Rakov V.E., Artifeksova A.A.

A role of Ecologic and Industrial Intensity of the Region in Prevalence of Thyroid Gland

ABSTRACT

In this report the profile of thyroid glands diseases is detected subject to iodine deficient background and industrial development of the Vladimirskiy region RF.

Keywords: thyroid glands, iodine deficiency, oncological and nononcological pathology.

INTRODUCTION

According to the data over the past 15 years, the number of newly diagnosed cases of neoplastic diseases of thyroid gland (TG) has grown twice mainly due to young and middle-aged people [1].

According to domestic authors TG pathology is caused by: " Endocrine pathology is mostly environmentally-related including TG diseases, as the structure and function of TG are closely associated with extraneous iodine and other microelements" [2,4]. On the other hand, TG like any other organ is exposed to the effects of man-made factors, industrial and household poisons, some of which are specific features of a particular territory [3,5].

The Vladimirsky region includes areas which are characterized by normal iodine content in water and endemic iodine combined with varying degrees of technical and chemical effects on people. All this creates a multifactor environment influencing on a human-being, it allowing not only to undertake comprehensive assessment of their significance in the development of TG pathology, but also to create a program of preventive treatment and diagnostics of the diseases of this organ.

The aim of this work is to identify a spectrum of TG diseases, depending on the level of iododeficiency and effects of industrial factors in a particular area for the formation of a program of screening analysis and development of tumor and non-tumor pathology prevention.

MATERIALS AND METHODS

For research reports there were data from patients and biopsy materials having been taken for 10 years (2003-2013 years). In the statistical analysis of the results we used methods of epidemiological statistics (intensive and standardized incidence ratio, the chance1, the relative

risk), variation statistics (95% confidence interval, Kolmogorov-Smirnov test on normal distribution, Mann-Whitney test χ_2, exact Fisher test for the small number of observations), the Spearman correlation analysis method , a ROC-curves. We used program Statistica 6.0 for Windows, and Microsoft Office Excel 2003.

RESULTS AND DISCUSSION

Annual average intensive incidence rate of TG carcinoma in the Vladimirsky region for 10 years was noted in 2.7 cases per 100 000 population (93% CI 1.87 -3.71), which means 42 ± 4 new patients per year, due to increase in the absolute number of patients with this disease from 28 in 2003 to 59 in 2013. In 2013 year the incidence almost reached nationwide and the prevalence rate was higher than in 2012, but no reliable differences noted (Mann-Whitney, p> 0.06). OR of the disease was 1 in the regional center. Odds ratios indices (ORI) was significantly higher in the Kovrov on 2.22 (94% CI 1.09 -4.24) and in the Murom district on 4.9 (95% CI -7.76 3.69). At the same time we noted reliably poor ORI of TG cancer compared to the city Vladimir, but not identified in the area.

The attitude of the urban and rural population of TG cancer cases amounted to 84% versus 16%. At the same time, the average urban population areas in 2.4 times the average population areas throughout the research period. The relative risk of developing TG cancer among the urban population stood at 2.16 (95% CI 1.53 -3.07).

The ratio of women to men was 5 to 1. The number of men in the study group was 14.9%, women-85.1% (χ_2= 279.6, p< 0.001). Thus, TG cancer patients were female. What was more – women of middle age.

The average incidence rate among men was intensive 0.9 cases (95% CI 0.7 -1.06) at 100 000 male population a year, women-4.3 cases (95% CI -5.92 2.65) per 100 000 female population per year .Average morbidity during the entire observation period exceeded that of men in 4.8 times (t= 5.3, p< 0.001).

The concentration of iodine in water sources of the Vladimirsky region varies widely. In the areas where the water is taken from artesian sources the iodine content is higher and varies from small limits 0.218 g/l to moderate decline (0.164 -0.141 µg/l). In the areas with ground-based and soil and groundwater iododeficit has been pronounced with concentrations determined by standard methods (in 4 districts and regional center). The average concentration of iodine in

the water of the Vladimirsky region totaled 0.0982 ± 0.06 μg/dm³ (95% CI -0.1181 0.0758 average, median-0.109) (Kolmogorov-Smirnov test, p= 0.452). The minimum content of iodine (at least 0.125 g/DM^3) was determined in 3 districts.

To determine possible TG carcinoma incidence based on the severity of iodine deficiency in the areas we conducted the correlation analysis with the Spearman ‘s correlation coefficient. We found no direct correlation between the level of TG cancer incidence with the concentration of iodine in the water of the examined patients was weak and unreliable (Spearman R= 0.11, p= 0.48).

Next, we analyzed the dependence of the age level of patients with newly diagnosed of the TG carcinoma and iodine concentration in drinking water. This was identified prognostically significant concentration of iodine in the water that was > 0.120 μg/dm³. Based on this indicator, all patients were divided into 2 groups: the average age of patients in the group living on the territory with the level of iodine in water ≤ 0, 120 μg/dm³ totaled 42.4 ± 8.6. At the same time, the average age of the patients with TG carcinoma in a group with the concentration of iodine in the water > 0.120 μg/dm³, was 54.4 ± 9.7 (student's T-test, t= 2.3 (p= 0.042). Thus, with more pronounced iodine deficiency of TG carcinoma was first identified in patients was significantly younger than the group who are living in areas with normal or moderately reduced iodine concentration in drinking water.

It is known that non-tumorous TG pathology directly correlates with the level of iodine deficiency. Many changes to the structure of the thyroid gland in tumor pathology background form the process. Our research showed that 23% of all carcinomas (mainly papillary and follicular variants) as background processes have nodular and diffuse toxic goiter, and chronic thyroiditis and microadenoma. Medullary and anaplastic variants of carcinoma are more likely to develop in the absence of structural gland pathology de novo. Multifactorial analysis of the combinations iododeficit, normal concentration of iodine and non-tumor and tumor (background) pathology did not find significant dependency.

At 76.9% of patients TG cancer was diagnosed due to absence of the pathological process of non-tumor nature. At the same time the most frequent TG adenoma and nodular goiter were background in 10.8% and 6.3% of the cases respectively. TG adenoma and nodular goiter, as well as the absence of any background of pathology were not associated with a specific form of cancer .

The assessment of score range of histological forms of thyroid cancer found out that the relative frequency of papillary thyroid cancer decreased from 2003 to 2013, with 85.2% to 63.6%, however, a reliable decline does not reveal the criteria for χ_2= 1.948,(p)= 0.163. Follicular thyroid cancer rates increased from 11.5% to 35.3%, criteria for χ_2= 3.736,(p)= 0.053. Frequency of anaplastic cancer also did not change significantly (exact Fisher test, p= 0.111). Histological variant of medullary thyroid cancer was rare.

The study of the influence of external factors on TG cancer began with creation of a morbidity map covering all the Vladimirsky area. The data showed that the highest prevalence rate of TG cancer cases (32%) was identified in the regional center. But in some regions high levels were presented due to industrial plans influencing on the ecological status of the region with different intencity.

Thus, on the basis of these data, we found that TG carcinoma was noted mostly at young women in the ioddeficient regions, the malignant tumor with relatively high differentiation occurs on the background of benign processes - adenoma and nodular goiter; tumors with a low degree of differentiation have their own way of anaplasia, there are no background processes, they are more common in industrial centers according to the level of iododeficiency.

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Authors:

Rakov Vasily Evgenevich - correspondence post-graduate student, doctor pathologist of the Murom CRH, **Artifeksova** Anna Alekseevna - doctor med. sciences, prof., head of the Department, artifeksova@yandex.ru
SBEI HPE «Nizhniy Novgorod medical academy» MH RF