Serum thyroid hormones and thyrotropin levels in subjects from an endemic goiter area of Ancak, Elazığ*

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We studied serum thyroid hormones and thyrotropin levels in 145 students from one region (Aricak-Elazig) of Eastern Turkey where goiter and/or iodine deficiency are prevalent. The results of this study indicated subnormal serum thyroxine levels (7.10±2.14 versus 7.85+1.49 mic.gr/100 ml, for normal Eiazig inhabitants,, p > 0.05), supranormal serum triiodothyronine levels (162.06±34.46 vs 132.43±14.96 ng/100 ml, p<0.0005), supranormal triiodothyronine/thyroxine ratio (T3/T4x100, 2.59±1.36 vs. 1.73±0.42, p<0.005) and supranormal serum thyrotropin levels (4.38±5.53 vs. 2.39±0.80 mic.U/ml, p >0.05). Serum thyroxine and serum thyrotropin in goitrous patients were no significantly higher than in nongoitrous patients (7.85 vs 7.00 mic.gr/100 ml and and 5.80 vs 4.16 micil/ml, p>0.05 and p>0.1). However, serum triiodothyronine levels were not different in the presence or absence of goiter. [Turk J Med Res 1994; 12(1): 15-17]

Key Words: Endemic goiter, Hypothyroidism, Thyroid hormones, Thyrotropin

Endemic goiter is the most common thyroid disease wordwide. Goiter cases are estimated to be 3 million in Turkey and 300 million in the world (1-3). Iodine deficiency is the most important etiological factor but a variety of environmental agents and genetic factors may play a role. Ancak, one region of Elazığ, was a mountainlous village in the Eastern Turkey. The incidence of goiter in children in this area has been found to be 87% (4). The current study was undertaken to document the hormonal (triiodothyronine: T_3, thyroxine: T_4 and thyrotropin: TSH) changes in subjects in this endemic region, and data are compared with results obtained in normal subjects living in a nearby control area without endemic goiter.

PATIENTS AND METHODS

The total number of students was 145 in the elementary school, their ages ranged from 6 to 13. Study group was selected at random from goitrous students in a hope to obtain a representative sample of population.

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The staging of the goiter was done according to the criteria of the Pan American Health Organization which are as follows (5).

Stage I goiter: The goiter is visible and palpable only when the neck is fully extended.

Stage II goiter: the goiter is visible with the neck in normal position: palpation is not needed for diagnosis.

Stage III goiterr very large goiter which can be recognized at a considerable distance.

Serum T_3, T_4 and TSH concentrations were measured by radioimmunoassay method using commercial kits (Amersham) and a minigammacounter. The samples were analyzed in duplicate. The results in the subjects under study were compared to those in healty subjects from Elazığ (6).

Student's t-test was used for statistical analysis (7).

RESULTS

Table 1 describes the data on various parameters of study in the subjects with and without goiter from Ancak, Elazığ and in a series of normal subjects from Elazığ.

The mean serum T4 of 7.00 micg/100 ml in goitrous subjects and that of 7.85 micgr/100 ml in nongoitrous subjects were not significantly different than the corresponding values of 7.85 micg/100 ml in normal Elazığ subjects.

Table!. Serum thyroid hormone and thyrotropin levels in inhabitants of Ancak of Elazığ

Group	Sex M	Sex F	Age Year	Total T4 (micgr/100ml)	Total T3 (ng/100 ml)	T3/T4X100	TSH (micU/ml)
				A. Ancak subjects			
Non goitrous							
Mean			8.5	7.85	162	2.26	5.80 .
S.D.				2.02	37.53	0.77	9.09
No.	13		19	19	19	19	19
Range			6-13	5.4-12.0	88-240	0.8-3.Í	1.2-42.0
Goitrous							
Mean			9.6	7.00	162.07	2.64	4.16
S.D.				2.14	34.14	1.42	4.79
No	81	45	126	126	126	126	126
Range			6-13		54-270	0.8-0.Í	
Non goitrous				2.0-13.5			0.2-34.0
vs goitrous p.					NS	p<0.3	
				p<0.1			p<0.3
				B. Normal Elazığ subjects			
Mean			9.2	7.85	132.14	1.73	2.39
S.D.				2.14	14.96	0.42	0.80
No	15		21	21	21	21	21
Range			5-13	5.7-10.0	105-165	1,1-3,0	1.1-4,1
Non goitrous							
vs. normal s.				NS	p<0,005	p<0.005	p<0.005
Goitrous vs.							
normal s..				p<0.05	p<0,0005	p<0.005	ps"0,

The mean serum **T3** of 162.00 ng/100 ml in goitrous subjects ant that of 162.07 ng/100 ml in nongoitrous subjects were not significantly different; both values were significantly (p<0.0005) higher than that of 132.14 ng/100 ml in healthy subjects in Elazığ.

The mean serum T3 /T4X100 in goitrous subjects and in nongoitrous subjects were not significantly dlf-ferent;both values were clearly higher (p<0.005) than that in normal Elazığ subjects.

The mean serum TSH was elevated to a com-parable degree in both goitrous and nongoitrous sub-jects (respectively 5.80 and 4.16 micU/ml). Both values were significantly higher (p<0.05) than that in normal Elazığ subjects.

DISCUSSION

This is the first study of its kind to be done on children of Arıcak-Elazığ region and the results in general, agree with those of previous reports from other countries which show that although serum **T4** may be low in subjects from endemic goiter regions, serum **T3** remains within the range values observed in subjects from regions where goiter is uncommon, and may even be higher (6,8).

With regard to serum T_3 values, our data are in agreement with those of Chopra et al.6, which demonstrated that the mean serum T_3 may be elevated in both the goitrous and nongoitrous subjects of endemic goiter regions. However, we did not find any appreciable difference in serum **T3** levels between goitrous and nongoitrous subjects.

Endemic goiter in Aricak has been attributed to iodine deficiency. In our hospital, another study was demonstrated the presence of iodine deficiency on milk, water and soil in Aricak (9). Regression of goiter and return of low serum **T4** and elevated serum T_3 and TSH to or towards normal following treatment with iodized salt (10) lends support to this consideration. In the Black Sea Region, dietary goitrogens have been implicated in the genesis of endemic goiter (11-13). There was, morever, no sign of hypothyroidism in children whose serum TSH con-centrations were high and whose T_4 concentrations were low. The absence of signs and symptoms due to hypothyroidism could be explained with normal or high serum T_3 values. As serum T_4 decreased, T_3 and TSH Increased. The increased serum T_3 and decreased T4 suggest an increase in monodeiodina-tion of T_4 to T_3 in both thyroid and peripheral tis-sues (6,8,14-16). The finding that all students were clinically euthyroid (and not hyperthyroid) despite supranormal serum **T3** suggests that higher than normal levels of serum T_3 may be needed no maintain euthyroidism when the serum T_4 is low (17).

High normal or high serum T_3 and subnormal serum T_4 can be explained by considerable elevation of the proportion of T_3 to T_4 (T3/T4) in the thyroid and the thyroid venous effluent, as noted in the iodine deficient rat (6).

Our finding that the average serum T_3 was already supranormal (162.06 vs. 132.14 ng/100 ml) in our apparently euthyroid patients whose serum T_4 was minimally lower (7.11 vs. 7.85 micg/100 ml) suggest tha*t both may function in concert to maintain euthyroidism. Some other studies have also led to similar consideration (6). But, serum T_4 level in our study is higher than that of Tezic's study (11) and Baki's study (12) in the Black Sea Region.

The finding of elevated serum TSH in subjects in our study is similar to those several previous studies where TSH was measured both by bioassay and radioimmunoassay (6). The lack of relationship between serum TSH and the presence and size goiter is aso similar to that noted in previous studies (8,14). These finding suggest that development of goiter in some subjects and its absence in others may be due to differences in duration of elevated serum TSH, to individual variations in thyroidal responsiveness to TSH and/or participation of factors other than TSH (18).

For the benefit all these children, iodination of this region has to be seriously considered and iodized salt seems to be the most practical and suitable way of doing it. The importance of age for beginning iodination lies in the fact that once nodule formation has begun, it may be too late too late to give iodine since this could give rise to thyroid storm (10,11).

Elazığ'ın Ancak yöresinde serum tiroid hormon ve tirotropin düzeyleri

Daha önceden iyot eksikliğinin kanıtlandığı endemik guatr bölgesi olan Elazığ ili Ancak ilçesi kırsal alanında yaşayan 145 öğrencide serum tiroid hormonları ve tirotropin düzeyleri araştırıldı. Çalışmanın sonuçlarına göre normalden düşük serum tiroksin (7.10±2.14'e karşın Elazığ'lı normal kişilerde 7.85±1.49 micg/100 ml p > 0.05), normalden yüksek triiodotironin (162.06±34.46 ya karşın 132.43±14.96 ng/100 ml, < 0.0005), normalden yüksek tirotropin düzeyleri (4.38±5.53'e karşın 2.39±0.80 micU/ml.P >0.05) ve normalden yüksek triiodotironin-tiroksin oranı (T^TAX100, 2.59±1.36 ya karşın 1.73+0.42, p< 0.005) bulundu. Serum tiroksin ve tirotropin düzeyleri guatrlı öğrencilerde guatr bulunmayan öğrencilere göre anlamsız yüksek (7.85'e karşın 7.00 micg/100 ml ve 5.80'e karşın 4.16micU/ml, p>0.05 ve p> 0.1) bulunurken serum triiodotironin düzeyleri guatr varlığı veya yokluğuna göre fark göstermedi. [Turk J Med Res 1994; 12(1): 15-17]

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