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Drugs and other substances aggravating acne vulgaris

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ABSTRACT

Introduction and Purpose

This review explores several factors exacerbating acne, including the supplementation of vitamins B6 and B12, the impact of red ginseng oil, dairy and whey product consumption, iodine association, anabolic-androgenic steroids, alcohol abuse, and the influence of progestin contraceptives.

Material and methods

This review is based on articles from the PubMed database, covering the years 2018-2023, using keywords: acne vulgaris, acne vulgaris aggravation, substances aggravating acne vulgaris.

Results

High doses of B6 and B12 have been reported to worsen acne, potentially linked to their prolonged use. Red ginseng oil, believed to have numerous health benefits, may exacerbate acne symptoms by increasing inflammatory biomarkers. Dairy consumption, specifically casein and whey proteins, is associated with increased insulin-like growth factor 1, contributing to acne aggravation. Iodine has been extensively linked to acneiform eruptions, and its correlation with dairy consumption is hypothesized. Anabolic-androgenic steroids, found in muscle-building supplements elevate sebum production and may cause acne fulminans. Alcohol abuse further intensifies acne symptoms by impacting testosterone levels, promoting proinflammatory cytokine production, and altering the skin microbiome. Progestin contraceptives, particularly levonorgestrel and etonorgestrel, exhibit androgenic properties that may increase sebum production and potentially aggravate acne.

Conclusions

Understanding and identifying these exacerbating factors are crucial for healthcare providers to enhance anti-acne therapy outcomes, emphasizing the importance of not only treating but also preventing the escalation of acne manifestations in patients.

Key words: acne vulgaris, acne

Introduction

Acne vulgaris is a chronic inflammatory disease affecting the pilosebaceous unit. Its causes involve multiple factors. Traditional, well-known factors include abnormal growth of keratinocytes, changes in sebum production, inflammation within the sebaceous follicles, and the presence of *Cutibacterium acnes* colonization. [1] Additional factors contributing to acne encompass genetics, hormones, mechanical stimuli (friction, rubbing, picking, squeezing), specific medications (like corticosteroids), and the use of skincare products and cosmetics. [2] Acne patients typically display symptoms such as comedones, papules, and pustules. Additionally, observable signs like scars, erythema, and hyperpigmentation may also be present in individuals with acne. Acne vulgaris affects any aspects of patients' lives. Not only does it influence their look, but also has impact on their self-esteem, social and professional life, mental health and last but not least their budget as acne treatment may be expensive. [3] That's why we should pay significant attention to identifying medications and substances that aggravate the symptoms of acne vulgaris, not only to treat but also to prevent the escalation of its manifestations in patients.

Vitamin B6 and B12

The supplementation of high doses of vitamins B6 and B12 has been reported to exacerbate already diagnosed acne. Not only, oral intake of vitamin B12, but also vitamin B12 intramuscular injections may cause aggravation of acne vulgaris. The factor that exacerbates acne can be both doses exceeding the patient's daily requirement for these vitamins and the prolonged use of these supplements. The mechanism of B6- and B12-induced acne is unclear. There are a few theories explaining its pathogenesis. One of them says that metabolism of *Propionibacterium acnes* depends on vitamin B12. Another one says that continuous excretion of B12 could irritate the follicular epithelium, leading to inflammation. [4]

On the other hand, B vitamins, specifically vitamin B1, B2, B3, B5, B6, and B7, have proven to be beneficial in the treatment of acne vulgaris. Their effectiveness lies primarily in inhibiting sebum secretion and reducing the colonization of *Cutibacterium acnes*. A study involving 41 individuals with acne vulgaris demonstrated that a 12-week supplementation with pantothenic acid (two tablets twice a day, totaling 4.4 g of the substance) not only led to a reduction in inflammation but also resulted in an improvement in the Dermatology Life Quality Index. [13] These results indicate that it is crucial to properly adjust the dosage of B-group vitamins to prevent exacerbation of acne due to overconsumption.

Red ginseng oil

In some Asian countries ginseng is believed to be a panacea for multiple diseases. This is why recently more and more attention is being paid to essential oils extracted from various herbs and plants. Red ginseng oil has demonstrated antibacterial and anti-inflammatory activities, which is why some researchers studied the impact of red ginseng oil on cultured cells relevant to acne. The study showed that red ginseng oil causes increased expression of inflammatory biomarkers, therefore it should be considered one of the exacerbating factors in acne, and it is advisable to discontinue its use in patients with this condition. [5]

Dairy and whey products

There are studies confirming a connection between the consumption of dairy and the exacerbation of acne. This may be attributed to both casein, present in milk, and whey proteins responsible for the insulinotropic effects of milk. Research indicates that casein leads to an increase in insulin-like growth factor 1 (IGF-1), and studies show that insulin-like growth factor 1 (IGF-1) promotes the proliferation and differentiation of sebaceous cells and IL-1 β . This may contribute to the aggravation of acne. [6, 7]

Iodine

The association between iodine and acne is extensively documented. Iodine has the capability to generate acneiform eruptions and worsen pre-existing acne. There has even been a hypothesis suggesting that the potential correlation between acne and dairy consumption in certain individuals might be connected to the iodine content present in milk. This iodine originates from animal feed containing iodine and sanitizing solutions used in milking. [4]

Anabolic-androgenic steroids

Anabolic-androgenic steroids, being synthetic exogenous derivatives of testosterone, lead to the growth of sebaceous glands. This enlargement results in heightened sebum production, creating a conducive environment for the proliferation of *Cutibacterium acnes*. Regrettably, even when bodybuilders are not directly misusing steroids, these substances may be found in specific dietary supplements used for muscle building. Some researchers revealed that 89.1% of "muscle-building supplements" were tainted with steroid-like ingredients or synthetic steroids. It's also worth noting that supplementing with the aforementioned vitamins B6 and B12, when

using anabolic-androgenic steroids, additionally contributes to the worsening of acne symptoms.

In addition, not only can anabolic-androgenic steroids aggravate acne vulgaris, but they can also cause acne fulminans including its systemic symptoms like fatigue, musculoskeletal pain, lymphadenopathy and fever. [4, 8]

Alcohol

People suffering from acne vulgaris are more likely to abuse alcohol due to the negative impact of acne on many aspects of their life. Alcohol has been demonstrated to elevate testosterone levels and promote the production of proinflammatory cytokines. Moreover, in the long term, it suppresses the immune system, facilitating bacterial proliferation that alters the skin microbiome and worsens acne. When excreted through sweat, alcohol serves as a nutrient for *C. acnes*. [1, 3]

Progestin contraceptives

There are multiple studies confirming that levonorgestrel and etonorgestrel exhibit androgenic properties. Hence, their systemic impact could influence the sebaceous glands to produce more sebum, potentially aggravating acne. [9]

The researchers have observed that intrauterine devices containing levonorgestrel, subcutaneous etonorgestrel, levonorgestrel implants, and progestin-only long-acting methods may have an adverse impact on acne or potentially initiate acne in predisposed females. In a prospective study, 10% of 80 women using subcutaneous implants with etonorgestrel developed acne. Another multicenter, randomized, controlled study comparing subcutaneous implants with etonorgestrel or levonorgestrel to copper intrauterine devices revealed a heightened occurrence of acne in the group with implants. [10]

Drugs

Some medications can exacerbate acne. These include primarily anabolic steroids, glucocorticoids, ACTH, antiepileptic drugs – especially phenytoin and valproate, antidepressants, antituberculosis drugs, halogens, vitamin B12, and barbiturates. [11, 12]

Conclusion

Acne vulgaris is a chronic condition, often challenging to cure. As mentioned earlier, it affects various aspects of patients' lives, diminishing its quality. Therefore, besides selecting appropriate treatment, physicians should be adept at correctly identifying potential exacerbating factors in a patient's condition and promptly eliminating them to maximize the positive impact of anti-acne therapy. As evident in the above article, substances exacerbating acne include not only well-known factors such as alcohol or anabolic-androgenic steroids but also certain vitamins, which most patients might associate with a generally positive impact on health.

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