

**Original article**

**Weight of the Human Thyroid Gland – A Postmortem Study**

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**Abstract**

**Context:** A cross-sectional study was designed to find out the difference in weight of the thyroid gland of Bangladeshi people in relation to age and sex and to compare with previous local and foreign studies. **Materials & Methods:** The present study was performed on 60 post mortem human thyroid gland (39 of male and 21 of female) collected from unclaimed dead bodies which were in the morgue under examination in the Department of Forensic Medicine, Dhaka Medical College, Dhaka. The samples were divided into three age-groups including Group A (10-20 years), Group B (21-50 years) & Group C (>50 years) and the weight of the thyroid glands were measured and recorded. **Results:** The mean weight of the thyroid gland in male was 15.14 gm, 19.20 gm and 14.64 gm and in female was 16.02 gm, 19.03 gm and 14.67 gm in group A, B and C respectively. The mean weight of the thyroid gland was 15.48 gm in group A, 19.15 gm in group B and 14.65 gm in group C. There was no difference in mean weight of the thyroid gland between male and female. The difference in mean weight of the thyroid gland between group A & group B and group B & group C were found statistically significant. The weight of the gland was found to increase from early childhood and puberty up to 50 years of age and then decrease.

**Key words:** Thyroid gland, Weight of thyroid gland.

**Introduction:**

The thyroid gland is a very important endocrine gland, which is concerned with rate of metabolism, blood calcium level, and affects on growth and development in mammals<sup>1</sup>. The thyroid gland is a notably labile gland that varies greatly in size and structure<sup>2</sup>. There is a limitation of published work on morphological variations of the thyroid gland in different age groups of Bangladeshi people. We mainly depend on foreign text and literatures. However, we need our own standard baseline from which we can compare the morphological parameter like weight of thyroid gland of our own population<sup>3</sup>. Several authors from various countries reported the data on thyroid

gland's weight but still to set a normal range considering the variations in race, age, sex and other environmental factors like iodine intake, seasonal variation as well as different measuring procedures<sup>4</sup>. Besides, the iodine intake of Bangladeshi people is very inadequate. Results of the morphological study of the thyroid in Bangladeshi people are most likely to differ from those of with adequate iodine intake<sup>5</sup>, as iodine is very essential for the biological activity of the thyroid gland<sup>6</sup>. It has been observed by various researchers that the dimensions of different organs in Bangladeshi population have got variations from those of the western population<sup>5</sup>. Therefore, it has been designed to study the

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**Table I:** Grouping of the sample of the present study (n = 60).

Group	Age limit in years	Number of samples	
		Male	Female
A	10-20	08	05
B	21-50	24	10
C	>50	07	06

weight of this important gland to see the variation with age and sex in Bangladeshi people as well as with those of western people.

**Materials:**

A cross-sectional study was designed and done in the Department of Anatomy, Dhaka Medical College, Dhaka from January to December 2008, based on collection of 60 human thyroid glands from the unclaimed dead bodies that were under examination in the Department of Forensic Medicine, Dhaka Medical College, Dhaka from February to October 2008. All the samples were collected within 24-36 hours of death without any sign of putrefaction, from medicolegal cases excluding hanging, poisoning, any cutting or crushing injury to

the thyroid gland and known case of thyroid disease.

**Methods:**

After isolation, the samples were divided into three age-groups i.e. Group A (10-20 years), Group B (21-50 years) & Group C (>50 years) according to Brown, Al-Moussa and Beck (1986) 7.

**Measurement of weight of the thyroid gland:**

The whole of the thyroid gland was taken and its outer surface was dried with blotting paper. Then the gland was weighed by means of a digital balance (SCIENTECH ZSA 210, made in USA) in grams.

**Statistical processing of data:**

The collected data were processed and statistical analyses were done by unpaired Student’s ‘t’ test and one-way ANOVA test. All the statistical analyses were done by using the SPSS 11.0 version.

**Results:**

The results of the present study are given in Table-II.

**Table II:** Weight of the thyroid gland

Group (n)	Sex (n)	Weight in gm Mean±SD	P value	Group weight in gm Mean±SD	P value
A (13)	Male (8)	15.14±1.34 (12.80-16.40)	>0.10ns	15.48±1.14 (12.80-16.40)	A vs B <0.01**
	Female (5)	16.02±0.32 (15.60-16.40)			
B (34)	Male (24)	19.20±4.75 (12.20-29.20)	>0.50ns	19.15±4.43 (12.20-29.20)	B vs C <0.001***
	Female (10)	19.03±3.77 (13.50-24.70)			
C (13)	Male (7)	14.64±2.07 (12.30-17.50)	>0.50ns	14.65±2.44 (11.60-18.40)	A vs C >0.50ns
	Female (6)	14.67±3.02 (11.60-18.40)			

Figures in parentheses indicate range. Comparison between sex done by unpaired Student's 't' test and between different age group by One-way ANOVA (PostHoc), ns = not significant, \*\*/\*\* = significant.

There was found no difference in mean weight of the thyroid gland between male and female in any age group (Table-II). Significant difference was found in between age groups (Table-II). The weight of the gland was found to increase from early childhood and puberty up to 50 years of age and then decrease.

### **Discussion:**

In 1938, Noland stated that the weight of the thyroid gland is 18-31 gm<sup>8</sup>. Mortensen, Woolner, Bannett (1955)<sup>9</sup> studied 821 cadavers with clinically normal thyroid gland and showed that the average weight of the normal thyroid gland depends almost entirely on the age of the person and is not consistently affected by sex or geographical residence. Pankow, Michalak, McGee (1985)<sup>10</sup> found male thyroid glands in the age group 20-29 years showing an average of 16.4 gm, in males of 30-69 years 18.5 gm and in females of 20-69 years was 14.4 gm. Khatun (1991)<sup>4</sup> observed 37 thyroid glands of Bangladeshi people and found the highest mean weight of the gland was in Group C (21-40 years), lesser in Group B (11-20 years) and Group D (41-65 years) and the lowest in Group A (5-10 years). She also found that glands were heavier in males than that of females in Group D. Enayetullah (1996)<sup>5</sup> studied 50 thyroid glands and found that the highest mean weight of the gland was in Group B (21-40 years) (17.85±6.75 gm), lesser in Group C (41-78 years) (14.35±5.86 gm) and the lowest in Group A (3½-20 years) (5.97±3.55 gm), where he found that the average weight of the gland was significantly lower in the first two decades of life in comparison to older aged people. He also observed that there was no significant difference with sex but had a positive correlation with the height of the

individual. Langer (1999)<sup>11</sup> observed that a typical thyroid gland was considered to be about 20-25 gm with the accepted upper normal size of 30 gm, while in iodine replete population, reported mean weight was of about 10 gm with an upper normal size of 20 gm. In Germany, Fleischmann and Hardmeier (1999)<sup>12</sup> stated the results of 420 autopsies, where the thyroid glands were weighed, then serial sections were made and examined histologically to exclude thyroid pathology e.g. goiter. There was an age-dependent increase in mean thyroid weight. In the 7th decade, the mean weight exceeded 29 g and weights above that were regarded as goitre. Harjeet, Sahni, Jit and Aggarwal (2004)<sup>13</sup> studied 210 cadaveric thyroid gland in Chandigarh zone of northwest India and found the mean weight of the gland in males 15.01±7.69 gm and in females 13.16±5.64 gm. Sexual and age-wise differences were found statistically insignificant. Begum (2004)<sup>14</sup> observed 60 thyroid glands and found that the mean weight was the highest in Group B (21-50 years) (15.96±5.06 gm), lesser in Group C (>50 years) (13.56±3.60 gm) and the lowest in Group A (upto 20 years) (8.18±3.32 gm). Kumar, Abbas and Fausto (2004)<sup>15</sup> stated that the weight of the adult thyroid gland is approximately 15-20 gm. Sultana (2005)<sup>3</sup> studied 60 thyroid glands and found that the highest mean weight of the gland was in Group B (19-45 years), lesser in Group C (>45 years) and the lowest in Group A (upto 18 years) and greater in males (19.83 gm) than that of females (17.08 gm). She also found correlation between increasing weight of the gland with the increasing height of the individual. Berkovitz (2005)<sup>16</sup> stated that the weight of the gland is about 25 gm but varies, slightly heavier in females and slightly enlarged during menstruation and pregnancy. Narongchai duo (2008)<sup>17</sup> studied different organs' weight in Thai population where various organs were collected from 269 males and 230 females. They found the mean weight of the thyroid gland to be 17±0.6 gm and 17±0.4 gm and

there was no difference in weight in either sex. In the present study, there was found no difference in mean weight of the thyroid gland between male and female. But the weight of the gland was found to increase from early childhood and puberty up to 50 years of age and then to decrease gradually. The observations of Noland (1938)<sup>8</sup> and Fleischmann and Hardmeier (1999)<sup>12</sup> were of higher value in comparison to that of the present study. The findings of the present study are more or less in agreement with the previous studies except that of Khatun (1991)<sup>4</sup>, as she found variation with sex in 41-65 years age group and Harjeet, Sahni, Jit and Aggarwal (2004)<sup>13</sup> where they found no difference between age groups.

**Conclusion:**

Further studies with larger sample and high technical backup, from both goiter endemic and non-endemic zones, are recommended.

**Ethical Clearance:**

This research work was approved by the Ethical Review Committee of Dhaka Medical College, Dhaka.

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