



The evaluation of thyroid function tests in patients presenting to the family medicine clinics

The evaluation of thyroid function tests

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Abstract

Aim: Publications concerning the effects in society of recommendations regarding iodine supplementation over the last approximately 30 years are inconsistent. In addition to studies suggesting that iodine supplementation is insufficient, others report that it can lead to hyperthyroidism. We planned this study in order to investigate the results of iodine supplementation in our region through the retrospective screening of records of patients presenting to the family medicine clinics. **Material and Method:** This was a retrospective, cross-sectional study. Five hundred seventy-two patients undergoing TSH and free T3 and free T4 measurement were included. All numerical data were categorized and expressed as number and percentage and then subjected to chi square analysis. **Results:** Free T3 and free T4 values were within reference ranges at a level of almost 100%. However, only 85% of TSH values were within reference ranges, and 12.9% were low. **Discussion:** The suppression of TSH values in this study shows an increased predisposition to subclinical hyperthyroidism. In the light of these findings, hyperthyroidism must be carefully monitored in addition to hypothyroidism in the approach to thyroid diseases.

Keywords

Iodine Supplement; Thyroid Function Tests; Thyroid Diseases

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Introduction

Iodine-supplemented salt began being used in the early 1990s as recommended by the World Health Organization in regions where hypothyroid disease, known as endemic goiter, is widespread. In Turkey, an iodine salt program was jointly initiated by the Ministry of Health and UNICEF in 1994. Publications concerning the effects in society of recommendations regarding iodine supplementation for the last approximately 30 years are inconsistent [1, 2].

In addition to studies suggesting that iodine supplementation is insufficient [3], others report that it can lead to hyperthyroidism [4]. Additionally, it has been suggested that predisposition to thyroid disorders will increase when iodine supplementation is insufficient or excessive, and close monitoring of iodine supplementation is recommended [2].

Iodine therapy increases the predisposition to autonomy in thyroid tissue [5, 6]. Avoidance of long-term iodine prophylaxis has therefore been recommended [5]. Even moderate iodine supplementation has been reported to raise the incidence of hyperthyroidism in young patients by increasing predisposition to autonomy [7]. In addition to all this information, an increase in hypothyroidism has been observed even after iodine supplementation together with a strict diet [8].

We planned this study in order to investigate the results of iodine supplementation in our region through the retrospective screening of records of patients presenting to the family medicine clinic.

Material and Method

This was a retrospective, cross-sectional study. Thyroid function test results obtained from a retrospective screening of records of patients presenting to the family medicine clinics, at the northern region in Turkey, together with demographic data such as age and sex were used in this study. Thyroid function tests were requested for 737 patients presenting to the family medicine clinic between 28 September, 2012, and 17 May, 2013. TSH only was measured in 165 cases. The remaining 572 patients underwent TSH and free T3 and T4 measurements for the first time. Patients undergoing TSH measurement only were excluded from the study on suspicion of a known thyroid disease. Five hundred seventy-two patients undergoing TSH and free T3 and free T4 measurement were enrolled.

Thyroid function reference ranges were 0.4-4.5 micro IU/ml for TSH, 1.8-4.2 pg/ml for free T3 and 0.8-1.9 ng/dl for free T4 [9]. TSH, free T3 and free T4 values were categorized into three groups each on the basis of reference ranges. In term of age, four groups were established: 47 and below, 48-57, 58-67 and 68 and above, based on the mean 10-year perimenopausal period in women.

Statistical analysis

SPSS statistical software was used for data analysis. (PASW Statistics for Windows, Version 16.0, Chicago: SPSS Inc.). All data obtained by the categorization of numerical data were expressed as number and percentages and analyzed using the chi square test.

Results

Women constituted 75.5% (432) of the subjects in the study and men 24.5% (140). Mean age was 56 among women and 57 among men. Free T3 and free T4 values were within reference ranges at a level of almost 100%. However, only 85% of TSH values were within reference ranges, and 12.9% were low [Table 1]. No statistically significant difference was determined between men and women in terms of free T3, free T4 or TSH values.

No statistically significant difference was determined in free T3 and free T4 values by age groups. However, a statistically significant difference was observed in TSH values by age groups. The level of TSH values above the reference range was higher among subjects aged 48-57 compared to the other age groups ($p=0.004$) [Table 2]. This difference between age groups applied in women, but not in men ($P=0.002$) [Table 3].

Table 1. Distribution of thyroid function test values by reference ranges

	Free T3: n (%)	Free T4: n (%)	TSH: n (%)
Low	2 (0.3)	15 (2.6)	74 (12.9)
Normal	569 (99.5)	557 (97.4)	487 (85.1)
High	1 (0.2)	0 (0.0)	11 (1.9)
Total	572 (100)	572 (100)	572 (100)

Table 2. Distribution of TSH values by age categories

Age groups	TSH values			Total: n (%)
	Low: n (%)	Normal: n (%)	High: n (%)	
47 and below	12 (8.3)	131 (91)	1 (0.79)	144 (100)
48-57	18 (12.2)	121 (82.3)	8 (5.4)*	147 (100)
58-67	26 (17.6)	120 (81.1)	2 (1.4)	148 (100)
68 and above	18 (13.5)	115 (86.5)	0 (0.0)	133 (100)
Total	74 (12.9)	487 (85.1)	11 (1.9)	572 (100)

* $p=0.004$

Table 3. Distribution of TSH values by age groups in women

Age groups	TSH values			Total: n (%)
	Low: n (%)	Normal: n (%)	High n (%)	
47 and below	5 (4.5)	104 (94.5)	1 (0.9)	110 (100)
48-57	15 (13.2)	92 (80.7)	7 (6.1)*	114 (100)
58-67	19 (17.3)	89 (80.9)	2 (1.8)	110 (100)
68 and above	15 (15.3)	83 (84.7)	0 (0.0)	98 (100)
Total	54 (12.5)	368 (85.2)	10 (2.3)	432 (100)

* $p=0.002$

Discussion

Almost all free T3 and free T4 values were within reference ranges. While 12.9% of TSH values were below reference levels, 1.9% were above them. These findings show a six-fold greater disposition to subclinical hyperthyroidism in the population in question compared to subclinical hypothyroidism. Studies investigating the prevalence of thyroid disorders across the world report figures of 3-12% for subclinical hypothyroidism and 1-6% for subclinical hyperthyroidism [10]. There was an increased disposition to hyperthyroidism in our study. Our findings support those studies suggesting that iodine supplementation increases the predisposition to hyperthyroidism [4, 5, 7].

No difference was observed between men and women in terms of predisposition to thyroid diseases in this study. These results differ from those of previous studies. The prevalence of hyperthyroidism in a study of a population of 90,000 in Norway was 2.5% in women compared to 0.6% in men, while the prevalence of hypothyroidism was 4.8% in women and 0.9% in men [11]. The absence of any difference between men and women, in contrast to the findings in the previous literature, in our study suggests that both sexes are exposed to the same environmental factors(s), such as excess iodine.

No difference was observed in our study in free T3 and free T4 values assessed in terms of age groups, although there was a difference in TSH values. The level of TSH values above the reference range was higher in the 48-57 ages group than in the other age categories. This difference was observed in women, but not in men. This is a novel finding. TSH elevation in women aged 47-58 compared to other age groups suggests an effect of the perimenopausal period in women in this age group. The number of studies reporting higher TSH values in the premenopausal period compared to the postmenopausal period is limited [12-14], although we encountered no studies assessing the perimenopausal period, and our findings are compatible with similar data from the literature. In addition, the majority of the 11 (1.9%) patients with subclinical hypothyroidism were also in this age group. In other words, the predisposition to hypothyroidism outside the perimenopausal period is almost zero. Again in contrast to the findings in the literature, no increase was determined in TSH values in the older groups in our study [15-18].

The high level of subclinical hyperthyroidism in this study shows that similar findings were elicited to those of studies suggesting that iodine supplementation increases predisposition to hyperthyroidism by causing thyroid tissue to acquire autonomy [5-7]. Increased predisposition to hyperthyroidism as a result of iodine supplementation also increases the prevalence of diseases associated with the thyroid, such as hypertension [18-19]. In addition, it has been suggested that iodine supplementation due to endemic hypothyroidism increases the incidence of hypothyroidism, rather than treating it, and close monitoring of iodine supplementation has been advised [2, 8].

Conclusion

In conclusion, more detailed studies reflecting all of society are now needed. The suppression of TSH values in this study shows an increased predisposition to subclinical hyperthyroidism. In the light of all these findings, hyperthyroidism must be carefully observed as well as hypothyroidism in the approach to thyroid diseases. In addition, given the simple and easily accessible pharmacological means of treating hypothyroid disease, we think that the reasons for initiating iodine supplementation programs for the purpose of treating endemic goiter need to be re-examined.

Scientific Responsibility Statement

The authors declare that they are responsible for the article's scientific content including study design, data collection, analysis and interpretation, writing, some of the main line, or all of the preparation and scientific review of the contents and approval of the final version of the article.

Animal and human rights statement

All procedures performed in this study were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. No animal or human studies were carried out by the authors for this article.

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Conflict of interest

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