of observation

The data collected on various parameters of epididymis of male buffalo was subjected to statistical analysis^[10]. The following measures were computed for analysing the data such as: Mean, Standard deviation and range. Student's paired t –test was applied to specify difference between means.

RESULTS

Table 1 indicates mean length, width and thickness of head, body and tail of epididymis in group A buffalo male (67.0-200 kg live body weight). The mean length, width and thickness of head of right epididymis in group A buffalo male in present study were recorded as 3.44±0.61 (2.0-4.20), 2.34±0.67(1.20-3.50) and 0.58±0.17(0.20-0.90)cm, respectively while that of head of left epididymis in group A were noted as 3.46±0.61(2.10-4.30), 2.42±0.65(1.40-3.60) and 0.65±0.17(0.30-1.0) cm. Significant difference was not observed for above parameters in the head of right and left epididymis. The mean length, width and thickness of body of right epididymis in group A buffalo male in present study were observed as 6.99±0.69(4.80-7.80), 0.74±0.21(0.30-1.10) and 0.54±0.19(0.20-0.90) cm, respectively while that of body of left epididymis in group A were found as 6.98±0.72(4.90-7.90), 0.80±0.19(0.40-1.10) and 0.58±0.20(0.10-1.00) cm. Significant difference was not observed for above parameters in the body of right and left epididymis. The mean length, width and thickness of tail of right epididymis in group A buffalo male in present study were recorded as 2.14±0.40(1.60-2.80), 1.31±0.21(0.90-1.90) and 0.90±0.21(0.50-1.30) cm, respectively while that of tail of left epididymis in group A were observed as 2.21±0.32 (1.50-2.60), 1.42±0.21 (1.0-1.90) and 0.93±0.23 (0.50-1.40) cm. Significant difference was not observed for above parameters in the tail of right and left epididymis. The mean Circumference and mean weight of the tail of right epididymis were recorded as 4.15±0.21 (2.10-5.10) cm and 3.90±1.08 (2.10-5.70) g, respectively. While that of left epididymis were recorded as 4.21±0.70(2.20-5.20) cm and 3.99±1.08(2.10-5.90) g, respectively.

Table 2 indicates mean length, width and thickness of head, body and tail of epididymis in-group B buffalo male (201.0-400 kg live body weight). The mean length, width and thickness of head of right epididymis in group B buffalo male in present study were found as 4.37±0.37(3.80-5.10), 3.71±0.31(3.80-5.10) and 1.05±0.15 (0.80-1.20) cm, respectively while that of head of left epididymis in group B were noted as 4.45±0.36(3.90-5.20), 3.81±0.31 (3.20-4.30) and 1.12±0.15(0.90-1.30) cm. During present investigation, statically significant difference was not observed of above described parameters in the head of right and left epididymis. The mean length, width and thickness of body of right epididymis in group B buffalo male in present study were observed as 8.00±0.39 (7.40-8.70), 0.90±0.22(0.50-1.30) and 0.83±0.21(0.50-1.30)cm, respectively while that of body of left epididymis in group B were recorded as 7.99±0.38(7.40-8.70), 0.97±0.22 (0.60-1.40) and 0.89±0.22(0.60-1.40)cm. Significant difference was not observed for above parameters for the body of right and left epididymis. The mean length, width and thickness of tail of right epididymis in group B buffalo male in present study were recorded as 3.13±0.48 (2.40-4.00), 2.10±0.34 (1.50-2.70) and 1.65±0.37(1.20-2.40) cm, respectively while that of tail of left epididymis in group A were measured as 3.07±0.45 (2.40-3.90), 2.15±0.35 (1.50-2.80) and 1.73±0.37 (1.20-2.50) cm. Significant difference was not observed for above parameters in the tail of right and left epididymis. The mean Circumference and mean weight of the tail of right epididymis in group B were recorded as 5.85±0.52 (5.00-6.70) cm and 7.10±1.08 (5.20-9.0) g, respectively. While that of left epididymis were found in Group B as 5.90±0.53(5.10-6.70) cm and 7.20±1.07(5.30-9.10) g, respectively.

DISCUSSION

The finding of the present study regarding the length, breadth and thickness of the head, body and tail of right and left epididymis are in line with previous observation recorded for the above mentioned parameters in Indian buffalo male^[10]. The head of right epididymis in

Indian buffalo male were investigated to be 3.48(2.20-4.84) cm in length, 3.87(3.0-5.20) cm in breadth and 0.77(0.49-1.40) cm thickness while that of head of the left epididymis in Indian buffalo male were recorded as 3.50(2.20-5.60) cm in length, 3.92(2.80-5.0) cm in breadth and 0.76(0.50-1.20) cm thickness. The body of right epididymis in Indian buffalo male were observed as 8.73(5.80-12.40) cm in length, 0.99(0.63-1.40) cm in breadth and 0.29(0.15-0.60) cm thickness while that of body of the left epididymis in Indian buffalo male were noted as 8.59(5.20-12.50) cm in length, 0.99(0.73-1.50) cm in breadth and 0.29(0.10-1.50) cm thickness. The tail of right epididymis in Indian buffalo male were reported to be 2.41(1.70-3.60) cm in length, 1.69(1.20-2.31) cm in breadth and 1.55(1.10-2.16) cm thickness, 5.45(4.50-7.10) cm in circumference and 15.32(7.65-28.40) g in weight while that of tail of the left epididymis was recorded as 2.40(1.74-3.50) cm in length, 1.78(1.30-2.90) cm in breadth and 1.56(1.14-2.65) cm in thickness, 5.42 (4.30-8.0) cm in circumference and 15.43(7.80-28.4)g in weight. The results obtained regarding the width of the head of epididymis in present study are in close vicinity with previous investigation carried out in Egyptians buffalo bulls. The mean width of the head of epididymis in Egyptians buffalo bulls were reported to be 1.1 and 2.6 cm at 6 month and 4.5-6 years of age, respectively. The higher value for width of head of epididymis in Egyptians buffalo bulls appeared to be due to different breeds having different genetic make up reared under better management and nutritional conditions.

The results obtained in present study regarding the tail of epididymis are in partial agreement with previous investigation recorded on Egyptians buffalo male^[11]. The mean width and thickness of tail of the epididymis of Egyptians buffalo male at 6 month and 4.5-6 years of age were reported to be 0.6 and 1.5 cm breadth and 0.8 and 2.0cm, respectively. Results obtained in present study regarding the length of the tail of the epididymis are in partial agreement with previous findings reported on the morphological and anatomical characteristics of the male genital organs of Egyptian buffalo male with special reference to scrotum and accessory sex glands^[13]. The mean length of the tail of the right Epididymis of Egyptian buffalo male were reported to be in range of 1.1 to 1.8 cm while that of left Epididymis were recorded in the range of 1.2 to 2.1 cm, respectively. The higher value in present study appeared to be due to different breeds having different genetic make up reared under better management and nutritional conditions.

CONCLUSIONS

The results obtained in this study could be used as baseline research data in reproductive functional anatomy, reproductive pathology and reproductive biotechnology in farms animals.

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