

Role of food and nutrition in pathogenesis and prevention of Hashimoto's thyroiditis

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Background: Over 300 million people around the world have thyroid problems. Hashimoto's thyroiditis is the most common reason for hypothyroidism among people aged 45 to 65, mostly women. Hashimoto's thyroiditis is a mysterious immune-mediated disease and its reason is still not fully clear. According to specialists nutritional habits have impact on the development of the disease. Fatigue, reduction of exercise capacity, movement deceleration, drowsiness, hair and eyebrow loss, dry skin, nail fragility, feeling cold and chronic constipation are dominant feelings in the clinical picture of the disease.

The objective of the paper is indication of food ingredients that support thyroid gland activity as well as those that should be limited.

Content: In many publications it is emphasized that right nutrition and proper selection of nutrients are necessary in occurring and development of Hashimoto's thyroiditis. The diet of patients with hypothyroidism should be based on increased content of complete protein, polyunsaturated fatty acids as well as carbohydrates with a low glycaemic index. Consumption

of complex carbohydrates which provide the most of mineral nutrients, vitamins and dietary fibres is recommended. The supply of vitamins and mineral nutrients is important due to their impact on secretory activity of the thyroid. They include iodine, iron, selenium and zinc as well as vitamins: A, D, E, B2, B3 and B12. Existence of relation between vitamin D deficiency and the risk of development of autoimmune thyroiditis is also indicated.

Summary: The diet of patients with Hashimoto's thyroiditis should be considered in a complex way, including hormone deficiency as well as changes in diet and supplementing it in necessary mineral nutrients and vitamins. Therefore education regarding the rules of proper nutrition should be a component of the process of treatment.

Key words: Hashimoto's thyroiditis, food, prevention

Background

Our civilization is polluted and chemical. The result of it is rapid increase of autoimmune diseases. They affect bigger and bigger population, but there are many patients who are unaware of the origin of the disease. Connecting diseases of the thyroid to autoimmune reasons is more and more popular. Diseases of endocrine system including the most often occurred: Graves-Basedov thyroid disease and chronic lymphocytic thyroiditis form a very large group of specific autoimmune diseases. In experts' opinion over 300 million people around the world have thyroid problems but a half of them do not know about it. In Poland, according to the estimates of endocrinologists approximately 22% of the population have thyroid problems [1]. Hashimoto's thyroiditis which is the most common reason for hypothyroidism affects people in all age intervals including children, but it mostly occurs between 45 and 65 years of age. Hashimoto's thyroiditis affects women 10 to 20 times more often than men that suggests that estrogens participate in the pathogenesis of the disease [2]. Hashimoto's thyroiditis – a medical condition defined as a disease attacking own organism – was described in 1912 by Japanese physician Haku Hashimoto and it was rare until 1950. Nowadays it is considered the most common immune-mediated disease [3]. Hashimoto's thyroiditis is a mysterious disease due to not fully disclosed pathogenesis. It is known that genetic predispositions, namely immune system disorders are the origin of the disease, but the direct causes of autoimmune reaction are not known [4]. Diagnosis is based on occurring of hypothyroidism and presence of anti-thyroid peroxidase antibodies (a-TPO) and anti-thyroglobulin antibodies (a-Tg) circulating in blood.

Lymphocytic infiltrates, gradual disappearance of thyroid follicular cells and hyperplasia of the connective tissue appear in response to antibodies in thyroid gland – which results in development of hypothyroidism [5]. Fatigue, reduction of exercise capacity, movement deceleration, drowsiness, hair and eyebrow loss, dry skin, nail fragility, feeling cold and chronic constipation are dominant feelings in the clinical picture of the disease. Characteristic symptoms include also swelling of the eyelids, increase of body weight due to released metabolism, low timbre, goiter as well as symptoms resembling rheumatism. Symptoms of severe hypothyroidism include slowing down of the speech, carpal tunnel syndrome, ascites, hearing impairment, water retention, infiltrates of the pleura, pericardial effusion and peripheral oedema affecting ankles, hands and face [6]. Scientific reports confirm relation between hypothyroidism and increased weight. It is also observed that obese people have statistically higher concentration of thyroid-stimulating hormone (TSH). It is also proved that there are disorders of carbohydrate metabolism in thyroid diseases both in hypothyroidism and hyperthyroidism. Thyroid hormones have a significant impact on glucose metabolism and development of insulin resistance, which may result in metabolic syndrome, type 2 diabetes or cardiovascular diseases [7]. The objective of the paper is indication of food ingredients that support thyroid gland activity as well as those that should be limited.

Nutritional habits and diet supplementation – impact on Hashimoto’s thyroiditis

Nutritional state of the organism is the factor that adjusts functioning of all organs in human body. Properly balanced diet can become also an important factor adjusting functioning of the thyroid. Liver, reproductive system, adrenal glands, digestive system (stomach, intestines) and immune system conditions have a significant impact on thyroid activity. In many publications it is emphasized that right nutrition and proper selection of nutrients are necessary in occurring and development of Hashimoto’s thyroiditis. Due to immune origin of Hashimoto’s thyroiditis and inflammation occurring in the organism the diet should be anti-inflammatory and it should eliminate potential food antigens. They could cause production of antibodies and cross-react with thyroid tissue contributing to hypersensitivity and stimulation of the immune system [8]. The diet of patients with hypothyroidism should be based on increased content of healthy and nutritious protein, polyunsaturated fatty acids as well as carbohydrates with a low glycaemic index. Animal protein (meat, marine fish, eggs) is recommended. The quality of consumed fats is also important. Low-fat diets can cause disorders in the functioning of the immune system and inadequate absorption, especially vitamins soluble in fat. Increased consumption of fats containing unsaturated fatty acids e.g. vegetable oils, nuts, avocado, pips and fish is

recommended [8]. In the course of hypothyroidism carbohydrate metabolism disorders often occurs, hence consumption of complex carbohydrates which provide the most of mineral nutrients, vitamins and [8]. Consumption of some groups of products in the course of hypothyroidism should be limited. They include: dairy – milk itself is a very allergenic product, but it contains casein which has antigenic abilities • gluten – it is a kind of a lecithin ,which could be toxic, it also causes the increase of markers of inflammation that could impact existing autoimmune diseases • goitrogen products – such as vegetables of Brassicaceae family (cabbage, cauliflower, broccoli), they contain glucosinolates which are responsible for blocking the uptake of iodine by the thyroid gland • heavily processed products – pastry, chips, crisps, desserts, prepared sauces, fast food, carbonated beverages and alcohol [8]. Vitamins and mineral nutrients are important due to their impact on secretory activity of the thyroid and their presence is necessary to proper functioning of thyroid. The nutrients include iodine, iron, selenium and zinc as well as vitamins: A, D, E, B2, B3 and B12. Well-balanced diet allows to provide all necessary mineral nutrients, but there exist many factors that can perturb their proper absorption in the intestines and as a result despite proper nutrition organism is liable to deficiency of necessary vitamins and minerals. Iodine is one of the most important mineral nutrients playing a key role in the functioning of the thyroid. Its deficiency prevents proper production of thyroid hormones [8]. However scientific reports show that excess of iodine in patients with Hashimoto's thyroiditis can lead to a breakdown in tolerance mechanisms as well as exacerbation of inflammatory response against own thyroid antigens [9]. Iron is the next necessary element of the diet of patients with hypothyroidism. It is an ingredient of thyroid peroxidase (TPO), an enzyme participating in synthesis of thyroid hormones. Iron deficiency causes reducing of synthesis of thyroid hormones through reduced conversion of T4 to T3 and contributes to increased secretion of TSH [8]. Patients with Hashimoto's thyroiditis should supplement iron deficiencies in their diet by eating red meat, yolks, wholegrain cereals, parsley leaves [8]. Lately scientist have paid more attention to applying selenium which influences the synthesis of thyroid hormones. Selenoenzymes act as antioxidants, that is why administration of selenium in proper doze can have an impact on reducing concentration of a-TPO and reducing the frequency of chronic thyroiditis as well as the risk of permanent hypothyroidism. The results of most of studies indicate that selenium supplementation can give positive effects in the treatment of Hashimoto's thyroiditis [8,10]. Selenium is not only necessary for hormones production, but it also has ability to reducing inflammation and neutralizing free radicals. Its deficiency can cause oxidative damage to thyroid structure, it may also be one of the factors participating in etiology of autoimmune thyroiditis. Products that are the richest source of

selenium include shellfish and fish (cod, halibut, tuna) as well as eggs, shrimps, mushrooms and nuts [11,12]. Zinc that has antioxidant and anti-inflammatory properties is subsequent mineral nutrient participating in proper functioning of immune system. The lower the concentration of zinc in blood serum the higher the presence of anti-thyroid antibodies, that can confirm the role of zinc in the functioning of immune defense of the organism. This element is a component of receptor proteins T3, hence its deficiency has an impact on impaired hormone binding, which results in reduced concentration of T3 and T4. Moreover insufficient amount of zinc in the organism causes reduction of metabolic rate of hormones [12]. Zinc can be found in rennet cheese, eggs, buckwheat groats, pumpkin seeds, wholegrain bread and meat [8]. Lately there has been many studies concerning relation between vitamin D and the risk of the development of Hashimoto's thyroiditis. The role of vitamin D is mostly participating in regulation of calcium-phosphate metabolism, it is also responsible for functions significant for immunomodulating action [13,14]. The results of previous research seem to confirm presence of significantly lower concentration 25(OH)D3 in patients with Hashimoto's thyroiditis in comparison to control group. For that reason it is indicated that there is relation between vitamin D deficiency and the risk of development of autoimmune thyroiditis [13]. The diet of patients with Hashimoto's thyroiditis should cover the demand for antioxidant vitamins (vitamins A, C, E), which counteract oxygen free radicals and relieve oxidative stress which is a factor destroying thyroid tissue cells. Moreover, the diet low in vitamin A and iodine can contribute to the risk of the development of hypothyroidism more so than just the deficiency of iodine. Therefore products that should be considered in the diet include: butter, yolks, liver, red, orange and dark-green fruit and vegetables, e.g. carrots, peppers, parsley, pumpkin, broccoli, tomatoes, spinach, oranges, peaches, cherries [15].

Summary

Slowing down the inflammatory process of Hashimoto's thyroiditis as well as getting positive effect on patient's well-being is possible thanks to properly balanced diet that provides all necessary nutrients. The diet taking into account the supply of complete protein, polyunsaturated fatty acids as well as carbohydrates with a low glycaemic index as well as covering demand for selenium, iodine, iron, zinc, vitamins D, B12 and antioxidant vitamins is particularly significant element supporting pharmacotherapy and thyroid gland activity [8]. Education regarding the rules of proper nutrition including weigh-reducing diet in obese patients should also be a fundamental component of the process of treatment [16]. It is proven that increasing fibers in the diet of women with Hashimoto's thyroiditis by about 30 g per day

increases the rate of weight loss, which helps to improve the efficacy of nutritional therapy in this group of patients [17]. The diet of patients with Hashimoto's thyroiditis needs therefore a holistic approach taking into account both supplement of hormones deficiency with medicines and changes in diet by supplementing it in necessary mineral nutrients and vitamins.

Bibliography:

1. Ponichtera A, Borowiak E. Choroby tarczycy jako poważny problem medyczny w Polsce. *Problemy Pielęgniarstwa* 2008; 16: 192-198.
2. Socha K, Dziemianowicz M, Omeljaniuk WJ, Soroczyńska J, Borawska MH. Nawyki żywieniowe a stężenie selenu w surowicy u pacjentów z chorobą Hashimoto. *Problemy Higieny Epidemiologii* 2012; 93: 824-827.
3. Janczy A, Małgorzewicz S. Skuteczność diety redukcyjnej u pacjentek z chorobą Hashimoto. *Forum Zaburzeń Metabolicznych* 2015; 6: 112-117.
4. Januszewicz W, Kokot F. *Interna, PZWL, Warszawa 2006, s.1032.*
5. Liziś-Kołos K. Ocena wpływu niedoboru witaminy D na przebieg choroby Hashimoto u chorych w województwie świętokrzyskim. *Praca doktorska. Kraków 2015.*
6. Ponichtera A, Borowiak E. Choroby tarczycy jako poważny problem medyczny w Polsce. *Problemy Pielęgniarstwa* 2008; 16: 192-198.
7. Janczy A, Małgorzewicz S. Skuteczność diety redukcyjnej u pacjentek z chorobą Hashimoto. *Forum Zaburzeń Metabolicznych* 2015; 6: 112-117.
8. Zakrzewska E, Zegan M, Michota-Kotulska E. Zalecenia dietetyczne w niedoczynności tarczycy przy współwystępowaniu choroby Hashimoto. *Bromatologia i Chemia Toksykologiczna* 2015; 2: 117-127.
9. Ruchała M, Gurgul E, Bączyk M, Gembicki M, Pietz L, Uruski P, Sowiński J. Functional and morphological changes of thyroid gland in 14-18 years of aged children in Western Poland at the transition period from iodine deficiency to iodine sufficiency. *Nowiny Lekarskie* 2009; 78: 96-98.
10. Zagrodzki P, Kryczyk J. Znaczenie selenu w leczeniu choroby Hashimoto. *Postępy Higieny i Medycyny Doświadczalnej* 2014; 68:1129-1137.
11. Socha K, Dziemianowicz M, Omeljaniuk WJ, Soroczyńska J, Borawska MH. Nawyki żywieniowe a stężenie selenu w surowicy u pacjentów z chorobą Hashimoto. *Problemy Higieny Epidemiologii* 2012; 93: 824-827.
12. Naliwajko SK, Markiewicz-Żukowska R, Sawicka E, Bartosiuk E, Omeljaniuk W J, Borawska MH. Składniki mineralne w diecie pacjentek z chorobą Hashimoto, *Bromatologia i Chemia Toksykologiczna* 2011; 44: 544-549.
13. Łącka K, Maciejewska A. Współczesne poglądy na temat etiopatogenezy autoimmunologicznego zapalenia tarczycy (choroby Hashimoto). *Polski Merkurusz Lekarski* 2011; 30: 132–138.

14. Łącka K, Maciejewski A. Udział witaminy D w etiopatogenezie autoimmunologicznego zapalenia tarczycy. *Polski Merkuriusz Lekarski* 2013; 34: 281-285.
15. Kawicka A, Regulska-Ilow B, Metabolic disorders and nutritional status in autoimmune thyroid diseases. *Postępy Higieny i Medycyny Doświadczalnej* 2015; 69 : 80-90.
16. Janczy A, Małgorzewicz S. Skuteczność diety redukcyjnej u pacjentek z chorobą Hashimoto. *Forum Zaburzeń Metabolicznych* 2015; 6: 112-117.
17. Pietrych A, Filip R. Wpływ diety redukcyjnej na masę ciała u osób z nadwagą i otyłością. *Problemy Higieny Epidemiologii* 2011; 92: 577-579.