



ACNE VULGARIS: AN UPDATED NARRATIVE REVIEW OF ETIOLOGY AND PATHOGENESIS

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ABSTRACT

Acne vulgaris is a prevalent inflammatory skin disorder affecting adolescents and young adults. It is characterized by comedones, papules, pustules, and nodules, commonly found on the face, neck, chest, and back. Acne often starts during preadolescence and typically resolves in the third decade of life, but it can persist into adulthood. The pathogenesis involves androgen-mediated sebaceous gland stimulation, dysbiosis within the skin microbiome, and immune responses. Various factors contribute to acne, including genetics, skin trauma, diet, stress, and body mass index. Treatment options include topical retinoids, benzoyl peroxide, antibiotics, oral contraceptives (for females), and oral isotretinoin for severe cases. Complementary treatments like chemical peels and light/laser therapies may also help. Individualized treatment plans and patient adherence are essential for successful management.

KEYWORDS : Acne vulgaris, Comedones, Topical medications, Oral isotretinoin

INTRODUCTION

Acne vulgaris is a common skin disorder characterized by chronic or recurrent development of papules, pustules, or nodules on the face, neck, trunk, or proximal upper limbs. Its pathogenesis involves multiple factors leading to comedone formation and inflammation. Although most prevalent among teenagers and young adults, acne can affect various age groups. Skin involvement ranges from mild to severe, with potential complications of hyperpigmentation, scarring, and negative psychosocial effects. This introduction explores the pathogenesis, clinical manifestations, and diagnosis of acne vulgaris, while its treatment will be discussed separately (1).

METHODS

The search strategy for the narrative review article on acne vulgaris involves a comprehensive exploration of various electronic databases. Firstly, databases like PubMed, Embase, and Web of Science will be searched using relevant Medical Subject Headings (MeSH) terms and keywords, such as "acne vulgaris," "pathogenesis," "clinical manifestations," and "treatment." Boolean operators (AND, OR, NOT) will be utilized to combine the terms effectively. Secondly, the search will include filters for full-text availability, publication date, and language (English). Thirdly, reference lists of relevant articles and reviews will be manually examined to identify potential additional sources. Grey literature, conference proceedings, and institutional repositories will also be searched to ensure a comprehensive approach.

decreases with age. A survey of over 1000 adults in the United States found self-reported acne rates of 43% and 51% in men and women, respectively, aged 20 to 29 years. For those aged 30 to 39 years, the rates were 20% and 35%, respectively, and for those aged 40 to 49 years, 12% and 26%, respectively. In individuals over 50 years old, the rates were 7% and 15%, respectively. It is important to note that studies using clinical examination generally find a lower prevalence compared to self-reported acne surveys (2,3).

Pathogenesis

Acne vulgaris is an inflammatory disorder of the pilosebaceous unit, composed of the hair follicle and sebaceous gland. Its pathogenesis involves a complex interplay of host factors, including androgen-mediated sebaceous gland stimulation, dysbiosis within the pilosebaceous follicle microbiome, and innate and cellular immune responses, potentially influenced by genetics and diet. Lesion development starts with microcomedone formation, considered the precursor of clinical acne lesions such as closed comedones ("whiteheads"), open comedones ("blackheads"), papules, pustules, and inflammatory nodules. Androgens play a significant role, stimulating sebaceous gland growth and sebum secretion, providing a growth medium for *Cutibacterium acnes* (*C. acnes*). The interplay of these factors leads to acne pathogenesis, with inflammation being a key contributor, partly mediated by *C. acnes*' ability to trigger immune responses. Genetics also plays a role, as individuals with affected first-degree relatives have a higher risk of developing acne (4).

Associated Factors

Proposed contributing factors for acne include skin trauma, dietary habits, stress, insulin resistance, and body mass index (BMI) (5).

Skin Trauma: Repetitive mechanical trauma caused by rubbing the affected skin with soaps, detergents, astringents, or other agents can worsen acne by breaking comedones and promoting the development of inflammatory lesions (6).

Diet: The role of diet in acne is an evolving concept. Several studies suggest an association between acne and increased milk consumption and high glycemic load diets. This association is thought to be related to increased insulin-like growth factor (IGF) levels resulting from dairy product consumption or high glycemic load diets, along with natural hormonal components or other bioactive molecules in milk (6).

Stress: Psychological stress is often proposed as a potential exacerbating factor for acne. Some studies have found an

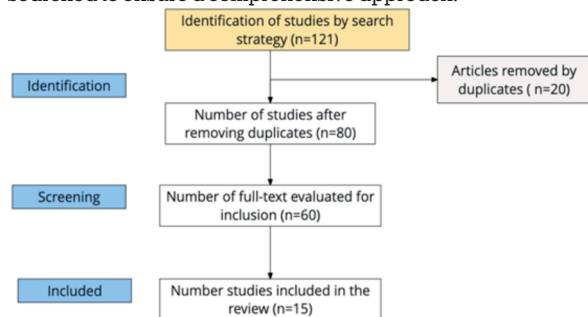


Figure 1. PRISMA.

Epidemiology

Acne vulgaris is common and occurs most frequently in adolescents and young adults. Prevalence estimates for acne vulgaris in teenagers range from 35 to 90 percent. Acne often starts during preadolescence, between 7 and 12 years, and typically resolves in the third decade of life. However, it can persist into adulthood or develop anew in adults. Adolescent acne is more common in males, while post-adolescent acne predominantly affects females. The prevalence of acne

association between stress and increased acne severity, particularly during high-stress periods (7).

Body Mass Index (BMI): Studies evaluating the relationship between acne vulgaris and weight have yielded varied results. Some studies found an inverse relationship between excess weight and acne, while others found a correlation between low BMI and reduced risk of moderate to severe acne. A large population-based study reported a decreasing risk of acne with increasing BMI, with a lower risk observed in severely obese individuals. However, other studies found a correlation between low BMI and reduced risk of moderate to severe acne, particularly among men. Another cross-sectional study found an association between increased BMI and increased acne risk among women (8).

Clinical Manifestations

Acne vulgaris presents classic characteristics with a typical distribution in areas of the body containing large sebaceous glands responsive to hormones, such as the face, neck, chest, upper back, and upper arms. Various types of active lesions may be present, including closed comedones (non-inflammatory, <5 mm, dome-shaped), open comedones (non-inflammatory papules with a dilated follicular opening), papulopustular acne (inflamed and relatively superficial papules and pustules), and nodular acne (large, inflamed, and painful papules or nodules). It is important to note that true cysts are rare, and the term "cystic acne" is incorrect (9).

The severity of acne varies widely, ranging from a few small comedones to the chronic presence of numerous inflamed nodules affecting most of the skin in an area. The extent and severity depend on patient characteristics and presentation. Pre-adolescents and young adolescents often have comedonal acne in the T-zone, while adult women may present with acne on the lower face and neck, often associated with premenstrual flares (9).

Diagnosis and Evaluation

Acne vulgaris is primarily diagnosed through a physical examination as no specific lab tests confirm it. Laboratory or radiological assessments are limited to cases where clinical evaluation suggests underlying hyperandrogenism or other specific conditions. Patient history is vital, helping identify triggers like drug-induced acne or conditions requiring further evaluation (e.g., hyperandrogenism, SAPHO, fulminant acne). Useful data to collect includes age of onset, medication history, menstrual patterns in females, medical and family history of acne, signs of virilization, joint/bone symptoms in severe acne, skincare routine, past and current treatments, and the psychological impact (10).

During the physical examination, clinicians recognize characteristic lesions such as closed comedones, open comedones, inflamed papules, pustules, and inflamed nodules. These lesions typically appear on the face, chest, shoulders, upper back, or upper arms. Identifying comedones with or without other types of lesions strongly supports the diagnosis. Additionally, acne lesions are usually in various stages of development and resolution, contrasting drug-induced acne, which often displays acute monomorphic lesions. Fungal folliculitis, a condition in the differential diagnosis of acne vulgaris, also tends to present with monomorphic inflammatory lesions (10).

For the vast majority of patients with acne vulgaris, laboratory tests and radiological imaging are not indicated. However, testing may be recommended for patients showing signs of associated diseases or fulminant acne. Patients with signs of hyperandrogenism may require evaluation for conditions like polycystic ovary syndrome, congenital adrenal hyperplasia, or adrenal or ovarian tumors. Initial test results indicating

abnormalities may prompt referral to endocrinology, gynecology, or other specialists as necessary (11).

General Treatment of Acne Vulgaris

Acne vulgaris is a common and distressing skin condition affecting adolescents and adults. The treatment of acne is multifaceted, and the choice of therapy depends on the severity of the condition and individual patient characteristics. There are several medications available with strong evidence of efficacy in managing acne (11).

Topical Medications

Topical retinoids: These derivatives of vitamin A are effective in reducing comedones and preventing new acne lesions. They also possess anti-inflammatory properties.

Benzoyl peroxide: It has potent antimicrobial effects and helps to reduce sebum production.

Topical antibiotics: Clindamycin and erythromycin are commonly used to target *Cutibacterium acnes*, the bacterium associated with acne development (12).

Systemic Medications

Oral antibiotics: Tetracyclines, such as doxycycline and minocycline, are prescribed for moderate to severe acne and reduce inflammation and bacterial growth.

Oral contraceptives: For females with hormonal acne, combination oral contraceptives can be beneficial due to their anti-androgenic effects.

Oral isotretinoin: Reserved for severe, nodulocystic acne, isotretinoin is highly effective in reducing sebum production and preventing acne recurrence (13).

Complementary Treatments

Chemical peels: Used to exfoliate the skin and reduce acne lesions.

Light and laser therapies: Can help reduce inflammation and bacterial growth in some cases.

It is essential to have a comprehensive evaluation by a dermatologist before initiating any treatment. The severity of acne, presence of scarring, and individual patient factors guide the treatment approach. Combination therapy, such as using topical medications with systemic antibiotics or oral contraceptives, may be necessary for optimal results (14).

Adherence to treatment and patience are crucial as acne improvement may take several weeks to months. Potential side effects and risks associated with each medication should be discussed with the patient. Acne treatment should be individualized and continuously reassessed to achieve the best outcomes for patients suffering from this skin condition (15).

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