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NATURE'S CURE: A COMPREHENSIVE REVIEW OF MEDICINAL PLANTS IN THE TREATMENT OF ACNE VULGARIS

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ABSTRACT

Acne vulgaris affects a wide range of age groups and gender identities the worldwide, leading to significant impacts on both the physical and mental well-being. Conventional acne remedies usually involve medications that fight inflammation and bacteria, still concerns about resistance to antibiotics and negative side effects have led to increased interest in alternative remedies such as herbal treatments. This review explores the usage of various medicinal plants for treating acne, with a focusing on their healing properties and mechanisms of action. These herbs can address the root causes of acne, like bacteria, inflammation, and sebum, with no adverse effects seen in synthetic medications. The evaluation implies that integrating these natural treatments in acne management could offer a safer, more thorough approach, yet more clinical studies are needed to confirm their efficacy and improve their therapeutic advantages.

KEYWORDS: Acne vulgaris, Herbal remedies, Skin health, Natural treatment, Propionibacterium acnes.

INTRODUCTION

Acne, belonging to a group of skin conditions, is a highly common dermatological disorder worldwide. It typically impacts nearly everyone at some point in their life.[1] Acne vulgaris, also known as acne, is a contagious condition and one of the most common illnesses in

humans. It is distinguished by various regions of the scaly red skin (seborrhea), small pimples (papules), clogged pores (comedones), large pimples (nodules), and the occasional scarring (piples). Severe acne is commonly characterized by inflammation, although it can also be non-inflammatory. Acne can causes alterations in skin structures of the pilosebaceous unit, which includes hair follicles and sebaceous glands. Typically, these modifications necessitate the presence of androgen stimulation.[2,3] Acne is currently the most prevalent skin condition. In this skin condition that lowers a person's self-confidence about how they looking and typically starts during the puberty and teenage years.[4] Because of the acne vulgaris lasts for a long time and keeps coming back, some experts believe it is a chronic condition. It not only causes by the physical symptoms like pain and itching, but also has a psychological impact on patients, reducing their quality of life. Acne vulgaris impacting the face, a crucial organ for social interaction, can diminish self-esteem and lead to lasting harm in their social interactions.[5] Acne occurs when the sebaceous glands become is too active, causing the skin condition. Both genders man and women are impacted by this condition with no gender bias, however, males are tend to experience more intense symptoms.[6,7] Excessive sebum production causes blockages in the canals, leading to the formation of pimples. Having the canals. When the process is obstructed, acne occurs due to an excess of the bacteria Propionibacterium acnes (P. acnes). The bacteria mentioned releases enzymes which disrupt.[8] Skin blemishes appearing mainly on the face caused by an excessive production of sebum. Blockages in the canals will result in an excessive increase of the bacteria that causes acne. The propionibacterium acnes has been acknowledged to the primary factor contributing to the occurrence of acne vulgaris[9] Growing interest has been seen in using medicinal plants as an adjuvant or alternative therapy for acne vulgaris during the past few decades. This interest arose from the desire to reduce the rate at which bacteria become resistant to currently available antibiotics, eradicate or lessen the possibility of side effects from conventional medicines, promote medication adherence, and deal with insufficient responses to treatment.[10]

ETIOLOGY

Acne development (microcomedones) is influenced by follicular obstruction, hyper keratinization, sebum production, and keratin plug formation. When testosterone synthesis increases, sebaceous glands enlarge and sebum production increases. The smallest acne lesion, known as a microcomedo (which can develop into an open comedone, or blackhead), or a closed comedone, depends on how big it gets. Sebum, a naturally produced oil, and dead

skin cells, produce comedones by clogging sebaceous glands. Infection related the pustules, nodules, and papules in the dermis around the microcomedone or comedone can causes the inflammation and inflammatory lesions. From the Propionibacterium acnes, a commensal bacterium that occurs normally and can lead to redness, scarring, or hyperpigmentation.[11]

The development of the disease involves multiple factors, with four main ones being responsible for its progression.

(a) Excess androgens lead to comedo formation due to abnormal overproduction of keratin in the hair follicle and oil gland duct.

(b) Elevated levels of androgens lead to higher sebum production from enlarged sebaceous glands.

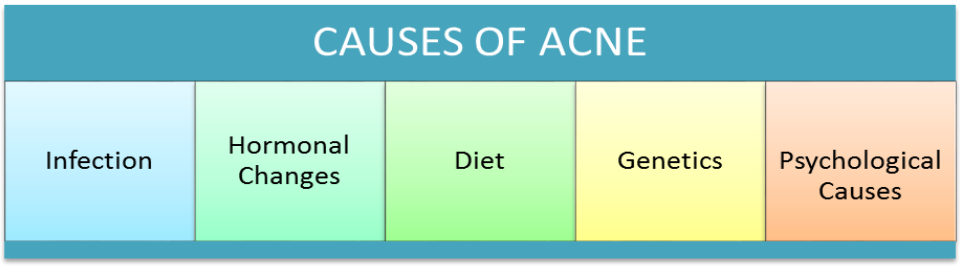
(c) The colonization and growth of bacteria in the duct, typically P. acnes, are common in cases of AV, although conclusive evidence of a direct link between P. acnes and AV is not available.

(d) The immunological activity of P. acnes triggers an inflammatory response.[12]

Causes of Acne

Acne is a commonly seen skin disorder, that impacting a large number of people, particularly the adolescents. Additionally, the factors contributing to acne can vary based on each individual's circumstances.[13]

Table 1: Acne causes.



1. Infectious contribution - Acne vulgaris has been linked to propionibacterium acnes and staphylococcus aureus. Their precise roles in the development of acne are unclear, though P. acnes substrains can cause normal skin. As a result, it’s unclear if these strains are pathologically acquired or related to this illness
2. Hormonal changes - Hormonal changes during the adolescence period and the menstrual cycle seem to have an impact on the development of acne vulgaris. During the puberty

and pregnancy, increases the levels of androgens result in the follicular glands producing more sebum. In general, the use of anabolic steroids results in similar effects.[14]

3. Dietary contribution – Vitamin A is crucial for maintaining the health of the skin. Lack of vitamin A leads to unusual eye adjustments in darkness and significantly impacts skin health, showing signs like dry skin, hair, and brittle nails due to vitamin A deficiency. There is insufficient high-quality research to determine the association between food and acne studies have shown that consuming a diet high in glycemic index can worsen acne vulgaris. A positive correlation has been proposed between the consumption of chocolate, milk, or salt and the exacerbation of acne vulgaris. Research has also indicated a correlation between weight and acne.[15]
4. Genetic contribution –Specific genes are linked to the appearance and seriousness of acne because they are connected to immune and inflammatory reactions. The interleukins (IL) are a prominent example, with current studies mainly focusing on IL-1α, IL-1β, IL-4, IL-6, IL-8, IL-10, and other interleukins. Genetics also play a role in how easily your pores clog. An individual may inherit a predisposition to produce excess dead skin cells and shed them in a manner that blocks your pores. When this results in breakouts, it can be considered as hereditary acne. One may have hereditary tendency to overproduce dead skin cells and then shed them in a way that clogs your pores. When this leads to breakouts, you can think of it as genetic acne.[16]
5. Psychological contribution - Stress has been identified as a component linked to acne flare-up and some scientific experts have shown a correlation between acne severity and elevated stress levels. Some other research has questioned the link between stress and acne vulgaris.

CLASSIFICATION AND DESCRIPTION OF ACNE

Type of acne

Acne vulgaris is a condition where the pilosebaceous unit becomes inflamed in skin regions with a high concentration of sebaceous glands, such as the face, chest, and back. Propionibacterium acnes can exacerbate the reaction of the sebaceous glands to normal levels of androgens in the body, resulting in acne.[17]

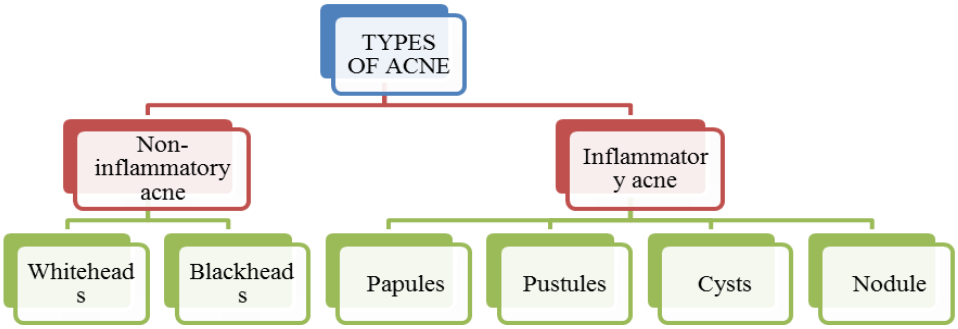


Figure 1: Types of Acne.

Acne vulgaris is graded by the Indian tradition by it means of a simple grading system, which classifies acne vulgaris into the four grades given in table below.[18]

Table 2: Grading of acne vulgaris.

Sr No	Grade	Description
1	**Mild (Grade I)**	The mildest form of acne with symptoms of blackheads or whiteheads, milieu and minor pimples which has no inflammation and can be treated with OTC. Products.
2	**Moderate (Grade II)**	Comprised of numerous blackheads and whiteheads, along with frequent papules and pustules. Can be managed using non-prescription medications as well..
3	**Severe (Grade III)**	Moderate to severe acne characterized by widespread papules and pustules, exhibiting redness and inflammation..
4	**Very Severe (Grade IV)**	This is also called as cystic acne. This is the most severe category of acne. The skin will show signs of numerous pustules, nodules, cysts, blackheads and whiteheads. The inflammation and breakouts tend to bodily areas in addition to the face..

Propionibacterium Acnes is the primary microorganism found in the follicle and plays a role in causing acne. It thrives in anaerobic environments and feeds on sebum. Employees. Aureus, P. Orbiculare and occasionally Demodex Follicularum can be found, but they do not impact the inflammation process. The inflammation caused by the growth of P.Acnes is responsible for the development of inflammatory acne lesions like papules and pustules.[19]

Traditional treatments for acne

One of the main goals in treating acne vulgaris is to control sebum production, abnormal skin cell growth in hair follicles, and the bacteria that causes infection, in order to manage and treat existing lesions. The primary methods for treating acne typically involve using anti-inflammatory and antibacterial medications.[20,21]

Advantages of Herbal Medicines / Benefits of using natural remedies[22]

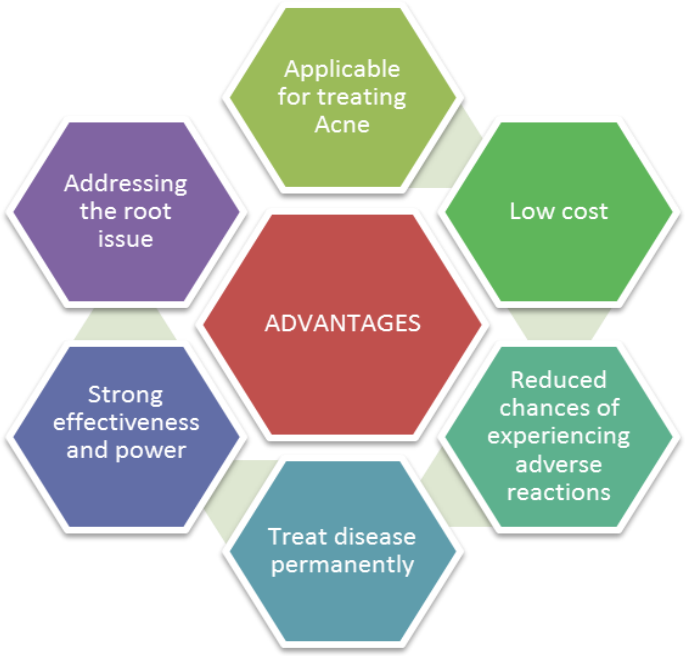


Figure 2: Advantages of herbal plant medicine.

MEDICAL TREATMENT

Acne is managed with topical, as well as systemic treatment options. Patients respond in various ways to treatment. numerous methods. Acne is typically managed with a mix of different approaches, and personalized treatments. Clinical evaluations show that patients with only comedomes benefit the most from retinoids. Therapy is the foundation. They have the ability to decrease the number of comedones (40-70%) and inflammatory lesions. Effective response rates have been shown for other treatments, such as isotretinoins and hormone therapy. Patients with mild to moderately severe inflammatory acne, along with papules, should seek advice and treatment. Pimples can be managed with topical antibiotics and retinoids. The primary treatment option for patients with moderate to severe symptoms. An oral antibiotic is used to treat severe inflammatory acne. In situations of severe nodular acne, repeated flare-ups, ineffective treatments In cases of severe mental distress, treatment with oral isotretinoin is recommended. The medication that yields the best results is isotretinoin may be recommended to avoid the emergence of bacterial resistance caused by Extend the duration of antibiotic treatment, whether topical or oral. Isotretinoin is an extremely potent teratogen that requires strict monitoring. Taking care in women of reproductive age. Following treatment with isotretinoin, the rates of recurrence may differ 15-30% of something. Additionally, conventional topical treatment is usually not successful for women showing symptoms of excessive levels of androgens. Women who have large nodules

on their lower face and neck, and those who mention Individuals experiencing a sudden increase in facial acne before their period may benefit from hormone therapy. Nevertheless, none of them There are no side effects in the methods. Acne can also be treated by the use of medicinal plants. Due to lower toxicity and side effects, herbal medicine is becoming popular when compared to the allopathic. The natural system of medicine focuses on the entire body and treat the root cause of acne, whereas the allopathic focuses on treating the symptoms like inflammation, redness, etc.[23,24]

Herbal Plant with Anti-Acne Activity

Following are the medicinal plants used in the treatment of Acne Vulgaris.

Azadirachta Indica Linn: (Neem)

Figure 3.

Azadirachtaindica, also called Neem, is a member of Family Meliaceae is considered to be highly adaptable in terms of medicinal uses. plants that have become globally significant because therapeutic and insecticidal qualities.[25] A number of research demonstrating the impacts of Azadirachtaindica on models in experimental and clinical settings. The Neem plant has potent anti-inflammatory and anti-fungal properties. dewormer, bug spray, germ killer, fungus fighter anti-viral, anti-septic, anti-inflammatory, and anti-ulcer properties. enhances the immune system's overall defensive capabilities. Outwardly, it appears to be the oil used as a germicide for hives and long-lasting illnesses such as eczema, scabies, ringworm, and infested with maggots injuries. It is also utilized as an insecticide for exterminating lice, fleas, and ticks. and proliferation of bacteria in the oral cavity.[26]

Chemical components:. It includes diterpenes such as stigmasterol, triterpenes, and several cyclic tri and tetrasulphides. An active ingredient found in neem oil is known as Nimbidin.

Neem leaves contain margolone, margolonone, and isomargolonone as their primary components.[27]

Curcumin

Figure 4.

Curcumin, a vibrant yellow chemical compound, is extracted from turmeric plants Curcuma longa L. belonging to the Zingiberaceae family.[28,29] It is widely distributed all over Asia, including India. Curcuminoids, a highly concentrated essential oil, are the primary component of curcuma longa, they have high content of the bisatiolane derivatives. According to studies on curcumin, it has remarkable anti- inflammatory properties.[30,31]

Papaya

Figure 5.

Papaya (Carica papaya Linn.) is an evergreen tree that belongs to the family Caricaceae Papaya fruit, peel, leaves, and seeds are abundant in vital enzymes that have amazing topically applied therapeutic qualities for treating a variety of skin ailments.[32] Literature data have discovered that Papayas are able to restore and revitalize skin. Papain, an enzyme found in papaya fruit, aids in exfoliation. This translates to "removing damaged skin and dead cells". The addition to being utilized to reduce pus formation, raw papaya juice alleviates enlarged acne.[33,34]

(Tulsi)

Figure 6.

Ocimum sanctum Linn. or Ocimum tenuiflorum L. (Family Lamiaceae) Ocimun sanctum commonly known as Tulsi in Hindi and Holy basil in English is a very important plant in India and is used extensively in Ayurveda.[35-36] When evaluated in trials as an antibacterial therapy, holy basil essential oil produced positive results. Good antibacterial activity has been demonstrated by this essential oil at low dilutions. The compound basil called linolenic can obstruct the mechanism of arachidonate pathway of cyclooxygenase and lipoxygenase that might be in charge of the anti-inflammatory activity of the oil as a result in charge of acne related reduction of inflammation.[37–39]

(Tea tree)

Figure 7.

The tea-tree, or *Melaleuca alternifolia*, is a tall shrub or tree in the Melaleuca genus of plants family Myrtaceae. It is indigenous to Australia and can be found along the north coast and in nearby New South Wales.[40] Additionally, it thrives beside streams and in marshy flats. and it frequently serves as the dominating species in its habitat. Tea A broad-spectrum agent against Gram-positive bacteria is tree oil. and resistant to S. aureus, as well as Gram-negative bacteria to yeasts such Candida albicans in vitro and methicillin. It's The attribution of the mechanism of action to monoterpenes, which interfere with the integrity of the plasma

membrane obstacle. In addition to its antibacterial properties, tea tree oil anti-inflammatory properties and monocyte activators. Applying little amounts of tea tree oil topically has anti low-side acne activity.[41]

Indian hemp/ marijuana

Figure 8.

Cannabidiol (CBD) is a non-psychoactive biochemical constituent of the *Cannabis sativa* (hemp) plant.[42] In recent years, the investigation and use of CBD for its anti-inflammatory and immunomodulatory effects has become extensive amongst the scientific community. This leaf powder Plant material works wonders for dressing cuts and sores. Tweed External application of sativus extract helps itch people feel better skin. Seed oil fortifies and enhances skin elasticity. capable of withstanding viral, bacterial, and fungal infections.[43,44]

Aghara

Figure 9.

Achyranthes aspera (common names: chaff-flower, family Amaranthaceae.[45] The traditional uses of this medicinal plant include treating scabies, boils, acne vulgaris, and other skin conditions. Alkaloid, non-alkaloid, and saponin Libid components isolated from this plant's leaves have significant early-stage inhibitory action on the Epstein-Barr virus Raji cells' antigen activation, with the most inhibitory 60% survivability and 96.9% activity were

reported for the non-alkaloid portion, which is made up of non-polar substances. Within the in Two-stage in vivo mouse skin carcinogenesis test reveals the overall Methanolic extract demonstrated a strong anti-carcinogenic effect genic (76%). According to the findings, the leaf extract and the non-alkaloid fractions had useful anticancer properties boosters of the development of cancer. The plant possesses insufficient both has contraceptive action and possesses qualities in rodents. This may be because to its strong estrogenic properties.

Onion

Figure 10.

An onion, also called the bulb onion, comes from the Latin word cepa which means "onion" (Allium cepa L.) Family: Amaryllidaceae.[46] Patients with seborrheic keratosis have demonstrated improvement in the appearance of their scars after using onion extract gel. There is evidence that this extract gel enhances the scar's appearance. Appearance by enhancing its texture, redness, and suppleness four, six, and ten weeks following the extraction, at the excision location years old. The antibacterial and antifungal properties of the antifungal qualities of A. sativum and A. cepa were discovered against Candida albicans, Malassezia furfur, and a few more Candida sp. and some dermatophytes strains and microorganisms associated with acne vulgaris. The outcomes showed that A. sativum and cepa may show promise in the treatment of illnesses linked to bacteria and fungi.[47,48]

Tailpatra/ Nilgiri Taila

Figure 11.

Eucalyptus globulus, commonly known as southern blue gum blue gum, is a species of flowering plant in the family Myrtaceae.[49] In one study, the antimicrobial properties of 29 different species of Eucalyptus leaves were investigated. Eucalyptus globulus, E. maculata, and E. viminalis extracts were able to help prevent six gram-positive bacteria from growing, including Bacillus cereus, Enterococcus faecalis, S. aureus, and P. acnes and the fungus Trichophyton, as well as Alicyclobacillus acidoterrestris mentagrophytes; nevertheless, they failed to exhibit a potent inhibitory action against germs that are gram-negative. a part of E. Moreover, maculate (8-desmethyl-eucalyptin) exhibited potent inhibitoryanti-microorganism action against the aforementioned isms. The writers deduced that extracts from eucalyptus and A few parts that were separated from this plant have an inhibitory impact on the microbes that cause athlete's foot and acne certain fungal infections and foot infection.[50]

Birch tree

Figure 12.

Betula alba Linn is the scientific name of the white birch tree. The plant has been extensively studied from both a chemical and pharmacological perspective.[51] We are examining the chemical composition of different parts of Betula alba to understand the diverse pharmacological effects they exhibit due to their various plant constituents. It is primarily located in the U.S, Canada, and Europe. Betula alba's bark is primarily utilized in the treatment of acne, eczema, psoriasis, and various other skin conditions. skin conditions. Guaiacol is the primary components that are accountable. betuloside, betulin, sakuranetin, terpenoids, salicylic acid and essential oils.[52]

Prince’s feather

Figure 13.

Amaranthus hypo- can be referred to as *Amaranthus hypochondriacus* Linn's chondriacus *and A. cruentus* Linn. (Family: Amaranthaceae) belongs to originating in China and Mexico.[53] A potent antimicrobial peptide was discovered in the medicinal plant Amaranthus tricolor, showing high effectiveness against E. coli. This peptide was chosen following examination of the protein fraction from A. tricolor and identified as having strong antimicrobial properties. Amaranth plant seeds and leaves have been utilized successfully as a way to tighten skin and be effective cleanse for a variety of skin issues like acne from eczema to psoriasis (Heinerman, (1996). The Saponin is a component that is essential to skin care.[54]

CONCLUSION

Herbal remedies use to treat acne vulgaris is a promising option that can overcome the challenges of antibiotic resistance, side effects, and inconsistent treatment outcomes associated with traditional treatments. Herbal p lants have demonstrated strong antibacterial, anti-inflammatory, and skin-healing effects that specifically address the underlying triggers of acne. These organic remedies not just decrease inflammation and bacterial proliferation but also aid in regulating excessive sebum production, offering a comprehensive method for managing acne. Although herbal remedies have promise as safer and effective options, additional research and trials are necessary to confirm their effectiveness, set dosages, and fully incorporate them into common acne treatments. Blending contemporary scientific verification with ancient wisdom can lead to creative, holistic remedies in skin care.

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