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Screening investigation of thyroid status in population of the republic of Armenia under conditions of relative iodine deficiency

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Iodine is the integral part of the hormones of thyroid gland. For their formation in required amounts the sufficient receipt of iodine into the organism is extremely important. The daily requirement in iodine depends on the age and physiological status of the individual, which during his life consumes only 3–5 *g* of iodine that makes about one teaspoon of this halogen [1, 2]. The diseases of iodine deficiency develop in result of iodine insufficient consumption. They are one of the most widespread not infectious diseases. For more than 1.5 billion inhabitants of the Earth there is an increased risk of insufficient consumption of iodine: in 655 million persons the enlarged thyroid gland (endemic goiter) is present, and in 43 million iodine deficiencies result in expressed mental retardation [8–10].

The researches performed in different countries during the last years have shown that the average parameters of intellectual development /General Intelligence Quotient Score (IQ Score)/ in regions with expressed iodine deficiency is 15–20 % lower than that in the regions without iodine deficiency [6,8].

The most obvious display of iodine deficiency is endemic goiter, which is the contributing risk factor for many diseases of thyroid gland, including nodular neoplasms and cancer [7]. The iodine deficiency increases the frequency of inherent hypothyrosis; it brings to irreversible infringements of brain in a fetus and newborn, resulting in intellectual retardation (cretinism, oligophrenia) [1, 9].

The sociomedical significance of iodine deficiency diseases (IDD) for Armenia is conditioned by the fact that more or less expressed iodine deficiency is observed actually all over its territory. In this connection the sociomedical and economic importance of the problem of iodine deficiency in Armenia cannot be overestimated as it may result in significant loss of intellectual and professional potential of the nation.

The above mentioned has induced us to carry out screening research of the thyroid status in the population of Armenia.

The aim of the research was to study the prevalence of endemic goiter, carriage of antibodies to thyroid peroxidase, antibodies to thyroglobulin, thyrotoxicosis, and hypothyrosis in the inhabitants of Armenia.

Materials and Methods

Inhabitants from different regions of Armenia (999–786 women and 213 men) at the age from 16 to 67 years were examined. The survey did not include the persons receiving within the last year anti-thyroid and thyroid preparations, sulfanilamides, thiocianates, oral contraceptives, as well as Nitroprussid-Na and ethionamide.

The thyroid gland was estimated by palpation according to WHO classification [9]: "0 degree – no goiter, I degree – the sizes of a lobe are bigger than the distal phalanx of the thumb, the goiter is palpated, but not visible; II degree – the goiter is palpated and visible.

To determine the contents of free T_4, TSH, free T_3, T_3, T_4, calcitonin and titers of antibodies to thyroid peroxidase and antibodies to thyroglobulin in blood serum the immune enzyme method was applied. The kits of "DRG International, Inc." (USA) and "Syntron Bioresearch, Inc." (USA) were used. Ultrasonographic examination of thyroid gland was also performed. The calculation of the gland volume was done according to the formula.

Volume = [(WR x LR x TR)] + [(WL x LL x TL)] x 0.479, where

WR – width of the right lobe;
LR – right thyroid lobe length;
TR – right lobe thickness
WL – width of the left lobe;
LL – left thyroid lobe length;
TL – left thyroid lobe thickness
0.479 – coefficient of correction for ellipsoidy.

All persons were examined by the endocrinologist, then the final diagnosis was given.

Results and Discussion

In 358 patients (291 women and 67 men), i.e. in 35,8% of cases, the increase of thyroid gland was determined first by palpation then confirmed by objective registration of gland volume by the data of ultrasonography. In 11,7 % (117 patients) nodular forms of goiter were revealed. On determining the markers of autoimmune process in thyroid gland, the carriage of antibodies to thyroid peroxidase and antibodies to thyroglobulin was revealed in 384 persons (38,4 %). With the increased frequency, in the ratio 4,33: 1, in female patients it was met more often, than in males (312 and 72, accordingly). In 148 (14,8 %) inhabitants of Armenia (105 women and 43 men; a ratio of 2,44: 1) thyrotoxicosis of different degree of severity was diagnosed. In 99 (9,9 %) persons (91 – woman, 8 men; a ratio of 11,4: 1) hypothyrosis of different degree of severity was assessed.

At the moment of checking 752 (75,3 %) of the examined persons were in the state of euthyreosis, while in 247 (24,7 %) there was a disorder of functional status of thyroid gland (in 148 thyrotoxicosis was diagnosed and in 99 – hypothyrosis).

Finally, during the medical examination, in a number of cases an association was observed, on one hand between the carriage of antibodies to thyroid peroxidase and antibodies to thyroglobulin and, on the other hand, diabetes of I and II type, breast cancer, cancer of stomach, as well as rheumatism and other autoimmune diseases. These data are not published in the present work because of incompleteness of the research.

Iodine deficiency diseases present a serious problem of public health. None of the endocrine pathologies is connected so closely to the environment like the diseases of the thyroid gland, as its structure and function depend on the external receipt of iodine, radionuclides, microelements, xenobiotics, etc. During the last years the increase in the thyroid diseases incidence has been stated, including tumors, not only in adults, but also in children [2,4, 9].

According to the results obtained, diffuse increase of thyroid gland was revealed in 35.9 % of the examined: 26.7 % of patients had type I goiter, in 9.2 % goiter of the II degree was revealed. Endemic goiter is a compensatory reaction of the organism in response to iodine deficiency, preventing in these conditions the development of hypothyrosis – decrease in the level of thyroid hormones. The moderate iodine deficiency seldom results in this functional state. In case of hard iodine deficiency (less than 25 mcg of iodine intake) hypothyrosis develops [3, 5].

During the last years the influence of iodine deficiency on prevalence of autoimmune diseases of thyroid gland, thyrotoxicosis and/or its nodular forms has been actively studied. So, Bulow I. et al. [3], came to the conclusion that in regions with heavy iodine deficiency (the degree of expressiveness was estimated by the medians of iodine urination) the spread of thyrotoxicosis is much higher as compared with the regions without iodine deficiency. In addition, in two geographical areas these authors revealed high carriage of antibodies to thyroid peroxidase and antibodies to thyroglobulin with slight and moderate iodine deficiency.

Our data completely coincide with the above-mentioned results: 38,4 % of the population of various regions of Armenia had carriage of auto-antibodies to thyroid peroxidase and antibodies to thyroglobulin. Besides, in 14.8% of the patients thyrotoxicosis was diagnosed of a various degree of severity, while hypothyrosis was registered only in 9.9 % of the surveyed persons. That is, it was demonstrated anew that the basic problem of slight and moderate iodine deficiency is the higher prevalence of thyrotoxicosis, developing as a result of formation of a functional autonomy thyroid gland. It arises at the long existing endemic goiter, especially if it proceeds with nodule formation. As a result some cells of the of thyroid gland, thyrocytes, are left from under the regulating control of TSH and begin to develop hormones in arbitrary quantity. Thus, the functional autonomy thyroid gland develops resulting in its decompensation which leads to thyrotoxicosis [5, 7].

In the context of our own data presented, we consider it extremely urgent and important to stop on a research carried out by Aghini-Lombardi F., Antonangeli L., Martino E. et al., 1999. The authors came to the conclusion that in iodine-deficient region the increase in frequency of goiter (especially nodular forms) and functional autonomy of thyroid gland is observed. Thyrotoxicosis was met approximately twice frequently in comparison with regions of sufficient iodine contents and was caused, basically, by nodular toxic goiter. Despite rather high frequency of revealing of the elevated titer of antibodies to thyroid gland, the occurrence of hypothyrosis did not differ from that observable in regions with the sufficient iodine contents.

In fact, according to our results, thyrotoxicosis was revealed 1.5 times more frequently in comparison with hypothyrosis (148:99); besides, in 11.7 % of the surveyed persons nodular forms of goiter were diagnosed.

The data obtained predetermine the necessity of our further researches; especially taking into account that already in 1990 WHO ratified as one of the basic tasks liquidation of iodine deficiency diseases by 2000 all over the world, and the task was not executed. It seems that for achievement of the goal it is necessary to have the complete information on their prevalence in each country, and on this basis to develop regional programs on their prevention and control.

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Հայաստանի Հանրապետության բնակչության վահանագեղձի վիճակի սկրինինգային հետազոտումը յոդի հարաբերական պակասության պայմաններում

Դ.Հ. Դումանյան, Հ.Խ. Ավագյան, Ս.Ա. Ներսեսյան

Հայաստանի Հանրապետության բնակիչների հետազոտման ժամանակ 75,3%-ը (999 -ից) գտնվում էին էութիրեոզի վիճակում, այն ժամանակ, երբ 24,7%-ի մոտ վահանագեղձի ֆունկցիոնալ վիճակը խանգարված էր (թիրեոտոքսիկոզ՝ 14,8%-ի մոտ, հիպոթիրեոզ՝ 9,9%-ի մոտ): 38,4% հիվանդների մոտ հայտնաբերված են ՏՊ-ի և ՏԳ-ի հակամարմիններ: 35,9% հետազոտվածների մոտ հայտնաբերված է վահանագեղձի մեծացում, որոնցից 26,7%-ի մոտ հայտնաբերված է I կարգի և, 9,2%-ի մոտ՝ II կարգի խպիպ:

Скрининговое исследование тиреоидного статуса у населения Республики Армения в условиях относительного йодного дефицита

Д.Г. Думанян, А.Х. Авакян, С.А. Нерсесян

На момент обследования 75,3% (из 999) жителей Армении были в состоянии эутиреоза, в то время как у 24,7% функциональное состояние щитовидной железы было нарушено (у 14,8% - тиреотоксикоз, у 9,9 % – гипотиреоз). У 38,4% пациентов выявлено носительство АТ к ТП и АТ к ТГ. У 35,9% обследованных лиц диагносцировано увеличение щитовидной железы, из них у 26,7% установлен зоб I степени, у 9,2% – зоб II степени.

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