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EDITORIAL

# EFFECT OF VITAMIN A DEFICIENCY IN THYROID HEALTH

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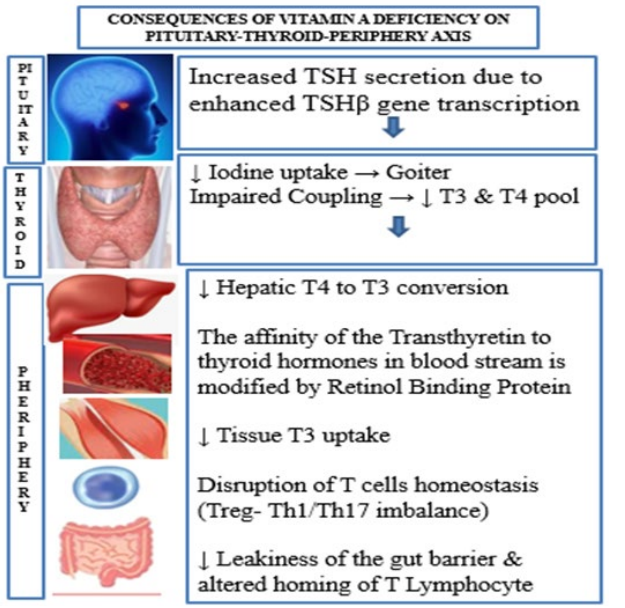
Once we talk about the thyroid functioning and the key nutrients required; iodine, selenium, vitamin D spring into our mind. There's no doubt that these nutrients are very much needed for the production of thyroid hormones; thyroxine (T4) and triiodothyronine (T3) and for the conversion of T4 to the more metabolically active T3. The role played by vitamin A is highly emphasized due to key role in fundamental life processes. "Vitamin A" reflects a group of fat-soluble compounds that are essential human life, which vary in their sources and bioavailability.[1,2] "Retinoids" includes both naturally occurring molecules and the synthetic compounds that exhibit biological activities that are characteristics of vitamin a. Compounds such as retinol, retinal, 9-cis-retinoic acid, ATRA [tretinoin], and 13-cis-retinoic acid are natural whereas synthetic compounds are etretinate, acitretin, adapalene, tazarotene and bexarotene which as mostly used for therapeutic purposes.[1]

Vitamin A helps to activate thyroid hormone receptors and enable thyroid hormones to get into the cells. Insufficient vitamin A may prevent thyroid hormones entering the cell and consequently lead to a hypothyroid status. Retinoic acid (RA), is a multifunctional metabolite and is involved in most functions of vitamin A. These functions are mainly highlighted by the role of retinoic acid receptors (RARs and RXRs).[2,3] The nutritional status of retinoid is able to modulate thyroid gland homeostasis. Vitamin A deficiency (VAD) is thought t be closely related to thyroid gland impairment, also because of its frequent association with iodine deficiency (ID).[2,3,4,5] Moreover, retinoids seem to play a role in the development and maturation of the thyroid cell phenotype.[3] There are reports of several animal studies in mouse models stating that VAD is related to reduced iodine uptake, impaired coupling of iodothyronines, and reduced thyroglobulin synthesis, which obviously can lead to thyroid hypertrophy and goiter and to decrease the pool of T3 and T4. [5-8]

Vitamin A also seem to have some effects associated with the modulation in the TSH-secreting pituitary function.[8]

Hashimoto's thyroiditis (HT), a most frequently diagnosed autoimmune disease, is an exemplar of an organ-specific auto-aggressive disorder. This has an early Th17-driven inflammatory phase followed by a typical Th1 polarization.[9] It has been stated in a recent study that there exist an association between vitamin A-related genes and the susceptibility to, and prognosis of HT. To the notice, they observed that some polymorphisms in CYP26B1 gene were associated with the severity of HT.[10]

**Figure 1: Effects of Vitamin A deficiency on Pituitary-Thyroid-Periphery Axis**




There have been studies done in vitro and in vivo that have evaluated the effect of the nutritional status of vitamin A in patients with thyroid cancer. The rationale behind this was based on the ability of retinoic acid to increase iodine uptake and sodium-iodine symporter activity in human thyroid cancer cell lines.[11] Moreover, a recent study states that elevated serum levels or oral intake of vitamin A and vitamin E were associated with a less aggressive clinical presentation and better prognosis in patients with papillary thyroid carcinoma.[12]

It will be a good suggestion that vitamin A is an important nutrient for the thyroid, mainly as it impacts the thyroid receptors, which helps the thyroid access our cells from the blood stream and that's when they become active. It is fairly easy to consume vitamin A due to being in so

many foods. The most potent form of vitamin A is from animal rich foods, known as Retinol. The less potent form is from plants called Carotenes - which is why you might have heard of the old saying of "eating carrots help you see in the dark".

But there is a need of more elaborative and variable studies around the world to be more confirmatory regarding the absolute association of vitamin A with the different thyroid functioning and health. Despite this limitation, it can be stated that vitamin A and its metabolites appear to have impactful effect on thyroid morphology, function and homeostasis (as shown in figure 1). The newer understanding of the role of vitamin A in the treatment of thyroid cancer, in pathophysiology of the goiter, and in the modulation of the adaptive immune response have been the major focus. And further studies regarding the association of vitamin A with the thyroid health is also advocated.

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