Mini Review
Volume 7:2, 2023

Reports in Thyroid Research

ISSN: 2684-4273 Open Access

The Immune System's Role in Thyroid Health: A Comprehensive Look at Autoimmune Thyroiditis

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Abstract

The immune system is a remarkable defense mechanism that safeguards the body against various threats, including infections and foreign invaders. However, in some cases, the immune system can turn against the body's own tissues, leading to autoimmune diseases. Autoimmune thyroiditis, also known as Hashimoto's thyroiditis or chronic lymphocytic thyroiditis, is a common autoimmune disorder that affects the thyroid gland. This comprehensive exploration delves into the intricate interplay between the immune system and thyroid health, providing insights into the pathogenesis, diagnosis, and management of autoimmune thyroiditis.

Keywords: Immune system • Autoimmune thyroiditis • Lymphocyte

Introduction

Autoimmune Thyroiditis (AIT) is a chronic autoimmune disease in which human thyroid tissue serves as an antigen. AIT involves the production of autoantibodies such as Thyroid Peroxidase antibody (TPO-Ab) and Thyroglobulin Antibody (Tg-Ab), which may trigger cellular and antibody-mediated immune processes that lead to the destruction of thyroid cells. Clinical manifestations include goiter, pharyngeal discomfort, neck compression and dysphagia. AIT includes Hashimoto's Thyroiditis (HT), Graves' Disease (GD) and other diseases. Lymphocyte infiltration in HT can gradually destroy follicular cells and lead to hypothyroidism. AIT affects about 5% of the general population and its incidence rate in women is about 4–10 times that in men; the incidence rate increases with age. Currently, it is unclear whether the incidence rate of AIT is increasing. However, the prevalence of hypothyroidism may be decreasing due to the widespread use of Levo Thyroxin (LT4). Various studies have proved that there is a relationship between AIT and thyroid cancer, so it is necessary to actively intervene in AIT [1].

Literature Review

Selenium is an essential micronutrient for the human body. Very low selenium concentration is associated with numerous diseases, such as endemic osteoarthropathy and dilated cardiomyopathy . Selenium plays a critical role in thyroid function, the thyroid is one of the organs with the highest levels of selenium in the body. Some studies have shown that antioxidants may have therapeutic effects in preventing AIT and selenium is significant in antioxidation. Selenium is essential in the molecular structure of thyroid enzymes, including glutathione peroxidase, which defends the thyroid against the oxidative damage caused by hydrogen peroxide enzyme synthesis by thyroid hormones. All these factors indicate that selenium has broad application prospects in the treatment and prognosis of AIT. Selenium, as a complementary therapy, may reduce antibody levels and decrease doses of LT4 use. The relevant guideline indicated that for mild Graves' orbitopathy, selenium may improve ocular manifestations and quality of life, potentially preventing disease progression [2,3].

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Received: 29 May, 2023, Manuscript No. rtr-23-113190; **Editor Assigned:** 31 May, 2023, PreQC No. P-113190; **Reviewed:** 14 June, 2023, QC No. Q-113190; **Revised:** 19 June, 2023, Manuscript No. R-113190; **Published:** 26 June, 2023, DOI: 10.37421/2684-4273.2023.7.40

The methodological quality of the SRs included in this study was not good, with only one study of high quality, one study of low quality and four studies of critically low quality. As for critical items, only two studies specified the research protocol before the SRs began. The registration of the SR before the research can not only reduce the risk of bias and improve the report quality but also save research resources. Other SR authors could determine whether the research was repeated by searching the registration platform. In studies partially met the requirements of the comprehensive literature search strategy but did not fully meet the requirements due to the lack of supplemented retrieval by reviewing the reference list from the studies found, the lack of searching relevant gray literature, the lack of a complete search strategy and other reasons. Other researchers might not be able to reproduce the search results, reducing the reliability of the results [4].

Discussion

The selenium treatment and control groups showed no significant differences in adverse effects and no serious adverse effects were observed. This showed that selenium supplementation was a safe and effective treatment for AIT. Most of the selenium supplementation used in the trials was 200μg/day and 200μg of selenomethionine was equivalent to 80μg of selenium According to relevant studies, the recommended intake dose of selenium is 55μg/day and the tolerable upper limit is 400μg/day. The current selenium dose used in the trials was reasonable. Some studies have shown that high levels of selenium intake are associated with the development of diabetes. In the studies we included, no such trend was observed. In addition, the selenium supplementation selected in the current RCTs was mainly in the form of selenium salts (sodium selenite), amino acids (selenomethionine) and selenium yeast. There was a new generation of selenium supplements, including zerovalent selenium nanoparticles and selenized polysaccharides, that had the advantages of low toxicity, high bioavailability, and controlled release. They could be considered for use in future research [5,6].

Conclusion

Although selenium supplementation could reduce the TPO-Ab levels at 3 and 6 months and the Tg-Ab levels at 3 and 6 months in the non-LT4-treated population, the routine use of selenium supplementation in patients with AIT is not recommended due to the low certainty of evidence. In current clinical practice, selenium supplementation beyond the support of evidence-based medical evidence should be corrected. Since low selenium status is closely related to many diseases, it is feasible to supplement selenium only in patients with selenium deficiency. In the future, it is expected that RCTs with rigorous design, long-term follow-up, and using the new generation of selenium supplementation will offer high-quality evidence to inform clinical decision making.

Acknowledgement

None.

Conflict of Interest

None.

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How to cite this article: Tatsuya, Shirai. “The Immune System's Role in Thyroid Health: A Comprehensive Look at Autoimmune Thyroiditis.” *Rep Thyroid Res* 7 (2023): 40.