

Age Related Changes in Weight of the Thymus Gland of Bangladeshi People

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Abstract

Context: *Thymus is intimately related to the immuno regulatory mechanism of the body, its weight in general as well as at different age in a particular population might also be related to the overall immune status of that population.*

Thus the knowledge of the weight of the thymus at different ages may be helpful in planning of the medical and surgical treatment of thymus related problem as well as dealing patients from immunologic aspects

Objective: *To measure the age related changes in weight of the thymus gland of Bangladeshi people*

Study design: *A descriptive type of study*

Place and period of study: *The study was carried out in the Department of Anatomy, IPGMR Dhaka from October 1996 to March 1997.*

Materials: *40 (forty) thymuses from Bangladeshi cadaver of either sex were taken for this study.*

Method: *The collected samples were divided into four age groups ranged from still born to sixty years old individuals and comparative studies were done between different age groups.*

Result: *The thymuses increased significantly in weight steadily through the increasing age groups from the still born babies to <16yrs and then declines through the age still higher.*

Conclusion: *In the present study the weight of the thymus increases through the increasing age groups and then declined.*

Key words: *Thymus, Weight*

Introduction:

The thymus is one of the two central lymphoid organs, the other being the bone marrow¹. It is a bi lobed organ², situated in the superior mediastinum, extending from the pericardial sac caudally to the root of the neck cranially³. It becomes occupied by lymphocytes early in the fetal development⁴. It plays a central role in the development and maintenance of the lymphoid system. Its influence is exerted either through the production of hormone stimulating the growth of the peripheral lymphoid tissue or by both mechanisms⁵.

It is an epithelial organ infiltrated with lymphocytes. It is not a transitory organ. It persists and functions even until old age. At puberty its parenchyma begins to be reduced⁶.

The thymus attains its greatest relative weight at the end of fetal life, but its absolute weight continues increase up to about the time of puberty. It then begins to undergo involution which progresses rapidly until in the adult, when the organ becomes largely replaced by adipose cells. However the lymphoid tissue that remains retains the function³.

Materials and Method:

The study was performed on 40(forty) thymuses from Bangladeshi cadaver of either sex. The collected specimens were divided into four age groups from still born to sixty years old individuals.

The specimens of lowest age group (still born to <2yrs) were collected from the unclaimed dead bodies under the custody of the Director of Dhaka Medical College Hospital and those of higher age groups from the Department of Forensic Medicine of Dhaka Medical College, from October 1996 to 1997. The specimens were collected within 8 to 12 hours of death.

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The collected specimens were washed gently with tap water. Blood were removed as far as possible. Then each specimen were preserved and fixed in 10% formol saline solution.

The thymus glands were separated from other structures and excess water was soaked with blotting paper and the gland was weighed in gm on an electric balance.

Observation and results

The weight of the thymus gland was measured in 40(forty) cases. It is evident from Table-I and Fig- 1 that in the present study the lowest weight (9.72 ± 2.22gm) was found in the lowest age group (Group-A: still born to <2 yrs). The mean weight gradually increased in the next two higher age groups ((Group: B: 2to <8 years and Group C: 8 to <16yrs) being 20.17 ± 6.85gm and 35.40± 4.11 gm respectively. However in the highest age group (Group D:16 to 60 yrs) the mean weight decreased to 19.39± 7.11 gm which was still higher than that in the lowest age group.

Table-I
Weight of the thymus gland in different age groups (n=40)

Age group (years)	Number of specimens	Weight (gm)	
		Range	Mean ±SD
A (still born to <2)	8	6.20-12.50	9.72± 2.22
B (2 to < 8)	7	14.50-30.50	20.17± 6.85
C (8 to < 16)	8	25.20-50.30	35.40± 4.11
D (16 to 60)	17	9.10-29.70	19.39 ± 7.11

Statistical comparison between different age groups:

Groups A vs B: P <0.001 (Highly significant)

Groups B vs C: P <0.05 (Significant)

Groups C vs D

Groups A vs C | P <0.001 (Highly significant)

Groups A vs D

Groups B vs D: P > 0.05 (Non- significant)

All the comparisons were done using unpaired "t" test

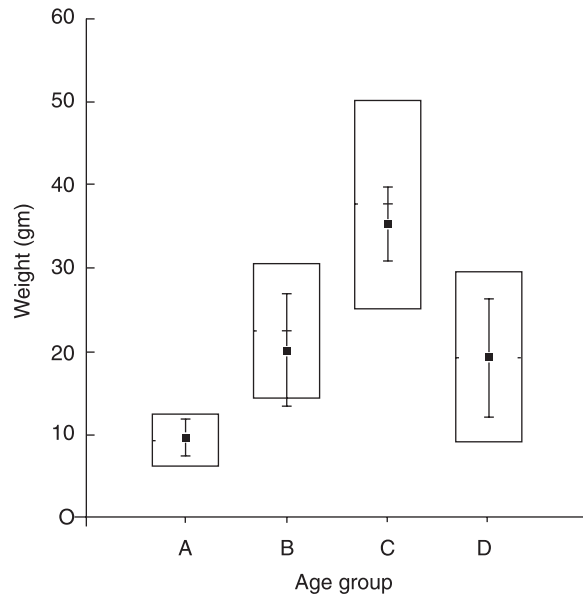


Fig.-1: Modified bar diagram showing the ranges of weight of thymus gland in gm in different age groups. The vertical lines within the bars show the mean values and standard deviations (SD) respectively.

The increase in weight from Group A through B to C and decreased from Group C to Group D was statically significant at every steps. However, the value in the Group D did not differ significantly than that in Group B.

Discussion

As shown in Table-I and Fig.-1 the mean thymic weight in the present study was found to increase significantly from Group A (still born to <2 yrs) through Group B (2 to <8 yrs) to Group C (8 to 16 yrs) and then decreased significantly from Group C to Group D (16 to 60 yrs)

Taher⁷ in his study with Bangladeshi people found that the mean weight of the thymus gland increased from 2 to 15 yrs and then declined.

Most of the foreign texts have mentioned that the weight of the thymus gland increases from birth to puberty^{2,3,8}. Subsequently the weight of the thymus is suppose to decline^{2,3}, during a process of age involution³, being progressively replaced by adipose tissue⁹. Griffith¹⁰ stated that individuals can display

considerable variations in thymic weight in all ages. Thus the thymic weight has been described as 10-15 gm at birth^{3,1} and continues to grow until puberty when it achieves a maximum weight of 20-50 gm⁸. There after it undergoes progressive atrophy to weight a little more than 5 to 15 gm in the elderly⁸.

Thus the age from which involution seems to be more is about puberty.

No marked difference could be found between the weight of the thymus of Bangladeshi people and that of the western people. Taher⁷ either could not find such marked differences regarding the thymic weight.

Reference:

1. Banister L. Haemolymphoid system. In:Williams PL, Banister LH, Berry MM, Collins P, Dyson M, Dussek JE et al., editors. Gray's anatomy. 38th ed. London: Churchill Livingstone; 1995; 1399-1450.
2. Ger R, Abrahams P. Essentials of clinical anatomy. Edinburgh: Churchill Livingstone; 1989.
3. Raviola E. The thymus. In: Bloom W, Fawcett DM, editors. A textbook of histology. 10th ed. Baltimore: The CV Mosby Co; 1975; 457-70.
4. Kelly DE, Wood RL, Andes AC, editors. Bailey's textbook of microscopic anatomy. 18th ed. Baltimore: Williams and Wilkins; 1984.
5. Miller JFAP, Osoba D. Current concepts of the immunological function of the thymus gland. *Physiol Rev* 1967; 47: 437-520.
6. Hammar JA. The new views as to the morphology of the thymus gland and their bearing on the problem of the function of the thymus. *Endocrinology* 1921; 5: 543-73.
7. Taher MA. Gross and histomorphological study of human thymus gland among Bangladeshi people (Thesis), University of Dhaka; 1996.
8. Cotran RS, Kumar V, Robbins SL. Robbins pathologic basis of diseases. 5th ed. Philadelphia: W.B. Saunders Co; 1995.
9. Wheater PR, Burket HG, Daniels VG. Functional histology : a text and colour atlas. 2nd ed. Edinburgh: Churchill Livingstone; 1987.
10. Griffith RG. Thymus gland. In Kissaine JM, editor, Anderson's pathology Vol. 2. 9th ed. Baltimore: The CV Mosby Co; 1990; 1493-511.