

# Study of thyroid dysfunction in young adults coming to tertiary care hospital Kanpur

Pallavi Anand<sup>1</sup>, Parul Gupta<sup>2\*</sup>

<sup>1</sup>Associate Professor, <sup>2</sup>Tutor, Dept. of Biochemistry, Rama Medical College and Hospital, Kanpur, Uttar Pradesh, India

\*Corresponding Author: Parul Gupta

Email: parul2080@gmail.com

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## Abstract

**Introduction:** The aim of this study was to check and compare FT3, FT4 and TSH levels in young adults (age group 18 – 35) for thyroid dysfunction. To check the thyroid hormones level in young adults (age group 18 – 35) in control and hypothyroidism and to compare them.

**Materials and Methods:** The study group included 200 subjects (young adults) taken from Rama Medical College and hospital, Kanpur. In which 100 were hypothyroidism and 100 were control. The thyroid profile (FT3, FT4 and TSH) was analysed in these individuals by Electrochemiluminescence technique.

**Result:** When control group was compared with hypothyroidism group then significant increase in TSH level and significant decrease in FT3 and FT4 level was found in hypothyroidism group. When level was compared between male (n=31) and female (n=69) then significant increase of TSH level was found in female group. When level was compared between male (n=32) and female (n=68) group in hypothyroidism then significant increase in TSH level was found in female group. The FT3 and FT4 levels were non-significant between male and female within the groups in both control and hypothyroidism. The levels of (TSH, FT3 and FT4) were significant higher in male and female groups in hypothyroidism when compared to male and female groups in control.

**Conclusion:** This study suggests that TSH level increases with age which is irrespective to gender difference.

**Keywords:** Hypothyroidism, Free triiodothyroxine, Free thyroxine, Thyroid stimulating hormone.

## Introduction

Thyroxine (T4) and tri-iodothyroxine (T3) are known as thyroid hormones. These are secreted by the thyroid gland which work under the influence of the hypophyseal thyrotropin releasing hormone (TRH) and thyroid stimulating hormone (TSH) of anterior pituitary.<sup>1</sup>

The main hormone of thyroid gland is thyroxine which is secreted 80 mcg per day. T3 is secreted only 4 mcg per day by thyroid gland.<sup>2</sup> In normal condition the thyroxine release is 93%, whereas tri-iodothyroxine release is 7% by thyroid gland approximately.<sup>3</sup>

Improper secretion of thyroid hormones can lead to many thyroid disorders. Impaired peripheral conversion of thyroxine (T4) to tri-iodothyroxine (T3) is a condition of low T3 syndrome.<sup>4</sup> The TSH concentration is high and T3 and T4 concentration is suppressed in primary hypothyroidism. While TSH concentration is suppressed and T3 and T4 concentration is high in primary hyperthyroidism.<sup>5</sup>

Increase age can lead to low changes in endocrine glands which may include low production of hormones or may be sensitivity decreases for the target organ.<sup>6</sup> There are standing controversy about the thyroid function test results in the elderly.<sup>7</sup>

The concentration of thyroid hormones and TSH changes with aging.<sup>8</sup> The excess deficiency may cause decreased libido and impotence in males.<sup>9</sup>

In elderly individuals the nonspecific clinical manifestations of hypo and hyperthyroidism also cause confusion in the clinical setup. On the other hand the value of thyroid profile may move outside the normal ranges applicable to younger age group.<sup>10</sup>

In patients with primary hypothyroidism there is a decreased secretion of FT4 and FT3 which leads to a reduction in the serum concentrations of the two hormones eventually resulting in an increased thyrotropin secretion. The causes of primary hypothyroidism include chronic autoimmune thyroiditis, iodine deficiency or excess, transient thyroiditis, congenital thyroid agenesis, subtotal thyroidectomy, subacute granulomatous thyroiditis and drugs like amiodarone and thionamide.<sup>11,12</sup> Hypothyroidism can be either subclinical or overt. Subclinical hypothyroidism is characterized by high TSH concentration and normal FT4 and FT3 concentration in the serum. Such patients will be asymptomatic. In overt hypothyroidism, the TSH levels will be high and FT4 levels will be low. Patients with a high serum TSH concentration and a low serum FT4 confirm the diagnosis of hypothyroidism. Treatment of primary hypothyroidism in adults should be based on their disease condition (cardiac and pregnant patients).<sup>12,13</sup>

In sub-clinical hyperthyroidism the levels of T3 and T4 hormones are normal but TSH is low.<sup>14</sup> Similarly high TSH with normal T3 and T4 hormones indicate hyperactivity of TSH as a result of defective negative feedback mechanism.<sup>15,16</sup> Subclinical hypothyroidism is not associated with impaired physical functions or depression in individuals aged 65 years and older.

## Materials and Methods

This study was conducted in the Department of Biochemistry, RAMA Medical College & Hospital,

Mandhana, Kanpur, Uttar Pradesh, India from August 2017 to March 2018 after obtaining approval from Institutional Ethics Committee and written informed consent. The thyroid profile (free tri-iodothyroxine, free thyroxine and thyroid stimulating hormone) was analysed by Electrochemiluminescent immunoassay method in 200 individuals in which 100 were hypothyroidism and 100 were control. Serum TSH, FT3 and Ft4 level was evaluated in hypothyroidism and control. Reference values: FT3 = 1.71-3.71 pg/ml; FT4 = 0.70-1.48 ng/ dl; TSH=0.35-4.90  $\mu$ IU/ml.

The present study was carried out with aim to evaluate the thyroid profile of young adult age group of both sexes in control and hypothyroidism.

**Result**

The present study was conducted between 100 Control and 100 hypothyroidism patients of age group between 18-35 years taken from RAMA Hospital, Kanpur. The mean $\pm$ SD values were found out between males and females in both the groups and was compared independently by statistical software SPSS version 2.2

**Comparison & mean $\pm$ sd between control and hypothyroidism group**

Group	TSH	FT3	FT4
Control (100)	1.88 $\pm$ 1.33	2.52 $\pm$ 0.85	1.42 $\pm$ 0.38
Hypothyroidism (100)	11.69 $\pm$ 1.71	0.76 $\pm$ 0.33	0.99 $\pm$ 0.27
P value	<0.001	<0.001	<0.001

When control group was compared with hypothyroidism by upaired p test then it was found that TSH value of control (1.88 $\pm$ 1.33) was significantly (p<0.001) lower than TSH value of hypothyroidism (11.69 $\pm$ 1.71).

When control group was compared with hypothyroidism by upaired p test then it was found that FT3 value of control (2.52 $\pm$ 0.85) was significantly (p<0.001) higher than FT3 value of hypothyroidism (0.76  $\pm$  0.33).

When control group was compared with hypothyroidism by upaired p test then it was found that FT4 value of control (1.42 $\pm$ 0.38) was significantly (p<0.001) higher than FT4 value of hypothyroidism (0.99  $\pm$  0.27).

**Comparison & mean $\pm$ sd between male & female in control group**

Group	TSH	FT3	FT4
Male (31)	0.78 $\pm$ 0.42	2.52 $\pm$ 0.85	1.42 $\pm$ 0.36
Female (69)	2.37 $\pm$ 1.30	2.42 $\pm$ 0.82	1.38 $\pm$ 0.41
P value	<0.001	0.07*	0.65*
*Not significant			

When male of control group was compared with female of control group by upaired p test then it was found that TSH value of males (0.78 $\pm$ 0.42) was significantly (p<0.001) lower than TSH value of females (2.37 $\pm$ 1.30).

When male of control group was compared with female of control group by upaired p test then it was found that FT3 value of males (2.52 $\pm$ 0.85) was not significantly (p<0.07) higher than FT3 value of females (2.42 $\pm$ 0.82).

When male of control group was compared with female of control group by upaired p test then it was found that FT4 value of males (1.42 $\pm$ 0.36) was not significantly (p<0.65) higher than FT4 value of females (1.38 $\pm$ 0.41).

**Comparison & mean $\pm$ sd between male & female in hypothyroidism group**

Group	TSH	FT3	FT4
Male (32)	10.53 $\pm$ 1.64	0.78 $\pm$ 0.34	0.92 $\pm$ 0.24
Female (68)	12.23 $\pm$ 1.46	0.75 $\pm$ 0.33	1.03 $\pm$ 0.27
P value	<0.001	0.64*	0.06*
*Not Significant			

When male of hypothyroidism group was compared with female of control group by upaired p test then it was found that TSH value of males (10.53 $\pm$ 1.64) was significantly (p<0.001) lower than TSH value of females (12.23 $\pm$ 1.46).

When male of hypothyroidism group was compared with female of control group by upaired p test then it was found that FT3 value of males (0.78 $\pm$ 0.34) was not significantly (p<0.64) higher than FT3 value of females (0.75 $\pm$ 0.33).

When male of hypothyroidism group was compared with female of control group by upaired p test then it was found that FT4 value of males (0.92 $\pm$ 0.24) was not significantly (p<0.06) lower than FT4 value of females (1.03 $\pm$ 0.27).

**Comparison & mean $\pm$ sd between male control and male hypothyroidism group**

Male Group	TSH	FT3	FT4
Control (31)	0.77 $\pm$ 0.41	2.75 $\pm$ 0.88	1.42 $\pm$ 0.37
Hypothyroidism (32)	10.53 $\pm$ 1.64	0.78 $\pm$ 0.33	0.92 $\pm$ 0.24
P value	<0.001	<0.001	<0.001

When control group male was compared with hypothyroidism group male by upaired p test then it was found that TSH value of control (0.77 $\pm$ 0.41) was significantly (p<0.001) lower than TSH value of hypothyroidism (10.53 $\pm$ 1.64).

When control group male was compared with hypothyroidism group male by upaired p test then it was found that FT3 value of control (2.75 $\pm$ 0.88) was significantly (p<0.001) higher than FT3 value of

hypothyroidism ( $0.78 \pm 0.33$ ).

When control group male was compared with hypothyroidism group male by upaired p test then it was found that FT4 value of control ( $1.42 \pm 0.37$ ) was significantly ( $p < 0.001$ ) higher than FT4 value of hypothyroidism ( $0.92 \pm 0.24$ ).

#### Comparison & mean $\pm$ sd between female control and female hypothyroidism group

Female Group	TSH	FT3	FT4
Control (69)	$2.37 \pm 1.30$	$2.42 \pm 0.82$	$1.41 \pm 0.39$
Hypothyroidism (68)	$12.23 \pm 1.46$	$0.75 \pm 0.33$	$1.03 \pm 0.27$
P value	$< 0.001$	$< 0.001$	$< 0.001$

When control group female was compared with hypothyroidism group female by upaired p test then it was found that TSH value of control ( $2.37 \pm 1.30$ ) was significantly ( $p < 0.001$ ) lower than TSH value of hypothyroidism ( $12.23 \pm 1.46$ ).

When control group female was compared with hypothyroidism group female by upaired p test then it was found that FT3 value of control ( $2.42 \pm 0.82$ ) was significantly ( $p < 0.001$ ) higher than FT3 value of hypothyroidism ( $0.75 \pm 0.33$ ).

When control group female was compared with hypothyroidism group female by upaired p test then it was found that FT4 value of control ( $1.41 \pm 0.39$ ) was significantly ( $p < 0.001$ ) higher than FT4 value of hypothyroidism ( $1.03 \pm 0.27$ ).

#### Discussion

The present study was conducted on 100 hypothyroidism and 100 control subjects of age group 18 – 35 years. It was found that TSH level in hypothyroidism was significantly higher. Whereas the levels of FT3 and FT4 was significantly lower in hypothyroidism. The similar findings were observed by Unnokrishnan AG et al and Hoermann R et al.<sup>17,18</sup>

When TSH, FT3 and FT4 values were compared between males and females in control and hypothyroidism group then it was found the value was significantly higher in females compared to males. The observations of thyroid profile in both men and women show a definite increase in TSH level and decrease in FT3 and FT4 level in control individuals as compared to hypothyroidism individuals. All the three changes were significant. The similar findings were observed by Harman SM et al.<sup>19</sup>

When TSH, FT3 and FT4 values were compared within the group between the male and females in control and hypothyroidism then it was found that the TSH levels were significantly higher in females but FT3 and FT4 levels were non-significant. Previously no findings were observed regarding the comparison between the male and females in control and hypothyroidism young adults.

#### Conclusion

The TSH, FT4 and FT3 levels in hypothyroidism exhibit different patterns according to the different gender in young adults in comparison to control. The TSH levels are highly raised in females hypothyroidism group in comparison to males. The gender wise distribution of thyroid profile in primary hypothyroidism amongst males and females showed raised levels of TSH and lower levels of FT3 and FT4 was found in age group of 18-35 year in both sexes, and severity decreased in males. The primary hypothyroidism was more pronounced in females compared to males except in young adults.

**Conflict of Interest:** None.

#### References

- Genitale F, DiLano R and Salvalace G. Bio-synthesis and secretion of thyroid hormone. *Endocrinology* Vol. 1 (3<sup>rd</sup> edition) (Degroot LJ). W. B. Saunder's Co; Philadelphia 1995 pp 535.
- Ganong's Review of Medical Physiology, 25<sup>th</sup> edition p.339.
- Guyton and Hall. Textbook of Medical Physiology, 2<sup>nd</sup> edition p.594.
- Kelly GS. Peripheral metabolism and thyroid hormones: a review. *Altern Med Rev* 2000;5:306-33.
- Maussier ML, D'Errico G, Putignano P, Reali F, Romano L, Satts MA. Thyrotoxicosis: clinical and laboratory assessment. *Rays* 1999;24:263-72.
- Mariotti S, Eranceschi A, Lossarizza, and Pinchera A. The aging thyroid. *Endocr Rev* 1995;16:686-715.
- Woeber KA. Aging and the thyroid. *West J Med.* 1985;143:668-9.
- Hesch RD, Gatz J and Pape. Total and free triiodothyronine and thyroid binding globulin concentration in elderly human persons. *Eur J Clin Invest* 1976;6:139-45.
- Lenzen S and Bailly CJ. Thyroid hormones gonadal and adrenocortical steroids and function of islat of Langerhans. *Endocrinol Rev* 1984;5:411.
- Seck T, Scheidt C, Zeigler R and Dfeilsclifer J. Prevalence of thyroid gland dysfunction in 50-80 years of old patients. An epidemiological cross-sectional study of southwestern Germany. *Med Klin* 1997;92:642-9.
- Shargel L, Mutnick AH, Souney PF, Swanson LN editors. *Comprehensive Pharmacy Review*. 8<sup>th</sup>ed New Delhi: Wolters Kluwer (India) Pvt Ltd; 2013.
- Jameson and Groot D editors. *Endocrinology: Adult and Pediatric Volume 2*. 7th ed. India: Reed Elsevier India Pvt. Ltd; 2016.
- Wass J, Owen K, Turner H editors. *Oxford handbook of endocrinology and diabetes*. 3rd ed. India: Oxford University Press; 2014.
- Koutras DA. Subclinical hyperthyroidism. *Thyroid* 1999;311-15.
- Weintraub BD, Geishengion MC, Kourides IA and Fein H. Inappropriate secretion of thyroid stimulating hormone. *Ann Inter Med* 1981;95:339-51.
- Bayliss RL. *Thyroid disease*. New York Oxford University Press. 1992 pp 442-3.
- Unnokrishnan AG, Menon UV. Thyroid disorders in India an epidemiological perspective. *Indian J Endocrinol Metab* 2011;15(Suppl 2):S78-S81.

18. Hoermann R, Eckl W, Hoermann C, Larisch R: Complex relationship between free thyroxine and TSH in the regulation of thyroid function. *Eur J Endocrinol* 2010;162:1123-9.
19. Harman SM, Wehmann RE, Blackman MR. pituitary thyroid hormone function and thyrotropin responses to constant infusions of thyrotropin releasing hormone. *J Clin Endocrinol Metab* 1984;58:320-6.

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