

## Evaluation of Thyroid Function in Premenopausal and Postmenopausal Women: A Hospital Based Comparative Study.

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### Abstract

**Objectives:** This present study was to compare the thyroid profile (serum TSH, T<sub>4</sub> and T<sub>3</sub> level) in premenopausal and postmenopausal women.

**Methods:** All the data like age, health status and thyroid hormone values of all selected premenopausal and postmenopausal females were collected from clinical laboratory of Department of Biochemistry and medical record department. All the values were recorded. Female with history of major illness, Diabetes mellitus, Hypertension, endocrinal disorders, altered serum T<sub>3</sub>, TSH, and T<sub>4</sub>, operational patient with hysterectomy, women not attaining puberty and pregnancy were excluded from this study.

**Results:** Mean serum TSH (uIU/ml) level of premenopausal and postmenopausal women was 2.54± 1.43 and 2.97±1.74 respectively. And P value was 0.180. Mean serum T<sub>3</sub> (ng/ml) of premenopausal and postmenopausal women was 1.32±0.12 and 1.12±0.09 respectively. And p value was <0.0001. similarly, mean Serum T<sub>4</sub> (ug/dl) level of premenopausal and postmenopausal women was 9.72±1.87 and 9.23±0.74 respectively. And P-value was 0.088.

**Conclusions:** T<sub>3</sub> level significantly decreases in postmenopausal women as compared to premenopausal women. Serum TSH level increases and T<sub>4</sub> level decreases in postmenopausal women as compared to premenopausal but it is not statistically significant. Hence, changes occur in thyroid function of the premenopausal and postmenopausal women. This pattern of changes may influence due to physiological and some pathological factors.

**Keywords:** Thyroid Level, Premenopausal Women, Postmenopausal Women.

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### Introduction

Menopause begins 12 months after the final menses and is characterized by a continuation of vasomotor symptoms and by urogenital symptoms such as vaginal dryness and dyspareunia [1]. The mean age of menopause in Indian women was found out to be 45.03 years on average. In

western countries, the mean age at menopause is higher [2]. The endocrine system seems to perform well in older individuals in spite of ageing changes. However, some researchers opine that blood levels of some hormones may increase, decrease, or remain unchanged.

Some of the changes to thyroid gland may be adaptive while some others may require therapeutic intervention [3]. Lower levels of thyroid hormones in elderly females have been reported in some cases [4]. Other researchers opine that in some elderly people intercurrent nonthyroidal illness can reduce extrathyroidal conversion of thyroxine to triiodothyronine and thereby causing lower levels of hormone [5]. The number of Indian people suffering from thyroid disease is estimated to be about 42 million [5].

Thyroid diseases mainly affect women. The incidence of thyroid diseases is five to 20 times higher in women than men. The literature has shown an increasing trend of thyroid disease with increase in age. Occurrence of thyroid gland autoimmunity, hypothyroidism, nodular goitre and cancer occur most often in post-menopausal and elderly women than younger women [6]. 2 Thyroid functions are often influenced by the nutritional status, associated co morbidities, co factors such as body surface area and others [7,8]. Women in their 40s and 50s often suffer from symptoms including fatigue, moodiness, erratic periods, sleep problems, loss of sex drive and weight gain [9]. Objectives of our study was to compare the thyroid profile in premenopausal and postmenopausal women.

### Material & Methods

This present study was conducted in the Department of Biochemistry, Bhagwan

Mahavir Institute of Medical Sciences, Pawapuri, Nalanda, Bihar during a period from April 2022 to December 2022.

A total of 100 females were enrolled in this study, among them 50 females were premenopausal and 50 were postmenopausal. Premenopausal women were in age group of 20-30 years and postmenopausal women were in age group of 50-60 years.

All the data like age, health status and thyroid hormone values of all selected females were collected from clinical laboratory of the Department of Biochemistry. All the values were recorded. Female with history of major illness, Diabetes mellitus, Hypertension, endocrinal disorders, altered serum T<sub>3</sub>, TSH, and T<sub>4</sub>, operational patient with hysterectomy, women not attaining puberty and pregnancy were excluded from this study.

### Statistical Analysis

Data was analysed with the help of latest version of SPSS software. Mean  $\pm$  Standard deviations were observed. T-values were calculated. P-value were taken less than or equal to 0.05 ( $p \leq 0.05$ ) for significant differences.

### Observations

In the present study, 50 premenopausal women with age group of 20-30 years and 50 postmenopausal women with age group of 50-60 years were included.

**Table 1: Comparison of thyroid hormone levels in premenopausal and postmenopausal women.**

Thyroid hormones	Premenopausal (Mean $\pm$ S.D.)	Postmenopausal (Mean $\pm$ S.D.)	t-value	p-value
Serum TSH (uIU/ml)	2.54 $\pm$ 1.43	2.97 $\pm$ 1.74	1.350	0.180
Serum T3 (ng/ml)	1.32 $\pm$ 0.12	1.12 $\pm$ 0.09	-9.428	<0.0001
Serum T4 (ug/dl)	9.72 $\pm$ 1.87	9.23 $\pm$ 0.74	-1.723	0.088

When we compared the mean  $\pm$  standard deviations of serum TSH level of premenopausal and postmenopausal

women. p-value was found to be 0.180 which is not statistically significant. When compared the mean $\pm$  standard deviations of

serum T3 level of premenopausal and postmenopausal women, p- value was found to be  $<0.0001$ . which is extremely statistically significant. Similarly, when we compared the mean  $\pm$  S.D of T4 level of premenopausal and postmenopausal women, p value was found to be 0.088, which is not statistically significant.

### Discussions

Thyroid hormones play an important role in normal reproductive function both through direct effects on the ovaries and indirectly by interacting with sex hormone binding proteins. Thyroid dysfunction can lead to menstrual irregularities and infertility [10]. Diseases of the thyroid gland are among the most abundant disorders worldwide second only to diabetes [11]. Onset increases with age and it is estimated that 26% of premenopausal and menopausal women are diagnosed with thyroid disease[12]. The prevalence and incidence of thyroid disorders is influenced primarily by sex and age. Thyroid disorders are more common in women than men, and in older adults compared with younger age groups [13]. Overt thyroid dysfunction is uncommon in women less than 40 years old and in men. The impact of hypothyroidism on the menstrual cycle has been identified since the 1950s and leads to changes in cycle length and blood flow [14].

In the present study, we compared the thyroid level (TSH, T4 & T3) of 50 premenopausal and 50 postmenopausal women. we were found that the mean serum TSH level was higher in postmenopausal women as compared to premenopausal women, but it was not statistically significant ( $p=0.180$ ). Factors like anti-thyroid antibodies, nutritional iodine supply, hidden thyroid disease are associated with low TSH value in postmenopausal period and problems like age related sleep disturbances lead to increase in TSH level [15]. Aging is associated with changes in pituitary-thyroid axis. Increasing age causes shifting of TSH

value towards higher side [16] in absence of any clinical and pathological cause age related change in endocrinal system leads to decrease circulatory level of TSH, reduction in TSH bioactivity or reduced responsiveness of the thyroid to TSH could result in increased TSH secretion. Another possibility is that it may be due to occult thyroid disease in older people or simply an age-related alteration in TSH set point [17,18].

In our present study, mean T4 level was higher in premenopausal women as compared to postmenopausal women, but it was also not statistically significant. Age related decrease of serum T4 level was observed in other published studies. This decreased value of T4 could be due to hypometabolic state within cell associated with aging [19, 20] and decrease in peripheral conversion of T4 to T3 [21]. Lowered mean serum T4 value in older people was observed in other previous published study [22,21].

In the present study, mean T3 level was extremely statistically significant differences ( $p<0.0001$ ). That was T3 level was significantly decreased in postmenopausal women as compared to premenopausal women. Similar age related decrease value of T3 was observed in previous published studies [22, 23]. This could be due to decrease thyroid hormone production with advancing age (8, 9) or because of decrease in peripheral conversion of T4 to T3 [22, 23]. It is also possible that degradation rate of T3 increases in old age leading to decreased serum T3 levels [22].

In the present study, premenopausal were with age group of 20-30 years and postmenopausal women were with age group of 50-60 years. Chaurasia P et al, conducted a study in Gujarat to find out the age and sex variation of thyroid hormone. In females they found that TSH level were lowest  $<20$  years (Mean  $\pm$ SD =  $0.43\pm 0.00\mu\text{U/L}$ ) and highest in 20-40 years

( $2.43 \pm 1.38 \mu\text{U/L}$ ). It again became low in 40-60 years ( $1.71 \pm 1.84 \mu\text{U/L}$ ) and high above 60 years ( $2.27 \pm 1.85 \mu\text{U/L}$ ) [24]. The study by A. Khan showed normal range of TSH, T3 and T4 in females which he stated was due to taking the mean of large number of individuals. The TSH levels were higher in old age ( $4.40 \pm 0.1664 \mu\text{IU/ml}$ ) than adults ( $3.62 \pm 0.0891 \mu\text{IU/ml}$ ) [25]. The study by Garg N et al, in Ambala, India on 100 nos. of postmenopausal women above 45 years revealed that 21% of postmenopausal women were having subclinical hypothyroidism [26]. In the study by Joshi SA in 200 peri and postmenopausal females of Nagpur in the age group 40-55 years showed that the prevalence of hypothyroidism was 12.50% in these age groups, 1.5% being overt hypothyroidism and 11% cases of subclinical hypothyroidism [27]. Kuckian DJ, in a study conducted in Bangalore among 100 postmenopausal women, found that the prevalence of hypothyroidism was 22% and that of subclinical type was 8% while 2% of the females were suffering from thyrotoxicosis. Prevalence of hypothyroidism increased with increasing age. She concluded that thyroid dysfunction has a correlation with duration of menopause with maximum patients having more than 10 years of menopause [28,29].

### Conclusions

This study concluded that the T3 level significantly decreases in postmenopausal women as compared to premenopausal women. Serum TSH level increases and T4 level decreases in postmenopausal women as compared to premenopausal but it is not statistically significant. Hence, changes occur in the thyroid function of premenopausal and postmenopausal women. This pattern of changes may influence due to physiological and some pathological factors.

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