A Holistic Review on Dietary and Nutritional Medicine Management of Hashimoto’s

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Introduction
Hashimoto’s thyroiditis (HT) is considered the most frequent autoimmune disease, endocrine disorder, and the leading cause of hypothyroidism (Caturegli, De Remigis & Rose 2014, p.391). The prevalence of HT within developed countries is approximately 0.3 -13.4% (Staii et al. 2010, p.1). The aetiology of HT is still not fully understood, however, both genetics and environmental factors are thought to contribute to the development and progression (Pyzik et al. 2015, p.979). These environmental risk factors include infections (Root-Bernstein & Fairweather 2014, p.417) and exposure to toxins (Sambasivarao 2013, p.1199). The pathogenesis of HT involves excessively stimulated T cell CD4+ and irregular Th17, Th1 and T-regulatory cells (Pyzik et al. 2015, p.980). Therefore, immune dysregulation and inflammation are major factors in HT management. Clinical features of HT are numerous and may include constipation, dry and cold skin, hair loss, low blood pressure, dysphagia, weight gain and fatigue (Caturegli, De Remigis & Rose 2014, p.392). Diagnosis of HT generally incorporates positive autoantibodies of antithyroglobulin antibody (anti-TG) 70% positive rate and antithyroid peroxidase antibody (anti-TPO) 95% positive rate, along with abnormal thyroid hormones, and clinical features (Caturegli, De Remigis & Rose 2014, p.393). As HT is an autoimmune disease, there are a number of modifiable risk factors that can exacerbate the development and progression. These include increased intestinal permeability (Xu et al. 2015, p.107), inflammation (Negro et al. 2007, p.1263), dysbiosis (Wiebolt et al. 2011, p.789) and immune dysregulation (Sweeney, Stewart & Gaitonde 2014, p.381). Therefore, holistic nutritional management of HT incorporates these factors, in addition to reducing autoantibodies, symptom support and to prevent clustering of other autoimmune diseases.
**Review of Dietary Approach to Hashimotos Thyroiditis Management**

Currently, there are limited RCT’s and intervention studies evaluating the effects of dietary modification on HT management. However, preliminary studies are beginning to illustrate that dietary choice may influence the development and progression of HT.

**Gluten**

Gluten is a peptide found in a number of grains (wheat, rye, barley) and has gained the attention of researchers in the last few decades. Gluten has been shown to increase intestinal permeability (Fasano 2012, p.74), promote inflammation (Vincentini et al. 2011, p.541) and contribute to dysbiosis (Winter, Lopez & Bäumler 2013, p.319). Currently there is a lack of evidence to confirm the correlation gluten has to HT, however, recent research is creating a clearer picture. Tissue transglutaminase-2 IgA antibodies commonly found high in individuals with coeliac disease are able to bind to tissue transglutaminase within the thyroid and are correlated with an increased anti-TPO level (Naiyer et al. 2008, p.1171). This can only occur in the presence of increased intestinal permeability (Xu et al. 2015, p.107). A prospective controlled study demonstrated no significant change to anti-TPO levels in coeliac disease subjects on gluten free diet over 12 months (Metso et al. 2012, p.43). Further randomised controlled trials are required to evaluate the effect of gluten free diet is subjects with HT.

**Carbohydrate Metabolism**

Approximately 44.4% of individuals with HT at the age of 50 will have some form of carbohydrate metabolism disorder. This may be either diabetes 27.8% or impaired glucose tolerance and impaired fasting glycaemia 16.6% (Polska et al. 2012, p.14). Therefore, a holistic management of HT also addresses carbohydrate metabolism and insulin resistance with the use of macronutrient and micronutrient balance.

**Oily Fish and Omega-3**

A recent study of 279 pregnant women demonstrated that higher consumption of oily fish during pregnancy is associated with a significantly lower serum thyroid autoantibodies compared to women who ate other fish or no fish (Benvenga et al. 2015, p.1). This beneficial effect of oily fish consumption may occur, as omega-3 reduces inflammatory cytokines, one of the modifiable risk factors of HT (Li et al. 2014, p.1). Therefore, maintaining adequate omega-3 levels via consumption of oily fish such as salmon is advised in pregnant woman and may prove beneficial in subjects with HT.
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**Vitamin D**

Vitamin D acts as an immunomodulator in HT and other autoimmune diseases, via enhancing the innate immune response, with an inhibitory action on the adaptive immune system (Antico et al. 2012, p.128). Vitamin D inhibits IL-17 and induces T regulatory cells, both of which are directly related to the pathogenesis of HT (Cantorna et al. 2015, p.3011). Additionally, polymorphisms of the vitamin D receptor are theorised to be involved in the pathogenesis of HT, increasing the requirement of vitamin D (Stefanić et al. 2008, p.125). A single centre, open study of 218 subjects with HT demonstrated that there is a significant negative correlation between vitamin D status and serum anti-TPO levels (Tsekouras 2015, p.222). Furthermore, subjects within this study were supplemented with vitamin D (cholecalciferol) orally 1200-4000 IU daily for 4 months. At the end of the study, a significant decrease of anti-TPO by 20.3% was demonstrated in vitamin D deficient subjects ($P<0.0001$) (table one). Although this study lacks a placebo and control group, such a significant decrease in anti-TPO illustrates a strong role that vitamin D may have in the management of HT.

**Selenium**

Selenium is an essential element of the thyroid gland, acting as a cofactor in the conversion of T4 to T3 and is also used within glutathione peroxidase (Combs Jr. et al. 2009, p.1808). There are numerous studies evaluating selenium’s effect on HT management, however, there are conflicting results between them. Early studies have clearly illustrated that selenium is dose dependent and suppression of anti-TPO requires dosage above 100mcg daily (Turker et al. 2006, p.151). Furthermore, other factors may interfere with selenium, as the effectiveness of anti-TPO suppression is affected by the length of the study and location (Turker et al. 2006, p.151). One study used 200mcg of L-selenomethionine daily over 6 months with no significant effect on anti-TPO (Anastasilakis et al. 2012, p.378). Whereas, another study using the same 200mcg of L-selenomethionine daily over 12 months demonstrated a significant decrease in anti-TPO (Mazokopakis et al. 2007, p.609). The last comparison study used 200mcg of sodium selenite over 6 months and had no significant change in thyroid autoantibodies (Eskes et al. 2014, p.444). Table one compares these studies in depth. Speculations for these differences are thyroid autoantibodies level, selenium status, selenium form used, dosage and study length. Therefore, in populations consuming food from selenium deficient soil, in
addition to having a high anti-TPO level, 200mcg of selenium in the form of L-
selenomethionine may provide a beneficial reduction in thyroid autoantibodies.

Iodine
A Chinese population-based study has demonstrated that consuming above adequate
levels of iodine (261mcg/day) is associated with positive anti-TPO and anti-TG and
increased levels compared to adequate consumption of iodine (145mcg/day) (Teng et al.
2011, p.943). Therefore, until further studies verify otherwise, consuming the iodine RDI of
150mcg/day set by the Australian government remains a safe and viable level.

Conclusion
In conclusion, HT is a multifactorial autoimmune disease that has a number of modifiable
risk factors. Currently, there are inadequate RCT’s in both dietary and nutritional medicine
to formulate a complete management protocol. However, even with the limited evidence
available a number of dietary modifications and nutritional supplementations are
recommended. Modifying dietary intake to exclude gluten containing products and
increasing omega-3 rich foods is advised. Furthermore, regulating carbohydrate
metabolism and insulin resistance is required in HT management. Although there is
conflicting evidence in RCT’s of nutritional supplementation in HT management, the
preliminary evidence suggests nutritional therapy is an important aspect in decreasing
disease activity. The use of vitamin D supplementation in subjects who have low serum
vitamin D may contribute to reducing disease activity. Beneficial effects of selenium
supplementation appear to be limited to subjects consuming food from selenium deficient
soil that also have a high anti-TPO level. Combining these dietary and nutritional aspects
may reduce disease activity, reduce the modifiable risk factors and support the
management of HT.
Reference


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