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PHYSICAL ACTIVITY IN INDIVIDUALS WITH HASHIMOTO'S THYROIDITIS: IMPORTANCE, BARRIERS, AND EXERCISE GUIDELINES

Apstrakt: Hashimoto's thyroiditis is the most common cause of hypothyroidism and is frequently associated with reduced functional capacity, fatigue, and impaired quality of life, even in patients with well-controlled thyroid hormone status. In recent years, physical activity has increasingly been recognized as an important non-pharmacological strategy in the management of this condition. The aim of this paper was to describe the mechanisms through which physical activity may exert beneficial effects in individuals with HT, identify the key barriers to its implementation, and provide practical guidelines for exercise planning and prescription.

Based on a review of the available literature and clinical experience, several physical, psychological, treatment-related, organizational, and professional barriers that may hinder participation in regular physical activity were identified. At the same time, the potential beneficial effects of exercise on thyroid function, body composition, cardiorespiratory fitness, and mental health were considered.

This paper emphasizes the importance of a gradual and individualized approach, including monitoring individual responses to exercise and coordinating exercise with medical treatment. A combination of aerobic exercise, resistance training, and interval-based exercise is proposed as a practical model, with particular emphasis on variable-intensity interval training as a potentially effective and safe approach for this population.

In conclusion, physical activity has considerable potential as an integral component of a comprehensive approach to the management of individuals with Hashimoto's thyroiditis. However, clearer exercise guidelines and better integration of physical activity into clinical practice are needed to facilitate its broader implementation.

Keywords: autoimmune thyroiditis, hypothyroidism, exercise intolerance, fatigue, psychosocial well-being, health-oriented exercise

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1. Introduction

Hashimoto's thyroiditis (HT) is a chronic autoimmune disease of the thyroid gland and the most common cause of hypothyroidism. It is characterized by increased production of specific autoantibodies that target and progressively damage thyroid cells, potentially leading to reduced thyroid hormone production [1, 2].

The disease progresses through several stages. In its early stage, it may remain asymptomatic for years, followed by the development of thyroid autoantibodies and, subsequently, alterations in thyroid hormone status. These changes are typically characterized initially by an increase in thyroid-stimulating hormone (TSH), followed by reductions in triiodothyronine (T3) and thyroxine (T4) levels as the disease progresses to the clinical stage [1].

Importantly, symptoms may occur even during the early stages of the disease, while thyroid hormone levels remain within the reference range. The clinical presentation is heterogeneous and may include fatigue, low energy levels, daytime sleepiness, poor sleep quality, impaired concentration, mood disturbances, anxiety or depressive symptoms, hair loss, dry skin, edema, a tendency toward weight gain, gastrointestinal disturbances, and anemia. As the disease progresses and thyroid function declines, symptoms may become more pronounced and functional capacity may deteriorate further [1].

Appropriate pharmacological treatment can restore a euthyroid state [3]. However, even after treatment, a substantial proportion of patients continue to experience persistent symptoms, impaired quality of life, an unfavorable lipid profile, and reduced functional capacity [5]. Depending on the study, approximately 10% to as many as 50% of patients continue to report symptoms despite levothyroxine treatment and normalization of TSH levels [2, 6].

In this context, modifiable lifestyle factors are increasingly recognized as important contributors to disease manifestation and progression. Environmental exposures and behavioral patterns may influence both thyroid function and autoimmune processes, and their modification may therefore contribute to more favorable clinical outcomes [7].

Physical activity represents one of the most important modifiable lifestyle factors in individuals with autoimmune thyroid disease. Available evidence suggests that regular, moderate exercise may exert beneficial effects on thyroid function, including reductions in TSH levels and increases in T4 concentrations [8]. In addition, physical activity may contribute to symptom reduction and improvements in functional capacity, mental health, and quality of life in individuals with HT [5].

Despite the growing body of evidence, physical activity has not yet been systematically integrated into the standard management of patients with HT. Previous research has paid insufficient attention to identifying the barriers that may hinder participation in physical activity in this population. At the same time, although recent studies [8, 9] have demonstrated the potential beneficial effects of specifically structured exercise programs on thyroid function and other health-related outcomes, official recommendations for exercise prescription and the implementation of structured exercise programs in these patients are still lacking.

Therefore, the aim of this paper was to examine the mechanisms through which physical activity may influence clinical outcomes in individuals with HT and, based on current scientific evidence and clinical experience, to identify the key barriers to its implementation and propose practical strategies and fundamental guidelines for the planning and implementation of structured exercise programs.

2. Clinical Presentation of Hashimoto's Thyroiditis

HT can be broadly classified into three main forms: euthyroid, subclinical, and clinical. The euthyroid form is characterized by elevated thyroid autoantibodies (TPO-Ab and Tg-Ab) with thyroid hormone levels remaining within the reference range, whereas the subclinical form is characterized by elevated TSH levels with normal T3 and T4 concentrations. The clinical form is characterized by a further increase in TSH accompanied by a decline in thyroid hormone levels, resulting in more pronounced symptoms and requiring thyroid hormone replacement therapy [1].

The pathophysiology of HT is primarily characterized by a chronic autoimmune response accompanied by low-grade systemic inflammation, which may be present across different stages of the disease. This process may contribute to a broad spectrum of systemic symptoms, including fatigue, reduced energy levels, sleep disturbances, changes in body mass, dry skin, hair loss, edema, constipation, bradycardia, muscle cramps, joint pain, cognitive impairment, and depressive symptoms [1]. The presence and combination of these symptoms can substantially impair patients' quality of life [10, 11].

Individuals with HT frequently exhibit alterations in lipid profile, including elevated triglyceride, total cholesterol, and low-density lipoprotein (LDL) cholesterol levels, together with reduced high-density lipoprotein (HDL) cholesterol levels [12, 13]. Furthermore, the autoimmune process has been associated with endothelial dysfunction, which may further increase the risk of atherosclerosis and cardiovascular complications [14].

Reduced thyroid function has significant consequences for both the muscular and cardiovascular systems. Thyroid hormones play an important role in regulating skeletal and cardiac muscle contractility; therefore, thyroid hormone deficiency may lead to reduced muscle strength, stroke volume, and cardiac output, accompanied by increased peripheral vascular resistance and reduced cardiac and pulmonary reserve [15]. Consequently, cardiorespiratory fitness may decline, as reflected by reduced maximal oxygen uptake (VO_2max) and exercise tolerance, particularly during higher-intensity exercise [16, 17].

In addition to hormonal disturbances, the autoimmune process itself may contribute to reduced functional capacity and increased fatigue, even in euthyroid patients. Jordan et al. (2021) demonstrated that euthyroid patients with HT experienced greater physical fatigue, perceived exertion, and muscle pain during the six-minute walk test compared with healthy controls, despite normal neurological and electrophysiological findings [18].

3. The Importance of Physical Activity in Hashimoto's Thyroiditis

Physical activity is increasingly recognized as an important non-pharmacological strategy in patients with HT. Recent studies indicate that exercise may exert beneficial effects on thyroid function, including reductions in TSH levels and increases in free thyroxine (fT4) concentrations [5, 19, 20]. These effects may be partially explained by stimulation of the hypothalamic–pituitary–thyroid axis [21], as well as by increased peripheral deiodinase activity, which may facilitate the conversion of T4 into the more biologically active T3 [22]. Furthermore, the increased metabolic demands associated with physical activity may stimulate greater utilization and turnover of thyroid hormones, thereby indirectly influencing TSH regulation [23].

In addition to its hormonal effects, physical activity plays an important role in regulating body composition, which is particularly relevant in individuals with HT. Reductions in total and visceral adipose tissue, which is metabolically active and contributes to a pro-inflammatory state, may help attenuate the systemic inflammation associated with the disease [24]. Given that chronic low-grade inflammation represents an important pathophysiological mechanism in HT, this effect of exercise may constitute a relevant pathway through which clinical outcomes can be improved. Studies have also demonstrated reductions in inflammatory markers, such as C-reactive protein (CRP), as well as improvements in endothelial function following long-term exercise programs [14, 25].

At the cardiovascular and muscular levels, physical activity contributes to improved cardiac and skeletal muscle contractility, increased stroke volume and cardiac output, and more efficient peripheral oxygen delivery. These adaptations are accompanied by improvements in VO_2max and overall cardiorespiratory fitness [26, 27]. The mechanisms underlying these changes include improved tissue oxygenation, increased capillary density, and the potential modulation of thyroid hormone receptor expression and local deiodinase activity in skeletal muscle [22]. Importantly, improvements in functional capacity have been observed even in the absence of significant changes in body mass [14, 25], suggesting that exercise exerts beneficial effects on the cardiovascular system independently of weight loss.

Physical activity also has important effects on the psychological aspects of the disease and on quality of life. Regular exercise may contribute to reductions in symptoms of depression, anxiety, and stress, as well as to improvements in sleep quality [28]. These effects may be partly explained by exercise-induced changes in neurotransmitters and hormones involved in mood regulation, including serotonin, dopamine, and endorphins [29]. Studies have demonstrated significant improvements in physical and mental health, vitality, and social functioning among individuals participating in structured exercise programs [5, 10]. Given that symptoms such as fatigue, reduced energy levels, and cognitive difficulties frequently persist even in euthyroid patients, these effects are of particular clinical relevance.

4. Barriers to Physical Activity in Hashimoto's Thyroiditis

Although current scientific evidence supports the use of physical activity in individuals with HT, it remains insufficiently recognized and integrated into the management of these patients. Based on a review of the available scientific literature and clinical experience with this population, the barriers to physical activity can be classified into several categories: physical barriers related to disease symptoms, psychological barriers, barriers associated with inadequately adjusted pharmacological treatment, barriers related to modern lifestyle and poor time management, and barriers arising from limitations in professional guidance and the implementation of exercise program.

4.1. Physical Barriers Related to Symptoms

In individuals with HT and hypothyroidism, even when receiving adequate thyroid hormone replacement therapy, a combination of objectively reduced exercise tolerance and a subjective feeling of persistent low energy is frequently present, substantially hindering the initiation and maintenance of regular physical activity [1]. Nevertheless, findings from intervention studies indicate that appropriately prescribed and structured aerobic or combined exercise programs can improve functional capacity, mood, and quality of life [9].

Fatigue, lack of energy, and subjective weakness are among the most commonly reported symptoms that reduce motivation and willingness to participate in structured exercise programs, particularly among untreated or suboptimally treated patients [30]. These complaints are not exclusively subjective but are often accompanied by measurable reductions in physical performance. For example, euthyroid patients with HT have been shown to exhibit a progressive decline in performance during the six-minute walk test (negative linear trend), accompanied by greater perceived fatigue and muscle pain compared with healthy controls [18].

Furthermore, individuals with subclinical hypothyroidism have been reported to exhibit reduced maximal exercise capacity and VO_2max, accompanied by more rapid lactate accumulation, a greater increase in pyruvate levels, and greater reliance on anaerobic metabolism as exercise intensity increases. In practical terms, this metabolic profile manifests as reduced tolerance to higher-intensity physical activity, particularly at and above the anaerobic threshold [17, 31].

From a subjective perspective, survey-based studies indicate that approximately two-thirds of women with hypothyroidism receiving thyroid hormone replacement therapy perceive their condition as limiting their ability to engage in physical activity, with these limitations being more pronounced in those with autoimmune HT. The most commonly reported complaints include muscle pain, pronounced post-exercise fatigue, prolonged recovery, and a lack of confidence in one's own physical capabilities [30, 32].

4.2. **Psychological Barriers**

Individuals with HT frequently experience psychological disturbances, including depressive mood, anxiety, cognitive difficulties, and persistent fatigue, which may substantially reduce motivation and willingness to engage in regular physical activity [33]. Importantly, these disturbances are not necessarily attributable solely to hormonal imbalance but may also be present in euthyroid patients. Indeed, individuals with HT have been shown to exhibit higher depression and anxiety scores and poorer mental health-related quality of life compared with healthy controls, despite thyroid hormone levels within the reference range. These findings suggest that autoimmunity itself may contribute to psychological well-being and the subjective perception of health [34].

These findings are further supported by meta-analyses indicating that autoimmune thyroiditis is associated with an approximately two- to threefold higher risk of depressive and anxiety disorders [35]. This may consequently lead to reduced initiative, lower energy levels, and avoidance of physical exertion. Together with cognitive difficulties, these disturbances may impair daily functioning and quality of life [36], thereby indirectly hindering the adoption and maintenance of physical activity as part of the daily routine.

Furthermore, women with HT have been reported to exhibit higher levels of psychological distress and somatization, while certain affective temperaments, such as depressive and cyclothymic temperaments, have been associated with greater severity of psychosomatic symptoms [37]. Such patterns may amplify the subjective perception of fatigue, pain, and physical burden, causing even moderate physical exertion to be perceived as excessive or potentially threatening.

Nevertheless, these barriers are not immutable. Research indicates that psychotherapeutic approaches, particularly cognitive behavioral therapy, may reduce stress and depressive symptoms and improve quality of life in these patients [38], potentially reducing psychological resistance to physical activity. In this context, combining psychological support with the gradual and individually tailored introduction of physical activity may produce synergistic benefits.

From a practical perspective, psychological barriers in individuals with HT are therefore clinically relevant but not insurmountable. With appropriate support and carefully prescribed, gradual engagement in physical activity, many patients may enter a positive cycle characterized by increased physical activity levels, improved mood, greater energy, and enhanced overall functional capacity [8, 38].

4.3. Barriers Related to Inadequately Adjusted Pharmacological Treatment

Based on findings from several studies conducted in primary care settings and outpatient populations, approximately 30–50% of treated patients with hypothyroidism have TSH levels outside the target range, indicating suboptimal adjustment of thyroid hormone replacement therapy [39, 40].

Inadequately treated hypothyroidism is associated with reduced cardiac output, muscle weakness, and impaired pulmonary function, which collectively contribute to reduced functional capacity and exercise tolerance. These alterations may further contribute to fatigue, impaired physical functioning, and an overall decline in quality of life [41].

Conversely, excessive thyroid hormone replacement may lead to muscle dysfunction, increased metabolic stress, and cardiovascular instability, including cardiac arrhythmias, which may adversely affect exercise performance and recovery. Excessive replacement therapy has also been associated with impaired physical functioning and an overall reduction in the capacity to engage in physical activity, despite increased metabolic activity [41].

4.4. Barriers Related to Modern Lifestyle and Poor Time Management

Barriers related to modern lifestyle and poor time management represent important factors that may hinder engagement in physical activity. In this context, available data indicate that physical activity levels remain low even among individuals with treated hypothyroidism. In a large study involving 1,724 women, only 16.1% of participants met the recommended levels of physical activity [32]. Studies conducted in the general population and among individuals with chronic diseases have identified lack of time, work-related commitments, caregiving responsibilities, fatigue, and stress as some of the most commonly reported barriers to regular exercise [42, 43]. These factors are often associated with contemporary lifestyle patterns characterized by sedentary behavior, high levels of psychological stress, and difficulties integrating physical activity into daily routines [43].

Although studies specifically examining these organizational barriers in individuals with HT are lacking, it is reasonable to assume that similar patterns may also be present in this population, an assumption that is further supported by clinical experience with these patients. Moreover, persistent fatigue and reduced energy levels may further complicate the organization of daily activities and make it more difficult to incorporate physical activity into everyday life.

4.5. Barriers Related to Professional Guidance and Exercise Implementation

System-level barriers also represent a significant obstacle to the implementation of physical activity in individuals with HT and have been well documented in the broader context of chronic non-communicable diseases. In particular, insufficient collaboration between healthcare professionals and exercise professionals involved in health-oriented exercise programs, including coaches and physical education professionals, may result in a fragmented approach and a lack of individualized recommendations for patients [44, 45]. In addition, there is a shortage of adequately trained professionals qualified to work with this population, as well as limited availability of educational programs specifically focused on integrating medical and exercise-related principles in the management of individuals with chronic non-communicable diseases [44, 45].

Another important limitation is the absence of official guidelines clearly defining the appropriate type, intensity, and volume of physical activity [46, 47]. Although current scientific evidence increasingly indicates the potential benefits of physical activity in this population, the lack of standardized recommendations limits its practical implementation and may contribute to uncertainty among both healthcare and exercise professionals, as well as among patients themselves [47].

5. Recommendations for Physical Activity in Patients with Hashimoto's Thyroiditis

5.1. Assessment of the Current Clinical Status of Patients with HT Before Initiating a Specific Exercise Program

Before enrolling an individual with HT in an exercise program, an initial assessment of their health status and functional capacity should be performed. This assessment provides the foundation for planning an individualized exercise program and selecting the appropriate type, intensity, and volume of physical activity [48].

However, in individuals with HT, it is important to recognize that symptoms and the subjective perception of exercise readiness may vary considerably from day to day and even throughout the same day. Fluctuations in energy levels, fatigue, mood, and overall physical readiness may result from hormonal variations, psychological stress, sleep quality, or inadequately adjusted pharmacological treatment [1]. Therefore, before each exercise session, a brief assessment of the patient's current condition is recommended. This may include discussing the presence of symptoms, evaluating the subjective perception of exertion and readiness to exercise, and, when appropriate, assessing simple objective indicators such as heart rate or blood pressure [49].

In this context, exercise programs should not be implemented rigidly but should instead be adjusted according to the patient's current subjective and objective condition. Individualization and flexible modification of exercise load in response to daily variations represent one of the fundamental principles of the safe and effective implementation of physical activity in individuals with HT [50].

5.2. Exercise Program Planning and Periodization

The initial information obtained by the coach or exercise professional from the patient should serve as the basis for precise planning and periodization of the exercise load. Key aspects that should be evaluated include the patient's current subjective and objective condition, recent laboratory findings, particularly TSH levels, previous training experience, and current level of physical fitness. Physical fitness can be assessed using simple and practically applicable tests, such as cardiorespiratory fitness tests (e.g., a step test or a cycle ergometer test with controlled workload), as well as indirect assessments of muscular strength and endurance (e.g., the number of squat or push-up repetitions or the duration of a plank hold) [51, 52].

Maximum heart rate (HRmax) is another important variable that can be used to define exercise intensity zones. In general, exercise intensities below approximately 80% of HRmax predominantly involve aerobic metabolism, whereas higher intensities are associated with a greater anaerobic contribution, although several distinct exercise intensity zones can be differentiated in practice [53]. Based on these parameters, exercise should be planned according to the principles of systematic and gradual progression, with a progressive increase in exercise load, progression from simpler to more complex exercises, and adequate time allocated for recovery.

The periodization of the exercise program should also account for daily and weekly fluctuations in the patient's condition. More demanding training microcycles may be planned during periods when the patient feels well rested, has higher energy levels, and reports a better mood, whereas reduced-load or recovery microcycles are recommended during periods of more pronounced fatigue. Such a flexible and individualized approach allows for a gradual progression through the exercise program, reduces the risk of excessive overload and adverse effects, and increases the likelihood of long-term adherence to the exercise program and the achievement of beneficial health outcomes [50, 54].

5.3. Monitoring Exercise Load and Response to Training

During exercise sessions, continuous monitoring of both subjective and objective indicators of exercise intensity and load is recommended. Heart rate represents one of the primary objective indicators and can be used to estimate the intensity zone in which the patient is exercising, as well as their ability to recover after exercise, since the rate of heart rate decline following exertion is an important indicator of physical fitness and exercise tolerance [55].

Particular attention should be paid to patients with inadequately controlled hypothyroidism and elevated TSH levels, in whom bradycardia may be present, making it difficult to reach higher heart rate values despite a subjectively high level of exertion [41]. In such situations, excessive exertion should be avoided, and exercise intensity should also be guided by other indicators. Conversely, in patients receiving excessive thyroid hormone replacement, a disproportionately high heart rate response may occur even at relatively low exercise loads, requiring additional caution and appropriate limitation of exercise intensity [41].

Given these specific considerations, monitoring the subjective perception of exertion is particularly important. Standardized rating scales, such as the Borg Rating of Perceived Exertion (RPE) scale [56], may be used for this purpose, together with direct communication with the patient through simple questions regarding fatigue, breathing, and overall perceived exertion. In addition, the patient's response during the post-exercise recovery period should be monitored, including their subjective condition on the following day. Another useful strategy is to encourage patients to report their physical and subjective condition after exercise sessions, thereby providing a better understanding of their individual response to exercise load and allowing further optimization of the exercise program [57].

5.4. Coordination of Exercise Training with Pharmacological Treatment and Interdisciplinary Collaboration

Coordinating the exercise program with pharmacological treatment represents one of the key aspects of the safe and effective implementation of physical activity in individuals with HT. A particular challenge is posed by patients in whom a stable thyroid hormone replacement regimen has not yet been established, which is most commonly encountered during the initial stages of treatment, when the body is still adapting to therapy [17]. Additional caution is required when pharmacological treatment and an exercise program are initiated simultaneously. In such cases, based on clinical experience, a gradual and conservative approach is recommended, with substantial increases in exercise intensity postponed until relative stabilization of thyroid hormone status has been achieved [17].

In this context, interdisciplinary collaboration between exercise professionals and endocrinologists is particularly important. Two-way communication enables better coordination between pharmacological treatment and exercise load, thereby reducing the risk of adverse effects and potentially improving the effectiveness of the intervention [32]. Feedback from exercise professionals regarding symptoms, energy levels, and exercise tolerance may provide valuable information to the endocrinologist when assessing the adequacy of thyroid hormone replacement therapy. Such collaboration should be continuous, given that significant changes in body composition, metabolism, and functional capacity may occur throughout the exercise program [9].

Conversely, inadequately prescribed exercise loads may result in adverse effects, including increased fatigue and symptoms of excessive training stress [58], further emphasizing the need for careful monitoring and timely communication with the treating physician. Importantly, HT itself does not constitute a contraindication to physical activity, and most patients can exercise safely when following an appropriately prescribed and supervised program [9]. Nevertheless, given the systemic nature of the disease, some patients may present with additional health conditions, including cardiovascular disorders [59]. In such cases, further evaluation by a cardiologist or sports medicine specialist may be recommended before initiating an exercise program.

5.5. Recommended Exercise Modalities and Types of Physical Activity

As previously emphasized, physical activity should be introduced gradually, progressing from less demanding to more challenging forms of exercise, with a progressive increase in exercise volume and intensity. During the initial stages, priority should be given to aerobic activities such as walking, swimming, hiking, cycling, rollerblading, or dancing. Given the frequently elevated levels of stress among individuals with HT, an important component of the exercise program should also include relaxation-oriented activities, such as breathing exercises, stretching, yoga, tai chi, and similar forms of exercise [60].

The weekly volume of physical activity should be aligned with general recommendations while also taking into account the individual capabilities of each patient. Accordingly, a total of 150–300 minutes of moderate-intensity physical activity per week is recommended. In practice, this can be achieved in different ways, for example through three exercise sessions per week lasting 45–60 minutes or through more frequent, shorter bouts of daily activity [61]. In terms of walking, this may correspond approximately to 7,000–10,000 steps per day or approximately 5–7 km of walking, distributed throughout the week [62].

In addition to moderate-intensity activity, smaller amounts of higher-intensity exercise may also be introduced, for example two to three times per week, depending on the patient's current condition and exercise tolerance [61]. This is particularly relevant given that individuals with HT may exhibit reduced cardiorespiratory fitness and lower levels of muscular strength [48, 61].

Accordingly, resistance training should also represent an important component of the exercise program and may be performed two to three times per week [63]. During the initial stages, bodyweight exercises may be used, followed by the gradual introduction of external resistance, such as dumbbells, kettlebells, resistance bands, or barbells [27]. Exercise load may be prescribed according to the number of repetitions, with 15–20 repetitions per set recommended for lighter loads and 8–12 repetitions per set for higher loads [27].

To improve cardiorespiratory fitness, higher-intensity exercise modalities may also be incorporated, including combined exercise programs consisting of aerobic exercise using ergometers or other exercise equipment together with resistance exercises [5], as well as high-intensity interval training (HIIT) [64]. However, HIIT may be demanding for some patients because of the rapid transitions from recovery to very high-intensity effort and the relatively short recovery periods between intervals [64].

Therefore, as a potentially more practical and tolerable alternative, we propose variable-intensity interval training (VIIT), which involves alternating exercises of different intensities separated by recovery periods. More specifically, a higher-intensity exercise is followed by a recovery period, then by a lower-intensity exercise and another recovery period (e.g., high-knee running followed by recovery, then a slow, controlled squat followed by recovery). This approach allows patients to exercise at higher intensities while providing sufficient recovery time and may also enable a greater overall exercise volume because the session can be sustained for a longer duration. In addition, dynamic variation in exercise intensity and exercise type may make the training session more engaging and subjectively less strenuous [65]. Similar exercise protocols have demonstrated beneficial outcomes in other populations [65]. More importantly, our recent study specifically examining VIIT in women with HT demonstrated improvements in cardiorespiratory fitness, body composition, and several domains of quality of life, together with a significant reduction in TSH levels in women with subclinical HT [66].

Regardless of the exercise modality, each session should conclude with stretching and relaxation exercises [60]. Finally, it is important to reiterate that physical activity should always be individually tailored to the patient's current condition, capabilities, and preferences, as this represents a key prerequisite for long-term adherence to the exercise program and the achievement of the desired health benefits [48].

6. Conclusion

Hashimoto's thyroiditis is a complex condition that, in addition to hormonal disturbances, involves a range of functional and psychological alterations that may hinder engagement in physical activity. Despite the presence of numerous barriers, available evidence and clinical experience indicate that appropriately prescribed and individually tailored physical activity can substantially improve functional capacity, quality of life, and overall health status in these patients.

The key to successful implementation lies in the gradual introduction of physical activity, individualization of the exercise program, careful monitoring of responses to exercise load, and appropriate coordination of exercise training with pharmacological treatment. Combined exercise modalities incorporating aerobic exercise, resistance training, and controlled interval-based methods may be particularly valuable.

Despite the growing body of evidence, physical activity remains insufficiently integrated into the standard management of patients with HT, while the lack of clear guidelines continues to limit its practical implementation. Therefore, further efforts are needed to bridge the gap between scientific evidence and clinical practice, with the aim of establishing physical activity as an integral component of the therapeutic approach for individuals with Hashimoto's thyroiditis.

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