



**ORIGINAL RESEARCH PAPER**

**Physiology**

**A COMPARATIVE STUDY OF THYROID FUNCTIONS IN PREMENOPAUSAL AND POSTMENOPAUSAL WOMEN**

**KEY WORDS:** Premenopausal, postmenopausal women, serum TSH, Tri iodothyronin, Thyroxin

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**ABSTRACT**

**Introduction :** Thyroid gland plays a vital role in regulating overall body metabolism including reproductive function. Thyroid diseases are among most prevalent endocrine disorders worldwide especially in women, second only to diabetes. Menopausal age is more prone to develop hypothyroidism. Hypothyroidism and menopause share some symptoms. So it can be difficult to differentiate. So routine screening of serum TSH and Tri iodothyronin and Thyroxin level in climacteric period is recommended. Taking this aim and objective this comparative cross sectional study of thyroid function in pre and postmenopausal women was processed.

**Objective :** To evaluate and compare the serum TSH and thyroid hormone levels in pre and postmenopausal women and to find out the effect of any postmenopausal hormonal changes on thyroid functions.

**Method :** 56 premenopausal women of age group 20 – 30 years and 56 postmenopausal women of age group 50 – 60 years are evaluated for serum TSH and T<sub>3</sub>, T<sub>4</sub> level by ELFA technique on VIDAS instrument.

Statistical Analysis : Unpaired student's t test

**Result :** Mean serum TSH level in post menopausal women found higher than that in premenopausal women but difference was not significant. Serum T<sub>3</sub> and T<sub>4</sub> level in postmenopausal women found slightly lower than in premenopausal women.

**Conclusion :** Postmenopausal women should be monitored for serum TSH and thyroid hormone level for reducing risk of thyroid dysfunction

**INTRODUCTION –**

Thyroid diseases are among most commonest endocrine disorders worldwide. India too is no exception. Thyroid diseases are more prevalent in women between puberty and menopause. All thyroid diseases are in fact more common in women than in men<sup>1</sup> and may interfere with the reproductive system. Thyroid function and gonadal axes are related throughout the women's fertile period.

European Journal of Endocrinology published a study based on which scientists concluded that thyroid dysfunction is more common in women than in men<sup>2</sup>, although the risk of developing the health problems increases with age.

It is important to mention that women are more prone to develop goitrogenic effect of iodine deficiency in premenopausal period.<sup>3</sup> Carcinomas of the thyroid are 3 times more frequent in woman than man and peak rate occurs earlier in woman. Theses suggests role of estrogen in pathogenesis of thyroid disease.

Estrogen has both indirect and direct effect on thyroid cells which may affect thyroid functions. In peer reviewed study 2011 researchers examined and found that estrogen levels have role on thyroid receptors .<sup>4</sup> Thyroid receptors are the molecules that allow thyroid hormones to enter the cells.

Estrogen indirectly contributes to the thyroid economy by raising the thyroid binding globulins (TBG).<sup>5</sup>

Again according to some studies incidence of some thyroid diseases like hypothyroidism and nodular goiter is highest among postmenopausal and elderly women.

The diagnosis of thyroid dysfunction in these group of patients is difficult because the symptoms can be nonspecific or common with menopausal and ageing complaints.

Hypothyroidism and menopause share some symptoms. Hypothyroidism is most common in middle aged women which is the time at which woman are going through menopause. Hypothyroidism can increase or aggravate

symptoms associated with menopause.<sup>6</sup> Evidence shows that ladies with a thyroid disorder and sever menopause related symptoms, experienced tremendous relief after they received treatment for the problem with thyroid gland.

Hypothyroidism can contribute to the onset of complications associated with the "change". Eg- Most common complication of menopause is osteoporosis or loss of bone density and evidence shows that hypothyroidism can loss of bone density<sup>7</sup> too.

It is seen that the low levels of estrogen associated with menopause are generally treated with estrogen therapy. Hypothyroidism also requires the use of HRT. Oral estrogen therapy increases the dose of T<sub>4</sub> requirement in hypothyroid woman. With time overt hypothyroidism can develop in menopausal age and there may be absence of clinical symptoms. Therefore routine screening of thyroid function in the climacteric period to determine subclinical thyroid disease is recommended.<sup>8</sup>

**II. MATERIALS AND METHODS**

The current study is a self- descriptive cross- sectional study. Around hundred twelve subjects are supposed to be selected randomly from patients and also staffs of different department of Fakhruddin Ali Ahmed medical college and hospital, Barpeta, Assam. Out of total subjects fifty six subjects will be premenopausal. Questionnaires will be made and distributed to the subjects to know details of menstrual history and also to exclude any diseases.

IEC approval was taken for the study. Informed consent was taken.

**Inclusion criteria –** premenopausal women of age 20–30 yrs and postmenopausal women of age 50 – 60 yrs

**Exclusion criteria –** Patients with major chronic illness, eg. Diabetes mellitus, hypertension, endocrine disorders, patients on hormone replacement therapy, pregnancy or women who have not achieved puberty yet are excluded. Also the subjects taking drugs like lithium or steroids which may

affect thyroid functions are also excluded.

In each group serum TSH, T<sub>3</sub> and T<sub>4</sub> were estimated and analyzed. Thyroid hormones are measured by using Enzyme Linked Fluorescent Assay (ELFA) technique using an automated mini VIDAS instruments. The assay principle combines a one step enzyme immunoassay sandwich method with a final fluorescent detection. The concentration of serum TSH are expressed in  $\mu\text{IU/ml}$  and T<sub>3</sub> and T<sub>4</sub> in  $\text{ng/ml}$  and  $\mu\text{g/dl}$  respectively. Participants having TSH values between .4 – 5  $\mu\text{IU/ml}$ , T<sub>3</sub> values between 1 – 7  $\text{ng/ml}$  and T<sub>4</sub> values between 4.6 – 11.2  $\mu\text{g/dl}$  were considered as euthyroid.

**OBSERVATION AND RESULTS**

Table 1 shows the mean values for the Body Mass Index in pre-menopausal and post-menopausal women

Mean BMI & SD	Premenopausal Women	Postmenopausal Women	T value	P value	Remarks
	23.3 +/- 0.36	23.13 +/- 0.36	0.2045	0.4101	Not significant

Table II : Serum TSH value in pre and post menopausal women

	Pre menopausal	Post menopausal	T Value	P Value	Remark
Mean TSH And SD ( $\mu\text{IU/ml}$ )	4.56 (+/- 0.54)	5.34 (+/- 0.52)	0.86	1.196	Not significant at P <0.05

Table III : Mean T<sub>3</sub> value in pre and post menopausal women

	Pre Menopausal	Post menopausal	T Value	P Value	Remark
Mean T <sub>3</sub> (ng/ml)	2.26 (+/- 0.27)	1.06 (+/- 0.28)	1.63	0.05252	Not significant

Table IV : Mean T<sub>4</sub> values in pre and post menopausal women

	Pre Menopausal	Post menopausal	T Value	P Value	Remark
Mean T <sub>4</sub> and SD ( $\mu\text{g/dl}$ )	5.44 (+/- 0.08)	4.99 (+/- 0.08)	1.11	0.1345	Not significant

**DISCUSSION :**

Table I shows increase BMI in postmenopausal women but it is not significant. It may be due to one form of estrogen, called estradiol is decreased at menopause which helps to regulate metabolism & body weight. It is also seen that BMI and TSH both are increased in postmenopausal women. So it suggests that thyroid function could be one of the several factors acting in concert to determine body weight in population. Even slightly elevated serum TSH levels are associated with an increase in occurrence of obesity.<sup>9</sup>

**Table II :** shows increase TSH value 6.32 micron IU /ml in postmenopausal women than in premenopausal women which is also not significant. It may be due to underactive thyroid gland which will produce more TSH. It may be due to low estrogen level in postmenopausal women. Because estrogen level have role on thyroid receptors and may affect thyroid function.

Age is also a factor for increase TSH in postmenopausal women due to deficient nutritional iodine supply. Again serum level of TBG increase with age<sup>10</sup> decreasing circulating thyroid hormone, thereby increasing TSH. Aging is also associated with reduction in TSH bioactivity and decreased responsiveness of thyroid to TSH. It might be possible that variation in the level of serum TSH is non significant, as the endocrine functions those are essential for life, as adrenal and thyroid show a minimal overall changes in basal levels with ageing.<sup>11</sup> In the interpretation of thyroid function tests the physiological changes in secretion and metabolism of thyrotropin (TSH) and thyroid hormones must be considered . Also problem regarding sleep disturbance and altered sleep patterns with increasing age may lead to increase TSH level.<sup>12</sup>

Table III & Table IV shows: shows decreased level of total thyroxin and triiodothyronine in postmenopausal women but which is not significant and within normal range, ( normal value for T<sub>4</sub> is 4.6 – 11.2  $\mu\text{g/dl}$ ).<sup>13</sup>

This may be due to decreased level of estrogen which helps to maintain normal thyroid function but as the value is within normal range, it may also be due to decreased thyroid function with age. Aging is associated with changes in pituitary thyroid axis. Many endocrine system exhibit changes with aging. The size of the thyroid gland may reduce with age. The daily production of T<sub>4</sub> decreases per 20  $\mu\text{g}$ . But the serum concentration of T<sub>4</sub> does not change over time as the half life of T<sub>4</sub> elongates. The daily production of T<sub>3</sub> also diminishes 10  $\mu\text{g}$  in women.

**CONCLUSION :**

Statistical analysis of the results showed that serum level of thyroid hormones decreases with age, although the menopause directly does not bring about marked changes in thyroid function.

Subclinical thyroid dysfunction and abnormal TSH with normal thyroid levels may improve with time.<sup>14</sup>

When physiological changes in thyroid function do occur in climacteric, they are not caused by primary changes in TSH secretion

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