

## Thyroid Dysfunction and Anemia- A study among urban women in Trivandrum Kerala

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### Abstract

The current study analysed the thyroid profile and anemia status of 329 women of age group 18-50 years from Trivandrum the capital city of Kerala, India. About 39.4% (n= 129) of the population was found to have anemia. 16.4% were having high concentration of thyroid stimulating hormone (TSH). The prevalence of hypothyroidism and subclinical hypothyroidism were 4.86% (n=16) and 11.55% (n=38) respectively, and all of them were anemic.

**Keywords:** Hypothyroidism, Subclinical hypothyroidism, Anemia, Thyroid dysfunction, Thyroid profile

### Introduction

India is the second largest producer of iodised salt in the world. Despite being iodine replete, goitre continues to be prevalent in mild to moderate degree in most states of India.<sup>(1)</sup> About 42 million people in India suffer from thyroid diseases.<sup>(2)</sup> Thyroid disorders can vary by many factors such as geographic, environmental and major radio nuclear events. Higher intake of iodine rich food can cause negative feedback mechanism.<sup>(3,8)</sup> Iron deficiency is an important cause for persistence of goitre in an iodine replete population.<sup>(4,5)</sup> A previous study from Kottayam district (Kerala), had documented a goitre prevalence rate of 7.05%.<sup>(6)</sup> Thyroid abnormalities especially hypothyroidism is a serious health problem in Kerala even at these post iodisation phase. For no proven reason, women are mostly affected by thyroid abnormalities.

### Materials and Method

The study was conducted among women of age group 18-50 in Trivandrum district of Kerala from November 2015 to January 2016. A total of 329 participants were included in the analysis. A predesigned questionnaire was used to collect demographic and socio-economic status as well as dietary pattern of the participants. Informed consent was obtained from each woman before the start of the study. Body Mass Index (BMI) was calculated from the anthropometric data obtained. Physical examination was done by a medical officer. Blood samples were collected from each individual by venipuncture method. Spot urine samples were collected in wide mouthed iodine free plastic tubes with tight screw caps.

Thyroid function test (Serum TSH, T3, and T4) was done by Chemiluminescence (Roche Cobas e 11) method. Haemoglobin in blood was estimated by Cyanmethaemoglobin method. Serum ferritin was quantified by Chemiluminescence assay (Roche Cobas e 11) method. Urinary Iodide and Fluoride were

estimated with an Ion meter (Eutech instruments pvt. Ltd.pF 6500).

### Results

Statistical analysis was done by using SPSS software version 16. A student's 't' test was performed with SPSS. The mean TSH concentration was 10.22 (SD 7.18)  $\mu$ IU/ml and mean T3 and T4 concentrations were 92.08 (SD 20.47) ng/dl and 6.40 (SD 1.55)  $\mu$ g/dl respectively. The prevalence of hypothyroidism (TSH > 4.5 and T4 < 5.5) was 4.86% and that of subclinical hypothyroidism (TSH> 4.5) it was 11.55%. The prevalence of anemia was 39.4%. There was a significant correlation between anemia and hypothyroidism in the study population (t= 14.88, P<0.001). The haemoglobin level of hypothyroid women was 10.74 $\pm$ 0.66 and that of normal women was 12.39 $\pm$ 0.76. Serum ferritin values also showed significant relation with hypothyroidism in the study population (t= 2.52, P< 0.05). Hypothyroid women reported low level of Serum Ferritin (37.58 $\pm$  34.78) as compared to normal women (50.93 $\pm$ 35.72). The mean body mass index (BMI) was 24.12. The percentage of overweight and obesity were 48.02% and 10.33% respectively. There was no significant association between hypothyroidism and BMI, age and Urinary Fluoride. A chi-square test was conducted and significant association between hypothyroidism and goitre were found (chi square = 115.4, P < 0.01). Majority of hypothyroid women (86.84%) and 68.75% of subclinical hypothyroid women were associated with goitre.

### Discussion

In the present study we analysed the thyroid profile of 329 women in the age group of 18-50 from Trivandrum. In a previous hospital based study in Kerala, the goitre prevalence was 27%.<sup>(7)</sup> A study conducted in 2009 reported a prevalence of 11.5% hypothyroidism among women of age group 20-80 in

Pondichery.<sup>(8)</sup> In our study also a high prevalence of hypothyroidism 16.41% (subclinical =11.55%) was obtained. All the participants of current study were iodised salt users. The mean value of urinary iodine ( $107.6 \pm 17.08$ ) indicated that, the population is iodine sufficient. High TSH values were observed in iodine sufficient women too. Our study found no significant association between TSH values and urinary Iodide in the population, which is similar to a study by Usha V Menon et al in 2009.<sup>(9)</sup> This clearly indicates the role of other factors causing thyroid abnormalities. In the presently studied population all the hypothyroid and subclinical hypothyroid women had anemia. But the mean value of serum ferritin is in the normal range ( $>15 \mu\text{g/L}$ ). At the same time a considerable decrease in serum ferritin level in hypothyroid persons (mean ferritin 37.58) when comparing with the normal persons (mean ferritin 50.93) was observed. Thyroid hormone dependent energy metabolism significantly altered in humans with iron deficient anemia.<sup>(10)</sup> Iron deficiency impairs thyroid metabolism and it may reduce the effect of iodisation programmes. The presented results also signifies the effect of anemia on the thyroid hormone activity. Lower serum T3 or increased serum TSH and lower serum T3 and T4 levels have been reported in iron deficient humans.<sup>(11)</sup> Eftekhari et al. found that iron supplementation improves some indices of thyroid function such as significant increase in T4, T3, and FT4 in iron-efficient adolescent.<sup>(12)</sup>

### Conclusion

High prevalence of hypothyroidism and anemia were observed in women of age group 18-50 in the studied population. The effect of high prevalence of anemia (39.2 %) may be a governing factor for the decreased effect of iodisation programme and increased thyroid inactivity. The possible role of anemia, autoimmune antibodies and other environmental and genetic factors on thyroid functioning need to be studied further.

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