

A Comprehensive Overview: On Pathogenesis, Diagnosis, and Management of Acne Vulgaris

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Date of Submission: 27-10-2023

Date of Acceptance: 08-11-2023

ABSTRACT:

One of the most chronic skin conditions that dermatologists have to treat is acne vulgaris. However, it may happen at any age, teenagers are most affected. In recent years, novel therapy approaches and numerous permutations and combinations have been created due to a greater understanding of the etiology of acne. Benzoyl peroxide, antibiotics, retinoids, and other topical medications constitute the basis of treatment and may be administered in combination. Although oral antibiotics, hormone therapy, and isotretinoin are all part of systemic therapy, the best course of treatment must be chosen based on the needs of the patient. 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 hyperkeratinisation, induction of inflammation, and problems of the innate and adaptive immune systems are just a few of the major mechanisms involved in the development of acne. A lesion counting and photographic techniques are used to grade acne lesions.

Keywords:

Acne vulgaris, Treatment of Acne, Pilosebaceous, Aforementioned medications, Hyperkeratinisation

I. INTRODUCTION: -

Over 85% of youth have acne, one of the most treatable skin disorders. The biggest organ in the body, the skin serves as the first line of defence by forming a barrier between the outside environment and the body's inside. Numerous hundreds of microorganisms that live in communities and defend the body against pathogen

invasion are found on the skin^{1,2}. Changes in the skin microbiota have been linked to a variety of skin illnesses, according to several research.⁽¹⁾ It begins throughout adolescence and slowly clears up by the time a person is 20 years old, while some factors can cause acne to persist into one's 40s and 50s.^(2,3)

Ongoing condition, acne vulgaris is typically treated by physicians. Girls than boys have acne vulgaris at a younger chronologic age⁽⁴⁾. When acne is left untreated, it usually persists for several years before going away on its own. Genetics, stress, androgens, and excessive sweetening all have an impact on the development and severity of acne, which is a complex condition.^(5, 6) Acne vulgaris, also known as simply acne, is a skin condition that causes inflamed skin, blackheads, and whiteheads.⁽⁷⁾ Foams of acne might be inflammatory or not.⁽⁸⁾ Acne vulgaris is a persistent, inflammatory condition of the pilosebaceous unit that has a self-limiting course.⁽⁹⁾ Propionibacterium acne is a common social problem that affects 90% of adolescents. Propionibacterium acne is an environmental issue that affects 15% of the general population and 90% of patients who are teenagers.⁽¹⁰⁾ Also, acne has a significant detrimental psychological and social impact on a patient's quality of life⁽¹¹⁾. Along with the development of novel medications, unique delivery methods and adjustments to current therapies are also required.^(12, 13)

One of the most common skin conditions affecting people is acne. Adolescents often suffer from acne vulgaris, which has a complex Etiology and a wide range of therapeutic options with various modes of action.⁽¹⁴⁾ In accordance with the European evidence-based (S3) acne treatment

requirement.⁽¹⁵⁾ As a result, patient involvement and submitting to physician advice are essential. Getting excellent cooperation from patients, the majority of whom are young people, can be problematic.⁽¹⁶⁾

1.1 Type of acne: -

1. A whitehead is caused by an inflammatory sebaceous or hair-growing gland. When sebum and dead skin cells clog a pore, whiteheads can also develop. However, the top of the pore shuts up, unlike with blackheads. It appears to be a little bulge sticking out from the skin.

2. Cyst: Cysts can form when a combination of germs, sebum, and dead skin cells clog pores. More below the surface than nodules, blockages develop deep into the skin. These big red or white lumps are frequently uncomfortable to touch. The largest type of acne, cysts, is typically formed as a result of a serious illness. In addition, this type of acne is most susceptible to developing scars. Cysts frequently receive therapy with isotretinoin, marketed with the brand name Sorted, which is a prescription medication. Your dermatologist might surgically remove a cyst in serious cases.

3. Nodule: - occurs when *P. acnes* bacteria, which are skin-dwelling bacteria, become trapped inside the clogged pore. When clogged, swollen pores experience more irritation and enlarge, nodules form. Nodules, as opposed to pustules and papules, are located deeper in the skin. Nodules are often difficult to treat at home because they are located so deeply within the skin. To help with this, prescription medication is recommended. Isotretinoin (Sorted), an oral drug, is likely to be recommended by your doctor or dermatologist. For four to six months, this is taken daily and is made from a type of vitamin A. By reducing the size of

the oil glands within the pores, it can both treat and prevent nodules.⁽¹⁷⁾

4. Blackhead: They start in exactly the same way, as an oil block within the pore.

5. Papule: This skin condition occurs when your oil glands produce excessive oil and there are more bacteria on your skin than usual. When there is acute inflammation, the walls enclosing your pores collapse, resulting in papules. As a result, the pores become tender to the touch and become hard and plugged. Usually pink, the skin around these pores is.

6. Pustule: This type of skin inflammation develops on when dead skin cells, bacteria, and excess oil push deeper into the skin. Additionally, as the pore-enclosing walls deteriorate, pustules might develop. Pustules contain pus as opposed to papules. These lumps protrude from the skin and are typically coloured red. On top, they frequently feature yellow or white heads.⁽¹⁸⁾ Acne is a complex condition that can be divided into grades 1 through 4 depends on how severe it is.

Grade 1: a small number of papules and non-inflammatory comedowns.

Grade 2: It comprises of a few pustules, papules, and comedowns.

Grade 3: shows larger papules, pustules, and a few cysts that can impact the face, neck, and upper trunk.

Grade 4: is the most severe stage and may show confluent cysts.⁽¹⁹⁾

In addition to teenagers but also adults can develop acne.⁽²⁰⁾ A Singaporean study indicated that 88% of adolescents between the ages of 13 and 19 have acne in the majority of cases. Acne vulgaris is typically detected all through teenage years, and it affects women more often than men.⁽²¹⁾

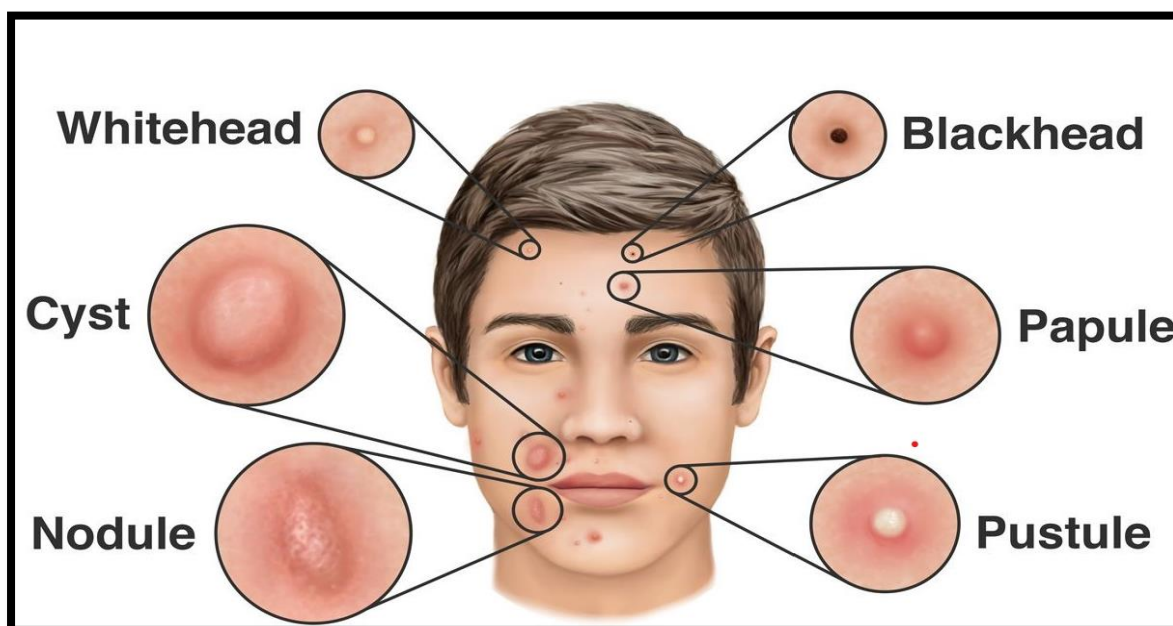


Fig 1.1: Type of acne

II. ETIOLOGY: -

Acne is caused by follicular blockage, hyperkeratinization, plug development, and sebum. Production of androgen increases with incision. ⁽²²⁾ Propionibacterium acne, a naturally occurring commensal bacterium, can cause inflammation including infected pustules, nodules, and papules in the dermis around the microcode or comedons, causing with redness & hyperpigmentation. ^{(23), (24)}

Environmental factors can affect the choice of topical treatments and have a significant impact on the severity and scope of acne. Heat and humidity can lead to comedones, pressure or friction from helmets, shoulder pads, or pillows can exacerbate existing acne by rupturing micromedones, as can over-scrubbing or washing. Acne problems typically go worse in the winter and improve in the summer, showing an advantageous effect of sunlight. ⁽²⁵⁾

Psychologic aspects are crucial in this protracted and unpredictable disease, as has been usually noted. Acne can be affected by emotions like stress and intense anger. ⁽²⁶⁾ The current research focuses on nutritional influence. Although patients could restrict particular foods such (chocolate, cola, snacks, milk and milk products), it

used to be thought that diet did not affect acne. ^(27, 28)

III. PATHOPHYSIOLOGY:

Acne vulgaris is the result of four pathophysiology theories. Propionibacterium acne colonization, higher production, altered follicular skin keratinization, and inflammatory processes involving both innate and acquired immunity are all symptoms of acne. ⁽²⁸⁾ Multiple host variables, including the activation of sebaceous glands by circulating androgens, dysbiosis of the pilosebaceous follicle microbiome, and cellular immune-mediated responses, interact to cause acne vulgaris. In addition, other elements including genetics and food may affect how the condition develops and progresses. All clinical symptoms of acne vulgaris have a microcomedo as their primary lesion, which also serves as its precursor. It is distinguished by a tiny, hyperkeratotic plug in the bottom part of the follicular infundibulum that is largely made up of corneocytes. Microcomedones gradually transform into various acne lesions such as inflammatory papules, pustules, and nodules as well as closed comedones (whiteheads) and open comedones (blackheads). ⁽²⁹⁾

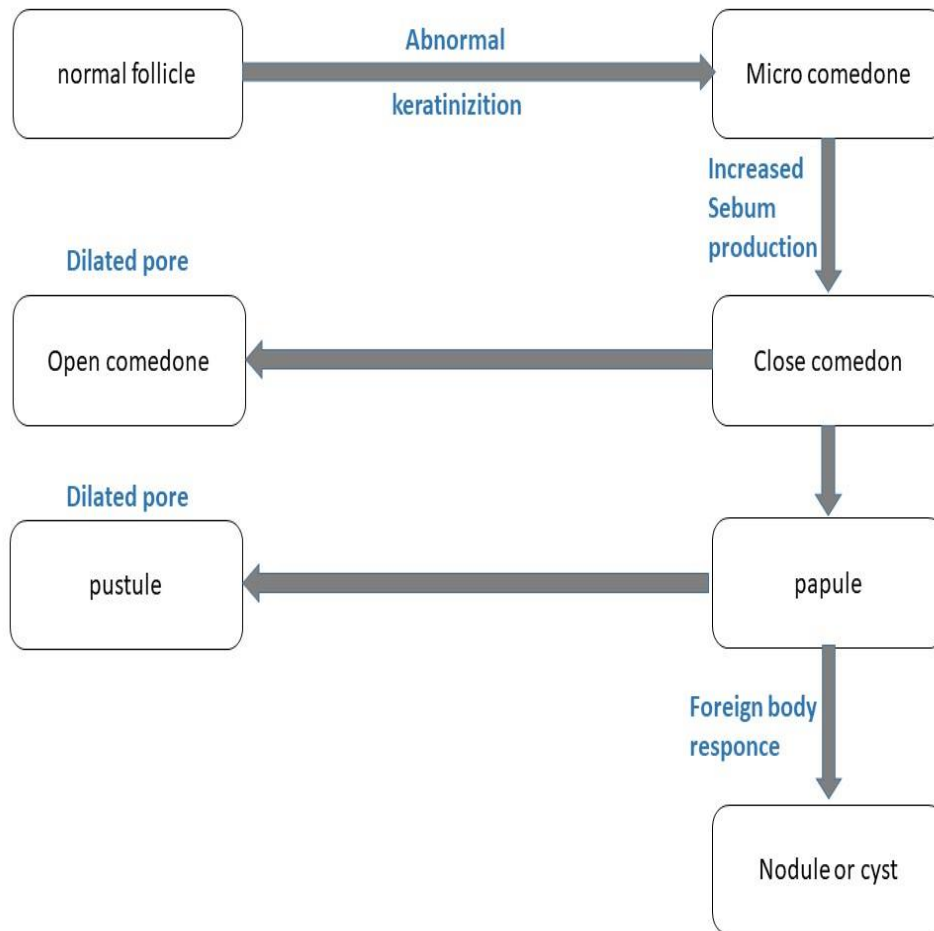


Fig 3.1: Flow chart of Pathogenesis of Acne

3.1 Sebum production: -

The androgen production is regulated by the hormone's androgen and testosterone. (30,31) Androgen hormones are what initially cause the disease to develop. (32) The level of DE hydro epiandrosterone sulphate (DHEAS) was higher in patients with severe acne, while sex-hero binding globulin (SHB4) levels were lower, which further elevated the level of androgen. Sebum production then contributes to the pathogenesis of acne by causing the inflammatory response. (33)

Role of androgen: -

The majority of acne vulgaris patients normally have normal levels of androgen in their bodies. However, the body produces too much androgen in some diseases such as congenital adrenal hyperplasia polycystic ovary syndrome, and adrenal or ovarian tumours, which finally causes acne.

The role of androgens in the development of acne involves various mechanisms, as listed below:

- The adrenal glands and the gonads secrete androgens.
- Sebaceous glands can also synthesize androgens through the conversion of DHEAS to testosterone via the action of several enzymes.
- Type I 5-alpha reductase in the sebaceous gland converts testosterone to 5-alpha-dihydrotestosterone (DHT).
- Androgens stimulate sebaceous glands' growth and secretory function, leading to seborrhoea and acne formation.
- The resulting anaerobic lipid-rich environment allows *C acnes* to thrive (29)

3.2 Follicular Hyper keratinization: -

Linoleic acid, a specific type of fatty acid, plays an essential role in the development of acne. Skin follicular cells may become more hyperkeratinized or hypercornified as a result of the reducing levels of linoleic acid in the skin. ⁽³⁴⁾

3.3 Microbial colonization by Propionibacterium acne:

Acne vulgaris' pathogenesis has been linked to Propionibacterium acne.

Propionibacterium acne has been determined through genomic analysis to be roughly 2.5 mg in size. ⁽³⁵⁾

P. acnes is a gram-positive anaerobic commensal of skin that is healthy. The peptidoglycan and ribosome-rich cytoplasm of this bacteria help to construct the cell wall layer. ⁽³⁶⁾

3.4 Role of inflammatory mediators: -

The inflammatory response is the fourth and last element in the etiology of acne. ⁽³⁷⁾ As a result of the above scenario, the invading cell breaks down and the level of inflammatory mediators that cause acne is increased. ⁽³⁸⁾ Sebaceous gland hypersensitivity to a normal amount of circulating androgens, which are increased by P. acnes & inflammation, is the cause of acne. ⁽³⁹⁾ During puberty, androgens cause sebum secretion to increase as 5-alpha reductase is activated. increases the production of sebum through the conversion of testosterone to more potent DHT that attaches to specific sebaceous gland receptors. ⁽⁴⁰⁾ Acne vulgaris has a multifaceted pathogenesis. Genes are the fundamental determining factor. ⁽⁴¹⁾ When Acne develops due to a combination of the four variables that follow ⁽⁴²⁾

Inflammation is caused by the release of mediators of inflammation into the skin. Follicular hyperkeratinization followed by follicle plugging (increased follicular keratinization) follicular Cutibacterium

acnes... Kraal Colonization (primarily caused by Propionibacterium acnes) Sebum production is excessive. (Boost sebum production) ⁽⁴³⁾ Acne Beans usually start in the prepubertal Period.

When the adrenal gland develops and progresses undergone, androgen synthesis progresses. & Sebaceous gland activities development with gland development when an inflamed sebaceous follicle, also called a micro comedo, develops. In reaction to circulating androgen, the sebaceous glands expand in size and activity. (Some (exceptions) have

sebaceous glands that are too sensitive to the androgen. ⁽⁴⁴⁾

As indicated below, genetics has an important role in the development of acne:

Several studies have shown evidence to support the genetic cause of acne. Individuals with affected relatives in the first degree have a threefold increased risk of having acne compared to those without a family history of the ailment. ^(45,46)

In inflammatory acne lesions, gene expression investigations revealed an increase in matrix metalloproteinase 1 and 3, inflammatory cytokines (IL-8), and antimicrobial peptides (human beta-defensin 4 and granzyme B. ^(47,48)

IV. DIAGNOSIS: -

The diagnosis is mainly clinical, based on the presence of specific lesions such as closed comedones, open comedones, and inflammation nodules. It is all distinctive distribution (facial, neck, back, chest, shoulders of upper arms.) when tests in the lab are usually not required unless clinically necessary. ^(49,50) Throughout the year, many photographic methods have been proposed to visualize acne, grade its severity, and assess therapy response. ⁽⁴⁸⁾ Standard photography is a helpful and dependable tool, but it must employ the same lighting distance as the patient camera and processing procedures. Modern imaging methods have opened up new avenues for optimizing acne visualization and improving the accuracy of assessing acne severity and response to treatment. ⁽⁵¹⁾ Acne affects body parts that have a higher density of the pilosebaceous gland, such as the face, chest, and back. ⁽⁵²⁾

- Acne conglobata
- Acne fulminans.
- Acne colloidal cysts
- Acneiform eruptions
- Folliculitis
- Perioral Dermatitis
- Rosacea
- Sebaceous Hyperplasia
- Syringomy
- Tuberos sclerosis ⁽⁵³⁾

4.1 Different diagnosis: -

Rosacea can be differentiated from acne by the presence of comedones and the absence of telangiectasia.

Unlike acne vulgaris, perioral dermatitis can be identified by organized red papules in a perioral distribution, sparing the lip border.

Demodex folliculitis is a condition marked by inflammatory papules and pustules. When a patient failed to respond to acne or redness treatment, it is suspected.

Tuberous sclerosis facial angiofibroma appears as pink or red papules on the cheeks and nose of children.⁽⁵⁴⁾

V. TREATMENT: -

New treatment abilities have been developed in recent years as a result of a better understanding of the pathophysiology of acne. The availability of novel treatment options to supplement the existing arsenal should aid in the successful treatment of a greater number of acne patients, assure enhanced tolerability, and meet patients' expectations. Successful acne therapy necessitates the cautious selection of an anti-acne agent based on clinical presentation and individual patient need. For mild acne, a topical fixed combination may be recommended. Therapy for mild acne, as mentioned earlier. Another option is to use oral antibiotics in conjunction with a topical retinoid and BPO.^(55, 56) A variety of modifications to your lifestyle may reduce your risk of acne.⁽⁵⁷⁾ To lower cortisol levels, get lots of rest. Mind-body therapies such as yoga and meditation can help you manage your stress. After exercise or demanding activities, gently wash your skin. Avoid over-cleaning your skin, specifically when using powerful soaps. Apply a light, oil-free moisturizer.⁽⁵⁸⁾

Acne treatment: -

Acne medications can be taken alone or in combination. Some drugs are administered topically (through the skin), while others are taken orally (through the mouth)

Some common acne treatment: -

Topical treatment is effective in mild to moderate acne as monotherapy, combination therapy, and maintenance therapy. Acne topical treatment is widely used and effective, particularly for mild to moderate acne.

- Benzoyl peroxide
- Topical Salicylic acid
- Retinoid
- Oral Anti biotics
- Aldactone (spironolactone)
- Topical Clindamycin
- Oral Isotretinoin
- Oral hormonal therapy

• Benzoyl peroxide: -

Benzoyl peroxide possesses both comedolytic and antimicrobial properties. It comes in a variety of formulations and concentrations ranging from 2.5% to 10%. It is typically applied once daily, focusing on a few small places for the first three days to evaluate for any potential hypersensitive reactions. Due to its oxidizing effect on tretinoin, benzoyl peroxide should not be used in conjunction with it. To avoid reactions, benzoyl peroxide should be given in the morning and tretinoin in the evening.⁽⁵⁹⁾

• Topical Salicylic acid: -

Individuals who are unable to tolerate or receive topical retinoids may benefit from topical salicylic acid. If patients do not respond to topical retinoids, benzoyl peroxide, and clindamycin, further topical treatments such as topical dapsone, topical minocycline, and clascoterone (the topical androgen receptor inhibitor) are available.⁽⁶⁰⁾

• Topical Retinoid: -

Topical retinoids are vitamin A derivative that act on keratinocytes by binding to retinoic acid receptors (RARs) and retinoid X receptors (RXRs). This medication, tazarotene, and adapalene are retinoids that operate primarily on the RAR-beta and RAR-gamma receptors. Most people with acne should begin treatment with topical retinoids such as tretinoin, tazarotene, adapalene, and trifarotene. Both comedones and inflammatory papules and pustules are effectively managed by these drugs. Topical retinoids can be used as a monotherapy for people with primarily comedone acne. They are also advised for follow-up care after successful treatment. Patients suffering with papulopustular acne may benefit from the application of a topical antimicrobial agent such as benzoyl peroxide or a topical antibiotic. To reduce the possibility of antibiotic-resistant bacteria growing, topical medicines should ideally be administered in combination with benzoyl peroxide. Due to tretinoin's apparent photolability, the topical retinoid should be used once daily, preferably at night.⁽⁶¹⁾ Adapalene and trifarotene, on the other hand, are more stable in the presence of light.⁽⁶²⁾ Make sure your skin is dry before applying retinoid. Rather than treating isolated lesions, a thin layer of topical retinoid should be administered over the entire afflicted area. A pea-sized amount of the drug will cover your entire face.

The most common side effects of topical retinoids are skin dryness, irritation, flaking, and sensitivity to sunlight due to skin thinning.

However, these side effects are frequently manageable through using non-comedogenic face moisturizers and sunscreens. It is vital to highlight that topical retinoids should not be used during pregnancy. ⁽⁶³⁾

- **Oral antibiotic: -**

acnes growth within the pilosebaceous unit is successfully suppressed by oral antibiotics. Because tetracycline has anti-inflammatory qualities, they are the chosen antibiotic for treating acne vulgaris. Other antibiotics (such as macrolides, cephalosporin, penicillin, and trimethoprim-sulfamethoxazole) may be considered if tetracycline are ineffective or poorly tolerated by patients. ⁽⁶⁴⁾ to decrease the development of antibiotic resistance, treatment should be limited to the shortest possible time (preferably, 3-4 months). This can be supplemented by the use of a topical retinoid, which can aid in the withdrawal of the antibiotic, or by combining the use of benzoyl peroxide.

Antibiotics such as doxycycline, erythromycin, and tetracycline can cause bacterial overgrowth, resulting in papules and pustules. Long-term antibiotic treatment may cause tooth yellowing in developing teeth. In addition, doxycycline can cause nausea, vomiting, esophagitis, and pseudotumor cerebra (idiopathic intracranial hypertension). Because photosensitivity is one of the side effects of oral antibiotics, sunscreen is advised while on tetracycline medication. ⁽⁶⁵⁾ a number of the fact that some of them are commonly used in monotherapy. Many studies and research indicate that agents such as topical antibiotics should not be used in monotherapy due to rising bacterial resistance and the limited action of such treatment. ⁽⁶⁶⁾

- **Aldactone (spironolactone): -**

it drugs Anti- androgenic effect and may be useful in treating acne. Spironolactone is an economical potassium-sparing diuretic with an anti-androgenic effect and a good safety profile. Our experience suggests that this diuretic is underexploited in dermatology even though there is evidence supporting its use in several skin conditions. When prescribed for acne in female patients (level 1-2 evidence; strength of recommendation, B), for example, it can reduce the need for antibiotics and possibly isotretinoin. ⁽⁶⁷⁾

Topical Clindamycin: Clindamycin topical is available in a number of formulations and in

combination with benzoyl peroxide or topical retinoids. It is usually used once or twice daily. It is recommended to use topical clindamycin in conjunction with benzoyl peroxide to reduce the chance of antibiotic resistance. Although it is generally well tolerated, some people may have skin irritation as a side effect ⁽⁶⁸⁾

- **Topical Erythromycin**

Topical erythromycin can be used rather than topical clindamycin to treat acne. However, because of an increase in erythromycin resistance reports, clindamycin is now the preferred treatment. When taking topical clindamycin, it is best to combine it with benzoyl peroxide whenever possible. ⁽⁶⁹⁾

- **Oral Isotretinoin**

Oral isotretinoin is a retinoid that treats acne vulgaris by blocking the four pathogenic components that cause the disease. Topical isotretinoin is a retinoid that treats acne vulgaris by inhibiting the four pathogenic elements that cause the illness. For severe acne vulgaris, oral isotretinoin is frequently prescribed as a monotherapy and given over an amount duration at a dose of 0.5 to 1 mg/kg per day. ⁽⁷⁰⁾ However, combining oral steroids at the start of therapy may be beneficial for individuals with severe acne vulgaris who are at a high risk of experiencing an isotretinoin-induced acne flare. Because it causes teratology, oral isotretinoin should not be used while pregnancy. Patients taking isotretinoin should let their doctors understand that they have any plans to become pregnancy so that the medication can be stopped at least one month before starting. Myalgia, dry skin and mucous membranes, vision abnormalities, hyperlipidaemia, and elevation of hepatic transaminase levels are some other side effects linked to the medication. Additionally, blood donations shouldn't be made while taking isotretinoin by patients. ⁽⁷¹⁾

- **Oral hormonal therapy**

For female patients seeking acne treatment, oral hormonal treatments like spironolactone and oral contraceptives are possible choices. These treatments reduce androgens' effects on pilosebaceous units, which in turn lowers sebum production and aids in the relief of acne symptoms. Several categories of females, including postmenopausal women with severe acne vulgaris, women with acne brought on by hyperandrogenism, and women with milder acne

who want to use contraception, may benefit from hormonal therapy. ⁽⁷²⁾

Oral anti-androgen Spiro lactone effectively reduces androgen production and blocks androgen receptors. Patients can start taking spironolactone treatment with a daily total dose of 25 or 50 mg, and the dosage may be increased to up to 100 mg per day, in the form of a single daily dose or separated into two doses. ⁽⁷³⁾

Breast soreness, menstrual abnormalities, minor gastrointestinal problems, hyperkalaemia, orthostatic hypotension, and headache are some of the side effects of this medication. Oral contraceptives can be used equally to reduce certain adverse reactions, including breast discomfort and irregular menstruation. ⁽⁷⁴⁾ Due to the rate of relapses of acne in women over the age of 25 after completing regular treatment, hormonal therapy for acne is a significant treatment option,

particularly for female patients. Multiple hormones, like androgens, can contribute to the emergence of acne. ⁽⁷⁵⁾

VI. ALTERNATIVE THERAPY: -

6.1 Achillea:

- ✓ **Common name:** - Yarrow
- ✓ **Botanical name:** - Achillea Milfoil - Millenarian ⁽⁷⁶⁾
- ✓ **Scientific names:** - Achillea mill folium
- ✓ **Family:** - Asteraceae ⁽⁷⁷⁾
- ✓ **Active constituents:** -
 - Polyare
 - Tannin
 - Alkaloids
 - Coumarins
 - Flavonoids (apigenin, luteolin, quercetin)
 - Salicylic acid ⁽⁷⁸⁾



Figure 6.1 yarrow plant

Uses: -

The yarrow plant's flower leaves, and stems are all used for medicinal purposes. Achillea mill folium L., which has the longest history of conventional uses, is easily the most widely recognized and deeply studied species in the genus. An 18th-century Polish medical handbook named Compendium medium acetum lists two Achillea species, A. mill folium and A. ageratum, as herbal treatments, also for skin conditions. ⁽⁸⁰⁾ Dried aerial portions of A. mill folium have been utilized as raw materials to create alcoholic and aqueous extracts that have been used topically as compresses or baths to treat inflammation of the skin and mucous membranes. ⁽⁸¹⁾

6.2 Burdock: -

- ✓ **Common name:** - Greater burdock
- ✓ **Botanical name:** - ArctiumLappm
- ✓ **Family:** - Asteraceae
- ✓ **Active constituents:** -
 - Protein (2.46 ± 0.01)
 - lipids (0.06 ± 0.01),
 - Ash (1.13 ± 0.08),
 - Total dietary fibre (17.43 ± 1.65)

According fresh burdock root contains moisture (78.13 ± 1.18), and digestible carbohydrates (0.79), for each 100 gm. ⁽⁸²⁾

Laps is considered to provide a rich pool of bioactive constituents, for example lignin's, which

are represented in the major compounds of this plant by irigenin among others, a phenylpropanoid dibenzyl butyrolactone lignin and one of the major active ingredients extracted from the fruits and

seeds of *A. lapper* L. Notably, arctigenin and arctiine are two of the bioactive compounds that exist in burdock extracts ^{(83) (84) (85)}.



Figure 6.2 Burdock plant

Uses: -

In folk medicine, mainly burdock roots, but also leaves and fruits, are used. The extracts from roots and leaves of burdock improve metabolism and diuretic action. They are used in catarrh of the gastrointestinal tract and to improve the liver and pancreas functions. In addition, they are recommended in the early stage of diabetes as a supportive means to maintain the proper level of glucose in the blood. Burdock fruits are used in traditional medicine as an aid in the treatment of cancer. ⁽⁸⁷⁾ Burdock leaves and roots are also used externally to relieve inflammation of the skin, such as pimples, boils, acne, and ulcers. They reduce inflammation and improve wound healing, especially infected wounds. They prevent hair loss and fight dandruff when applied to the scalp. ^{(88) (89)} ⁽⁹⁰⁾ It has been demonstrated that extract from larger

burdock roots greatly reduced the time required for injured skin healing.

Sources: -

Asia & North America, Europe ⁽⁹¹⁾

6.3 Berberis: -

- ✓ **Common name: -** Barberry
- ✓ **Family: -** Burseraceous
- ✓ **Botanical name: -** *Berberis vulgaris*
- ✓ **Geographical Sources: -** Europe

They showed about 45% reduction in acne in the barberry treated group, pretty impressive result. ⁽⁹²⁾

- ✓ **Active constituent: -**
 - isoquinoline alkaloid

Barberin has also been found to specifically have an Anti -aging effect on skin.



Figure 6.3 barberry plant

Uses: -

Plants in this genus are used for the treatment of inflammation, illness, infection, diabetes, and constipation. It also has anti-inflammatory and anti-bacterial properties. It combats inflammation caused by tooth infections and acne. ⁽⁹⁴⁾⁽⁹⁵⁾

- Dimyrecene
- Polypyridene
- Diterpenoid
- Resin ⁽⁹⁷⁾

Its plant is use to affect the cholesterol levels in the body.it also reduce redness and swelling from acne.Guggul extract contains anti-inflammatory and anti-bacterial properties. Guggul is an excellent treatment for oily skin. found in India, Bangladesh, and Pakistan's dry regions. It is found in Rajasthan, Gujarat, Assam, Madhya Pradesh, and Karnataka in India ⁽⁹⁸⁾

6.4

Guggul: -

- ✓ **Common name:** - Guggul, guggul ⁽⁹⁶⁾
- ✓ **Botanical name:** - Comephorid weightier
- ✓ **Family:** -Burseraceous
- ✓ **Active constituents:** -
- Volatile oil



Figure 6.4 guggul plant

Uses: -

Guggul has been used for thousands of years in Indian traditional medicine to treat arthritic conditions inflammatory processes, gout, arthritis, obesity, and lipid metabolic issues. It is also known as guggul, guar, and Indian bdellium. ^(100, 101)

VII. MANAGEMENT:

Acne vulgaris problems require a variety of ways to address specific difficulties that may occur.

The objectives of treatment are to provide the patient the best possible appearance while minimizing scars and psychological consequences. The goals of therapy are to avoid follicular hyperkeratosis, diminish C. acnes, restrict fatty acid synthesis and sebum secretion, and eradicate comedowns. In general, topical medications used to treat acne vulgaris have a positive safety profile. As a result, topical drugs are the first line of treatment for mild-to-moderate acne and can be combined with other treatments for more severe acne. ^(102,103) Systemic therapy ARPatients should be advised to use gentle skin cleansers rather than scrubs and

soaps (particularly harsh or drying soaps), as well as non-comedogenic skin care and cosmetic products, when it comes to skin hygiene. ⁽¹⁰⁴⁾ Patients must be advised to pat dry their faces before pressing and exfoliating after washing. They should avoid scrubbing their skin aggressively and plucking or squeezing acne spots, as this can increase the chance of scar formation.^{69,92} It is best to use soap-free face wash, oil-free moisturizers, and sunscreens. ^(105,106) Topical antibiotics have anti-inflammatory properties and are either bactericidal or bacteriostatic, depending on the formulation. ^{(107) (108)} When compared to oral antibiotics, topical medicines have less systemic toxicity and adverse effects. Antibiotics shouldn't be used as monotherapy due to the potential of bacterial resistance. ^(109,110) The use of topicalAntibiotics in combination with topical retinoids or benzoyl peroxide improve the therapeutic effect as they avoid the growth of antibiotic-resistant C. acnes strains. ⁽¹¹¹⁾ In general, topical antibiotics should not be provided to patients who are also receiving oral antibiotics. ⁽¹¹²⁾



Fig.7.1: management of acne

Monitoring Treatment Response and Compliance: -

Acne treatment with any of the aforementioned medications can take as long as three months. Re-evaluating a patient between 8

and 12 weeks is one method for monitoring therapy success. The reasoning behind this schedule is that it takes around 8 weeks for a microcomedone to mature, hence therapy must be continued beyond this time frame to measure efficacy. In addition, many clinical trials testing acne regimens have been scheduled with 12-week clinical goals, making this a realistic time frame to evaluate for clinical improvement. When possible, take baseline images to gain an objective measurement of progress. If no improvement is apparent after 2 to 3

months, the first step is to make sure that the patient is adhering to the treatment. If treatment adherence is adequate, more aggressive therapy may be essential. If a patient does not improve with combined topical therapy, the natural next step would be replacing the topical antibiotic with an oral antibiotic, such as doxycycline. Patients who do not respond adequately to initial or modified therapy should be referred to a dermatologist to receive further evaluation and treatment. ^(114, 115)

	Mild	Moderate	Severe
1 st Line Treatment	Benzoyl Peroxide (BP) -or- Topical Combination Therapy** BP+ Antibiotic Or Retinoid+ BP+ Or Retinoid+ BP+ Antibiotic	Topical Combination Therapy** BP+ Antibiotic Or Retinoid + BP Or Retinoid +BP Antibiotic Or Oral Antibiotic + Topical Retinoid + BP + Topical Antibiotic	Oral Antibiotic + Topical Combination Therapy** BP + Antibiotic Or Retinoid + BP + Antibiotic -or- Oral isotretinoin
Alternative Treatment	Add topical Retinoid or BP Or Consider Alternate Retinoid -or- Consider Topical Dapson	Consider Alternate Combination Therapy -or- Consider change in Oral Antibiotic - Or- Add combined oral Contraceptive or oral Spiro lactone (female) Or Consider Oral isotretinoin	Consider change in Oral Antibiotic -or- Add combined Oral Contraceptive or Oral Spiro lactone (female) -or- Consider Oral isotretinoin

Table 1. Recommendation for grading and classification of acne

VIII. CONCLUSION

Acne vulgaris is one of the most chronic skin conditions doctors address. Teenagers are the most affected, yet it can happen to anyone at any age. Thanks to advances in our understanding of the origin of acne, new therapeutic treatments and many permutations and combinations have been developed in recent years. The foundation of treatment consists of benzoyl peroxide, retinoids, antibiotics, and other topical drugs, which can be used in combination. Systemic therapy includes hormone therapy, isotretinoin, and oral antibiotics, however the patient's needs must be taken into consideration while selecting the appropriate

course of action. A number of key mechanisms motivate the development of acne, including dysregulation of the hormone microenvironment, interaction with neuropeptides, follicular hyperkeratinisation, induction of inflammation, issues with the innate and adaptive immune systems, and disrupted sebaceous gland activity linked to hyperseborrhea (increased sebum production) and changes in sebum fatty acid composition. Acne lesions are evaluated using a lesion counting method and visual techniques.

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