

# Multivitamins and Minerals are used for the Treatment of Hair Loss

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## ABSTRACT

Hair loss is a prevalent issue that can be alleviated by incorporating vitamins and minerals into our diet. Adequate levels of vitamins and minerals are crucial for usual cell development and action. A lack of these nutrients can result in hair loss. It is crucial to have knowledge about the specific vitamins and minerals that can effectively address hair loss, despite the reasonable cost and easy availability of supplements. Two common forms of hair loss are androgenetic alopecia and telogen effluvium. Insufficient amounts of essential nutrients have the potential to enhance the occurrence of premature graying. Micronutrients play a crucial role in the hair follicle cycle by facilitating cellular turnover, particularly in the rapidly dividing matrix cells of the follicle bulb. The impact of vitamins and minerals on the hair cycle and immune system's defense mechanism, along with the effects of targeted micronutrient supplementation on hair growth, are being studied to determine if there is a link between hair loss and deficiencies in these micronutrients, specifically in individuals with non-scarring alopecia.

### Introduction

Many individuals frequently inquire about the utilization of vitamin and mineral supplementation and diet for the purpose of preventing or managing dermatological diseases, with a specific focus on hair loss. The development of novel evidence-based guidelines aimed at the prevention and management of atopic dermatitis, psoriasis, acne, and skin cancer. Furthermore, these findings emphasize the need for continuous research investigations in this field. Micronutrients, encompassing essential vitamins and trace minerals play a critical role in our dietary requirements. Protein-energy malnutrition is characterized by notable alterations in the skin and hair which are particularly evident in individuals affected by conditions such as kwashiorkor, marasmus and marasmic-kwashiorkor, especially in the case of children. Hair loss has been identified as a prominent outcome resulting from a significant reduction in carbohydrate intake. The management of alopecia holds significant importance in the field of clinical dermatology given the wide prevalence of hair loss and its consequential impact on the overall welfare and contentment of individuals afflicted with this disorder. There are several contributing factors that potentially contribute to the association of micronutrients with non-scarring alopecia. The study of the effects of nutrition and dietary factors on the management of alopecia is an emerging and burgeoning area of research analysis [1].

### Vitamin A

Vitamin A consists of a cluster of retinoids that are soluble in fat, which include retinol, retinal, and retinyl esters. This essential vitamin plays various important roles in the physiological processes of the human body. It is crucial for the visual process, immune function, and cellular growth and differentiation to have it. There are two distinct types of vitamin A present in our diet: preformed vitamin A, sourced from animals, and pro-vitamin A carotenoids, obtained from plants. The majority of the body's vitamin A is stored in the liver as retinyl esters. In many instances, consuming an excessive quantity of vitamin A or taking excessive supplements of it can result in the loss of hair. Broadly speaking, the liver effectively regulates the allocation of fat-soluble vitamin A by performing a sequence of building-up and breaking-down reactions, guaranteeing the appropriate storage of both the dormant and active forms. Ensuring a stable equilibrium within the body and achieving optimal levels of active metabolite are vital for the overall health of hair. Gentle pulling removed four to five hairs, all of which were in the dormant stage of the hair growth cycle. Hair loss was no longer a problem after stopping the use of vitamin A supplements for one month.

### Vitamin B

The vitamin B complex consists of a collection of eight water-soluble vitamins called thiamine (B1), riboflavin (B2), niacin (B3), pantothenic acid (B5), vitamin B6, biotin (B7), folate, and vitamin B12. These vitamins have a crucial role in aiding cell metabolism. It is commonly recommended that consuming a well-rounded diet is sufficient to obtain all necessary vitamins, except for biotin, which is the only B vitamin naturally produced by the body.

Individuals who are in good physical health do not need to take biotin supplements. Hair loss is specifically linked to deficiencies in riboflavin, biotin, folate, and vitamin B12.

### Vitamin B2

Vitamin B2, also known as riboflavin, holds significance as a constituent of two crucial coenzymes, namely lavin mononucleotide and flavin adenine dinucleotide. FMN and FAD comprise a significant proportion, specifically 90%, of riboflavin found in the human diet. These compounds assume crucial roles in the processes of cellular development and function, as well as in the metabolism of fats and the generation of energy. The liver, heart, and kidneys are where the human body primarily stores its small supply of riboflavin. Alopecia can be triggered by a rare occurrence of riboflavin deficiency in the United States.

### Vitamin B7 (Biotin)

Biotin also plays important roles in histone modification, cell signaling, and controlling gene expression. Most of the biotin in our diet comes from proteins. The process of enzymatic hydrolysis breaks down dietary protein, releasing biotin. This biotin is then stored in the small intestine and liver. Many hair, skin, and nail supplements frequently exceed the recommended daily biotin intake by a substantial amount. In severe cases of dermatitis and hair loss, there is a noticeable absence of both fine and thick hair in different areas of the body such as the scalp, eyebrows, and eyelashes. In some instances, there may even be no presence of lanugo hair. In this particular manifestation, there is a notable scarcity or complete absence of hair on the scalp, eyebrows, and eyelashes. Insufficient levels of biotin can result in multiple indications such as hair loss, skin eruptions, and weak nails. However, there is still a lack of evidence to support the use of biotin supplements in improving these mentioned conditions related to hair, skin, and nails.

### Vitamin B9 (Folate)

Folate, an aqueous B-vitamin, encompasses the naturally occurring dietary folate and folic acid in its fully oxidized monoglutamate state. Folate serves as an essential coenzyme in the intricate process of nucleic acid synthesis and assumes a critical role in the metabolism of amino acids. The 5-methyl-tetrahydrofolate compound is found within the plasma, whereas roughly fifty percent of the total body content is situated within the liver. The insufficient presence of folate within the human body possesses the capability to elicit modifications in the integumentary system, specifically the hair, skin, and nails.

### Vitamin B12

Vitamin B12 is a critical dietary component necessary for numerous physiological processes, encompassing DNA synthesis, neurological functionality, and the development of red blood cells. The two active forms of vitamin B12 are identified as methylcobalamin and 5-deoxyadenosylcobalamin in academic literature. Vitamin B12 plays a vital role as an essential cofactor for methionine synthase, exerting a significant

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impact on the biosynthesis of around 100 substrates. This includes crucial molecules like DNA, RNA, and proteins. The precise determination of an upper threshold for vitamin B12 consumption remains elusive due to its limited propensity for eliciting toxic effects. The potential contribution of folate and vitamin B12 to the process of nucleic acid synthesis suggests their potential influence on the accelerated cellular proliferation observed in the hair follicle.

**Vitamin C**

Vitamin C, or ascorbic acid, is a hydrophilic compound that is acquired through the metabolic degradation of glucose. The chemical compound functions as a potent antioxidant, effectively impeding the process of oxidation in low density lipoproteins and providing defense against the harm induced by free radicals. Moreover, it plays a crucial role as a pivotal reducing mediator that is essential for the formation of collagen fibers by facilitating the hydroxylation process of lysine and proline. Vitamin C is widely recognized for its essential role in facilitating the absorption of iron in the intestine. This is attributed to its chelating and reducing properties, which assist in the mobilization and uptake of iron. Therefore, the significance of vitamin C consumption becomes paramount for individuals afflicted with alopecia as a result of inadequate iron levels. Citrus fruits, potatoes, tomatoes, green peppers, and cabbages have been recognized for their noteworthy concentrations of vitamin C. The presence of inadequate levels of Vitamin C is frequently linked to variations in bodily hair manifestation.

**Vitamin D**

Vitamin D is a lipid-soluble micronutrient that is synthesized endogenously within epidermal keratinocytes. Vitamin D possesses regulatory properties that influence the growth and differentiation mechanisms of keratinocytes through its interaction with the nuclear vitamin D receptor. The maximum level of vitamin D receptor immunoreactivity in murine hair follicle keratinocytes is observed during the anagen stage. Several patients in this study present mutations in the vitamin D receptor gene, resulting in vitamin D resistance and the development of sparse body hair. This is most commonly observed as complete hair loss on the scalp and body, known as alopecia.

**Vitamin E**

Oxidative damage has been demonstrated to have a significant influence on immune cells as a result of their increased vulnerability. Reactive oxygen species are produced as a component of the immune response mechanism, thereby instigating a lipid peroxidation reaction. The efficacy of antioxidant supplementation in mitigating age-related immune deficiencies has been substantiated in empirical studies. This intervention leads to a notable augmentation in the overall lymphocyte count as well as the abundance of T-cell subsets. Additionally, it is accompanied by heightened levels of interleukin-2, increased activity of natural killer cells, improved responsiveness of antibodies to antigen stimulation, enhanced mitigation of mitogen-associated reactions, reduced prostaglandin synthesis, and diminished lipid peroxidation. Numerous clinical investigations have established a correlation between imbalanced oxidant or antioxidant levels and patients diagnosed with alopecia areata, a condition associated with the interplay of autoimmunity, genetic predisposition, and emotional and environmental factors [2].

**Iron**

Iron deficiency is a prevalent condition observed among women experiencing hair loss. However, the correlation between hair loss and a deficiency in serum ferritin has been the subject of ongoing discourse within the scientific community for a considerable period of time. The current discussion revolves around the classification of low serum ferritin levels as a potential trigger for hair loss within the framework of nutritional inadequacy. Furthermore, a comprehensive understanding of the complete impact of amino acids on hair growth has yet to be elucidated. The bioavailability of L-lysine is primarily constrained to aquatic fauna, meat sources, and avian reproductive products in academic parlance. Presently, there is a dearth of comprehensive understanding regarding the implications of L-lysine intake with regards to the intricate mechanisms of iron absorption and metabolic regulation. The investigation into the potential correlation between serum calcium, serum ferritin, and vitamin D3 levels and the initiation of premature graying of hair is a subject matter that piques scholarly interest.

**Selenium**

Selenium is an essential trace element of the highest importance. The proper functioning of the antioxidant enzyme glutathione peroxidase depends on the presence of selenium as an essential co-factor. Selenium deficiency is a condition that occurs in infants with low birth weight and individuals who require complete parenteral nutrition. Selenium can be found in a variety of foods such as meat, vegetables, and nuts, which is sufficient to meet the daily dietary need. Exceeding a daily intake of 400 micrograms of Selenium can result in harmful consequences. Indications of selenium toxicity, whether acute or chronic, include digestive discomfort such as nausea and vomiting, as well as brittle and discolored nails, hair loss, increased feelings of fatigue, heightened irritability, and a noticeable unpleasant odor in the breath.

**Zinc**

Zinc is a vital micronutrient that falls under the category of essential trace elements. This designation implies that the human body lacks the ability to synthesize zinc endogenously and therefore necessitates its incorporation through dietary sources. The predominant dietary sources of zinc are aquatic animals and livestock-derived products. Additionally, inadequate consumption of meat, reliance on total parenteral nutrition, and utilization of milk formula in infants can also contribute to the occurrence of zinc deficiency. Various factors such as alcoholism, malignancy, burns, infection, and pregnancy have been observed to contribute to heightened metabolic and excretory processes of zinc in the human body. Alopecia represents a widely recognized indicator of a confirmed case of zinc deficiency, whereby the introduction of zinc supplementation facilitates the process of hair regrowth [3].

**Prevent of Androgenic Alopecia through oral supplements**

Micronutrients found in food, including vitamins and minerals, are now being considered as a potential solution for treating androgenic alopecia, a hair loss condition. These minerals play a crucial role in controlling the regular cycle of hair follicles. The lack of essential nutrients is a changeable factor that is associated with the development, prevention, and treatment of hair loss. Hair loss can be linked to a lack of these important nutrients. The upcoming conversation will center on the effectiveness of different vitamins and minerals in addressing hair loss, taking into account how easy and affordable they are to obtain. About 90% of all hair follicles are in the anagen phase, preventing hair loss from happening. The existence of essential components such as proteins, vitamins, and minerals is vital for the production of strong and healthy hair. Hair loss is widely recognized as a prevalent issue in the field of dermatology, having a significant adverse influence on the psychological and emotional well-being of affected individuals. Micronutrients, specifically vitamins and minerals, possess an integral yet partially elusive significance in the progression of normal hair follicle development and the functioning of immune cells. The insufficiency of these micronutrients may potentially serve as an alterable risk element connected to the occurrence, prevention, and management of alopecia [4].

**Conclusion**

In order to understand the impact of vitamin and mineral intake on the growth of hair follicles and immune system function. The main objective should be to determine how supplementing with micronutrients affects hair growth in patients who suffer from both micronutrient deficiency and non-scarring hair loss, with the aim of identifying any possible link between hair loss and micronutrient insufficiency. The precise understanding of the impact of micronutrients on hair follicle function and the potential link between deficiency and hair loss remains incomplete. Treatment of hair loss conditions without confirmed deficiencies has not been proven useful based on evidence and experience. More research is necessary to confirm the effectiveness of vitamins and minerals in treating various hair loss conditions.

**References**

- [1] Lugo NT, Trujillo AM, Martínez MH. Serum copper, zinc, calcium and magnesium levels in mothers with offspring affected by neural tube defects: a case-control study. *Revista Cubana de Investigaciones Biomédicas*. 2019;38(1):1-9.
- [2] Almohanna HM, Ahmed AA, Tsatalis JP, Tosti A. The role of vitamins and minerals in hair loss: a review. *Dermatology and therapy*. 2019 Mar;9(1):51-70.
- [3] Rajendrasingh JR. Role of non-androgenic factors in hair loss and hair regrowth. *J Cosmo Trichol*. 2017;3(2):118.
- [4] Ashique S, Sandhu NK, Haque SN, Koley K. A systemic review on topical marketed formulations, natural products, and oral supplements to prevent androgenic alopecia: a review. *Natural products and bioprospecting*. 2020 Dec;10:345-65.