Review Article
IASR Journal of Medical and Pharmaceutical Science
Website: https://iasrpublication.com/ijmps
ISSN(*online*): 2582-9343

Acne Vulgaris: Chronic Inflammatory Disease: A Review

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A B S T R A C T
In contrast to how it is commonly understood, acne vulgaris (AV), which affects the pilosebaceous unit, which includes the hair follicle, hair shaft, and sebaceous gland, is a chronic inflammatory illness. It is one of the most prevalent dermatological conditions in the world. Disrupted sebaceous gland activity associated with hyperseborrhea (increased sebum production) and changes in sebum fatty acid composition, dysregulation of the hormone microenvironment, interaction with neuropeptides, follicular hyperkeratinization, induction of inflammation, and dysfunction of the innate and adaptive immune systems are just a few of the major mechanisms involved in the development of acne. Lesion counting and photographic techniques are used to grade acne lesions. The execution and comparability of randomised controlled clinical trials are hampered by the lack of agreement on the precise grading standards. Successful management of modifiable risk factors, such as underlying systemic disorders and lifestyle choices, is essential for acne prevention. Although there are many therapies, there is not enough information in the guidelines to provide recommendations that are supported by evidence. Additionally, the complicated combination medication regimens needed to address many parts of acne pathogenesis result in low adherence, which compromises the effectiveness of treatment. Scarring from acne is a typical side effect, and it lowers patients' quality of life. We will be better able to improve the outcomes for acne patients if new therapy options target the early processes involved in acne development as opposed to reducing the impacts of end products.

Keywords*:* *Acne Vulgaris, Chronic Inflammatory Disease, Acne Lesions.*

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INTRODUCTION:
Acne vulgaris (AV) is a condition of the pilosebaceous unit that results in noninflammatory lesions, such as open and closed comedones, inflammatory lesions, such as papules, pustules, and nodules, as well as scarring of varied degrees. AV is a condition that affects a large percentage of adolescents and has a lifetime prevalence of about 85%. [1]AV can linger into adulthood, with a prevalence rate of 50.9% for acne in women between the ages of 20 and 29 compared to 26.3% for women between the ages of 40 and 49. [2] Two thirds of all dermatology office visits for acne are from female patients, and one third of these visits are from women older than 25 years old. [3] Acne causes severe morbidity, including psychological problems including low self-esteem, sadness, and anxiety, as well as persistent scarring, which has a detrimental effect on quality of life. [4-6] 8.8% of acne patients reported depression in one epidemiologic study by Yentzer et al. (2010) [3], with women experiencing depression twice as frequently as men (10.6% vs. 5.3%), however this was unrelated to the severity of the acne.

SYMPTOMS:
Acne vulgaris (or simply acne) is characterized by [7] :

- areas of seborrhea (scaly red skin),
- comedones (blackheads and whiteheads),
- papules (pinheads), nodules (large papules),
- pimples and ultimately scarring.

Other symptoms may include pain, tenderness or erythema depending upon the severity of disease.
Acne vulgaris most typically doesn't have any systemic signs. Acne fulminans is a term used to describe severe acne with accompanying systemic signs and symptoms, such as fever. Acne conglobata refers to severe acne that has many

comedones but no overall systemic signs. This severe kind of acne frequently leaves unsightly scars after healing. Additionally, acne might have psychological effects based on the disease's grade or severity. [8]

CAUSES OF ACNE:

Acne appear mostly in young people due to several factors [9]

- **Hormonal imbalances** (overproduction of the male sexhormones)
- Acne can also be brought on by puberty and menstruation. The expansion of the follicular glands and an increase in sebum production are both caused by an increase in androgen levels throughout puberty [10, 11]. Similar effects are produced by anabolic steroids [12]. Numerous hormones, such as the androgens testosterone, dihydrotestosterone, dehydroepiandrosteronesulfate, and insulin-like growth factor 1, are associated with acne (IGF-I). Acne vulgaris formation in later years is rare, but rosacea incidence will rise and older age groups will experience more of this condition's symptoms. Adult women's acne vulgaris may be brought on by an underlying illness like pregnancy, Cushing's syndrome, hirsutism, or polycystic ovary syndrome. Menopause-related acne, also known as acneclimacterica, develops when the anti-acne ovarian hormones estradiol and progesterone are produced, which allows the acne-causing hormone testosterone to continue to have an impact.
- **Bacterial infection:**
  Acne is mostly brought on by the anaerobic bacterium Propioni bacterium acnes (P.acnes). Since only the Propioni bacterium acnes colonises normal pores, Staphylococcus aureus has been found to be crucial [13]. Long-term acne issues and normal skin health are also related to particular clonal substrains of P. acnes. These strains are able to alter the aberrant cycle of inflammation, oil production, and insufficient sloughing activities of acne pores, perpetuating or adapting to it. One particularly dangerous strain of the Propioni bacterium acnes has been going across Europe for at least 87 years [14]. In vitro antibiotic resistance to P. acnes has been steadily rising [15].
- **Heredity or genetics**
  The genetics of acne susceptibility is polygenic as the disease does not follow classic Mendelian inheritance pattern.
- Consumption of certain drugs (including androgens and Barbiturates) Drugs like Phenytoin, Isoniazid, Phenobarbital, Lithium, Ethionamide, Steroids, Azathioprine, Quinine and Rifampin causes acne.[16]
- **Exposure to environmental irritants** (such as pollution and High humidity) It includes various factors like High-humidity, Prolonged sweating, Increase in skin hydration, Exposure to dirt or vaporized cooking oil or certain chemicals like petroleum derivatives.
- Stress
- Cosmetic application
- Hard scrubbing of the skin

Increase in hormonal activity especially during puberty, may cause the formation of acne. The most important cause attributed is infections due to Propionibacterium acnes (P.acnes), the anaerobic bacterium species.[1]

DIAGNOSIS AND EVALUATION

The amount and shape of the lesions are typically used to make the diagnosis of AV. Their morphologies can either be open (blackheads) or closed (whiteheads), non-inflammatory comedones, or inflammatory lesions (papules, pustules, cysts, or nodules).

The severity of AV was divided by the American Academy of Dermatology (AAD) into mild, moderate, and severe. Mild AV is defined by the absence of nodules and the presence of a few to several papules and pustules. Numerous papules, pustules, and a few nodules are seen in moderate AV. Numerous or extensive papules, pustules, and multiple nodules are features of severe AV. [17]

DIFFERENTIAL DIAGNOSIS

There are many possible diagnoses for AV, including (1) acne rosacea, which is frequently seen in middle age or later in life, (2) pityro sporum folliculitis, which is more prevalent on the trunk, (3) milia, which is a small non-follicular keratin papule that may be mistaken for whiteheads, and (4) boils, which frequently present with pustular lesions similar to acne. [18]

MEDICATION: TOPICAL THERAPIES

For people with mild-to-moderate acne, topical therapy are one of the standard treatments. [19] These topical medications are available without a prescription and over-the-counter. In more recent times, a number of topical therapeutic combinations have been created to treat acne patients. The amount of agent applied, the surface area of the application, the length of the application time, the frequency of the application, the application to broken skin or erosions, the choice of vehicle used, and the thickness of the stratum corneum are just a few of the variables that affect how well topical therapies are absorbed. [20] Benzoyl peroxide (BP), salicylic acid (SA), antibiotic drugs, BP combined with

antibiotic drugs, retinoid drugs, retinoid with antibiotic drugs, azelaic acid, and sulfone agents are some of the topical treatments for acne that are frequently utilised. [21]

BENZOYL PEROXIDE

Acne patients frequently utilise BP, which comes in a variety of formulations and strengths (2.5-10%). (cream, gel, wash, foam, aqueous gel, leave-on, and wash-off). BP is an anti-inflammatory, comedolytic, keratolytic, and antibacterial drug. By producing reactive oxygen radicals, BP is bactericidal primarily against P. acnes and does not cause resistance. [22] The inclusion of BP to antibiotic therapy improves outcomes and may slow the emergence of antibiotic resistance. [21] Topical BP may be used 1 to 3 times per day, as tolerated, in a variety of formulations.

SALICYLIC ACID

A comedolytic drug known as salicylic acid is sold over-the-counter in concentrations ranging from 0.5 to 2% in both wash-off and leave-on preparations. Patients generally tolerate SA well, although its effectiveness in treating acne is only moderate. [23] The two most popular over-the-counter, topical acne treatments, BP and SA, are frequently combined. SA can be used up to three times per day, as tolerated. SA receives a C from the FDA for pregnancy.

TOPICAL ANTIBIOTIC MEDICATIONS

It is believed that topical antibiotics build up in the follicle and function through both anti-inflammatory and antibacterial actions. [24] Monotherapy using topical antibiotics for the treatment of acne is not advised due to rising antibiotic resistance. The ideal way to utilise topical antibiotic medicines is in conjunction with BP. [21] The two most common topical antibiotic drugs are erythromycin and clindamycin.

TOPICAL CLINDAMYCIN

Clindamycin is available in a gel, lotion, pledget, or topical solution and has been assigned FDA pregnancy category B. The clindamycin 1% solution or gel is currently the preferred topical antibiotic medication.[25] The recommended dosing is an application of a thin layer once daily.

TOPICAL ERYTHROMYCIN

It is possible to get erythromycin as a gel, solution, ointment, pledget, or thin film. FDA category B refers to both erythromycin formulations for topical and oral use. Due to P. acnes resistance, topical erythromycin is less effective than clindamycin in treating acne in patients. [23-28] Erythromycin 3% plus BP 5%, clindamycin 1% plus BP 5%, and clindamycin 1% plus BP 3.75% are available as stable, fixed-combination agents. [29-31] Combination drugs may improve adherence to treatment plans. [21] Typically, topical erythromycin is applied once or twice daily.

TOPICAL RETINOID MEDICATIONS

Prescription drugs that are derivatives of vitamin A include topical retinoid treatments. [23,32-34] For patients with mild to severe acne, especially when the acne is mostly comedonal, topical retinoid medicines are frequently utilised as the initial line of treatment. The precursor microcomedone lesion is removed by retinoid therapy, which is comedolytic. All forms of acne can be treated with retinoid medicines, which are also anti-inflammatory and act in conjunction with other topical treatments. [21] After stopping oral therapy, the mainstay in maintaining clearance is topical retinoid therapy. [21] Once daily application of a thin coating is the dosage that is advised.

AZELAIC ACID

Azelaic acid acts as a comedolytic, antimicrobial, and anti-inflammatory agent [35] and is a naturally occurring dicarboxylic acid that is found in whole-grain cereals such as wheat, rye, and barley. [36] Azelaic acid should be used with caution in patients with sensitive skin due to side effects that include redness, burning, and irritation. Azelaic acid should also be used with caution in patients with Fitzpatrick skin types IV or greater because of its potential lightening effect. [37-39] However, because of this side effect, azelaic acid is a useful adjunctive in acne treatment because it aids in the treatment of post inflammatory dyspigmentation.

DAPSONE

Dapsone is a sulfone agent that is available in a 5% gel and used as a twice-daily agent or 7.5% gel used once daily. Data only show modest-to-moderate efficacy in the reduction of inflammatory acne lesions.[34,40] Dapsone has a poorly understood mechanism in the treatment of patients with acne and its ability to kill P. acnes has been studied poorly.[21] Similar to other topical antibiotic treatments, dapsone is thought to work as an anti-inflammatory agent. The recommended dosing is application of a thin layer twice daily.

OTHER TOPICAL AGENTS

The following topical agents lack evidence-based data for their use in patients with acne but have been demonstrated to be effective in clinical practice: sodium sulfacetamide [41-43], sulfur [44], resorcinol [44], aluminum chloride [45,46], topical zinc [47,48], and niacinamide.[23,49]

CONCLUSION

Despite being a very prevalent and expensive condition, acne does not get the attention it merits. When compared to diseases with a similar burden measured by disability-adjusted life years from the Global Burden of Disease 2010 project, acne was one of the under-represented diseases in the Cochrane Database of Systematic Reviews1. Despite being the fourth most common skin-related disability in the US, according to another study, acne received less than half of the funding from the National Institute of Arthritis and Musculoskeletal and Skin Diseases (NIAMSD) compared to projects on bacterial skin diseases, which only rank thirteenth in terms of disability. One must first admit that acne is a significant issue in order to progress our understanding and methods of therapy. Basic research, involving microbiology, endocrinology, immunology, genetics, and dermatology, is required to identify the pathways and regulatory nodes that might be addressed to prevent and treat acne. New therapeutic medicines have been produced or are being developed in response to the findings from these research efforts. Consensus guidelines must be developed by numerous, carefully planned, comparative, randomised controlled experiments.

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