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Original Research

Thyroid dysfunction and thyroid antibodies in a mild to moderate iodine deficiency area

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Abstract

Background and aims: Albania is considered a region with mild-to-moderate iodine deficiency. The improved salt iodization program implemented in 2008 elevated the median urinary iodine excretion levels to the lower recommended level and reduced goiter prevalence in schoolchildren. Most regions still remain with a mild or moderate iodine deficiency. Meanwhile, there are no studies on the prevalence of thyroid autoimmune disorders. The purpose of this study was to evaluate thyroid function and the presence of thyroid antibodies in a cohort of Albanian individuals not previously examined for thyroid diseases. **Material and method:** This is a cross-sectional study performed during a 2-year period (January 2019–January 2021). We assessed the prevalence of thyroid function disorders and the presence of thyroid antibodies in 458 individuals (80% females and 20% males). Statistical analysis was performed to see the prevalence of thyroid dysfunction and the presence of thyroid antibodies. **Results:** About 88.6% (406) of subjects resulted in euthyroid. We found a low prevalence of overt thyroid dysfunction (hyperthyroidism 1.1% and hypothyroidism 3.1%). The rates of subclinical hypothyroidism and hyperthyroidism were 5.5% and 1.7%, respectively. The prevalence of positive thyroid antibodies, at least one of them was 26.5% in females and 11.8% in males (2.2:1 ratio). Twenty-one percent% (96 individuals) from 458 examined, had normal thyroid function and resulted positive for thyroid peroxidase (anti-TPO) or thyroglobulin (anti-TG). **Discussions:** Undiagnosed biochemical thyroid dysfunctions were common in Albania, a country with mild to moderate iodine deficiency especially subclinical hypothyroidism. TSH level correlated well with the presence of antibodies. Measuring TPO antibodies in euthyroid subjects can be used to identify subjects with increased risk for hypothyroidism.

Keywords: anti-thyroid antibodies, iodine deficiency, thyroid dysfunction.

Background and aims

Thyroid disorders affect a considerable portion of the population [1–3]. However, the prevalence and the pattern of thyroid disorders depend on ethnic and geographical factors and especially on iodine intake [4, 5]. In iodine-replete areas, most persons with thyroid disorders have an autoimmune diseases, like Hashimoto's thyroiditis or thyrotoxicosis caused by Graves' disease. The prevalence of spontaneous hypothyroidism is between 1% and 2%, and it is more common in older women and ten times more common in women than in men. The prevalence of hyperthyroidism in women is between 0.5% and 2% and is ten times more common in women than in men [6]. Albania is considered a region with mild-to-moderate iodine deficiency. The improved salt iodization program implemented in 2008 elevated the median urinary iodine

excretion levels to the lower recommended level and reduced goiter prevalence in schoolchildren. Most regions still remain with a mild or moderate iodine deficiency [7]. Meanwhile, there are no studies on the prevalence of thyroid autoimmune disorders. The purpose of this study was to evaluate thyroid function and the presence of thyroid antibodies in a cohort of Albanian individuals not previously examined for thyroid diseases.

Material and method

This is a cross-sectional study performed during a 2-year period (January 2019–January 2021). We assessed the prevalence of thyroid function disorders and the presence of thyroid antibodies in 458 individuals (80% females and 20% males). Individuals previously diagnosed or treated for thyroid disease were excluded from the study. Venous blood samples were drawn from all participants and analyzed for TSH, Free T4, Free T3, thyroid peroxidase (anti-TPO), and thyroglobulin (anti-TG). These parameters were measured with electrochemiluminescence method with Cobas 6000 Roche Diagnostics. The following reference ranges for laboratory tests were used:

TSH (0.2–4.5 uUI/ml), fT3 (2–4.4 pg/ml), fT4 (0.93–1.7 ng/dl), TPOAb (<34 IU/ml), TgAb (<115 IU/ml). A questionnaire was completed for each participant in the study regarding demographic data such as age, place of residence, education, etc.

Statistical analysis

Statistical analysis was performed to see the prevalence of thyroid dysfunction, presence of thyroid antibodies and correlation with age, gender, education, and region. The data were transferred to SPSS 25. The following techniques were used in the paper: Mean, Standard Deviation, Minimum, Maximum, Frequency, Percentages which serve to present a more accurate panorama of the questionnaire result in Tables (1–3) and graphical form. For continuous variables, non-parametric tests (2-tailed Mann–Whitney U-tests) were used. Group differences between the numbers of subjects were analyzed using the Chi-squared test. p-Values <0.05 were considered statistically significant.

Results

The study involved 458 individual patients of whom 80% were females and 20% were males. In terms of the age group, it turns out that 3.35% are under 20-years-old, 38.9% are 20–40-years-old, 41.2% are 41–60-years-old and 16.65% are over 60-years-old. The age varies from 14 years to 70 years with an average (M=44.51, ds=14.245).

Out of 458 patients analyzed, 88.6% (406) of subjects resulted in euthyroid. We found a low prevalence of overt thyroid dysfunction (hyperthyroidism 1.1% and hypothyroidism 3.1%). The rates of subclinical hypothyroidism and hyperthyroidism were 5.5% and 1.7%, respectively. Ninety-seven percent of subjects who tested negative for antibodies had normal thyroid function compared to 73% in the antibodies positive group. There was a significant difference for subclinical hypothyroidism and other thyroid disorders between the antibodies positive group and the antibodies negative group (p-value <0.00001).

Table 1: Distribution by gender.

	n	%
Female	365	79.7
Male	93	20.3
Total	458	100.0

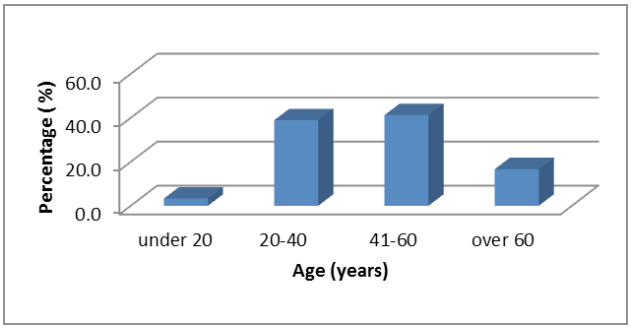

Figure 1: Distribution by age.

Table 2: Population characteristics and laboratory data.

Parameter	Value
Patients (n)	458
Age (years)	44.51±14.2
Female/male n (%)	365/93 80/20
TSH (uUI/ml)	3.2±7.9 (0–67.4)
Anti-TPO or anti-TG positive in females (%)	26.5
Anti-TPO or anti-TG positive in males (%)	11.8

Table 3: Prevalence of thyroid dysfunction and thyroid antibodies.

Prevalence of thyroid dysfunction and thyroid antibodies	
Euthyroid n (%)	406 (88.6)
Overt hyperthyroidism n (%)	5 (1.1)
Overt hypothyroidism n (%)	14 (3.1)
Subclinical hyperthyroidism n (%)	8 (1.7)
Subclinical hypothyroidism n (%)	25 (5.5)
Prevalence of positive antibodies in population examined (%)	25.3
Prevalence of positive antibodies in euthyroid individuals (%)	25.5

Twenty-one percent (96 individuals) from 458 examined, had normal thyroid function and resulted positive for anti-TPO or anti-TG.

An important statistical difference was found between gender and family history with the presence of anti-thyroid antibodies (p-value <0.0001). The prevalence of positive thyroid antibodies, at least one of them was 26.5% in females and 11.8% in males (2.2:1 ratio). Anti-TPO antibodies were present in 78% of individuals who had a family history of Hashimoto thyroiditis compared to 23% who did not. There was not found a significant statistical difference between age and presence of antibodies (p>0.05).

Discussion

We found a low prevalence of overt thyroid dysfunction (hyperthyroidism 1.1% and hypothyroidism 3.1%) and low rates of subclinical hyperthyroidism. These data are similar to those reported in our studies. Most of them present no symptoms and pass without being diagnosed.

The rates of subclinical hypothyroidism were considerable 5.5%. Most of them do not manifest any specific symptom and pass without being diagnosed. Therefore, screening for thyroid dysfunction is important, especially in individuals with risk factors [10]. It is well-known that at a population level thyroid antibodies and autoimmune hypothyroidism are more common in iodine-replete areas than in iodine-deficient areas. The most recent evidence supporting this statement comes from Denmark. The prevalence of TPO-Ab before and after mandatory iodization of salt was 14.3% and 23.8%, respectively [11]. Titers of TPO antibodies also correlate with the degree of lymphocytic infiltration in euthyroid subjects, and they are frequently present in euthyroid subjects (prevalence 12–26%) [12]. In our study the prevalence of antibodies in the euthyroid population was high, but it should be taken into account that 80% of the subjects examined were females. Given that iodine intake has increased since 2008 through the salt iodization program and greater awareness of people and medical staff in primary care, this may be one of the factors that have influenced the high presence of antibodies in the population. The weak points of our study are that it includes a small number of people and we do not have data on autoimmune diseases and anti-thyroid antibodies before this period to make the comparison.

Measuring TPO antibodies in euthyroid subjects can be used to identify subjects with increased risk for hypothyroidism. This could be done in women who wish to become pregnant, patients with other autoimmune diseases, subjects on medications such as amiodarone and relatives of patients with autoimmune thyroid diseases.

Conflict of interest

The authors declare no conflict of interest.

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