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Herbal and mineral composition for the management of thyroid dysfunction

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Abstract. Background. To date, herbal medicine is one of the most promising methods for comprehensive treatment of diffuse and mixed goiter. Under such conditions, it is relevant to use pharmacological preparations based on plant materials that would have a wide range of effects on thyroid function. The purpose of the study was to evaluate the effectiveness, safety and tolerability of dietary supplements containing L-tyrosine, brown algae extract (Phaeophyceae), zinc, copper, and folate, as well as dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), sodium selenite and possibilities of their combination. **Materials and methods.** The study included 147 patients with nodular goiter and different thyroid functional state: 23 with diffuse goiter, euthyroidism; 24 with diffuse goiter, subclinical hypothyroidism; 22 with diffuse goiter, subclinical thyrotoxicosis; 27 with nodular goiter, euthyroidism; 25 with nodular goiter, subclinical hypothyroidism, 26 with nodular goiter, subclinical thyrotoxicosis. **Results.** The analysis of the use of herbal medicines showed that dietary supplements containing L-tyrosine, brown algae extract (Phaeophyceae), zinc, copper, and folate can be recommended alone or as part of a comprehensive treatment for 3 months in patients with endemic and multinodular goiter on the background of hypothyroidism and euthyroidism. In nodular goiter with hyperthyroidism and euthyroidism, it will be more effective to use herbal remedies with the inclusion of dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), sodium selenite alone or as comprehensive treatment for 6 months. Patients with endemic and mixed goiter without thyroid dysfunction are recommended combined therapy with both herbal remedies for 3 months. **Conclusions.** The best effect was achieved with the combined use of both phytopreparations: in euthyroid patients with diffuse and mixed goiter, thyroid status remained normal, antibody levels were unchanged; they presented a significant decrease in volume and a tendency to decrease in the size of thyroid nodules.

Keywords: thyroid gland; hypothyroidism; thyrotoxicosis; nodular goiter; treatment; herbal medicine

Introduction

Over the past decade, there has been a tendency to increase the number of thyroid gland (TG) diseases, which is due to many environmental factors. Among the most important are iodine deficiency and radiation contamination [1, 2].

Almost the entire territory of Ukraine suffers from iodine deficiency. According to the Global Iodine Nutrition Scorecard study, in Ukraine, 382,000 children (80 %) are born every year at risk of disorders due to iodine deficiency [3].

Among the causes of nodular goiter, there are primary and secondary exogenous iodine deficiency. The secondary one occurs when there is an excess of numerous trace elements (manganese, sodium fluoride, iron, cobalt) that

interfere with the absorption of iodine by plants, radiation exposure, monotonous diet, vitamin deficiency in food, consumption of foods containing goitrogens (thiocyanates), a defect in the enzymes involved in the synthesis and metabolism of thyroid hormones, genetic predisposition [4, 5]. Combined iodine and selenium deficit exacerbates the problem of iodine deficiency, leading to increased frequency of hypertrophic and hyperplastic processes in the thyroid gland, autoimmune thyroid diseases, and multinodular goiter [6, 7]. Prolonged iodine deficiency also contributes to the development of thyroid dysfunction: hypothyroidism and thyrotoxicosis (increased ability of autonomous hyperproduction of thyroid hormones by thyroid nodules) [8, 9].



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However, despite the proven multifactorial nature of endemic and nodular goiter in regions with iodine deficiency, there are still no unified preventive and rehabilitation programs aimed at eliminating all unfavorable factors that lead to the formation and progression of goiter. According to the current protocols, the following drugs, first of all, are prescribed: potassium iodide, which is not always effective, especially in the case of a combination of several unfavorable factors [10–12]. Under such conditions, the relevance of pharmacological preparations based on plant materials that would have a wide range of effects on thyroid function. According to the WHO, 80 % of people around the world use medicinal herbs for various purposes [13–17].

One of the most available today in the literature is information on the spectrum of therapeutic properties of white cinquefoil [18] (*Potentilla alba* L.), which has found a place in the complex treatment of patients with diffuse toxic goiter, hypothyroidism, diffuse and nodular goiter. The underground part of *Potentilla alba* L. (rhizomes with roots) contains carbohydrates (starch), iridoids, saponins, phenolcarboxylic acids, flavonoids (quercetin), tannins (gallotannin) up to 17 % in the flowering phase. The aerial part contains iridoids, saponins, phenolcarboxylic acids, flavonoids (rutin), tannins up to 6 %. The leaves contain phenolcarboxylic acids, flavonoids (quercetin, kaempferol, cyanidin). Rhizomes and roots of white cinquefoil (*Potentilla alba*) contain flavonoids, macro-iridoids, saponins, carbohydrates, phenolcarboxylic acids, tannins, most of which have significant antioxidant properties that help reduce the levels of peroxide radicals, hydroxyl radicals, and phospholipid degradation, as well as anti-inflammatory properties, antimutagenic and immunomodulatory, antitumor, membrane stabilizing, and thyroprotective properties. The plant also accumulates microelements (iodine, magnesium, copper, selenium, zinc, cobalt, iron, aluminum, and silicon) in physiological doses, which are molecular iodine synergists [19–21].

The literature contains data on the effectiveness of herbal remedies in the complex treatment of hypothyroidism, which include white cinquefoil, dry extract of Baikal skullcap (*Scutellaria baicalensis* Georgi), dry extract of roseroot (*Rhodiola rosea* L.), in other publications, a combination of cinquefoil with selenium and zinc [17].

Given the above, it was important to study the effectiveness and the possibility of using the capsules contains 300 mg of dry extract of roots and rhizomes of cinquefoil (*Potentilla alba*), 39.9 mg of dry extract of chokeberry fruits (*Aronia melanocarpa*), 30 mg of dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), 0.1 mg of sodium selenite (*Natrii selenis*) in the form of dry powder, and capsules, which contains 300 mg of L-tyrosine, brown algae extract (*Phaeophyceae*) (which corresponds to 50 µg of iodine), 25 mg of zinc oxide, 2 mg of copper gluconate, folate, which corresponds to 25 of 40 µg folic acid and their combination in case of thyroid pathology.

The fruits of black chokeberry (*Aronia melanocarpa*) contain anthocyanins, flavonoids, organic acids, vitamins C, E, PP, carotenoids, sugars, tannins, vitamin B₉, folic acid, and trace elements (fluorine, iodine, copper, and iron), contribute to stabilization of the endocrine glands, restore thyroid function, and reduce blood sugar and cholesterol levels.

Flowers of redhaw hawthorn (*Crataegus sanguinea*) contain hyperoside, quercetin, vitexin, saponarethin, orientin, amines (choline, acetylcholine, and trimethylamine), ascorbic acid (18–100 mg%), B-carotene (0.4–2.7 mg%), vitamin K, and phenolic compounds.

Fruits and flowers of redhaw hawthorn improve metabolism, promote weight loss, tone the heart muscle, reduce the excitability of the central nervous system, increase blood supply to the coronary vessels of the heart and brain, eliminate arrhythmia and tachycardia, improve sleep and well-being, normalize blood pressure, and also remove heavy metal salts from the body, lower cholesterol, increase the body's resistance to the effects of unfavorable factors [22].

Selenium is a component of protein compounds named selenoproteins: glutathione peroxidase, deiodinase, thioredoxin reductase, which ensure adequate functioning of the thyroid gland, it participates in the secretion and metabolism of thyroid hormones, activates the conversion of thyroxine into triiodothyronine; promotes optimal functioning of the immune system, free radical scavenging, and has antitumor properties [17].

L-tyrosine is an amino acid that is part of the active centers of some enzymes. Also, residues of this amino acid in proteins can be substrates for enzymes that perform post-translational modification, for example protein kinases. For the construction of thyroid hormones, not only iodine but also other trace elements (selenium, iron, zinc, copper, and calcium) and the amino acid, L-tyrosine.

According to recent studies, tyrosine, in addition to the synthesis of thyroid hormones, is involved in the synthesis of several substances important for the human body, such as norepinephrine and adrenaline, dopamine and melanin. Scientific studies have shown that tyrosine supplementation can reduce the effects of stress and fatigue on cognitive performance in work environments characterized by psychosocial and physical stress [23, 24].

In addition to L-tyrosine, it contains brown algae extract (which corresponds to 50 µg of iodine), zinc, copper, and folate, which are components of the synthesis of one of the most important thyroid proteins, thyroglobulin.

The purpose of the study was to evaluate the effectiveness, safety and tolerability of dietary supplements containing L-tyrosine, brown algae extract (*Phaeophyceae*), zinc, copper, and folate, as well as dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), sodium selenite and possibilities of their combination.

Materials and methods

The study included 147 patients with nodular goiter with different thyroid functional state (23 with diffuse goiter, euthyroidism; 24 with diffuse goiter, subclinical hypothyroidism; 22 with diffuse goiter, subclinical thyrotoxicosis; 27 with nodular goiter, euthyroidism; 25 with nodular goiter, subclinical hypothyroidism, 26 with nodular goiter, subclinical thyrotoxicosis).

The mean age of the patients was 43.24 ± 2.19 years (20 to 72 years). All patients underwent an ultrasound examination (US) on a Canon Aplio a550-AEE 197297 scanner

(Japan). During the ultrasound, we evaluated the volume of the thyroid gland, the presence and size of nodules and the dynamics of these parameters in 3 months to analyze the effectiveness of the therapy. The study included patients with thyroid nodules who were not recommended the FNAB of nodules (THIRADS 2).

All patients underwent a study of the thyroid hormonal status: free thyroxine (T_4), free triiodothyronine (T_3), thyroid-stimulating hormone (TSH), antibodies to thyroglobulin (Tg-Ab), antibodies to thyroid peroxidase (TPO-Ab).

According to the developed study design, patients with diffuse and mixed goiter in euthyroidism received a combination of herbal remedies containing L-tyrosine, brown algae extract (Phaeophyceae), zinc, copper, and folate, as well as dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite; patients with diffuse and multinodular goiter, subclinical thyrotoxicosis received a dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite; patients with diffuse and multinodular goiter, subclinical hypothyroidism received a phytopreparation with the inclusion of L-tyrosine, an extract of brown algae (Phaeophyceae), zinc, copper, and folate. Observations of the above parameters were performed before treatment and after 3 months.

The work is part of the research of the Department of Endocrinology of the IFNMU on the topic "Scientific substantiation and improvement of diagnosis and treatment of endocrinopathies based on the study of priority etiopathogenetic factors and comorbidities". State registration number: 0120U105103.

Results

Under the influence of the treatment, there were changes in clinical symptoms in all study groups. In patients with subclinical thyrotoxicosis on the background of both nodular and mixed goiter who received a phytopreparation containing a dry extract of the roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of the fruits of black chokeberry (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite, got improved emotional state, normalized sleep, reduced tremors and sweating. Levels of TSH, T_3 , T_4 corresponded to euthyroidism in 3 months. When comparing the results of ultrasonography of the thyroid gland, we revealed a significant decrease in thyroid volume from $20.95 \pm 3.11 \text{ cm}^3$ to $15.55 \pm 2.92 \text{ cm}^3$ ($p < 0.05$) in patients with multinodular goiter, and from $22.95 \pm 2.15 \text{ cm}^3$ to $17.05 \pm 1.65 \text{ cm}^3$ ($p < 0.05$). It should be noted that the size of the thyroid focal lesions did not change significantly over 3 months of observation.

Thus, the use of a phytopreparation containing a dry extract of the roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of the black chokeberry fruit (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite in

patients with multinodular goiter, and subclinical thyrotoxicosis, helps to improve subjective well-being, normalize TSH levels and reduce goiter size.

Our data on the effectiveness of the herbal preparation, which contains a dry extract of the roots and rhizomes of white cinquefoil, are consistent with studies conducted in Ukraine [15, 17].

Patients with diffuse and mixed goiter with subclinical hypothyroidism received a dietary supplement containing L-tyrosine, an extract of brown algae (Phaeophyceae), zinc, copper, and folate for 3 months. After 3 months, 95.9 % of patients reported improvement in general condition: decreased fatigue, lethargy, drowsiness, facial swelling, hair loss, improved skin condition, which is likely due to improvement of thyroid status. Thus, in 91.7 % of patients with diffuse goiter and subclinical hypothyroidism and 92.0 % of patients with multinodular goiter, respectively, achieved euthyroidism, which proves the effectiveness of the use of this complex in hypothyroidism. When analyzing the dynamics of thyroid ultrasound parameters, the tendency to decrease the volume of the thyroid gland in patients of both groups was established: $21.15 \pm 3.02 \text{ cm}^3$ to $18.69 \pm 2.92 \text{ cm}^3$ ($p > 0.05$) in patients with multinodular goiter, and with $23.56 \pm 2.25 \text{ cm}^3$ to $21.25 \pm 1.55 \text{ cm}^3$ ($p > 0.05$). The size of focal thyroid masses also did not change significantly. In our opinion, for better and faster reduction of goiter size, it is recommended to enhance the effect of dietary supplementation with the inclusion of L-tyrosine, an extract of brown algae (Phaeophyceae), zinc, copper, and folate with an additional prescription of a phytopreparation containing a dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of the fruit of black chokeberry (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite in this cohort of patients, which may be the target for further research.

Discussion

In our opinion, the results obtained in the groups of patients who took complex therapy with the inclusion of phytopreparations for 3 months. In patients with both diffuse and multinodular goiter who were in euthyroidism, got subjectively reduced feeling of pressure, compression in the thyroid area, and improved well-being. Indicators of thyroid status and antibody levels did not change, which allows the use of these herbal remedies in patients with autoimmune thyroiditis. Compared to the pre-treatment values, a significant decrease in thyroid volume was observed: from $21.85 \pm 2.71 \text{ cm}^3$ to $15.85 \pm 2.95 \text{ cm}^3$ ($p < 0.05$) in patients with diffuse goiter and from $22.18 \pm 2.93 \text{ cm}^3$ to $16.15 \pm 2.95 \text{ cm}^3$ ($p < 0.05$) in patients with multinodular goiter. It should also be noted that after treatment in 58 % of patients, the echographic structure of the thyroid tissue improved and a tendency of reducing the size of the nodules was observed. Therefore, in our opinion, the patients should be recommended to continue taking the dry extract of the roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruit (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite for up to 6 months.

Thus, combined therapy with herbal medicines in patients with diffuse and multinodular goiter who were in euthyroidism, subjectively improves the condition of patients, helps to maintain the balance of thyroid hormones, reduces the size of thyroid nodules.

It should be noted that none of the patients had intolerance, side effects, or allergic reactions to the studied phytopreparations during the study.

Thus, we have tested and proved the effectiveness and safety of the use of phytopreparations containing L-tyrosine, extract of brown algae (Phaeophyceae), zinc, copper, and folate, as well as dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), sodium selenite, and their combination.

Conclusions

Based on our research, it has been shown that phytopreparations can be used in the following treatment regimens: a dietary supplement containing L-tyrosine, an extract of brown algae (Phaeophyceae), zinc, copper, and folate is recommended as a monotherapy for 3 months for patients with endemic and multinodular goiter with hypothyroidism and euthyroidism. A complex herbal preparation containing dry extract of roots and rhizomes of white cinquefoil (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite is recommended as monotherapy for 6 months for patients with endemic and multinodular goiter with thyroid hyperfunction and euthyroidism. Patients with endemic and multinodular goiter without thyroid dysfunction are recommended combined treatment for 3 months and continued use of the herbal medicine with a rational ratio of white cinquefoil rhizomes (*Potentilla alba* L.), dry extract of black chokeberry fruits (*Aronia melanocarpa*), dry extract of flowers and fruits of redhaw hawthorn (*Crataegus sanguinea*), and sodium selenite for up to 6 months.

References

1. Hatch-McChesney A, Lieberman HR. Iodine and Iodine Deficiency: A Comprehensive Review of a Re-Emerging Issue. *Nutrients*. 2022 Aug 24;14(17):3474. doi: 10.3390/nu14173474.
2. Street ME, Shulhai AM, Petraroli M, et al. The impact of environmental factors and contaminants on thyroid function and disease from fetal to adult life: current evidence and future directions. *Front Endocrinol (Lausanne)*. 2024 Jun 19;15:1429884. doi: 10.3389/fendo.2024.1429884.
3. Pasyechko NV, Kulchinska VM, Naumova LV, Krytskyy TI, Yevstratieva YuV. Subclinical hypothyroidism in women at the stage of natural pregnancy planning and with the use of assisted reproductive technologies in the iodine deficiency region. *Clinical Endocrinology and Endocrine Surgery*. 2020;(72):70-77. Ukrainian. doi: 10.30978/CEES-2020-4-70.
4. Kravchenko VI, Andrusyshyna IM, Luzanchuk IA, Polumbryk MO, Tarashchenko YM. Association between Thyroid Hormone Status and Trace Elements in Serum of Patients with Nodular Goiter. *Biol Trace Elem Res*. 2020 Aug;196(2):393-399. doi: 10.1007/s12011-019-01943-9.
5. Boas M, Frederiksen H, Feldt-Rasmussen U, et al. Childhood exposure to phthalates: associations with thyroid function, insulin-like growth factor I, and growth. *Environ Health Perspect*. 2010 Oct;118(10):1458-64. doi: 10.1289/ehp.0901331.
6. Demiral Sezer S, Erdoğan Yücel E. Does insulin resistance trigger thyroid nodule? *Intern Emerg Med*. 2021 Nov;16(8):2105-2108. doi: 10.1007/s11739-021-02713-z.
7. AlSaedi AH, Almalki DS, ElKady RM. Approach to Thyroid Nodules: Diagnosis and Treatment. *Cureus*. 2024 Jan 13;16(1):e52232. doi: 10.7759/cureus.52232.
8. Pankiv VI. Coexistence of accompanying autoimmune diseases in adolescents with autoimmune thyroiditis. *Child's health*. 2024;19(7):429-433. doi: 10.22141/2224-0551.19.7.2024.1754.
9. Tarashchenko YuM, Kovalenko AYe, Kravchenko VI, Kovzun OI, Simurov OV. Iodine and selenium deficiency in the pathogenesis of goiter transformation of the thyroid gland and autoimmune thyropathies (literature review and results of own researches). *Endocrinologia*. 2020;25(4):297-304. Ukrainian. doi: 10.31793/1680-1466.2020.25-4.297.
10. Barrea L, Muscogiuri G, de Alteriis G, et al. Adherence to the Mediterranean Diet as a Modifiable Risk Factor for Thyroid Nodular Disease and Thyroid Cancer: Results From a Pilot Study. *Front Nutr*. 2022 Jun 17;9:944200. doi: 10.3389/fnut.2022.944200.
11. Durante C, Hegedüs L, Czarniecka A, et al. 2023 European Thyroid Association Clinical Practice Guidelines for thyroid nodule management. *Eur Thyroid J*. 2023 Aug 14;12(5):e230067. doi: 10.1530/ETJ-23-0067.
12. Kobaly K, Kim CS, Mandel SJ. Contemporary Management of Thyroid Nodules. *Annu Rev Med*. 2022 Jan 27;73:517-528. doi: 10.1146/annurev-med-042220-015032.
13. Turchina SI. Vitamin-mineral premix and treatment of diffusive nontoxic goiter. *Mіžnarodnij endokrinologіchnij žurnal*. 2018;14(1):59-66. Ukrainian. doi: 10.22141/2224-0721.14.1.2018.127094.
14. Parfait BTS, Lawrence MTJ. Pharmacognosy, phytotherapy and modern medicine. *Int J Infect Dis Epidemiol*. 2023;4(1):1-5. doi: 10.51626/ijide.2023.04.00041.
15. Goncharova OA, Pankiv VI, Pankiv IV. Assessment of selenium supply in adolescents living in a rural area. *Child's health*. 2022;17(6):289-293. Ukrainian. doi: 10.22141/2224-0551.17.6.2022.1531.
16. Javidi N, Khorasani ZM, Salari R, Niroumand S, Yousefi M. Achievements in Hypothyroidism Treatment with Herbal Medicine: A Systematic Review of Randomized Controlled Trials. *Curr Drug Discov Technol*. 2023;20(5):e030423215393. doi: 10.2174/1570163820666230403091841.
17. Ghaffari-Saravi F, Jokar A. Herbal remedies for hypothyroidism: A systematic review and meta-analysis. *Caspian J Intern Med*. 2024 Oct 19;16(1):1-8. doi: 10.22088/cjim.16.1.1.
18. Augustynowicz D, Podolak M, Latté KP, Tomczyk M. New Perspectives for the Use of *Potentilla alba* Rhizomes to Treat Thyroid Gland Impairments. *Planta Med*. 2023 Jan;89(1):19-29. doi: 10.1055/a-1663-6461.
19. Pankiv VI. New possibilities of phytotherapy for hypothyroidism. *Mіžnarodnij endokrinologіchnij žurnal*. 2020;16(2):152-155. doi: 10.22141/2224-0721.16.2.2020.201301.
20. Damien Dorman HJ, Shikov AN, Pozharitskaya ON, Hiltunen R. Antioxidant and pro-oxidant evaluation of a *Potentilla alba* L. rhizome extract. *Chem Biodivers*. 2011 Jul;8(7):1344-1356. doi: 10.1002/cbdv.201100043.
21. Alakbarov FU. Medicinal Plants Used in Medieval Azerbaijan Phytotherapy. *Journal of Herbal Pharmacotherapy*. 2001;1(3):35-49. doi: 10.1080/J157v01n03_04.
22. Mahmoodianfard S, Vafa M, Golgiri F, et al. Effects of

Zinc and Selenium Supplementation on Thyroid Function in Overweight and Obese Hypothyroid Female Patients: A Randomized Double-Blind Controlled Trial. *J Am Coll Nutr.* 2015;34(5):391-399. doi: 10.1080/07315724.2014.926161.

23. Tomczyk M, Latté KP. *Potentilla* - a review of its phytochemical and pharmacological profile. *J Ethnopharmacol.* 2009 Mar 18;122(2):184-204. doi: 10.1016/j.jep.2008.12.022.

24. Deijen JB, Wientjes CJ, Vullings HF, Cloin PA, Langefeld JJ. Tyrosine improves cognitive performance and reduces blood pressure in cadets after one week of a combat training course. *Brain Res Bull.* 1999 Jan 15;48(2):203-209. doi: 10.1016/s0361-9230(98)00163-4.

25. Steenbergen L, Sellaro R, Hommel B, Colzato LS. Tyrosine promotes cognitive flexibility: evidence from proactive vs. reactive control during task switching performance. *Neuropsychologia.* 2015 Mar;69:50-55. doi: 10.1016/j.neuropsychologia.2015.01.022.

26. Kravchenko V, Zakharchenko T. Thyroid hormones and minerals in immunocorrection of disorders in autoimmune thyroid diseases. *Front Endocrinol (Lausanne).* 2023 Aug 30;14:1225494. doi: 10.3389/fendo.2023.1225494.

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Ефективність застосування фітотерапії та мінералів при лікуванні дисфункцій щитоподібної залози

Резюме. Актуальність. На сьогодні фітотерапія є одним із перспективних методів комплексного лікування тиреоїдних дисфункцій. За таких умов актуальним є застосування фармакологічних препаратів на основі рослинної сировини, які б мали широкий спектр впливу на функцію щитоподібної залози. **Мета:** оцінка ефективності, безпеки й переносимості добавок, що містять L-тирозин, екстракт бурих водоростей (Phaeophyceae), цинк, мідь і фолат, а також сухий екстракт коренів і кореневищ перстачу білого (*Potentilla alba* L.), сухий екстракт плодів чорноплідної горобини (*Aronia melanocarpa*), сухий екстракт квітів і плодів глоду криваво-червоного (*Crataegus sanguinea*), селеніт натрію, та можливості їхньої комбінації. **Матеріали та методи.** У дослідженні взяли участь 147 пацієнтів із вузловим зобом та різним функціональним станом щитоподібної залози: 23 — із дифузним зобом, еутиреозом; 24 — із дифузним зобом, субклінічним гіпотиреозом; 22 — із дифузним зобом, субклінічним тиреотоксикозом; 27 — із вузловим зобом, еутиреозом; 25 — із вузловим зобом, субклінічним гіпотиреозом, 26 — із вузловим зобом, субклінічним тиреотоксикозом. **Результати.** Аналіз застосування рослинних препаратів показав, що добавки, які містять L-тирозин, екстракт бурих водоростей (Phaeophyceae), цинк,

мідь та фолат, можуть бути рекомендовані як монотерапія або в складі комплексного лікування протягом трьох місяців у пацієнтів з ендемічним і багатовузловим зобом на тлі гіпотиреозу й еутиреозу. При вузловому зобі з гіпертиреозом та еутиреозом більш ефективно використовувати фітопрепарати з включенням сухого екстракту коренів та кореневищ перстачу білого (*Potentilla alba* L.), сухого екстракту плодів чорноплідної горобини (*Aronia melanocarpa*), сухого екстракту квітів та плодів глоду криваво-червоного (*Crataegus sanguinea*), селеніту натрію як монотерапію або комплексне лікування протягом шести місяців. Пацієнтам з ендемічним та багатовузловим зобом без порушення функції щитоподібної залози рекомендується комбінована терапія обома фітопрепаратами протягом трьох місяців. **Висновки.** Найкращий ефект був досягнутий при комбінованому застосуванні обох фітопрепаратів: у пацієнтів із дифузним та багатовузловим зобом, які перебували в стані еутиреозу, показники тиреоїдного статусу залишались у нормі, рівні антитіл не змінювались, спостерігалось вірогідне зменшення об'єму і тенденція до зменшення розмірів вузлів щитоподібної залози.

Ключові слова: щитоподібна залоза; гіпотиреоз; тиреотоксикоз; вузловий зоб; лікування; фітотерапія