

Original Research Article

A study of thyroid function in premenopausal and postmenopausal women of Dibrugarh town, Assam, India

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ABSTRACT

Background: Ageing process can cause some changes in body system controlling mechanism. Consequently thyroid hormone levels may show variations reflected by TSH level in elderly people, more so in females.

Methods: Serum TSH level were measured in 304 apparently healthy females of Dibrugarh town, Assam. Unbound T₃ and T₄ were measured if TSH level was abnormal. TSH levels were compared among different age groups.

Results: The prevalence of hypothyroidism was found to be 8.2% in premenopausal and 12.7% in postmenopausal women. There were more cases of subclinical hypothyroidism than clinical hypothyroidism. Difference of Mean±SEM of TSH level in these two groups was significant though there was no correlation between age and TSH level.

Conclusions: The study reveals decreasing thyroid function in postmenopausal female population of Dibrugarh town.

Keywords: Hypothyroidism, Premenopausal, Postmenopausal, Thyroid

INTRODUCTION

Ageing process can cause some changes in body system controlling mechanisms. Consequently the sensitivity of the target tissues to the controlling hormone will decrease. 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.¹ Lower levels of thyroid hormones in elderly females have been reported in some cases.² 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.³ The number of Indian people suffering from thyroid disease is estimated to be about 42 millions. This number is second only to diabetes mellitus among

endocrine disorders.⁴ Women are more susceptible to thyroid disorders than men and older adults than younger age groups.⁵ Thyroid dysfunction is common among the women over the age of 50 for some reason or the other.⁶

Menopause, by definition, 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.^{7,8} 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.⁹ The risks of osteoporosis and cardiovascular diseases get magnified in postmenopausal women. Thyroid disorders, if left untreated, will increase these risks. Screening for thyroid dysfunction in asymptomatic individuals is not always recommended, but various researchers suggest that aggressive case-finding should be pursued in older women.⁶ Menopause and hypothyroidism may be clinically difficult to

differentiate because symptoms like fatigue, depression, mood swings, and sleep disturbances are found frequently in both the conditions.

Serum concentration of thyroid hormone is inversely related to TSH concentration which is normally 0.5-4.5mIU/L. The most valuable screening test to diagnose hypothyroidism is measurement of serum TSH level.¹⁰ A normal TSH level excludes primary hypothyroidism. If the TSH is elevated, an unbound T₄ level is needed to confirm the presence of clinical hypothyroidism. Subclinical hypothyroidism is diagnosed when peripheral thyroid hormone levels are within normal reference laboratory range but serum TSH levels are mildly elevated. The incidence of subclinical thyroid disease seems to be more than clinical thyroid disease.¹¹

METHODS

Study design

A cross-sectional observational study was done in 304 apparently healthy premenopausal and postmenopausal women (146 premenopausal, 158 postmenopausal) of Dibrugarh town during the period of one year between 1st July 2013 and 1st June 2014. Approval from institutional ethics committee was taken prior to the study.

Sample size calculation and subject selection

Sample size was determined by using the statistical formula z^2pq/L^2 taking the prevalence rate as 26%. There are 22 wards in Dibrugarh town. From those, 6 wards were selected randomly and 50 cases were taken from each ward. The first house in each selected ward was visited and enquired for required age group women. Thereafter consecutive houses were visited and cases were taken. For the purpose of the study, spontaneous cessation of menstruation for at least one year was taken as menopause. Age group of 30-60 years was considered taking 45 years as median and average menopausal age for Indian women. Subjects with known hypothyroidism and hyperthyroidism or metabolic disease, pregnant women, those taking hormonal supplements including contraceptives etc were excluded from the study.

Procedure

A pro-forma was prepared and the information regarding the basic details of the subjects, anthropometric measurements, general and systemic examinations, were

incorporated into it. Subjects were interviewed face to face and the pro-forma was filled in each case. Detailed history regarding identity, lifestyle, and family history of diabetes mellitus, hypertension, cardio vascular and Thyroid diseases was enquired. History of any past and present illness and history of any drug intake was noted down. Thorough general examination was done.

The blood samples were collected by venepunctures with disposable syringe and needle. Sera were separated by centrifugation and subjected to TSH estimation in RIA centre with Immunoradiometric assay kit, IRMAK-9 provided by Board of radiation and isotope technology (BRIT), Vashi, Navi Mumbai. T3 and T4 were also estimated if TSH level was abnormal. The sensitivity of TSH estimation was 0.05µIU/ml. Normal level of TSH was taken as 0.5-4.5µIU/ml.

Statistical analysis

Statistical analyses were done by using the Graphpad prism software. The mean TSH were compared by 2-tailed unpaired t-test with Welch's correction. Correlation between parameters was examined by determining the Pearson correlation coefficient (r value). The significance value (p-value) was determined in both cases. A p-value <0.05 was taken as significant.

RESULTS

Figure 1 shows distribution of cases according to pre and postmenopausal age groups. Out of 304 females, 146 cases (48%) were premenopausal and 158 cases (about 52%) were postmenopausal.

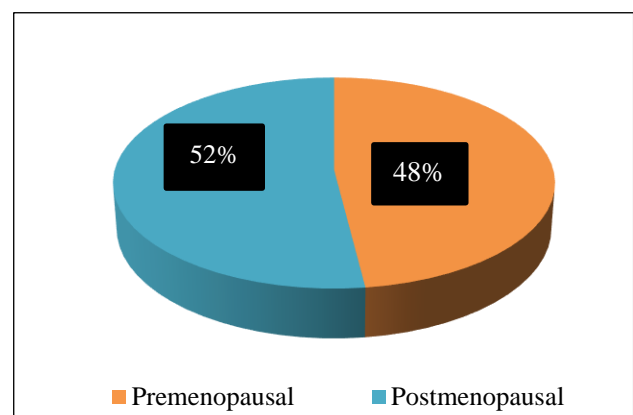


Figure 1: Distribution of cases according in pre and postmenopausal groups.

Table 1: No. of premenopausal and postmenopausal women with different TSH levels.

TSH level (µIU/ml)	Premenopausal	Postmenopausal	Total
<0.5	1 (0.685%)	2 (1.266%)	3 (0.987%)
0.5-4.5	133 (91.096%)	136 (86.076%)	269 (88.486%)
>4.5	12 (8.219%)	20 (12.658%)	32 (10.526%)

From the table 1, total prevalence of hypothyroidism calculated was 10.526%. In the premenopausal group the prevalence was 8.219% and in the postmenopausal group the prevalence was 12.658%. The difference of prevalence of hypothyroidism between the two groups were not significant by Fisher's exact test (P value 0.2622).

Table 2: No. of cases for subclinical and overt hypothyroidism.

Group	Subclinical hypothyroid	Clinical hypothyroid
Premenopausal	8 (5.479%)	4 (2.739%)
Postmenopausal	13 (8.228%)	7 (4.430%)

The prevalence of subclinical hypothyroidism was found to be 5.5% in the premenopausal group and 8.2% in the postmenopausal group (Table 2). The numbers are roughly twice of the clinical hypothyroid cases: 2.7% and 4.4% in the two groups respectively.

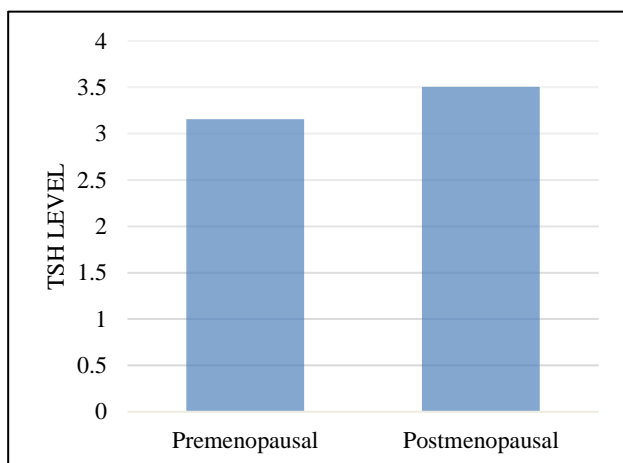


Figure 2: Mean TSH levels in premenopausal and postmenopausal women.

Table 3: The mean TSH in premenopausal and postmenopausal women.

TSH (μIU/ml)	Premenopausal	Postmenopausal	P value
Mean± SEM	3.157±0.1077	3.504±0.1195	0.0314

The mean TSH levels are shown in Figure 2. The means were compared by 2-tailed unpaired t-test with Welch's correction (Table 3). The P value was found to be 0.0314 (Table 3) which is considered significant (Welch-corrected t=2.162 and df=300.8)

As shown in Table 4 The correlation between age and TSH levels in the female population was examined by determining the Pearson correlation coefficient (r value)

and corresponding P value. In both the groups the correlation was not significant. The correlations are also depicted by scatter diagrams in Figure 3 and Figure 4.

Table 4: Correlation between age and TSH levels in pre and postmenopausal age groups.

Correlation	r value	P value
Premenopausal age and TSH	0.115	0.1671
Postmenopausal age and TSH	0.028	0.7288

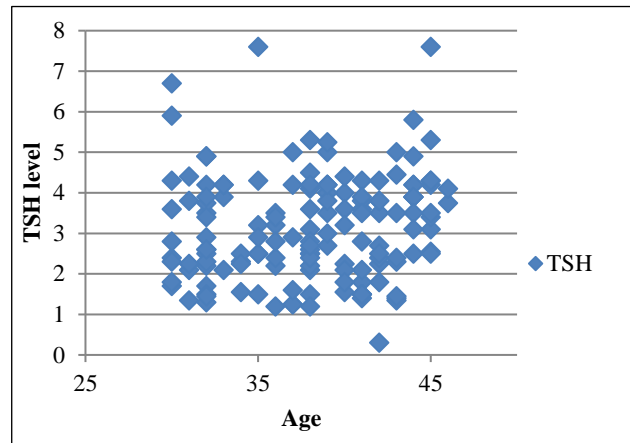


Figure 3: Correlation between age and TSH in the premenopausal group.

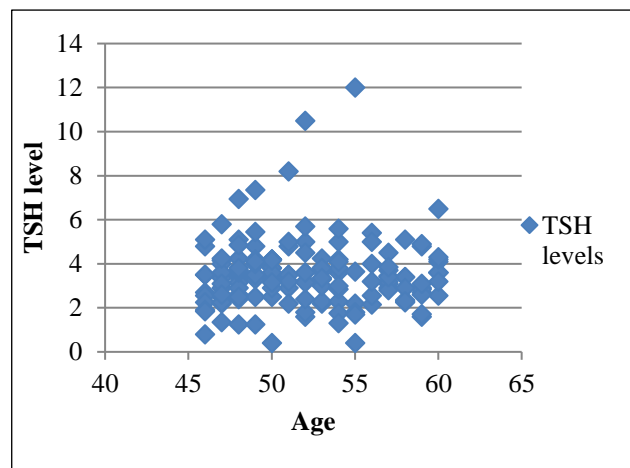


Figure 4: Correlation between age and TSH in the postmenopausal group

DISCUSSION

While the ICMR study conducted in 1989 in Dibrugarh district and the multicentre study conducted by Toteja GS et al, and coordinated by Indian Council of Medical Research in 1997-2000 differs from present study due to the age group, it is interesting to note that the former recorded the highest prevalence of goitre cases (65.8%) among 13 districts of India and the later study revealed a relatively high (8.56%) prevalence of goitre cases in

Dibrugarh.¹² Another study in schoolchildren of Dibrugarh district by Thakur C et al, found higher TSH and lower T₃ level than the control group suggestive of poor thyroid status.¹³ The epidemiological study by Unnikrishnan AG et al, in eight cities of India revealed an overall prevalence of hypothyroidism of 10.95% of which 7.48% patients self-reported the condition, whereas 3.47% were previously undetected. The 0.67% participants were diagnosed with hyperthyroidism. Subclinical hypothyroidism (SCH) was observed in 8.02% of participants.¹⁴

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.¹⁵ 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.¹⁶ 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.¹⁷ So in the present study, prevalence of hypothyroidism in female population, particularly postmenopausal women was found to be similar to findings in the studies of Unnikrishnan et al and Joshi et al, whereas the studies by Garg et al, Kuckian DJ found higher prevalence rate of hypothyroidism than the present study.

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 ($2.27 \pm 1.85 \mu\text{U/L}$).¹⁸ 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 ($3.62 \pm 0.0891 \mu\text{IU/ml}$).¹⁹ The study by Unnikrishnan AG showed that a larger proportion of females than males (15.86% vs. 5.02%; $P < 0.0001$) were found to be affected by hypothyroidism. Low thyroid hormone levels were found more in the age group of 46 to 54 years (13.11%) and less in the age group of 18 to 35 years (7.53%).¹⁴

The study by Garg N et al, found that 8% women lying in the age group 45- 55 yrs and 13% women above 55yrs of age were having subclinical hypothyroidism with mean serum TSH levels ($8.24 \pm 1.3 \text{mIU/ml}$) and ($9.56 \pm 1.57 \text{mIU/ml}$) respectively.¹⁵ So the present study shows a variation of TSH level is in accordance with the

study by Khan A, Garg et al, Unnikrishnan et al, and to some extent with the study by Chaurasia. The researchers outside India have either found no variation or decreased level of TSH with age.¹⁹⁻²¹

CONCLUSION

From the present study it can be concluded that the prevalence of thyroid disorders, particularly hypothyroidism, is more in postmenopausal women than premenopausal women in Dibrugarh town. The difference of prevalence rates between the two groups was not significant. The total prevalence of thyroid disorders found in the present study is less than some earlier studies in Dibrugarh and other regions. There were more cases of subclinical hypothyroidism than overt hypothyroidism and so the diagnosis of hypothyroidism in postmenopausal women may be missed. Though there was no significant correlation between age and TSH levels, the levels were increased above 50 years. So, screening test for thyroid disorders may be routinely pursued in older women. The study can be improved by measuring the concurrent sex hormone levels along with thyroid hormones and including larger population.

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Conflict of interest: None declared

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