# HORMONAL AND IMMUNOLOGICAL STATUS IN PATIENTS WITH VASOMOTOR RHINITIS ON A THYROTOXICOSIS BACKGROUND

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***Abstract.*** *Hormonal and immunological disturbances play an important role in the pathogenesis of vasomotor rhinitis (VR) developing on a background of thyrotoxicosis. The aim of this study was to determine thyroid hormone levels and immunological status in patients with VR associated with thyrotoxicosis and to assess their influence on disease course. Seventy-five patients with VR on a thyrotoxicosis background and 20 healthy subjects (controls) were examined. Serum thyroid hormones (T3, T4, TSH), cellular immunity markers (T- and B-lymphocytes) and humoral immunity parameters (IgA, IgM, IgG, total IgE), as well as nasal-secretion immunoglobulins (sIgA, IgA, secretory IgA), were determined. T4 was elevated in 82.6% of patients and T3 in 76% (T3 7.86 ± 2.55 ng/mL, T4 49.9 ± 5.4 ng/mL; reference ranges T3 2–4.2 ng/mL, T4 7–18 ng/mL), while TSH was reduced (1.39 ± 0.45 μIU/mL). Immunological testing revealed a deficiency of T- and active T-lymphocytes in 64% of patients; serum IgM (2.48 ± 0.25 g/L) and total IgE (343.2 ± 29.9 IU/mL; reference 166.4 ± 7.5 IU/mL) were elevated, while nasal-secretion sIgA and IgA were reduced (298.7 and 207.2 mg/L, respectively; $p<0.001$). In conclusion, VR on a thyrotoxicosis background is accompanied by thyroid hyperfunction, an imbalance between cellular and humoral immunity, and weakening of local mucosal defence, all of which aggravate the disease course and warrant that hormonal and immune status be taken into account in treatment planning.*

***Keywords:*** *vasomotor rhinitis, thyrotoxicosis, thyroid hormones, T3, T4, TSH, immune status, total IgE, secretory immunoglobulins.*

**Introduction.**

Thyroid hormones influence nearly all body systems, including the state of the immune system and mucosal surfaces. Thyrotoxicosis is characterized by an acceleration of metabolism, altered tone of the autonomic nervous system, and immune dysregulation, all of which may modify the reactivity of the upper airway mucosa.

Recent studies have demonstrated an association between thyroid dysfunction and rhinitis: hormonal imbalance contributes to nasal mucosal oedema, glandular hyperfunction, and impaired mucociliary transport. At the same time, the specific features of hormonal and immunological status in vasomotor rhinitis (VR) occurring on a thyrotoxicosis background, and their influence on disease course, remain insufficiently studied. A comprehensive assessment of these parameters is important for elucidating the pathogenetic mechanisms of the disease and for optimizing treatment, which underlies the relevance of this study.

The aim of this study was to determine thyroid hormone levels and immunological status in patients with vasomotor rhinitis associated with thyrotoxicosis and to assess their influence on disease course.

**Materials and methods.**

The study included 75 patients with vasomotor rhinitis on a thyrotoxicosis background and 20 healthy subjects (control group). Thyroid hormonal status was assessed in blood serum by determining total triiodothyronine (T3), thyroxine (T4), thyroid-stimulating hormone (TSH), and autoantibodies to thyroglobulin (anti-TG) and thyroid peroxidase (anti-TPO) using the radioimmunoassay method (“Immunotech” RIA kits, Czech Republic); thyroid ultrasonography was also performed.

Immunological reactivity was studied using the E-rosette (E-RFC) and EAC-rosette (EAC-RFC) tests to determine the total number of T- and B-lymphocytes and active T-lymphocytes. Serum immunoglobulin levels of classes A, M and G were determined by Mancini's radial immunodiffusion method, and total IgE concentration was measured by enzyme immunoassay. The levels of secretory immunoglobulins (sIgA, IgA, secretory IgA) in nasal secretions were likewise measured by radial immunodiffusion. Data were analyzed using Student's t-test ($p<0.05$ was considered statistically significant).

**Results and discussion.**

Assessment of thyroid hormonal status showed a marked increase in thyroxine (T4) production in 82.6% of patients and in triiodothyronine (T3) in 76%, while TSH levels were reduced. Mean values were: T3 — 7.86 ± 2.55 ng/mL (reference 2–4.2), T4 — 49.9 ± 5.4 ng/mL (reference 7–18), and TSH — 1.39 ± 0.45 μIU/mL (reference 0.25–4) (Table 1). These findings confirm increased hormonal activity in VR associated with diffuse toxic goiter.

***Table 1.***

**Thyroid hormone levels in vasomotor rhinitis on a thyrotoxicosis background (M±m, n=75)**

| Hormone | Baseline value (M±m) | Reference range |
|---|---|---|
| T3, ng/mL | 7.86 ± 2.55 | 2–4.2 |
| T4, ng/mL | 49.9 ± 5.4 | 7–18 |
| TSH, μIU/mL | 1.39 ± 0.45 | 0.25–4 |

***Table 2.***

**Immunological parameters in vasomotor rhinitis on a thyrotoxicosis background (M±m, n=75)**

| Parameter | Patients | Reference range |
|---|---|---|
| Deficiency of T- and active T-lymphocytes | 48 patients (64%) | — |
| Serum IgM, g/L | 2.48 ± 0.25 | 1.25 ± 0.06 |
| Serum total IgE, IU/mL | 343.2 ± 29.9 | 166.4 ± 7.5 |
| Nasal-secretion sIgA, mg/L | 298.7 ± 8.3 | 1545.0 |
| Nasal-secretion IgA, mg/L | 207.2 ± 6.5 | 600.0 |

Examination of cellular immunity revealed a deficiency in the relative and absolute counts of T- and active T-lymphocytes, together with a mild increase in B-lymphocytes, in 48 of 75 patients (64%). With respect to humoral immunity, serum IgA and IgG levels remained within the physiological reference range, whereas IgM was elevated (2.48 ± 0.25 g/L; reference 1.25 ± 0.06 g/L). Serum total IgE was significantly elevated (343.2 ± 29.9 IU/mL; reference 166.4 ± 7.5 IU/mL), reflecting the presence of an allergic component and immune dysregulation (Table 2).

Local defence immunoglobulins in nasal secretions (sIgA and IgA) were significantly lower than reference values (298.7 and 207.2 mg/L, respectively, versus reference values of 1545 and 600 mg/L), indicating a weakening of the local defensive capacity of the nasal mucosa and increased vulnerability to pathogens ($p<0.001$). Thus, the baseline immunological reactivity parameters of the patients demonstrated an imbalance between cellular and humoral immunity.

A comprehensive analysis of hormonal and immunological parameters demonstrated that, in vasomotor rhinitis on a thyrotoxicosis background, thyroid hyperfunction is combined with immune dysregulation and has a pronounced effect on the disease course. Elevated thyroid hormone levels intensify autonomic tone and vascular reactivity, aggravating VR symptoms, while the weakening of local immunity contributes to chronicity of inflammation. These findings substantiate the interaction

between the two conditions and the necessity of a combined treatment approach that addresses both the endocrine and immunological components of the disease.

**Conclusion.**

In patients with vasomotor rhinitis on a thyrotoxicosis background, thyroid hyperfunction is observed: T4 is elevated in 82.6% and T3 in 76% of patients (T3 7.86 ± 2.55 ng/mL, T4 49.9 ± 5.4 ng/mL), while TSH is reduced (1.39 ± 0.45 μIU/mL). In cellular immunity, a deficiency of T- and active T-lymphocytes is found in 64% of patients, indicative of immune dysregulation. In humoral immunity, IgM (2.48 ± 0.25 g/L) and total IgE (343.2 ± 29.9 IU/mL) are elevated, while local defence immunoglobulins (sIgA, IgA) in nasal secretions are significantly reduced, reflecting weakened local defence. In vasomotor rhinitis on a thyrotoxicosis background, thyroid hyperfunction combines with immune dysregulation to aggravate the disease course, which requires a comprehensive treatment approach that takes hormonal and immune status into account.

**Conflict of Interest**

The authors declare no conflict of interest.

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