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Review Article

One Oral Dermatologic Supplement with Two Indications? A Review of Active Ingredients in Popular Hair Supplements and Their Efficacy in Treating Hair Loss and Acne

Amanda Hunt, MD[1], Victoria Kuritza, MD[2], Peter Lio, MD[2]

[1] Resurrection Medical Center, [2] Medical Dermatology Associates of Chicago

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The use of oral supplements in the treatment of dermatologic conditions has been increasing. These supplements often contain a combination of vitamins, minerals, and botanicals. They are advertised to treat various conditions, including hair and skin disorders. Given the overlap in ingredients, this review explores whether a single oral supplement could effectively address multiple dermatologic conditions, even if not specifically advertised. A Google search was performed for "hair growth supplements." The top results were reviewed with documentation of active ingredients, and then a literature search was performed for each ingredient's role in hair and acne management. Results showed that vitamins A, C, D, and E, as well as biotin, zinc, and selenium, demonstrated mixed efficacy in treating hair loss and acne, while iodine supported hair growth but was associated with worsening acne. By synthesizing the current data, clinicians can help consumers make more informed decisions and gain a clearer understanding of the supplements they use.

INTRODUCTION

In recent years, companies have increasingly developed over-the-counter oral supplements to address dermatologic conditions. This growing interest builds on longstanding research into the role of nutrition in dermatologic health. For example, several vitamin deficiencies have been specifically associated with hair disorders. Low iron, zinc, and vitamin D levels are associated with telogen effluvium and alopecia areata. Additionally, low iron and vitamin D levels are seen in people with androgenetic alopecia. Vitamin A abnormalities can lead to hair breakage and shedding, while vitamin C abnormalities can cause abnormal hair shaft structure.[1] In addition to micronutrient deficiencies, high glycemic load diets have been associated with androgenic alopecia.[2]

Hair loss and acne have overlapping pathogenic mechanisms, particularly regarding androgen-driven hormonal pathways. Along with the investigations into dietary influence on hair disorders, studies have also examined the relationship between diet and acne. Similarly, high glycemic load diets may worsen acne vulgaris.[3] Vitamin A, vitamin D, zinc, and other micronutrients have been investigated for their potential association with acne.[4] As a result, oral supplements are of growing interest to patients seeking options for managing a range of dermatological concerns.

These supplements can include various ingredients, such as vitamins, minerals, and botanicals. However, many of the supplements marketed for hair loss and acne contain similar ingredient lists. Therefore, a single oral supplement might be beneficial for both hair loss and acne, even if not explicitly marketed for such use. This approach could be cost-effective, simplify patient use, and reduce the risk of toxicity from overlapping ingredients. This review investigates the common active ingredients in hair loss supplements due to their popularity and frequent use among patients. Given the increasing number of oral supplements now being marketed for acne, we examined whether these same hair growth supplement ingredients may also have relevance in acne management. This review explores the efficacy and safety of commonly used hair growth supplements and evaluates their potential roles in both hair and acne vulgaris management.

METHODS

A Google search was conducted using the term "hair growth supplements." The top ten Google results were reviewed, including both sponsored and organic content to better reflect the typical consumer experience. From these results, eight unique supplement products were identified. The active ingredients within each product were documented and the most common overlapping ingredients were selected for further analysis. (See Table 1.) Then, a comprehensive literature search was performed for each chosen ingredient using PubMed, Google, and Google Scholar. The literature was reviewed for relevance and a total of 48 papers were included in this review.

RESULTS AND DISCUSSION

VITAMIN A

Vitamin A is a fat-soluble compound that exists in many forms. It can be derived from either plant or animal sources and serves multiple roles in the human body, including aiding immune system function and promoting cell growth and turnover.[5] Provitamin A, mainly derived from carotenoids, is abundant in dark-leafy greens and orange and yellow fruits and vegetables.[6] As a provitamin, it requires intestinal conversion to activate vitamin A.[6] This process is regulated in the body, allowing for decreased conversion when vitamin A levels are sufficient, and thus reducing risk of toxicity.[6] In contrast, preformed vitamin A found in dairy, egg yolk, and liver is readily absorbed, leading to increased risk of excessive intake and adverse effects.[6]

The mechanism of action of vitamin A has been investigated for its potential role in hair loss treatment, as evidence has shown it to be implicated in the hair cycle. For example, dimerization between the vitamin A alpha retinoid nuclear receptor and the vitamin D receptor assists in hair cycle initiation.[1] Given its potential influences on the hair cycle, vitamin A supplementation is often seen in oral hair growth supplements. However, no formal studies have proven that oral vitamin A supplementation improves hair loss conditions.[7]

Vitamin A has been used to treat acne vulgaris. The first report of oral vitamin A supplementation for treating acne vulgaris was published in 1943.[8] It is thought that oral vitamin A improves acne by decreasing sebaceous gland activity and inhibiting comedone formation.[9] Studies have shown that low serum vitamin A levels are a risk factor for acne, and oral vitamin A supplementation has improved acne in some.[10] Further, the widely-used prescription retinoids, including isotretinoin, are derived from vitamin A. However, evidence for vitamin A supplementation itself is conflicting. Ozuguz et al found no statistically significant difference in plasma vitamin A levels between acne vulgaris patients and controls.[10] Along with this study, a 12-week research study compared 150,000 IU/d vitamin A versus a placebo and found no difference in acne when assessed by clinicians.[9] As evidence remains conflicting, further studies are needed to determine whether oral supplemental vitamin A is effective in acne management.

While supplementation may ultimately prove ineffective, ensuring it is not harmful remains critical. The dosage of vitamin A in hair supplements is around 5,000 IU. However, studies assessing vitamin A's efficacy range in doses from 36,000 IU to 500,000 IU. Therefore, it is difficult to conclude that these dosages would have any effect on acne.[11] Vitamin A toxicity can occur in both acute and chronic forms. Chronic toxicity has been reported after 4,000 IU/kg taken over six to fifteen months.[8] Toxicity can cause teratogenicity, hyperlipidemia, and hepatotoxicity.[8] It is crucial that consumers are aware of these side effects and are mindful about the dosages they are ingesting and the duration of treatment. Due to the risk of teratogenicity, it is vital that patients taking these oral supplements for acne or hair growth are appropriately educated about the dangers, particularly for women of reproductive age.

Overall, the dosages of oral vitamin A found in hair supplements are relatively low, making it difficult to draw conclusions about their effectiveness.

VITAMIN C

Vitamin C, also known as ascorbic acid, is a water-soluble vitamin. As it is not made by the body, vitamin C must be obtained from the diet, most commonly through fruits and vegetables.[12] Vitamin C plays many roles in the body. It is essential for collagen synthesis and disulfide bond formation, both of which are necessary for hair development.[12] Mouse models show that vitamin C can assist with hair shaft elongation and overall growth by advancing from the telogen phase to the anagen phase by activating Insulin Growth Factor-1 (IGF-1) in dermal papilla cells.[1] Vitamin C supplementation may also be helpful for patients with hair loss secondary to iron deficiency, as vitamin C is important for increasing iron absorption from the gut.[13] Despite its role in hair production, no current data suggests that orally supplemented vitamin C is beneficial in treating hair loss directly.[5] The evidence that links vitamin C with hair loss arises from data on individuals with a vitamin C deficiency, or scurvy. Scurvy can lead to hair follicle abnormalities, corkscrew-shaped hairs, and follicular hyperkeratosis.[13] Despite limited evidence supporting its role, Vitamin C remains a common ingredient in oral hair supplements.

Many forms of vitamin C have been investigated as potential treatments for acne. Topical vitamin C prevents photoaging by blocking Activation Protein-1 (AP-1), a protein responsible for collagen breakdown.[12] Klock et al found that a topical 1% sodium ascorbyl phosphate (SAP), a precursor of vitamin C, has an antibacterial effect on *P. acnes*. When patients were provided 5% SAP lotion for twelve weeks, there was a reduction in both inflammatory and non-inflammatory lesions.[14] However, oral vitamin C produces only a limited elevation in skin concentrations even in high doses.[12] Thus, oral vitamin C may not be the most effective supplementation for optimal skin benefits, and current research on this route remains limited.

Safety of vitamin C is a key consideration. Vitamin C toxicity can cause gastrointestinal discomfort, including diarrhea, nausea, and abdominal cramping.[12] These side effects are due to the high osmotic effect of unabsorbed vitamin C.[13] However, vitamin C does not cause serious adverse events, even when taken at high doses.[12] Therefore, supplementation with vitamin C is generally well tolerated and considered safe. The evidence for the use of oral vitamin C in acne treatment is lacking. Although supplementation appears primarily safe, its efficacy is still unproven for acne and hair loss.

VITAMIN D

Vitamin D is a fat-soluble vitamin acquired through diet and sunlight.[12] The association of low vitamin D in numerous hair pathologies has been studied, including telogen ef-

fluvium, alopecia areata, androgenetic alopecia, and scarring alopecia.[15] In vivo studies using mouse models have shown that knocking out the vitamin D receptor (VDR) results in progressive hair loss, with mice developing hair loss within 3 months and complete hair loss by 8 months.[13] This correlation has also been seen in humans, as patients with mutations in VDR have both body and scalp alopecia.[13] In another study, supplementation with the VDR in VDR-null mice reversed alopecia, supporting its essential role in hair follicle maintenance.[13] VDR expression is active in the hair follicle during the late anagen and catagen phases, thus assisting with the proliferation and differentiation of keratinocytes.[1] Many studies have demonstrated a link between reduced vitamin D levels and hair loss.[15] However, further studies are still needed to confirm these results and support supplementation for treating hair loss.

Numerous studies have investigated the role of vitamin D in acne vulgaris, though results remain inconclusive. El-Hamd et al found low serum levels of 25-hydroxy vitamin D in 90 patients with acne vulgaris. Similarly, Hasamoh et al reported that vitamin D deficiency was not only prevalent among patients with acne vulgaris but also correlated with greater disease severity.[16] This association could be partly explained by the fact that patients with acne experience high levels of emotional stress and may spend less time outdoors, contributing to lower vitamin D levels.[17] Additionally, the observed correlation may reflect the anti-inflammatory effects of vitamin D, which could reduce acne severity.[18] Further supporting this, supplementation with 1000 IU/d of vitamin D for 8 weeks reduced acne inflammatory lesions compared to controls. However, the two groups had no difference in total lesion count or changes to non-inflammatory lesions.[9] Other studies have reported conflicting results, finding no correlation between vitamin D levels and acne. In a cross-sectional study by Tossi et al, there was no statistically significant difference in vitamin D levels between the acne and control groups.[17] Overall, while some evidence suggests a potential link between oral vitamin D supplementation and acne, inconsistent findings limit its clinical application.

The recommended daily intake of vitamin D is 600 IU/day for individuals aged 1-70,[17] and the upper limit of safety has been generally accepted as 4,000 IU/day.[19] However, this remains an area of debate, as some studies have shown higher doses, like 50,000 -100,000 units/week can be safe under surveillance.[19] Therefore, the upper limit of safety may vary depending on numerous factors, including age, sex, baseline vitamin D status and comorbidities.[19] In comparison, many oral hair supplements contain 2,500 IU per daily serving. Vitamin D toxicity is rare. If taken within recommended levels, there should be little concern for adverse events.[20] In fact, vitamin D deficiency is widely prevalent. One study showed that 40% of hospitalized patients were vitamin D deficient in 2011-2012.[13] Vitamin D supplementation should be taken cautiously for patients with some medical conditions, including sarcoidosis, tuberculosis, hyperparathyroidism, and lymphoma.[20] Vitamin D is beneficial for both cardiovascular and bone health, and when taken along with vitamin K2, the two may exhibit synergistic properties.[21] Overall, vitamin D supplementation is safe at appropriate doses for most patients. However, conflicting data regarding its effectiveness in hair loss and acne management highlight the need for further research.

VITAMIN E

Vitamin E is a fat-soluble vitamin with potent antioxidant properties that protect the skin from free radical damage.[5] It can be found in vegetables, nuts, and fortified cereals.[22] Depending on its form, vitamin E can be termed tocotrienols or tocopherols.[13] There has been conflicting literature on the role of vitamin E and hair loss. One study found that fifteen subjects with alopecia areata had lower vitamin E levels when compared to control patients.[5] However, subsequent studies failed to replicate these findings, calling into question whether vitamin E plays a significant role in alopecia areata.[5] It is known that oxidative stress can lead to the development of androgenetic alopecia and alopecia areata.[13] Therefore, while the antioxidant properties of vitamin E suggest a potential role in treatment, existing data remain inconclusive. However, some evidence in the literature supports vitamin E supplementation. Twenty-one patients with unspecified hair loss were supplemented with 50 mg of tocotrienols twice daily for 8 months. At the end of treatment, the experimental group found significant hair growth compared to the placebo.[13] Overall, the role of vitamin E in the treatment of hair loss remains unclear, with mixed findings existing across studies.

Vitamin E has also been studied for its potential role in acne management. Ozuguz et al performed a study in 94 patients with acne vulgaris and found that the acne group, compared to age-matched control groups, had lower levels of vitamin E. These researchers postulated that diet may play a role in acne, as they found patients with acne vulgaris consumed fewer fruits and vegetables, which may have contributed to their lower vitamin E levels.[10] Reduced vegetable and fruit content in the diet may also result in decreased fiber as well as fewer anti-inflammatory, and antioxidant nutrients. Additional support for the use of vitamin E in acne treatment includes its synergistic effect with vitamin A, as together they help regulate keratinization.[10] Vitamin E is also known for its anti-inflammatory properties and has been shown to reduce inflammation in various conditions, including among patients who smoke.[23] Given that acne is an inflammatory condition, these properties could be potentially beneficial. However, not all research has demonstrated a correlation between vitamin E and acne. For example, Tuncez et al did not find a statistical significance of vitamin E levels when comparing 90 patients with acne vulgaris to 30 patients without acne.[23] Although findings are inconsistent, the potential anti-inflammatory role of vitamin E in acne warrants further investigation. Future research is needed to support the efficacy of oral vitamin E supplementation for treating acne.

As with any supplement, it is crucial to understand the risks of supplementation. Overall, the safety profile of vitamin E is good. Human studies have shown that oral vitamin E supplementation, even in doses of 3,200 IU/d, re-

sulted in few side effects.[24] But, vitamin E has been shown to increase the risk of bleeding, decrease thyroid production, and reduce hair growth. It is important to mention that some studies have found excess intake of vitamin E was associated with a slight increased risk of lung cancer in current smokers.[25] As such, vitamin E supplementation may be dangerous in this patient population. Many people in the United States have been found not to meet the recommended daily vitamin E intake.[22] However, given the inconsistent findings regarding its role in hair loss and acne, routine use for this purpose is not currently recommended and warrants further research.

BIOTIN

Biotin, or vitamin B7, is a water-soluble vitamin found in protein, egg yolks, nuts, and milk.[12] It has many metabolic roles, including assisting with gene regulation, cell signaling, fatty acid synthesis, and gluconeogenesis.[12,20] Biotin is often marketed for improving hair, skin, and nails, but studies on its efficacy are mixed. A study conducted in Germany found that biotin supplementation increased cytokeratin expression and promoted differentiation of epidermal cells. Research suggested that these findings could improve the quality of keratin-containing appendages, such as hair, skin, and nails.[12]

Biotin supplementation benefits patients with conditions such as familial uncombable hair syndrome and alopecia secondary to valproic acid treatment, which are associated with reduced biotin levels.[20] However, one review found no improvement in hair growth with biotin supplementation in individuals without a deficiency.[13] Despite this, numerous case reports show the benefits of biotin supplementation in 18 women. Authors conclude that confounding variables exist in these studies, including medications, gastrointestinal disease, and seborrheic dermatitis, all of which could be contributing to hair loss.[13] While biotin supplementation may benefit patients with deficiency-related hair loss, current evidence does not support its routine use in individuals with normal biotin levels.

Studies evaluating the effects of biotin on acne are limited. Tolino et al performed a study comparing the impact of topical salicylic acid-based treatment versus an oral supplement for men and women that contained biotin, probiotics, vitamin E, zinc, and nicotinamide. The results showed that global acne grading scores in both genders improved after twelve weeks of treatment.[11,26] However, as this study included multiple ingredients, it is impossible to determine which component contributed to the improvement in acne. Some claim that biotin can decrease dry skin associated with isotretinoin use in acne patients.[26] Anecdotal reports suggest that biotin may worsen acne by decreasing vitamin B5 levels and increasing hyperkeratinization.[27] However, no formal research has been conducted to support this theory. Therefore, biotin's role in managing acne is yet to be fully assessed.

Biotin has an overall good safety profile. Toxicity is rare, and there is no dosage of concern.[12] The daily recommended intake is 30 micrograms in adults, and most people receive an adequate amount of biotin in a healthy and balanced diet.[20] However, caution should be taken when undergoing specific lab tests, as biotin can impact immunoassay tests, leading to improper results of troponin, thyroid-stimulating hormones, and others.[20] Therefore, sharing all medications, including supplements, with healthcare providers is critical. Overall, biotin shows mixed results for both hair growth and acne management. Therefore, further research is needed to better understand its efficacy in these areas.

IODINE

Iodine is an essential nutrient for the body, playing an important role in the production of thyroid hormone.[28] Hypothyroidism is a well-recognized contributor to hair loss, and this relationship has been investigated in many studies. Sheep fed a diet deficient in iodine were noted to develop thyroid goiters, which led to dry, brittle hair and diffuse alopecia.[28] This relationship has similarly been investigated in human populations. In 1972, Freinkel published a paper that found patients with hypothyroidism had increased hair in the telogen phase. After hormone supplementation, the telogen-anagen relationship was restored.[29] However, iodine itself has not been directly studied for a role in hair loss beyond its established effects on thyroid function. Therefore, insufficient evidence supports its direct use as a treatment for hair loss.

Iodine has a known causal link to acne, triggering new eruptions or worsening preexisting acne.[30] Excess iodine consumption is believed to lead to sudden acneiform eruptions characterized by numerous pustules distributed across the upper trunk and face.[30,31] In 1928, it was reported that seven females developed acneiform eruptions after using iodized salt, with onset ranging from six weeks to one year of consumption.[32] Iodine is present in various foods, including dairy products and seaweed. Dairy consumption is often associated with the exacerbation of acne, a link some researchers attribute to the high iodine content of milk.[31] There have also been reports of acneiform eruptions in patients after ingesting kelp dietary supplements, which are rich in iodine, that resolved after discontinuing the supplement.[30] Overall, there seems to be a link between iodine intake and acne. As a result, supplementation with hair vitamins that contain iodine may exacerbate acne in some individuals.

Iodine deficiency was widely prevalent until public health initiatives began to supplement iodine in salt to decrease worldwide iodine deficiency.[33] This supplementation has been widely studied, and most agree that benefits outweigh risks. Iodine is crucial in the diet, and exposure to high amounts of iodine is well tolerated. However, iodine can contribute to thyroid dysfunction in certain individuals. Most commonly, excessive iodine ingestion may cause hyperthyroidism, particularly in older patients with autonomous nodular goiters, following rapid or sudden increases in iodine ingestion.[34] Studies provide conflicting evidence regarding the use of iodine for hair growth, but demonstrate its potential to worsen acne. Therefore, patients with acne should be aware of these possible side effects.

ZINC

Zinc is a metal ion that plays a role in structural and regulatory properties.[20] It can assist in hair follicle recovery by inhibiting endonuclease activity, thus preventing hair follicle regression.[35] Zinc deficiency has been associated with alopecia, and patients with zinc deficiency had reversal of their alopecia after proper supplementation.[5] In a study of 312 patients with a diverse array of hair loss pathologies, including alopecia areata, male and female pattern hair loss, and telogen effluvium, the hair loss group was found to have significantly lower serum zinc levels when compared to 30 healthy controls.[36] These findings were replicated in a study by Abdel Fattah et al, which included 50 patients with alopecia areata. Patients in this study were found to have lower serum zinc levels compared to 50 healthy controls. Furthermore, zinc levels were lower in resistant alopecia areata than in those with newly diagnosed alopecia areata, demonstrating an inverse correlation between zinc levels and alopecia areata severity.[37] Zinc exhibits anti-androgen effects through inhibition of 5α-reductase. This mechanism may help explain the potential benefits of zinc supplementation in patients with androgenetic alopecia.[38] When compared to standard treatment of 5% minoxidil lotion in patients with androgenetic alopecia, zinc was less effective but still provided hair growth.[38] Zinc appears to support hair health, but additional research is warranted to best understand its therapeutic potential.

Studies evaluating zinc supplementation for acne have shown mixed findings. In 1977, Fitzherbert found that patients treated with zinc supplementation for acrodermatitis enteropathica also experienced improvements in their acne.[39] Since this discovery, many studies have investigated the role of zinc in acne treatment. Zinc is thought to have various anti-acne mechanisms, including inhibiting pro-inflammatory pathways through suppression of TNF alpha, toll-like receptors, and IL-6, inhibiting *P. acnes* growth, and reducing 5α-reductase, which lowers DHT levels and sebaceous gland activity.[39]

Topical zinc has been shown to decrease mean acne pustules compared to controls. In contrast, oral zinc supplementation had no effect.[40] In a study by Cunliffe et al, oral tetracycline was compared to oral zinc sulfate. Zinc supplementation reduced pustule count only, while tetracycline improved all clinical endpoints.[39] Michaelsson et al evaluated oral zinc sulfate alone and in combination with vitamin A versus placebo in patients with acne vulgaris. After twelve weeks, both zinc groups showed reduced comedones, pustules, and papules, with no significant difference between zinc alone and the combination treatment.[41] Overall, many studies have assessed the efficacy of topical or oral zinc for treatment in acne vulgaris, though results remain mixed. Only approximately half the studies have shown zinc to be beneficial in treatment.[9] Therefore, the wide range of results highlights the need for updated studies before definitive conclusions can be drawn.

Side effects from zinc are mainly gastrointestinal, including nausea, vomiting, and stomach cramps. The recommended daily intake of zinc for adults is 15 mg/d.[38] Zinc can impair copper absorption status and due to these effects of copper homeostasis, the tolerable upper intake level of zinc is 40 mg daily.[42] It is important to note that zinc studies with higher doses were the ones that found it to be beneficial in treating acne.[9] Higher doses may carry an increased risk of side effects, so it is essential to exercise caution. In addition, the bioavailability of zinc varies depending on the type of zinc salt formulation, with zinc glycinate and zinc gluconate being best absorbed.[42] Zinc has a favorable safety profile and is inexpensive; however, with some supporting evidence for its use in hair loss and acne treatment, further research is needed to clarify its efficacy, given its mixed results.[39]

SELENIUM

Selenium is a trace element with antioxidant and anti-inflammatory properties, found in Brazil nuts, fish, and other sources.[7] Hair loss has been observed in selenium-deficient rats, including those with knockout genes of selenium-dependent cofactors.[13] Selenium is important in producing thyroid hormone, and low selenium levels can lead to hypothyroidism.[43] A study on adult sheep with hypothyroidism, brittle hair, and alopecia found reduced serum and liver levels of selenium and zinc.[28] Additionally, children on total parenteral nutrition were found to have a loss of pigmentation in their hair and skin. They were later found to have low selenium levels in these tissues.[13] One clinical trial administered selenium supplementation to patients undergoing chemotherapy for ovarian cancer. The researchers observed reduced hair loss in the group receiving selenium compared to controls.[5] Therefore, selenium supplementation may be beneficial in addressing hair loss secondary to thyroid dysfunction, but its role in promoting hair growth in other contexts remains unclear.

Selenium has been shown to regulate sebum production in the skin.[44] It is often used in collaboration with zinc and vitamin E, as all have antioxidant properties. Antioxidants may be beneficial in acne treatment by reducing inflammation. However, limited research evaluates selenium alone. Therefore, no specific conclusions can be drawn on its benefits for supplementation in acne.

With this uncertainty, safety considerations are crucial when evaluating selenium supplementation. The recommended daily selenium intake is 55 micrograms for people aged 14 and older. However, diet often is rich in selenium, and it was found that the average daily intake of selenium was 108.5 micrograms.[13] Toxic levels approach 400 micrograms daily and have been reported.[5] In one reported case, a mislabeled dietary supplement led a patient to consume 200 times the labeled amount of selenium, resulting in hair loss.[5] In patients with selenium toxicity, 72% of patients experienced hair loss that ranged from 10 to 100% of their scalp hair.[13] While selenium may support hair health in the context of deficiency, there is evidence that toxicity can lead to hair loss. Therefore, it is important to pay close attention to intake levels. Further research is needed to identify if selenium has a role in acne management.

PROBIOTICS AND POSTBIOTICS

The skin microbiome plays an important role in regulating cutaneous homeostasis, and a diverse, balanced microbiome promotes overall skin health.[45] Probiotics are live microorganisms, often found in fermented foods, which metabolize prebiotics and create bioactive compounds known as postbiotics. These compounds include short-chain fatty acids, enzymes, and lipopolysaccharides, which enhance host immunity and reduce inflammation.[46] Dysbiosis of the cutaneous microbiome has been related to numerous dermatologic conditions, including both acne and hair loss.[45]

Lactobacillus plantarum, a probiotic found in kimchi, was studied by Kim et al in a 12-week study of 28 patients with mild to moderate acne vulgaris. Supplementation was associated with a greater percent reduction in inflammatory lesion count and acne grade compared to controls.[9,47] Additionally, dysbiosis of the scalp has been implicated in the pathogenesis of alopecia. In animal models, supplementation with the probiotic *Lactobacillus reuteri* resulted in increased proportion of hairs in the anagen phase and increase subcuticular hair follicles.[48]

Current research on postbiotics in dermatologic conditions is limited, but interest continues to expand. Notably, both probiotics and postbiotics were absent from the oral supplements reviewed in this analysis. Given the evidence supporting microbiome modulation in dermatologic conditions, this is an emerging area of interests for physicians and consumers alike. (See Table 2.)

CONCLUSION

There has been a rising trend in the use of oral supplements for the treatment of many dermatologic conditions, including hair growth and acne management. As many of these supplements have similar ingredients, it is of interest to see if one supplement can be beneficial for multiple conditions. Overall, we found mixed evidence for many of the listed ingredients in both hair and acne treatment. Vitamins A, C, D, E, biotin, zinc, and selenium show mixed results on their effectiveness in both hair growth and acne treatment. While iodine may promote hair growth through thyroid support, evidence shows possible worsening of acne. As a result, patients using these oral supplements could experience variable effects on acne outcomes. Therefore, it is important to understand the ingredients in these supplements, as they carry the potential for side effects and toxicity. The current limited evidence suggests that one oral supplement is *not* universally beneficial, as some compounds may improve one dermatologic condition yet negatively impact another. Management should be instead individualized and patient-centered, with open and honest discussions on how specific ingredients may be beneficial or harmful for a given patient. While nutrition and dermatology are closely interrelated, further research is needed before oral supplements can confidently be recommended for treating multiple dermatologic conditions.

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