

# ORIGINAL ARTICLE

---

## A MORPHOLOGICAL STUDY OF HUMAN THYROID GLAND IN THE POPULATION OF NORTH-EASTERN REGION OF INDIA

Debabani Bora<sup>1</sup>, Rajib Kr. Borah<sup>2</sup>, Santona Thakuria<sup>3</sup>, Rajat Dutta Roy<sup>4</sup>

### HOW TO CITE THIS ARTICLE:

Debabani Bora, Rajib Kr. Borah, Santona Thakuria, Rajat Dutta Roy. "A Morphological Study of Human Thyroid Gland in the Population of North-Eastern Region of India". Journal of Evidence based Medicine and Healthcare; Volume 2, Issue 25, June 22, 2015; Page: 3742-3746.

**ABSTRACT: BACKGROUND:** Due to the high incidence of thyroid disorders in the North-Eastern population of India a study was undertaken in Guwahati Medical College to see the age related changes in the morphology of the gland in the cadavers of this region. **AIM:** The study was done to compare the dimensions of the thyroid gland in this population with different studies around the world to see if it can throw any light why thyroid disorders are more common in this population and help clinicians to deal better. **MATERIALS AND METHOD:** The specimens were divided into three groups according to their ages. Twenty (21) specimens (both male and female) were taken from each age group. Statistical analysis was done by paired t-test and t was taken as significant if the value of t was greater than 2.18. **SUMMARY:** A study of all together of 63 specimen were taken up to see if any morphological differences in dimension exists in various age groups viz. pediatrics, adults and elderly and co relate with findings of previous workers and was statistically analyzed. **CONCLUSION:** The study showed that there was no morphological difference of this population with that of previous studies done in other parts of the world. Perhaps a histological study in molecular level will throw more light why this stratum of population is so vulnerable to thyroid disorders.

**KEYWORDS:** Thyroid gland, Length, Breadth, Thickness, Weight.

**INTRODUCTION:** Diseases of the thyroid have assumed great importance in India especially the population inhabiting the North-Eastern region. Hypothyroidism has become almost endemic in this part of the country. The sub Himalayan region is said to be the world's greatest goiter belt. Currently no less than 140 million people are estimated to be living in goiter endemic areas in India.

Due to the high incidence of thyroid disorders a study was undertaken in Guwahati Medical College to see the age related changes in the morphology of the gland in the cadavers of the population of this region.

The word thyroid named by Thomas Wharton in 1656 is derived from the greek word "Thyreos" meaning an oblong shield and "Eidos" meaning form. It is the largest exclusively endocrine gland in the body. The hormone secreted by the gland helps to maintain homeostasis within the body.

The lobes of the thyroid are approximately conical. Their ascending apices diverge laterally to the level of oblique lines on the lamina of thyroid cartilage and their bases are leveled with 4<sup>th</sup> or 5<sup>th</sup> tracheal rings. It usually weighs around 25 grams but can be variable. The gland is slightly heavier in females and enlarges during menstruation and pregnancy.

The present study was carried out in the Dept. of Anatomy Guwahati Medical College.

# ORIGINAL ARTICLE

**MATERIALS AND METHOD:** The specimen was divided into three groups according to their ages. Twenty (21) specimens (both male and female) were taken from each age group. The groups were divided into pediatric group (0-15 years), adult group (16-50 years) and elderly group (above 50 years). All the specimens were of subjects that belonged to the ethnic population of this part of the country. The thyroid glands were obtained from the following sources – Dept. of Forensic Medicine Guwahati Medical College from cadavers within stipulated time limit after fulfilling the formalities. Care was taken to collect the non-pathological specimens. Also specimen was taken from cases of neonatal deaths in the Dept. of Obstetrics and Gynecology after autopsies were done in the Forensic Medicine. Then the thyroid glands were washed in normal saline first, dried with blotting paper and weighed in an electronic weighing machine. The length, breadth and thickness were measured by means of graph paper, scale, pin to locate the maximum length/breadth and Vernier calipers mainly for thickness. Biometrical values of different age groups were statistically analysed and significant difference of length, breadth and thickness were noted. Statistical analysis was done by paired t-test and t was taken as significant if the value of t was greater than 2.18.

**OBSERVATION AND RESULTS:** In the present study the thyroid gland were grouped into three as it has been mentioned above that is Pediatric, adult and elderly groups. The results and observation were placed under the heading Biometric. The average length of the right and the left lobes of the thyroid glands in group 1, 2 and 3 were found to be 2.68cm and 2.58cm, 5.48cm and 5.26 cm, 4.66 cm and 4.59 cm respectively.

The average breadth of the right and left lobes of the thyroid glands in group 1, 2 and 3 were found to be 1.41 cm and 1.31 cm, 2.49 cm and 2.46cm, 1.98 cm and 1.90 cm respectively.

The average thickness of the right and left lobes of the thyroid glands in group 1, 2 and 3 were found to be 1.10 cm and 0.95 cm, 2.06 cm and 2.00 cm, 1.82 cm and 1.75cm respectively.

The average weight of the thyroid glands in group 1, 2 and 3 were found to be 6.06 gms, 26.71 gms and 19.37 gms. respectively. No significant statistical difference were found between right and left lobes of the thyroid glands though in all the groups length breadth and thickness were seen to be more in right than in the left lobes. The shape of the thyroid gland was found to be shield shaped or butterfly shaped in all the groups. Below are the different dimensions of the thyroid glands in different age groups in tabulated form.

		<b>Group I</b>	<b>Group 2</b>	<b>Group 3</b>
Length of thyroid in cm ± SE	Rt	2.68 ± 0.6199	5.48 ± 0.1169	4.66 ± 0.1561
	Lt	2.58 ± 0.6145	5.26 ± 0.0804	4.59 ± 0.1531
Value of 't'		0.1205	1.571	0.3005
Breadth of thyroid in cm ± SE	Rt	1.41 ± 0.3173	2.49 ± 0.0290	1.98 ± 0.0822
	Lt	1.31 ± 0.2899	2.46 ± 0.0263	1.90 ± 0.0957
Value of 't'		0.2360	0.9475	0.6338
Thickness of thyroid in cm ± SE	Rt	1.10 ± 0.2643	2.06 ± 0.0456	1.82 ± 0.0954
	Lt	0.95 ± 0.2201	2.00 ± 0.0340	1.75 ± 0.0889
Value of 't'		0.4610	1.0790	0.6131

Table 1

't' is significant if 't' >2.18; significance level = 5%.

# ORIGINAL ARTICLE

---

Degrees of freedom is 12.

Group 1 means 0 – 15 years.

Group 2 means 16 – 50 years.

Group 3 means above 50 years.

**DISCUSSION:** The results and observations obtained in the study reveals points of interest so these have been considered worthy of discussion in conjunction with the findings with other workers to draw definite conclusion in respect to morphology of the thyroid gland among different age groups of humans in the North eastern population. Investigation of the length breadth and thickness of the thyroid gland in humans have been reported by several workers like Kolliker (1854), Shennan<sup>1</sup> (1912), Johnson<sup>2</sup> (1960), Bloom and Fawcett<sup>3</sup> (1972), Sahana<sup>4</sup> (1980), Chakraborty<sup>5</sup> (1997), Larsen and Kronenberg<sup>6</sup> (2008).

The average weight was found to be 6.06 grams in the pediatric age group. The length breadth and thickness of the thyroid gland in the study are seen to be less at birth till it becomes more or less similar to adult dimensions at around attainment of puberty. The finding of the study is similar to Lochard,<sup>7</sup> Foster,<sup>8</sup> Kimber,<sup>9</sup> B. K. Khan.<sup>10</sup> In the 1<sup>st</sup> year of life the dimensions were seen in the study to be similar to the findings of Brennemnn.<sup>11</sup> The study also shows the dimensions are slightly more in right lobe than in the left lobe which is similar to the study of workers like Montgomery,<sup>12</sup> Chatterjee.<sup>13</sup> The shape was also found to be shield shaped or butterfly shaped similar to the observations made by previous workers. The weight of the gland in new born also corresponds to the observations of workers like Schaffer<sup>14</sup> and others. The weight increases in infancy and childhood. The present study was compared with the observations of B. P. Chatterjee<sup>15</sup> who says that during childhood weight increases at the rate of 0.054 grams per month and it was seen to be almost similar. In the study it was found that there was rapid increase in weight in adolescence similar to the findings of Brennemnn<sup>11</sup> and Chatterjee.<sup>15</sup> It reaches adult dimension at puberty where there is high functional activity.

Also in Adult group (Gr 2) the dimensions were similar to the observations of the previous workers like Robinson,<sup>16</sup> Andersen,<sup>17</sup> Artz,<sup>18</sup> Jubiz<sup>19</sup> and Gray.<sup>20</sup> The study shows that towards 50 years of age the dimensions of the thyroid gland starts decreasing due to increased fibrosis associated with ageing process.

In Elderly group (Gr 3) all the dimensions were seen to be decreasing in comparison to Gr 2. This is due to fibrosis and also due to decreased demand due to decrease in functional activity. Investigations on the ageing thyroid gland were done earlier by workers like Jonshon<sup>2</sup> and others.

**CONCLUSION:** The study shows that the morphology of the thyroid gland is almost similar to that of the findings of previous workers in other parts of India and the world. To see why this part of North-Eastern India is so susceptible to thyroid disorders a through histological study at the molecular level is needed to be undertaken.

# ORIGINAL ARTICLE

---

## REFERENCES:

1. Shennan Theodore, Postmortems and Morbid Anatomy, Constable and Co. Ltd. 1912, page 156.
2. Johnson M., The Older Patient, Paul B. Hoeber Inc. 1960, page 424.
3. Bloom and Fawcett, A Text Book of Histology, 10<sup>th</sup> Ed, WB Saunders Co, 1972, page 524.
4. Sahana SN, Human Anatomy, Vol 2 4<sup>th</sup> Ed, New Central Book Agency. 1985, page 434.
5. Chakraborty N, Fundamentals of Human Anatomy, 1<sup>st</sup> Ed, New Central Group Agency, 1997, page 150.
6. Larsen and Kronenberg, William's Textbook of Endocrinology, 2008.
7. Lockhart, Hamilton, Anatomy of Human Body, 1<sup>st</sup> Ed, Faber and Faber LTD., 1959, Page 485.
8. Foster C. L., Haver's Textbook of Histology, 8<sup>th</sup> Ed., William Heinemann Medical Books, 1964, page 215.
9. Kimber, Gray et al, Anatomy and Physiology, 4<sup>th</sup> Ed, The Mac Millan Co., 1964, page 423.
10. Khan B.K., Concise Textbook of Anatomy, Basic and Applied, 1<sup>st</sup> Ed., Current Books International, 2001 page 521.
11. Brennemnn, Practice of Pediatrics Vol 1., W.F. Prior, Co Inc, 1982, page 215.
12. Montgomery, Clinical Endocrinology for Surgeons, 1<sup>st</sup> Ed., Edward Arnold Pub, 1963, page 218.
13. Chatterjee CC, Human Physiology Vol 2, 11<sup>th</sup> Ed., Medical Allied Agency, 2006.
14. Alexander J Schaffer, Markowitz et al, Diseases of the New Born, Chapter 55, Disorders of Thyroid Gland, WB Saunders Co, page 197.
15. Chatterjee BP, A Short Textbook of Surgery, Vol. 1, 2<sup>nd</sup> Ed., New Central Book Agency, 1978, page 573.
16. Robinson James O., Surgery 1<sup>st</sup> Ed., Orient Longman, page 134.
17. Andersen William, Boyde's Pathology for Surgeons, 8<sup>th</sup> Ed., WB Saunders Co, page 171.
18. Artz, Cohn, Davis, A Brief Textbook of Surgery, 1<sup>st</sup> Ed., WB Saunders Co., 1976, page 304.
19. Jubiz William, Endocrinology 1<sup>st</sup> Ed, McGraw Hill Book Co, page 35.
20. Gray's Anatomy, 40<sup>th</sup> edition, Churchill Livingstone Elsevier 2008, page 462.

# ORIGINAL ARTICLE

---

**AUTHORS:**

1. Debabani Bora
2. Rajib Kr. Borah
3. Santona Thakuria
4. Rajat Dutta Roy

**PARTICULARS OF CONTRIBUTORS:**

1. Assistant Professor, Department of Anatomy, Jorhat Medical College and Hospital.
2. Assistant Professor, Department of Medicine, Jorhat Medical College and Hospital.
3. Assistant Professor, Department of Anatomy, Jorhat Medical College and Hospital.

4. Assistant Professor, Department of Anatomy, Jorhat Medical College and Hospital.

**NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:**

Dr. Debabani Bora,  
Assistant Professor,  
Department of Anatomy,  
Jorhat Medical College,  
Jorhat – 785001.  
E-mail: debabanibora@gmail.com

Date of Submission: 13/06/2015.  
Date of Peer Review: 14/06/2015.  
Date of Acceptance: 20/06/2015.  
Date of Publishing: 22/06/2015.