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Review Article

Review Paper on Anti Acne Properties of Winter Green Leaves and Cucumber Peels

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ABSTRACT

Acne by definition is a long lasting inflammatory disease of Pilosebaceous units. Although acne does not pose a serious threat to general health, it is one of the most socially distressing conditions especially for young ones. The plants have been reported in the literature having good anti-microbial, anti-oxidant and anti-inflammatory activities. The main objective is to prepare a cream with natural herbal extract and minimize side effects of chemical cosmetics. Creams are considered an important part of cosmetic products as topical preparations from time immemorial due to ease of application to skin and also their removal. Acne is mainly caused due to oil production, clogged pores, increased androgen level etc. Creams have a variety of applications such as cleaning, beautifying, altering appearance, moisturizing etc. to skin protection against bacterial, fungal infection as well as healing cuts, burns, wounds on skin. In this review, we have focused on the use of herbal drugs like winter green leaves which possess antibacterial, anti-inflammatory and anti-oxidant activity; aloe-vera gel which reduces swelling, redness and growth of microorganisms; cucumber peel extract which reduces skin aging, dark circles, open pores, almond seed oil; for skin glowing and possesses anti-ageing property; grape seed extract as a preservative & orange peel powder which controls excess sebum production and it is also used as a flavouring agent to give a pleasant feeling while applying on skin.

INTRODUCTION

Acne vulgaris is a troubling problem, particularly for adolescents and teenagers. Global statistics show that almost 85% of people will experience

this skin condition between the ages of 12 and 25, roughly 8% of adults between the ages of 23 and 34, and only 3% of

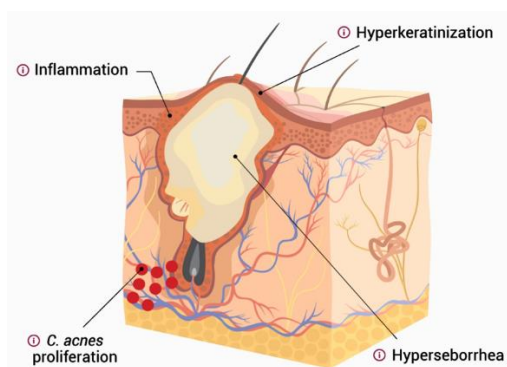
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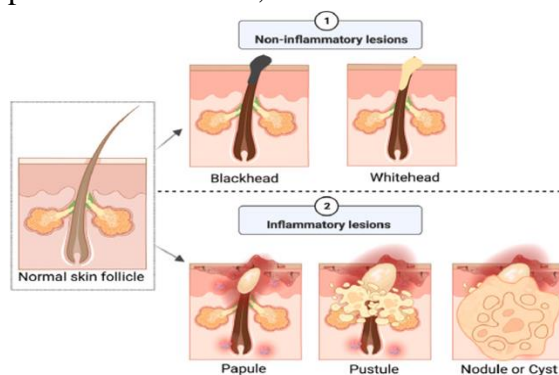




individuals between the ages of 35 and 44 will have acne vulgaris. While some skin conditions may be considered self-limiting, they can also have detrimental psychosocial effects on an individual, including low self-esteem, social disengagement brought on by humiliation, and in the worst case, suicide thoughts(1).The widespread skin condition known as acne vulgaris is caused by alterations in the pilosebaceous units,

which are skin structures composed of a hair follicle and the sebaceous gland that surrounds it (2).In both males and females, acne is typically brought on by an increase in androgens, such as testosterone, primarily during puberty[3] . As people mature, acne tends to lessen and eventually go away [4,5]

Types of acne:



1. Whiteheads: These tiny pimples stay beneath the skin’s surface.
 2. Blackheads: These appear black and rise to the skin's Surface, yet they are not caused by dirt. The reason black heads are black is not because of the dirt. The protein known as keratin is typically oxidized by air.
 3. Papules: These little, delicate pink pimples are easily noticeable on the skin.
 4. Pustules: Also known as zits or pimples, pustules are visible on the skin’s surface and are red at the base with pus at the top.
 5. Nodules: These are easily seen on the skin’s surface. These are big, painful, solid pimples that are visible on the skin’s surface yet are located deep within the skin.
- Cysts: Easily seen on the skin’s surface. They are painful, pus-filled, deeply ingrained, and prone to scarring.[6,7].

Causes of acne:



- Blockage of follicles, hyperkeratinization, keratin plug development, and sebum (microcomedo) are the causes of acne. Sebaceous glands swell and sebum production rises in tandem with increased androgen production. The microcomedo may grow into a closed comedo or an open comedo (blackhead). Comedones develop when sebum, naturally occurring oil, and dead skin cells clog the sebaceous glands.[8]

- Propionibacterium acnes, a naturally occurring commensal bacterium, can produce inflammation and inflammatory lesions in the dermis surrounding the microcomedo or comedone, such as infected pustules, nodules, and papules, which can lead to redness, scarring, or hyperpigmentation.[9]

- Environmental factors :

These include things like high humidity, prolonged perspiration, increased skin hydration, and exposure to specific chemicals, such as petroleum derivatives, or dirt or vaporized frying oil.

Drugs :

Acne can be caused by using medications such as phenytoin, isoniazid, phenobarbital, lithium, ethionamide, steroids, azathioprine, quinine, and rifampin.[10]

- **Genetics :**

Acne does not develop according to the traditional Mendelian inheritance pattern, hence its genetic susceptibility is polygenic. There are several

potential genes linked to acne, such as polymorphisms in CYP1A1, Interleukin-1 alpha, and tumor necrosis factor-alpha.[11]

- **Hormones:**

Acne can also result from adolescence and menstrual cycles. Follicle gland enlargement and an increase in sebum production are caused by the rise in androgen levels throughout puberty. The effects of anabolic steroids are comparable. The androgens testosterone, dihydrotestosterone, dehydroepiandrosterone sulfate, and insulin-like growth factor 1 (IGF-I) are among the hormones associated with acne. Acne vulgaris rarely develops in later life, but rosacea, which has comparable symptoms in older age groups, will become more common. Adult female acne vulgaris may result from underlying conditions such as polycystic ovarian syndrome, Cushing's disease, hirsutism, or pregnancy.[12]

- **Stress :**

Research indicates that a higher degree of stress is linked to more severe acne. According to the National Institutes of Health (USA), stress can trigger an outbreak of acne. A study conducted on teenagers in Singapore found a favorable relationship between stress levels and the severity of acne.[13]

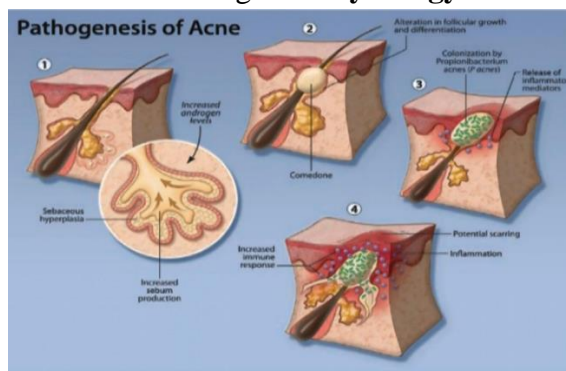
- **Improper diet:**

Although a high-glycemic diet is linked to worsening acne, the exact association between diet and acne is yet unknown. Consuming milk is positively correlated with an increase in the

prevalence of acne. According to reports, eating chocolate and salt is not linked to the onset of acne. Chocolate has a high glycemic load due to its high

sugar content. It's probable that obesity and insulin metabolism are related to acne.[14]

Physiology:



- Pilosebaceous gland illness is the cause of acne. Sebum, aberrant follicular differentiation, hormones, Propionibacterium acne, inflammation, and diet are some of the elements that contribute to the pathophysiology of acne. Hormones: Testosterone and dehydrotestosterone, which promote the growth and differentiation of sebocytes and infundibular keratinocytes during puberty, are the only androgens that play a priming role in the development of acne. Increased dehydrotestosterone (DHT) may cause hyperkeratinization by acting on infundibular keratinocytes.
- Hyperkeratinization in the sebaceous duct and follicular infundibulum is one of the most important processes in the formation of acne lesions. The sebum The lipid-rich secretory product of the sebaceous gland, sebum is produced by sebocytes, which may function as skin immune cells in conjunction with keratinocytes. Sebum production is directly correlated with acne severity¹⁶. The expansion of sebaceous glands brought on by androgen stimulation results in an increase in sebum excretion. Patients with acne have lower amounts of the sebum antioxidant vitamin E and lipoperoxides from the peroxidation of squalene in their sebum.
- The main alteration in the pilosebaceous unit of acne patients is abnormal follicular epithelial differentiation. When desquamated cornified cells in the follicle's upper canal become excessively adherent, they form a retained, microscopic hyperkeratotic plug (the microcomedo) in the follicular canal rather than passing through the regular process of shedding and discharge through the follicular orifice. Comedogenesis is the term for this process. Clinically visible comedones are the result of the microcomedo's progressive enlargement. These can be open comedones, or black heads, which appear flat or slightly elevated and protrude from the follicular orifice; they can also be closed comedones, or white heads, which have a closed overlying surface; or they can be black due to the oxidation of melanin pigment.
- The anaerobic obligatory diptheroid bacteria Propionibacterium acne inhabits the androgen-stimulated sebaceous follicles beneath the epidermis. The pilosebaceous unit's oxidative stress shifts the environment from aerobic to anaerobic, which is ideal for this gram-positive bacterium. Inflammatory acne¹⁸ is the result of it. The aerobic bacteria linked to superficial infections in the sebaceous units, Staphylococcus epidermis, is also a resident of human skin flora.[15]

- **Symptoms:**
- Papules, nodules (big papules), comedones, pustules, scarring, and seborrhea (increased oil-sebum discharge) are among its symptoms.[16]
- Acne's appearance changes depending on the color of the skin, and it's also linked to social and psychological issues.[17]
- Inflammation within the dermis is seen in acne scars, which are produced when wounds heal and collagen deposits in one area.[18]

- **Treatments:**

- **Synthetic drugs:**

- **Salicylic acid:**

- Salicylic acid, a white crystalline chemical, is best at treating inflammation and swelling, blocking pores so that new cells can grow, and reducing the loss of cells that line the oil gland follicles. It also helps break down blackheads and whiteheads.[20]
- Benzoyl Peroxide:

White crystalline peroxide, or benzoyl peroxide, slows down the glands' ability to create oil and kills bacteria. As a peeling agent, it effectively speeds up skin turnover, unclogs pores, and lowers the number of microorganisms in the afflicted area. Doctors have claimed for decades that the "gold standard" for treating mild to moderate acne consists of a topical antibiotic or sulfur-based treatment to combat the bacteria and a deep pore cleaner like benzyl peroxide. Benzyl peroxide is a very gentle topical drug that is frequently used to treat acne. It is safe for pregnant women, children, and adults, according to studies.

- **Sulphur:**

Sulfur is a yellow, crystalline material that effectively breaks down whiteheads and blackheads.

- **Azelaic acid :**
Naturally occurring on healthy skin, azelaic acid is a byproduct of the yeast *Pityrosporum ovale*. It is a non-prescription medication that

comes in gel or cream form. When used directly to the skin, it works by removing dead skin cells, which keeps pores from becoming clogged. Is a naturally occurring saturated dicarboxylic acid that is present in wheat, rye, and barley. It helps individuals with dark complexion recover dark spots on their face and severe acne areas that leave brown marks.[19]

Disadvantages of synthetic drugs on skin :

- Topical drugs: Dryness, irritation, burning, stinging, and peeling of the skin
- Oral drugs: upset stomach, lightheadedness, dizziness, elevated blood clot risk, depression, suicidal thoughts, changes in liver function, and changes in cholesterol levels
- Isotretinoin: Damages the liver and raises blood pressure in the brain, which can cause vision issues, irreversible blindness, and in extreme situations, death. Additionally, it may result in sun sensitivity, dry lips, dry skin, dry mouth, and dry nose.
- People with gout or high uric acid levels should not take thiazide treatment.
- Increased chance of adverse consequences from birth control tablets, such as heart attacks, strokes, and potentially fatal blood clots in the lungs or legs[21]

Due to various side effects of synthetic drugs on skin, consumers generally prefer natural drugs over synthetic drugs.

- **Natural drugs :**

- ✓ winter green leaves
- ✓ cucumber peels
- ✓ Alo vera gel
- ✓ Butterfly pea flower
- ✓. Almond seed oil
- ✓ Neem
- ✓ Manjistha
- ✓ Tea tree oil
- ✓turmeric



Winter green leaves :



- Plant components (flowers, buds, seeds, leaves, twigs, bark, herbs, timber, fruits, and roots) provide aromatic, oily liquids known as essential oils or volatile oils. They can be obtained using the most widely utilized method for commercial production, steam distillation. Certain oils have been utilized in the treatment of cancer.[22]
- The Ericaceae family includes the small, low-growing shrub *Gaultheria procumbens* L., also known as the eastern teaberry or American wintergreen. It is indigenous to northeastern North America. For hundreds of years, the plant has been used in traditional medicine to treat conditions related to inflammation or infection, particularly fever, influenza, rheumatoid arthritis, and the common cold.[23]
- Genus name – *Gaultheria*
- Species name – *Gaultheria procumbens*
- Family – Ericaceae
 - Other Common Names
 - Winterberry
 - Checkerberry
 - Tea Leaf
 - Deer berry
 - Box berry
 - Eastern teaberry
 - Geographical source :

It is indigenous to northeastern North America, extending from Newfoundland to Alabama and west to southeastern Manitoba.

- Chemical constituents:

- 1) Methyl salicylate : 96.90%
- 2) cyclic monoterpene hydrocarbon : limonene 2.17%
- 3) Monoterpene hydrocarbon: Beta pinene , alpha pinene, sabinin and myrcene – 0.64%
- 4) oxygenated Monoterpene : fenchone and menthone

- **Mechanism Of action of methyl Salicylate :**

1. Keratolytic Action: Methyl salicylate softens and removes the stratum corneum, the outermost layer of skin, by acting as a keratolytic agent. The main cause of acne, pore blockage, is lessened by this exfoliating action. It maintains pores open and encourages a smoother skin surface by eliminating dead skin cells, which lessens the development of comedones (blackheads and whiteheads).
 2. Anti-inflammatory Activity: Because methyl salicylate inhibits the activity of cyclooxygenase (COX) enzymes, it possesses anti-inflammatory qualities. It lessens acne lesions' redness, swelling, and irritation by lowering the synthesis of pro-inflammatory mediators such as prostaglandins.
 3. Antimicrobial Effect: Methyl salicylate has modest antibacterial qualities that aid in preventing the growth of microorganisms that cause acne, including *Propionibacterium acnes* (formerly known as *Cutibacterium acnes*). Inflammation and the chance of developing fresh acne are reduced by this decrease in bacterial burden.
 4. Decrease in Sebum Production: Methyl salicylate may also affect the sebaceous glands by somewhat lowering the production of sebum, or oil, which is a major contributing cause to the development of acne. Reduced sebum production lessens the likelihood of clogged pores and helps manage oily skin.
- **Properties of winter green leaves :**
 - Antiseptic

- Astringen
- Antipyretic
- anti inflammatory
- analgesic
- Antispasmodic
- hepatic regeneration
- platelet aggregation inhibitor[24]
- **Uses :**



- **Action and uses :**

- Similar to aspirin, wintergreen oil can have an analgesic effect when applied directly to the skin.
- When alcohol is combined with wintergreen essence, it also exhibits antipyretic properties.
- It is highly effective in treating sporadic fever.
- Additionally, this can be used to treat rheumatism and other sexually transmitted diseases like gonorrhea.
- Wintergreen oil is useful for chronic cystitis, subcutaneous pain, and trigeminal neuralgia.
- In the aforementioned situations, this oil is applied as liniments and ointments to relieve discomfort.
- Several foods and drinks, candies, and tooth paste also include this ingredient.
- They are utilized in perfumery to create woody, forest-inspired scents.
- **Cucumber peels:**



- Cucumber peels have various health benefits, so don't throw them away. Constipation, vitamin A and C deficiencies, eye diseases,

and disorders of the bones and muscles are among the advantages.

- Minerals including magnesium, potassium, and silica can be found in cucumber peels, which are also high in fiber.
- Silica is necessary to maintain the health of your tendons, muscles, and bones. Additionally, it moisturizes our skin and enhances our complexion and vision.
- Genus name : cucumis
- Species name : cucumis sativum
- Family : Cucurbitaceae
- Geographical source :

Asia, which includes China, Bangladesh, India, Nepal, and Northern Thailand, is home to Cucumis sativus. A similarly related wild species, C. hardwickii, is still found in the foothills of the Himalayas, where it is thought to have originated.

- **Chemical constituents:**

1) Phenolic compounds :

flavanoid (quercetin)

Tannins

Caffeic acid

2) **Vitamins:**

vitamins c. (Ascorbic acid)

Vitamin k

Beta carotene

3) **Minerals :**

silica

Potassium

Magnesium

4) Cucurbitacins

5) Ligands

6) Fiber

Mechanism of action of cucurbitacin :-

1) Anti-inflammatory Action:- Inhibition of Pro-inflammatory Cytokines: TNF- α (tumor necrosis factor-alpha), IL-1 β (interleukin-1 beta), and IL-6 (interleukin-6) are among the pro-inflammatory cytokines that cucurbitacin inhibits. Redness, edema, and inflammation related to acne are lessened with cucurbitacin by blocking these inflammatory chemicals. Suppression of the NF- κ B Pathway: Cucurbitacin has the ability to block the NF- κ B (Nuclear Factor-kappa B) pathway, which is an important inflammatory regulator. The inflammatory reaction that causes acne lesions to form is lessened by this activity.

2) Antimicrobial Properties: -

Inhibition of Bacteria Causing Acne: Cucurbitacin has antimicrobial effect against bacteria that are frequently linked to acne, such as *Propionibacterium acnes* (now *Cutibacterium acnes*). By lessening bacterial colonization on the skin, this lowers the chance of acne lesions forming.

3) Antioxidant Activity:-

Decrease in Oxidative Stress: Cucurbitacin reduces oxidative stress in the skin by scavenging free radicals. Acne can result from oxidative stress, which can harm skin cells and exacerbate inflammation. Cucurbitacin promotes a clearer complexion by shielding skin cells from this harm.

4) Control of the Production of Sebum:

Prevention of Lipid Synthesis Cucurbitacin may moderate the production of sebum (oil) via influencing lipid metabolism in the skin,

albeit this is not its main mechanism of action.

One typical cause of acne is clogged pores, which can be avoided with reduced sebum production.[25]

Properties of cucumber peels :-

- Antioxidant properties
- Anti-inflammatory effect
- Antibacterial activity
- Hydration and astringent effect
- Cooling and soothing effect
- Mild exfoliating effect

Beneficial for the skin: Cucumber peels helps in revitalizing the skin from within. Regular application of cucumber-based face packs or grated cucumber appears to be effective in reducing the signs of skin aging. It is also good for your dark circles, open pores, blemishes, etc. Reverses Skin Tanning Cucumber has a mild bleaching property that can help you get rid of skin tan. Just grate the cucumber and apply the juice on your face and you're all set to face harsh UV rays. [26]

CONCLUSION: -

In conclusion, natural ingredients that are said to have positive skin care effects include cucumber peels and winter green leaves. It is said that antioxidants, antimicrobials, antibacterials, and anti-inflammatory properties restore skin hydration and prevent aging. Even if the market is filled with synthetic pharmaceuticals, consumers typically prefer to utilize natural drugs because of the negative effects they have on their skin.

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