

ORIGINAL ARTICLE

Histological study of human thyroid gland relative proportion of parenchyma and stroma in thyroid glands of Bangladeshi People.

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ABSTRACT:

Deep cervical fascia forms a connective tissue sheath around the thyroid gland. Delicate trabeculae and septa penetrate the gland indistinctly dividing the gland into lobes and lobules which in turn composed of follicles.^{1,2,3} These follicles are structural units of thyroid gland which varies greatly in size and shape.⁴ The number of follicles varies in different age groups. The study was carried out to see the percentage of area occupied by follicles in the stained section of thyroid glands in different age groups. The collected samples were grouped as A (3.5 – 20yrs), B (21- 40yrs) & C (41 – 78yrs). Percentage of area occupied by follicles was (58.55 ± 10.72) in group A, (63.79 ± 12.35) in group B + (63.39± 8.29) in group C.

Introduction:

The thyroid gland is an endocrine gland situated in front of the trachea and the larynx.^{5,6} The gland is immediately covered by its fibrous capsule. Trabeculae and septa invade the parenchyma and partially outline it into lobes and lobules. The follicles are the functional units of the gland.

The follicles vary greatly in size and shape but they are usually irregularly spheroid in shape measuring 50 - 500µm. A follicle consists of a layer of simple epithelium enclosing a cavity that usually is filled with a jelly called colloid.^{7,8} The follicular epithelial cells have their apical ends facing inwards towards the follicular cavity and their basal ends resting on the basal lamina. In addition to the follicular cells, there are cells which are found singly or

in small groups in the follicular wall. These cells are parafollicular (C, Clear or light cells). The follicular cells secrete thyroxin (T4) and tri-iodothyronin (T3). These hormones are essential for normal growth and development. Absence of this gland or its hyposecretion causes mental and physical retardation, cold intolerance and in cases of children, it causes dwarfism.⁹ The Parafollicular cells secrete thyrocalcitonin which regulates Ca⁺⁺ metabolism and maintain optimum blood Ca⁺⁺ level. Functional state of the thyroid gland can be appreciated by knowing its histological structure.¹⁰ Optimum levels of its hormones are essential to maintain a normal physical and mental health. Keeping the above information in mind the study was done to observe the histological status of thyroid gland in Bangladeshi people.

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Materials and methods:

The study was done on 50 human thyroid glands. All these samples were collected from the dead bodies autopsied in the morgue of the Department of Forensic Medicine of Dhaka Medical College during the period of November 1994 to May 1995. The samples were grouped into three age groups. Group A- 3.5 yrs – 20yrs, group B- 21yrs-40yrs, groups C 41yrs – 78 yrs. The collected samples were washed thoroughly with running tap water and was preserved and fixed by 10% formol saline solution.

Microscopic study:

Six relatively fresh glands were selected from each age group for histological study. As because the central part of each lobe, in its long axis, is the most representative. Therefore tissue blocks were prepared for sectioning from the central part. The size of the tissue section was 5mm x5mm x2mm. Sections made were processed following standard histological procedures and was stained with hematoxylin and eosin stain. One good slide prepared from each of tissue block was chosen for study. The tissue section of the slide was divided into three parts by drawing three lines on the cover slip from the centre of the tissue. The lines were made to radiate towards the periphery through the 10 O'clock, 2 O'clock and 6 o'clock positions. From each division one microscopic field was chosen close to the centre as far as possible for studying. Therefore from each age group, a total of 3 x 6 or 18 fields were taken for study.

Procedure followed to study the relative proportion of parenchyma and stroma in the thyroid gland:

The thyroid gland is composed of parenchymatous tissue and stromal part. As the parenchymous part (i.e the follicles) includes the colloid and its lining epithelium with the basement membrane, all other tissue elements in the slides were considered as parts of the stroma. The follicles of the thyroid vary in size and shape. Therefore, to determine the area occupied by the follicles, a precision planimeter was used.

A coloured photomicrograph was taken to each field using an X20 objective and an X10 eye piece. Thus 3 x 6 or 18 photomicrographs were taken from each group of the specimens. The area of the photograph was measured with a centimeter scale and was noted as P.

Measurement of the total area (in the photograph) occupied by the follicles:

The study was done by the precision planimeter. A drawing sheet (art paper) was fixed over a wooden table. Then the photograph under study was placed over the drawing sheet near the centre of the table. A transparency sheet already marked with the outline of a photograph to be used was then placed over the photograph in such a way as to match the mark with the actual borders of the photograph. The sheet was fixed on the board with board pins. Then each of the follicles was outlined with a transparency marker pen (temporary) over the transparency sheet and was numbered. Then the area occupied by each follicle was measured with the help of the precision planimeter. Then the total area occupied by the follicles (F) in the photograph was calculated and expressed as the proportion of the total area occupied by the follicles and

stroma i.e the area of the photograph: (P). In this way all the photographs were studied one by one, and the relative proportions of the

parenchymal (follicular) and stromal tissue were calculated.

Observation and Results:

Table-1 Percentage of area occupied by follicles in the stained section of the thyroid glands in different age group.

Group	Number of specimens (3 fields for each specimen)	Area occupied by follicles (%)	
		Range	Mean \pm SD
A (3.5-20 yr)	6x3=18 fields	41.05 - 75.22	58.55 \pm 10.72
B (21-40 yr)	6x3=18 fields	47.38 - 92.92	63.79 \pm 12.35
C (41-78 yr)	6x3=18 fields	50.84 - 80.06	63.39 \pm 8.29

Percentage of area occupied by follicles.

Group A VS Group B – P> 0.10 (NS)

Group B VS Group C – P>0.10 (NS)

Group C VS Group C – P> 0.10 (NS)

in unpaired 't'
test of significance
of different groups.

Key: NS = Non-Significant.

On histological preparation, it was seen from Table –1 that the proportion of follicles in the thyroid section was around 60% and was the highest in the 21-40 age group (group-B). The lowest proportion of thyroid follicles was found in the 3.5-20 age group (group-A). However, the differences between the three age groups were not statistically significant.

Discussion:

It was evident from the results of the present study that the relative proportion of the parenchymous part and stromal part of the thyroid gland did not differ significantly in different age groups studied. This observation conforms to the statement, “the proportion of the gland occupied by the various histological components did not change appreciably with age.”¹¹

Conclusion:

Histologically, there were no significant differences in the proportion of parenchyma and stroma between different age groups.

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