Age Related Changes of Testis - A Post Mortem Study

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Testes are paired male primary sex organ lies in a pouch like skin covered structure called scrotum. Paired testicular length, breadth and weight as well as age were recorded. A series of fifty (50) consecutive testes were collected from the morgue of Forensic Medicine department, ranging in age from 15 to 80 years. These data were analyzed to examine the effect of age on testicular size. Aims and objective of study were to find out the size and weight of testes, dimension of seminiferous tubules in relation to different age groups in Bangladeshi peoples. The study was carried out in the department of Anatomy, Sylhet M A G Osmani Medical College, Sylhet from July 2006 to June 2007. The samples were divided into four age groups ranging from 15 to 80 years and morphological and histological studies of all samples were done. Comparative studies were done in different age groups. In this study it was found that the size of testis, sperm quality, number of Sertoli cells and leydig cells decrease in elderly. The dimensions of seminiferous tubules increase with increase of age, which is statistically significant ($P < 0.05$).

[Shaheed Syed Nazrul Islam Med Col J 2018, Jan; 3 (1):36-41]

Keywords: Testes, age, Bangladesh, post mortem

Introduction

Male reproductive system consists of a paired testis, epididymis, vas deferens, seminal vesicle, prostate, ejaculatory duct and a penis. Testes are situated within the scrotum, located outside the abdomen. At early period of fetal life testes were located in the posterior part of abdominal cavity. At birth they descend to scrotum. In scrotum the testes are in cooler environment, is necessary for spermatogenesis.

Descend of testis may be arrested in the abdomen or in the inguinal canal. A retained testis is infertile. A person with both un-descendent testes is sterile. The un-descendent testes are at the risk of testicular carcinoma and require surgical intervention to ensure its descent.[1]

Disease of testes affects on health and fertility. Advancing age, malnutrition, alcoholism, and malignancy were each individual risk factor for reduced testicular size, whereas diabetes, narcotic or other drug usage, and pelvic injury were not associated with reduced testicular volume.[2] Determination of testicular volume remains an approximation. Shape, relationship of epididymis to testes, layers of scrotal skin and possibility of compression of tissue can affect the measurement of testes. Testicular volume of pre adolescent boy is relatively constant until puberty. The change in puberty is extremely variable.[3]

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By studying testes of different age group it was found that there is no definite age for the onset of progressive testicular involution associate with advancing age. But the size of testis decrease in elderly and dimensions of seminiferous tubules also decrease in the elderly. The fetal testis is predominantly an endocrine gland. Postnatally the testis changes its role, but retains ability to manufacture testosterone. At puberty the testis increase in size and becomes a source of producing spermatozoa. The human testis size varies among different ethnic groups; the testis of Japanese and Korean men is smaller in size than Caucasians.[4]

Epididymis is a comma shaped structure situated in the lateral part of posterior border of testis and vas deferens is a thick cord like structure, begins from the tail of epididymis and passes upwards behind the testis medial to epididymis. Bilateral ligation of vas deferens (Vasectomy) is applied as one of the method of family planning.[5]

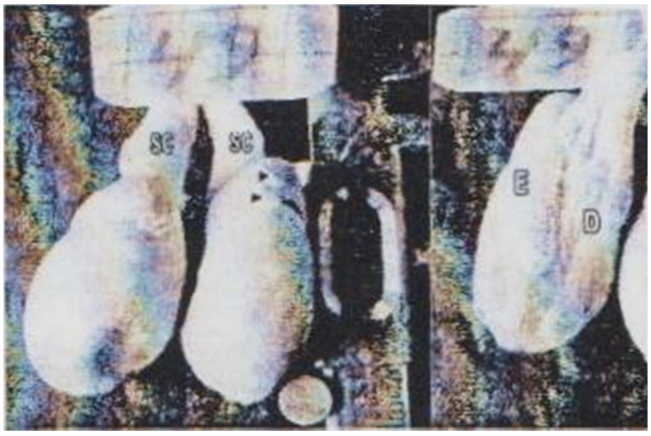

Fig-1. photograph showing A) anterior B) posterior view of both testis. E=epididymis, D=vas deferens, SC= Spermatic cord, Arrow- appendix of testis, Arrow head= appendix of epididymis.

Considering the above aspect, it is clear that the weight, size, volume and even histological values of different component of testicular tissue vary greatly among the people of different ages and also different places of different geographical areas. So study of testis may lead to valuable findings, which may cause dramatic modifications in both conservative and surgical treatment of disorders of testis.

For clear understanding of various conditions of testes in Bangladeshi individual, it is essential to establish a data on testis of our population.

With these view the present study proceeds with the following objectives.

- To find the dimensions of testis in Bangladeshi people.
- To detect the histomorphological changes in different age group.
- To detect the microscopic features of testicular tissue.

Methods

The present study was performed on 50 pair of testes in different age group of Bangladeshi people. The study was done from July 2006 to June 2007. Testes along with spermatic cord up to superficial inguinal ring were collected from the dead bodies. After removal from the body the spacemen were washed, tagged and preserved in 10% formal in.

Grouping of specimen
The collected samples were divided into four groups (A, B, C, and D) as shown in table I.

Table I: Grouping of the patients

Groups	age in year	no of specimen
A	15-29	19
B	30- 44	19
C	45- 59	8
D	60 and above	4
	Total	50

Parameters
Following morphological parameters of testes were measured

- Weight of testis in grams (gm)
- Length of testis in centimeter (cm)
- Breadth of testis in centimeter (cm)
- Diameter of seminiferous tubules (micron)
- Thickness of wall of seminiferous tubules (micron)

Measurement of weight
For this purpose each testis was weighed in grams by means of an analytical balance. Measurement was taken after fixation with 10% formalin. The specimen was socked dry with blotting paper fairly and then weighed.

Measurement of length
The length of testis was measured by slide caliper in centimeter. Measurement was taken from upper pole to lower pole of testis after fixation with 10% formalin.

Measurement of breadth
The breadth of testis was measured also by slide caliper in centimeter. Measurement was taken at the region of its maximum transverse diameter; generally it was in the middle portion of testis.

Measurement of transverse diameter of seminiferous tubules
The ocular micrometer was used for this purpose. The stage micrometer was used to measure one ocular division for magnification. At first stage micrometer was set on the microscope stage. Then the ocular micrometer was placed on eyepiece. On the stage micrometer there is a straight line that is one millimeter in length and that small division measured 0.01mm. The ocular micrometer also has a line, caliberated into small divisions.

100 division of stage micrometer = 1000 microns. 1 division of stage micrometer = 10 microns.

In low magnifications (10 x)
18 ocular micrometer divisions = 20 stage divisions. 1 ocular micrometer division = 20/18 stage divisions.= 1.11 stage divisions
1 stage division = 10 microns ocular division = 10x1.11 microns = 11.10 microns.

After determining the caliber of ocular micrometer, the stage micrometer was removed. The slide was placed one by one on the stage. The greatest longitudinal and transverse diameters of round seminiferous tubules were measured from microscopic focus in each group.

The average diameter of seminiferous tubule was calculated by following formula.
The average diameter = (Longitudinal diameter + transverse diameter) /2

Measurement of thickness of wall of seminiferous tubules
The average thickness of wall of seminiferous tubule was calculated by following way,

The average thickness = (Maximum thickness + Minimum thickness)/2

Results

Table II: Weight of testis in different age groups

Group	Right		Left	
	Range	Mean ±SD	Range	Mean ±SD
A	4.4-16.4	11.4±2.3	4.4-16.2	11.5±2.2
B	9.5-19.0	13.4±2.5	8.9-18.5	13.2±2.5
C	13.6-	17.3±4.0	13.2-25.0	17.0±4.0
D	9.9-17.7	12.8±3.4	9.9-17.8	13.0±3.4

Table III: Length of testis in different age groups

Group	Right		Left	
	Range	Mean ±SD	Range	Mean ±SD
A	3.1-4.2	3.5±10.3	3.1-4.4	3.5±10.3
B	3.0-4.3	3.6±0.2	3.0-4.2	3.6±10.2
C	3.5-4.6	3.9±10.3	3.4-4.5	3.8±10.3
D	3.0-3.9	3.5±0.4	3.2-4.0	3.6±10.3

Table IV: Breadth of testis in different age groups

Group	Right		Left	
	Range	Mean ±SD	Range	Mean ±SD
A	2.0-2.6	2.3 10.2	2.0-2.6	2.3±0.1
B	2.2-2.7	2.4 10.1	2.1-2.7	2.4±10.1
C	2.4-2.9	2.6 10.2	2.3-2.8	2.5±0.2
D	2.2-2.5	2.3510.4	2.3-2.6	2.4±10.1

Table V: Average diameter and thickness of seminiferous tubules in different age

Age group	Diameter of seminiferous tubules		Thickness of seminiferous tubules	
	Right	Left	Right	Left
A	157.06±2.14	154.44±2.87	33.02±0.46	32.54±0.87
B	169.60±1.16	168.14±1.57	33.79±0.47	34.46±0.82
C	187.62±2.16	188.14±2.65	33.46±0.76	33.84±0.89
D	196.62±4.14	198.14±5.50	32.88±0.16	32.47±0.89

Table VI: Statistical analysis of table - II, III and IV

Group	Weight P value	Length P value	Breadth P value
A vs. B	P<0.05*	P<0.05*	P<0.05*
B vs. C	P<0.01**	P<0.001***	P<0.01**
C vs. D	P<0.05*	P>0.1 ^{ns}	P>0.1^{ns}

Statistical analysis done by unpaired `t' test and 'ns' = not significant, '*/**/***' = significant.

Table VII: Statistical analysis of table V

Group	Diameter of seminiferous tubules 'P' value	Thickness of seminiferous tubules 'P' value
A vs. B	<0.05*	P<0.3[1]
B vs. C	<0.05*	F,<0.3^{ns}
C vs. D	<0.01**	P>0.1[1]

Statistical analysis done by unpaired 't' test and 'ns' = not significant, '1'= significant.

Discussion

In this study the weight of testis was observed to be increased up to 59 years of age then decreased with advanced age which was statistically significant (P>0.05). This result was similar to the findings of Diamond et a1[3]. According to them testicular weight was much less in old age than younger. The weight of testis in adult was 10.5 to16.5 gm at present study which shows similarity to that observed by Williams et al.[1] According to them testicular weight was10.5 to 14 gm. Similar result also observed by White[6] (10-16 gm).

The mean breadth of adult testis was about 2.4 cm in the present study. The result was almost similar to that of Williams et al [1]. According to them the breadth of testis was 2.5 cm.

In the present study it was found that the average diameter of seminiferous tubules in group A, group B, group' C, group D was

125.54 microns, 147.42 microns, 188.43 microns, 196.74 microns respectively. It was evident from the present study that the average diameter of seminiferous tubules increased with the increasing age.
So these findings of tubular diameter in all groups agree with the findings of Sohval[7]. His findings were in pre pubertal period the tubular diameter was 42 5to 79 microns, in pubertal period the tubular diameter was 67 to 108 microns and in post pubertal period the tubular diameter was 150 to 200 microns.

The average diameter of seminiferous tubules in present study was 188.43+ 6.75 microns which shows similarity with that reported by William et al[1]. According to William et al[1] the tubular diameter in all adult was 120 to 300 microns. Similar result was observed by Hollinshead et al[8]. According to him the tubular diameter was 150 to 300 microns in adult. The average thickness of wall of seminiferous tubules in present study was 33.45±0.47 microns.
From the observed result of present study the following conclusions were drawn.

Conclusion

There were changes in the morphology of testes in relation to age. The weight, length and breadth of testis increase with increase of age up to 59 years. Epididymis lies in the lateral aspect of posterior border of testis. Vas deferens also lies in the posterior border of testis but medial to epididymis. There were changes in the diameter of seminiferous tubules in relation to age. Diameter of seminiferous tubules increased with the increasing age.

Further study with large sample size covering narrow age groups is recommended.

Limitation of study

Children are excluded due to less availability of child cadaveric testis during study period.

References

1. Williams PL, Warwick R, Dyson H, Benniater LH, editors. Gray's Anatomy, 37th edition. Edinburgh: Churchill and Livingstone; 1989. pp.1424-1429
2. David J Handelsman, Staraj. Journal of andrology; 1985; 6 pp 145.
3. Daniel Waj, Feinstein Ra, Howard- Peedle P, Baxley Wd (1982), Testicular volume of adolescents, J Pediatric, 101. P-503.
4. Diamond JM. Variation of Human Testis Size, Nature. J Anatomy 1986; pp 320, 488-489.
5. Datta AK. Essentials of Human Anatomy, Part-1, 6th edition. Kolkata: Current Book International; 2003. pp 298-305.
6. White RO (1982) Aspect of male infertility, William and Wilkins publishing company, England, pp733—755.
7. Sohval AR Histopathology of cryptorchidism. Am J med; 16 p 346.
8. Hollinshead S Textbook of Anatomy, 5th Ed. Lippincott Williams and Wilkins pp 654-655.