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Physical Activity, Diet and Overweight in Hashimoto's Thyroiditis: A Current Literature Review

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ABSTRACT

Introduction and purpose. Hashimoto's disease affects approximately 3% of the population and its prevalence is steadily increasing. As a result, unverified information and lifestyle-related advice are increasingly appearing on social media. This research aims to systematize knowledge on excessive body weight, physical activity, and nutrition in Hashimoto's disease.

Material and methods. Scientific articles on Hashimoto's disease were searched in medical databases such as PubMed, Google Scholar, and Embase, focusing on information about the disease, excessive body weight and healthy lifestyle.

State of knowledge. In Hashimoto's disease, excessive body weight is more commonly seen even in the euthyroid phase. Adhering to the doctors' treatment recommendations remains the key strategy. Social media should not replace evidence-based information about healthy living with this condition. Balanced nutrition and physical activity are important in combating obesity in Hashimoto's disease. So far, no specific types of diets or exercise have been shown to offer superior outcomes in patients with this condition. Taking care of patients' mental health is a crucial element in supporting obesity treatment in the disease, while weight reduction combined with physical activity may lead to an alleviation of depressive symptoms.

Conclusions. The most important strategy, alongside pharmacological treatment supervised by a specialist, is adopting a health-promoting lifestyle based on recommendations for the general population. However, individual patient differences must be considered, and lifestyle modifications should be guided holistically under physician supervision.

Key words: Hashimoto's thyroiditis, Nutrition, Physical activity, Healthy lifestyle

1. INTRODUCTION

Hashimoto's thyroiditis (HT), also known as chronic lymphocytic thyroiditis, is an autoimmune disorder first described by Hakaru Hashimoto in 1912 [1,2]. His description was based on four cases of women who did not present with hypothyroidism but had enlarged thyroid glands with tissue resembling lymphoid structures, leading to the term "struma lymphomatosa". It was not until 1931 that Allen Graham provided a detailed description of struma lymphomatosa, confirming Hashimoto's theory and recognizing it as a separate disease, which has since been known as Hashimoto's thyroiditis [3,4]. Hashimoto's thyroiditis, Graves Disease and others belong to a group of diseases called autoimmune thyroid disorder (AITD) [1,5,6]. The pathogenesis of Hashimoto's thyroiditis (HT) involves lymphocytic infiltration of the thyroid parenchyma, particularly by T and B lymphocytes, along with follicular cell atrophy and fibrosis [1,5,7,8]. This process leads to the development of hypothyroidism in around 25% of patients, resulting in a deficiency of thyroid hormone production [1,5]. It is the most common type of autoimmune thyroid disorder which affects about 3% of the population and its incidence is increasing [1,5, 9]. The annual incidence is estimated at approximately 350/100 000/year in women and 80/100 000/year in men, indicating that the occurrence of this disease in women is more than four times higher than in men [5,10,11]. Hashimoto's thyroiditis is affected by genetic and environmental factors, which contributes to the variable prevalence of the disease across different geographic regions [1,2,5,7,8,11]. Environmental factors such as alcohol consumption, smoking, a diet low in iodine, and deficiencies in selenium or vitamin D3 can influence HT in different ways, either positively or negatively [1,2,5,7,8]. The basis of diagnosis is the presence of antibodies against thyroid peroxidase, which are found in approximately 90% of patients, and antithyroglobulin antibodies, which are detectable in about 60–80% of cases, as well as clinical symptoms, biochemical parameters such as TSH, and ultrasound (USG) imaging [1,2,5]. Treatment is not provided in patients without thyroid hormone deficiency, however, monitoring every 6–12 months is recommended [1,12]. If hypothyroidism has developed, treatment involves lifelong supplementation with levothyroxine, with the dose adjusted to maintain appropriate TSH levels. This therapy does not cure the disease, but helps to manage the symptoms caused by thyroid hormone deficiency. Alternative approaches, such as selenium supplementation, glucocorticoid therapy, and herbal treatments, are not recommended due to limited evidence of their effectiveness. [1,2,5,11,13].

2. THE AIM

The review aims to systematize knowledge regarding the pathophysiology, symptoms, and factors influencing the disease, with particular emphasis on a healthy lifestyle, obesity, overweight, and physical activity, and their effect on disease progression. Hashimoto's disease is a common topic on the Internet, as indicated by analytical studies of social media. These studies highlight the issue of misinformation online, and the medical community can influence patients by sharing reliable information [14,15]. The medical problem, therefore, often lies in the uncritical adoption of popular online trends without a full understanding of the issue, not only in the context of Hashimoto's disease [16]. In the context of the disease's growing popularity on the Internet, the aim of this paper is also to systematize knowledge regarding whether a different approach is necessary for individuals with Hashimoto's disease compared to healthy individuals in terms of fundamental aspects of a healthy lifestyle, such as body weight, nutrition, and physical activity.

In this work, the data were sourced from medical databases such as PubMed, Google Scholar, and Embase, and the information obtained from the sources was collected in this review, combining the above-mentioned topics.

3. STATE OF KNOWLEDGE

3.1 Pathogenesis of Hashimoto's thyroiditis

Hashimoto's thyroiditis (HT) is an autoimmune disease with a still not fully understood pathogenesis, involving both humoral and cellular immune responses. The cellular immune system, especially T cells, plays a central role in HT. It is driven by helper T cells (Th), regulatory T cells (Treg), and cytotoxic T lymphocytes such as CD8+ T cells, which infiltrate the thyroid tissue, inducing inflammation and destruction of follicular cells through the release of cytotoxic molecules including perforin, granzymes, and proteoglycans. CD4+ T cells, once activated by autoantigens, differentiate into Th1 cells, which stimulate macrophages, cytotoxic T cells, and B lymphocytes,ultimately contributing to thyroid damage and the production of autoantibodies. The humoral immune response, mediated by B cells, focuses on the production of specific autoantibodies, including: Anti-thyroid peroxidase antibodies (AbTPO): These serve as a predictor of hypothyroidism and are the primary antibodies responsible for increased tissue inflammation and lymphocyte infiltration; Anti-thyroglobulin antibodies (AbTG): Their role in the pathogenesis of the disease is not yet fully understood; Antibodies against the TSH receptor (TSHR): Different types have been identified: stimulating, neutral, and inhibitory. In

Hashimoto's thyroiditis, inhibitory antibodies are the most common, while the presence of stimulating or neutral antibodies is typically associated with the development of Graves disease. The activated, aberrant immune response initiates apoptosis in thyroid cells, thereby contributing to the development of hypothyroidism and the progression of Hashimoto's thyroiditis (HT) [1,17,18,19]. The consequence of the described immune response is a clinical presentation in stages such as thyrotoxicosis, caused by the release of hormones from damaged thyroid follicles, euthyroidism, when the remaining intact tissue compensates for the destroyed thyrocytes; and hypothyroidism, resulting from excessive loss of thyroid tissue exceeding the compensatory capacity for hormone production, as reflected in hormonal levels [18,20]. From the physical examination perspective, two forms can be distinguished: the goitrous form and the atrophic form. In the goitrous form, the thyroid gland is enlarged and firm, while in the atrophic form, it is not palpable [5].

3.2 Symptoms

In the course of HT, systemic and local symptoms may present in various forms, reflecting the different disease progressions associated with the immune response. Local symptoms depend on whether HT manifests as a goitrous form, with thyroid enlargement, or as an atrophic form, with an impalpable thyroid [5]. An enlarged thyroid can compress nearby neck structures, resulting in pain, voice changes (dysphonia), difficulty swallowing (dysphagia), breathing difficulties (dyspnea), and, in some cases, sleep apnea caused by airway narrowing [5,18]. In the case of hyperthyroidism in the course of HT, in some sources referred to as Hashitoxicosis,patients may present with symptoms such as increased appetite, heat intolerance, fatigue, and sweating [20,21]. During the euthyroid phase, patients may experience mild symptoms such as mood swings, concentration difficulties, dry skin, hair loss, tiredness, and weight gain, although they might not always notice them. Symptoms of thyroid hormone deficiency include fatigue, weight gain, constipation, impaired concentration, and depression, as well as cold, dry skin, body hair loss, hoarseness, coarse facial features, facial edema, bradycardia, hyperlipidemia, anemia, irregular menstruation, and infertility. These symptoms usually improve with proper and well-managed treatment [18,20,22]. Treatment of Hashimoto's thyroiditis (HT) involves restoring thyroid hormone levels through supplementation with L-thyroxine, which alleviates symptoms caused by thyroxine and triiodothyronine deficiency. However, even after achieving euthyroidism, some patients continue to experience symptoms that may reduce their quality of life, such as fatigue, poor sleep quality, memory difficulties, and muscle and joint tenderness [23].

3.3 Associations between excessive body weight and Hashimoto's thyroiditis

Body weight and thyroid hormone activity are closely correlated, as these hormones participate in the regulation of basal metabolic rate and thermogenesis, playing a crucial role in metabolism and its stimulation [24]. Therefore, obesity and excessive body weight are an inseparable component of the clinical presentation of patients with Hashimoto's thyroiditis [25]. Excess adipose tissue itself may influence the onset and progression of autoimmune diseases such as Hashimoto's thyroiditis. The potential mechanisms by which adipose tissue affects thyroid diseases include the secretion of proinflammatory cytokines that cause low-level inflammation, disruption of the transformation of Th2 cells into Th1 cells, reduction in the growth of regulatory T (Treg) cells, and an impact on the hypothalamic-pituitary-thyroid axis, ultimately contributing to the development of thyroid changes [26,27]. Individuals affected by Hashimoto's thyroiditis have a higher propensity for increased body weight compared to healthy individuals. Obesity is estimated to affect about 10–60% of adults with autoimmune thyroid disorders, and higher BMI correlates with elevated TSH levels. An impact on abdominal obesity and lipid profile has been observed independently of thyroid function in Hashimoto's disease. Research shows that body weight, waist-to-hip ratio, and body mass index (BMI) are significantly higher in affected individuals compared to healthy controls, even despite treatment. It has also been observed that longer therapy improves patients' parameters, and their body weight tends to be lower compared to those initiating treatment [25,28]. Increased cardiovascular risk due to disturbances in body weight and metabolism is also a significant concern that should be addressed through prevention. Obese individuals with Hashimoto's thyroiditis probably have a higher risk of atherosclerosis than obese individuals without Hashimoto's. Additionally, the risk of atherosclerosis does not correlate with thyroid hormone levels. This suggests that cardiovascular risk in women with Hashimoto's may result not only from hypothyroidism but also from chronic inflammation associated with the autoimmune disease [25,29]. It has been noted that patients who are properly treated and have achieved euthyroidism exhibit the same risk of body weight and metabolic disorders as healthy individuals. The prevalence of metabolic syndrome in euthyroid patients was examined by comparing individuals without autoimmune thyroiditis to those with Hashimoto's thyroiditis who achieved euthyroidism through levothyroxine substitution therapy, revealing no statistically significant differences. Therefore, the rate of obesity in treated Hashimoto's patients does not support the conclusion that properly treated Hashimoto's causes obesity [25,30]. An important aspect supporting pharmacotherapy remains the pursuit and maintenance of a healthy

body weight through a healthy lifestyle, especially since normalization of thyroid parameters after treatment causes a reduction in body weight; however, most patients remain overweight [31,32]. Another key point is that a health-promoting lifestyle, characterized by moderate physical activity and rational dietary choices, is associated with reduced symptoms of depression in patients with Hashimoto's disease. There is a bidirectional relationship between obesity and depression, meaning that depression can lead to obesity, and obesity can worsen depression, creating a vicious cycle [31,33]. This phenomenon is also significant given the higher incidence of depression among people with Hashimoto's disease compared to the general population. [34].

3.4 Diet in Hashimoto's Disease

Although there is a limited number of studies focusing on the impact of dietary habits on the course of Hashimoto's thyroiditis, changes in diet and lifestyle may influence the development and even progression of autoimmune thyroid diseases [25,35]. However, there are no established specific dietary guidelines or recommendations for patients with Hashimoto's disease. Despite the lack of clear professional advice, patients often make various dietary changes to their diet based on information found in the media [36]. Examples of dietary changes that may positively impact the course of Hashimoto's thyroiditis include increasing the consumption of nuts, vegetables, and dried fruit, as these foods contain phytosterols and polyphenols that help reduce the autoimmune process [37]. A similar effect, potentially reducing inflammation intensity, may result from a healthier fat consumption profile, including increased intake of fatty fish rich in omega-3 fatty acids and a reduction in animal fats. However, experts emphasize that the key dietary focus should be on modifying eating habits to maintain a reference BMI level rather than adhering to a specific diet [25]. A noteworthy observation is that individuals with Hashimoto's thyroiditis (HT) may be more likely to exhibit unfavorable dietary habits compared to healthy individuals. A study assessing the dietary habits of euthyroid individuals with HT found that they consumed animal-derived foods, such as meat and dairy products, more frequently, while healthy individuals more often chose plant-based items like fruits, vegetables, and nuts. [38]. There are only a few studies on the impact of a gluten-free diet on Hashimoto's thyroiditis (HT), suggesting that adhering to such a diet may positively influence the disease's course. However, due to its restrictive nature and the risk of nutrient deficiencies, it is generally not recommended for HT patients. Currently, the Mediterranean diet is considered the most beneficial, mainly because of its antioxidant effects. Nevertheless, evidence supporting any specific dietary strategy remains limited. Therefore, a well-balanced

diet that provides essential nutrients, combined with an appropriate caloric intake to prevent excessive weight gain, remains the key recommendation. [25]. These recommendations are therefore consistent with those for the general population, which emphasize the consumption of fruits, vegetables, legumes (e.g., lentils and beans), nuts, and whole-grain products. Free sugars should account for less than 10% of total energy intake, while fats should provide less than 30% of total energy. It is advised to limit saturated fat intake to less than 10% of total energy, trans fats to less than 1%, and salt consumption to under 5 grams per day [39].

3.5. Physical activity in Hashimoto's Disease

An important observation is that individuals with Hashimoto's thyroiditis (HT) are often less physically active than the general population [40].Currently, no official guidelines on physical activity management for patients with Hashimoto's thyroiditis (HT) have been issued by leading endocrine societies, such as the American Thyroid Association (ATA) and the European Thyroid Association (ETA). Existing recommendations mainly focus on pharmacotherapy and hormone regulation, with little to no explicit guidance on non-pharmacological approaches like exercise [41,42]. Physical activity is a crucial strategy for the prevention and management of excessive body weight. By preventing the accumulation of excess adipose tissue, it contributes to the reduction of systemic inflammation [43]. When combined with nutritional modifications, physical activity primarily improves anthropometric parameters, potentially leading to multiple health benefits [44]. A clear advantage of integrating exercise with dietary interventions is the potential to alleviate depressive symptoms in individuals with Hashimoto's thyroiditis, as demonstrated in a study involving 219 women aged 20 to 50 years diagnosed with the disease [31]. This benefit appears particularly significant given that the likelihood of developing depression is 3.5 times higher in patients with Hashimoto's thyroiditis compared to healthy individuals [34].

Research findings regarding biochemical parameters remain inconclusive and inconsistent. While some studies have reported no association between physical activity and improvements in thyroid function based on laboratory assessments, other evidence suggests a potential link. On the other hand, a study involving a cohort of 438 patients with Hashimoto's thyroiditis demonstrated that recreational physical activity was associated with reduced TSH secretion, indicating a possible effect of exercise on the hypothalamic–pituitary axis. However, no such association was observed for occupational physical activity [43,44]. An interesting observation is that individuals with Hashimoto's thyroiditis (HT) were more likely to engage in more than

one type of sport, despite the fact that physical activity tolerance tends to be reduced in individuals with autoimmune thyroid diseases (AITD) [40].

Recommendations regarding physical activity for individuals with stabilized Hashimoto's thyroiditis (HT) should follow general population guidelines. According to these, adults aged 18–64 years should engage in 150–300 minutes of moderate-intensity aerobic physical activity per week, or 75–150 minutes of vigorous-intensity aerobic activity, or an equivalent combination of both. Similarly, older adults (≥65 years) are advised to perform the same amount of moderate- or vigorous-intensity aerobic activity to achieve health benefits. Currently, there are no established guidelines or large-scale cohort studies indicating that individuals with Hashimoto's thyroiditis should be considered a distinct population requiring specific exercise protocols, nor is there evidence that any particular type of physical activity confers superior benefits in this group. The benefits of physical activity are broad and should be evaluated in terms of systemic effects, including reductions in all-cause and cardiovascular mortality, hypertension, site-specific cancers, and type 2 diabetes, as well as improvements in mental health (e.g., reduced symptoms of anxiety and depression), cognitive function, sleep quality, and obesity-related indicators. Regardless of disease status, it is essential to emphasize that engaging in any amount of physical activity is preferable to none [45].

4. CONCLUSIONS

Hashimoto's disease remains a frequently discussed topic on social media platforms, often accompanied by the dissemination of health advice that lacks medical validation [14,15]. Although the topic is highly popular and conflicting opinions exist within the scientific community, there is no confirmed evidence supporting the recommendation of a different lifestyle, diet, or physical activity regimen for individuals with Hashimoto's thyroiditis compared to the general population. [41,42].An essential component of managing Hashimoto's thyroiditis, its symptoms, and associated complications is appropriately controlled pharmacological treatment under medical supervision, supplemented by a healthy lifestyle that should also be guided in consultation with a physician. Given that features of metabolic syndrome have been reported with similar frequency in euthyroid individuals both with and without autoimmune thyroiditis, efforts should prioritize maintaining a healthy body weight, in line with general population recommendations, through a combination of balanced diet and physical activity. [28,30]. It should also be noted that patients with Hashimoto's disease have a higher occurrence of depressive symptoms, yet depression is closely associated with obesity, which is likewise more common in this group than in the general population. Therefore, a key

strategy for the prevention and management of both depressive symptoms and obesity involves maintaining a healthy body weight and engaging in regular physical activity. [25,28,31,43]. Many authors suggest that the higher prevalence of overweight and obesity among individuals with Hashimoto's thyroiditis (HT) primarily originates from the hypothyroid phase mainly from the time before treatment. This is supported by observed trends toward body weight normalization following therapy, although patients often remain overweight. Additionally, reduced physical activity compared to the general population may contribute to this issue. Importantly, there is currently no conclusive evidence that Hashimoto's disease in the euthyroid phase directly causes excessive body weight. [25, 40]. The most important aspect of managing Hashimoto's disease remains appropriately tailored pharmacotherapy under medical supervision, a critical evaluation of information disseminated on social media, and maintaining a healthy lifestyle, including physical activity, diet, and mental health, in accordance with strategies established for the general population.

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