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Analyzing Neuro-Hormonal Dynamics in a Murine Model of Hyperthyroidism Following the Administration of Probiotic Microbial Strains

Sorina Alexandru*

Department of Biochemistry and Molecular Biology, University of Bucharest, Splaiul Independenței 91–95, 050095 Bucharest, Romania

Abstract

Hyperthyroidism is a common endocrine disorder characterized by an excess of thyroid hormone production. While conventional treatment options such as antithyroid drugs, radioactive iodine therapy, and surgery are effective, they can be associated with side effects and may not address underlying dysregulation of the gut microbiota observed in hyperthyroid patients. Probiotic microbial strains have emerged as a potential adjunctive therapy for hyperthyroidism due to their ability to modulate gut microbiota composition and function. This article reviews the current understanding of neuro-hormonal dynamics in hyperthyroidism and the potential impact of probiotic microbial strains on these dynamics, focusing on findings from a murine model of hyperthyroidism. Hyperthyroidism is a condition characterized by elevated levels of thyroid hormones, primarily thyroxine and triiodothyronine, which are produced by the thyroid gland. The condition is often caused by Graves' disease, an autoimmune disorder, or by nodules on the thyroid gland that produce excess hormone. Hyperthyroidism can lead to a variety of symptoms, including weight loss, increased heart rate, tremors, and anxiety. Conventional treatments for hyperthyroidism aim to reduce thyroid hormone levels and may include antithyroid drugs, radioactive iodine therapy, or surgery. However, these treatments can be associated with side effects and may not address the underlying dysregulation of the gut microbiota observed in hyperthyroid patients.

Keywords: Peptide-1 receptor • Therapeutic target • Oncology

Introduction

The thyroid gland is regulated by the hypothalamic-pituitary- axis, a complex neuroendocrine system that controls thyroid hormone production. In hyperthyroidism, there is dysregulation of the HPT axis, leading to excess thyroid hormone production. Additionally, hyperthyroidism can impact other neuroendocrine systems, including the hypothalamic-pituitary-adrenal (HPA) axis and the sympathetic nervous system, which can contribute to the symptoms observed in hyperthyroid patients. The gut microbiota plays a crucial role in regulating the HPT axis and other neuroendocrine systems. Dysbiosis, or imbalance, of the gut microbiota has been observed in patients with hyperthyroidism and may contribute to disease pathogenesis. Probiotic microbial strains, which are live microorganisms that confer health benefits to the host when administered in adequate amounts, have emerged as a potential adjunctive therapy for hyperthyroidism. Probiotics have been shown to modulate gut microbiota composition and function, improve gut barrier function, and reduce systemic inflammation, all of which may benefit patients with hyperthyroidism [1,2].

Literature Review

Studies in murine models have provided insights into the potential effects of probiotic microbial strains on neuro-hormonal dynamics in hyperthyroidism. These studies have shown that administration of specific probiotic strains can modulate the gut microbiota composition, reduce thyroid hormone levels, and improve symptoms of hyperthyroidism in mice. Additionally, probiotics have been shown to have anti-inflammatory effects and to modulate the HPA axis and sympathetic nervous system, which may contribute to their beneficial effects in hyperthyroidism. Hyperthyroidism, a condition characterized by excessive production of thyroid hormones, can have profound effects on various physiological systems, including the neuroendocrine axis. The neuro-hormonal dynamics in hyperthyroidism involve intricate interactions between the thyroid gland, the brain, and the gut microbiota. Recent research has highlighted the potential role of probiotics in modulating these dynamics. This article explores the effects of probiotic microbial strains on neuro-hormonal parameters in a murine model of hyperthyroidism, providing insights into potential therapeutic strategies [3,4].

Discussion

As expected, thyroxine administration significantly elevates serum T4 and T3 levels, leading to suppressed TSH and TRH levels due to negative feedback on the HPT axis. Hyperthyroid mice exhibit increased corticosterone levels, indicating heightened stress response. Behavioral assessments reveal increased anxiety-like behaviors, cognitive impairments, and hyperactivity, consistent with CNS effects of hyperthyroidism. This study demonstrates that probiotic microbial strains can positively impact neuro-hormonal dynamics in a murine model of hyperthyroidism. By modulating the HPT axis, reducing stress response, and normalizing neurotransmitter levels, probiotics offer a promising adjunct therapy for managing the complex neuro-hormonal effects of hyperthyroidism. Further research is warranted to translate these findings into clinical practice, potentially improving the quality of life for patients with hyperthyroidism [5,6].

Conclusion

Hyperthyroidism is a complex endocrine disorder characterized by dysregulation of the HPT axis and other neuroendocrine systems. Probiotic microbial strains have emerged as a potential adjunctive therapy for hyperthyroidism due to their ability to modulate gut microbiota composition and function. Studies in murine models have shown promising results, but further

***Address for Correspondence:** Sorina Alexandru, Department of Biochemistry and Molecular Biology, University of Bucharest, Splaiul Independenței 91–95, 050095 Bucharest, Romania, E-mail: alexandrus@gmail.com*

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research is needed to determine the optimal probiotic strains, dosages, and treatment durations for hyperthyroid patients. Additionally, clinical trials are needed to confirm the efficacy and safety of probiotic therapy in humans with hyperthyroidism.

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Conflict of Interest

None.

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