

## AN OVERVIEW ON ANTIACNE ACTIVITY OF MEDICINAL PLANTS

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Article Received on 05/10/2022

Article Revised on 26/10/2022

Article Accepted on 16/11/2022

### ABSTRACT

Acne vulgaris is the skin condition that affects people the most often in a generation. Acne vulgaris is a common chronic skin condition that affects the hair follicles and sebaceous gland that they are attached to. Teenagers and young adults are the age groups when acne most frequently occurs and manifests as red, painful bumps with pus-filled pimples. Some medicinal plants are readily available and safer than others, making them suitable anti-acne treatments. Herbs with varied antibacterial, anti-inflammatory, antifungal, and antioxidant properties have been used to treat acne. Overall, compared to modern pharmaceuticals, herbal therapy is still far more affordable and safe. Therefore, in the current environment, there will be a greater need for herbal therapeutic products than for synthetic ones.

### INTRODUCTION

#### Herbal cosmetics

There will be desperate changes in the society are clearly seen in all parts of the world for enormous application of cosmetics for the most part in 21st century. The world cosmetics is derived from Greek word "KOSMETICOS" which define adorn and preparation.<sup>[1]</sup> Cosmetics are external preparation meant for to apply on external part of body that is nails, skin, hair for colouring, covering, softening, cleaning, nourishing, waving setting, mollification, preservation, removal and protection.<sup>[2]</sup> Cosmetics can be applied by rubbing, pouring, sprinkling or spraying on human body or any part for cleansing, beautifying, promoting attractiveness altering appearance.<sup>[3]</sup>

Cosmetics are the chemical compounds derived from either natural sources or synthetically created products. Cosmetics are those designed for personal care and skin care which is used to protect the body skin.<sup>[4]</sup> These are also designed to enhance the persons appearance and also used to conceal blemishes by enhancing the persons natural features such as eyebrows, eyelashes. Cosmetics are also mainly designed to enhance the fragrance of the body.<sup>[5]</sup>

Medicinal plants by virtue of their safe nature and easy availability may lend themselves as potential anti-acne therapy. The present review deals with the proven medicinal plants to treat acne.<sup>[6]</sup>

#### Acne

Acne is an inflammatory disorder of the pilo sebaceous unit, which runs a chronic course and it is self-limiting. In adolescence Acne vulgaris is triggered by Cutibacterium acne under the influence of normal circulating dehydroepiandrosterone (DHEA). It is a prevalent skin disorder which can exist with inflammatory and non-inflammatory contusion predominantly on the face but can also occur on the upper arms, trunk and back.<sup>[7]</sup>

Acne, also familiar as acne vulgaris, is a long-term skin condition that arises when dead skin cells and oil from the skin congest hair follicles. Acne is a habitual skin constrain where the pores of skin become impassable by hair, sebum bacteria and dead skin cells, those blockages give rise to blackheads, whiteheads, nodules and other types of papules.<sup>[8]</sup> Most teenagers will have papules at some point. Some only have a few small papules that disappear early. Others develop relentless and distinctly visible acne. This can be very traumatic, peculiarly in puberty.<sup>[9]</sup>

It is the most common skin disease worldwide, being specifically common in adolescents and young adults. However, it can also affect toddlers and adults at any age. This assess the pathophysiology, topical and oral treatments, therapeutic approaches and evolving therapeutics for acne. Acne vulgaris, a disease of pilosebaceous follicles is an extremely common clinical problem.<sup>[10]</sup> In societies, acne vulgaris is a nearly universal skin disease, affecting 79% to 95% of the

adolescent population. Though it is more prevalent among men than women at age 18, beyond the age of 23 clinical acne is more prevalent among women as the prevalence in men gradually declines. At 40 to 49 years, 3% of men and 5% of women still have definite, mild, clinical acne, and at 50 to 59 years, 6% of men and 8% of women have physiologic acne.

Four major factors are involved in the pathogenesis:

- Increased sebum production
- hyper cornification of the pilosebaceous duct
- abnormality of the microbial flora, especially colonization of the duct with *Propionibacterium* acnes
- inflammation.<sup>[11]</sup>

The sebum produced by acne patients has been shown to be deficient in linoleic acid, an essential fatty acid. This deficiency is associated with retention hyperkeratosis of the pilosebaceous follicle. Once the follicles have been congested bacteria, especially the Gram-positive anaerobic diphtheroid *P. acnes*, which inhabit the follicles at puberty but do not attack living tissue, produce lipases, which hydrolyse sebaceous gland triglycerides into free fatty acids. These acids, in grouping with bacterial proteins and minutes of keratin are then extruded through the dilated follicular wall into the dermis, producing a neutrophilic inflammatory response.<sup>[12]</sup> The process is mediated by production of interleukin-1 $\alpha$  and tumour necrosis factor alpha by keratinocytes and T-lymphocytes with resultant increased proliferation of keratinocytes, reduced apoptosis and consequent hyper granulosis. Circulating androgens are also of importance in acne vulgaris, the expansion of the disease at puberty coinciding with rise in the levels of circulating androgens. Androgens directly stimulate sebum secretion and also hair growth.<sup>[13]</sup>

*P. acnes* are anaerobic obligate diphtheroid that reside below the surface of human skin and populate the androgen stimulated sebaceous follicles. The oxidative stress within the pilosebaceous unit changes the environment from aerobic to anaerobic which is the best suited for this Gram-positive bacterium. It causes inflammatory acne. *Staphylococcus epidermidis* is also the resident of human skin flora and is the aerobic organism accompanying with superficial infections within the sebaceous units.<sup>[14]</sup>





Nutrition is also an important aspect in acne treatment as certain vitamins, minerals, and supplements can be taken in combination with the standard treatment to help clear up acne faster. Brewer's yeast, zinc, fatty acids and vitamins A and B have been shown to reduce the severity of acne. Avoidance of chocolate, fats, sweets, and carbonated beverages was commonly recommended as part of the treatment for acne. However, these dietary restrictions are no longer part of standard medical treatment, as little evidence has been found to link the consumption of these foods to the incidence of acne.

Certain drugs have also been noted to cause or exacerbate acne, including lithium, hydantoin, topical and systemic glucocorticoids, oral contraceptives and androgens. Occlusion and pressure can exacerbate acne. Acne mechanica is a form of acne caused by heat, pressure, occlusion of the skin, and repetitive frictional rubbing against the skin.<sup>[15]</sup>





#### ADVANTAGES OF ANTIACNE






- Antibacterial, anti-inflammatory, anti-oxidant activity.
- Decreasing the excess sebum production
- Correcting altered follicular keratinisation.
- Clears clogged pores of impurities, oil and dust.
- Treats active acne and prevents further breakouts.<sup>[16]</sup>






## List of some medicinal plants related to anti acne activity.

SL. NO	COMMON NAME	BIOLOGICAL SOURCE	FAMILY	CHEMICAL CONSTITUENTS	PARTS TO BE USED	USES	IMAGES	Ref No
1	Aloe Vera	Aloe barbadensis	Liliaceae	Saponins, Lignin, Amino Acids	Leaves	Skin Abrasions, Minor Burns		[17]
2	Indian Gooseberry (Amla)	Emblica Officinalis Gaerth	Euphorbiaceae	Ellagic Acid, Gallic Acid	Fruit, Seeds	Antiaging, Cancer Prevention		[18]
3	Devils Horsewhip	Achyranthes Aspera	Amaranthaceae	Triterpenoids, Oleanolic Acid	Seeds, Leaves	Treatment of cough, acne vulgaris		[19]
4	Honey	Apis Mellifera	Apidae	Fructose, Glucose	Juice	Anti-oxidant, Anti-inflammatory		[20]






5	Onion	Allium Cepa	Amaryllidaceae	Allicin, Quercetin	Bulb	Reduce Cholesterol		[21]
6	Neem	Azadirachta Indica	Meliaceae	Azadirachtin, Nimbin	Flowers	Anticancer, Antianthelmintics		[22]
7	Hemp	Cannabis Sativa	Cannabaceae	Cannabidiol, Cannabinol	Seeds	Anti-inflammatory, Antimicrobial		[23]
8	Rosemary	Rosmarinus officinalis	Labiatae	Cineol, Camphor	Leaves, Twigs	Antibacterial, Antioxidant		[24]

9	Blue Gum	<i>Eucalyptus globulus</i>	Myrtaceae	Eucalyptol	Leaves	Antiseptic, Antioxidant		[25]
10	Tea Tree	<i>Melaleuca Alternifolia</i>	Myrtaceae	Terpinen-4-ol 1,8-cineole	Leaves	Treatment of nail fungus, insect bites and acne		[26]
11	Pepper	<i>Piper longum</i>	piperaceae	Piperin, Piperlongumine	Dried roots	Chronic bronchitis, respiratory infection		[27]
12	Bitter Almond	<i>Prunus amygdalus Batsch var. amara</i>	Rosaceae	Fixed oils protein, bitter glycoside amygdalin	seeds	To treat cough, spasms		[28]




13	Pomegranate	<i>Punica granatum L.</i>	Lythraceae	Flavonoids Alkaloids	seeds flowers	Antiacne Anticancer		[29]
14	Black Cumin	<i>Nigella sativa</i>	Ranunculaceae	Thymoquinone dithymoquinone	seeds	Antihypertensive Antibacterial		[30]
15	Olive	<i>Olea europaea Linn.</i>	Oleaceae	Oleuropein, Hydroxytyrosol	Fruit	To treat heart disease, diabetes		[31]
16	Henna	<i>Lawsonia inermis</i>	Lythraceae	2-hydroxy-1,4-naphthoquinone	Leaves	Used in cosmetics, hair dyes, hair care		[32]
17	Camphor	<i>Cinnamomum Camphor</i>	Lauraceae	D-Camphor 1,8-cincole	Bark and wood of campharee	Reduce cold sources, Hemorrhoids		[33]

18	Lemon	Citrus limon	Rutaceae	Limonene, Terpinene	Lemon peel	Antioxidant, Source of vitamin		[34]
19	Coriander	Coriandrum, Sativum Linn.	Umbelliferae	Cinalol, Camphor	Seeds	Flavoring agent, Anti-oxidant		[35]
20	Tulsi	Oscimum Sanctum	Lamiaceae	Rosemarinic Acid, Eugenol	Leaves	Antiaging, Remove Blackheads		[36]
21	Ashwagandha	Withania Somnifera	Solanaceae	Withanalide, Withaferina, Withanone.	Roots and Berry	Antibacterial, Anti-inflammatory		[37]
22	Vitellaria (Shea tree)	Butyrospemum paradoxum	Spontaceae	Sesamin, Senamalin, Sesamal.	leaves and fruits	Antibacterial		[38]



23	Tea Plant	Camellia Sinensis	Theaceae	Catechin, Caffeine, Theaflavin.	Leaves	Anti-inflammatory, Antibacterial, Anti-aging		[39]
24	Guggul	Commiphora Mukul	Burseraceae	Steroids, Diterpenoids, Carbohydrates.	Sap (Gum resin)	Anti-inflammatory		[40]
25	Marigold	Calendula officinalis	Asteraceae	Triterpenoids, Lutein, Saponin.	Flower, Petal	Anti-inflammatory, Antifungal		[41]
26	Witch Hazel	Hamamelis Virginiana	Hamamelidaceae	Eugenol, Safrole, Hexenol.	Leaves, Barks	Relieve swelling, bleeding, itching.		[42]
27	Chamomile	Matricaria Recutita	Asteraceae	Bisabolol, Chamazulene, Apigenin.	Flower	Treat cough and bronchitis and fever cold.		[43]



28	Wheat	Tritium aestivum	Poaceae	Zinc, Iron, Phenolic acid.	Leaves	To treat Cancer, Diabetes, Digestive problem.		[44]
29	Chaste tree, Wild lavender	Vitex agnus- cavastus	Lamiaceae	Sabinene, Casticin, Agnuside.	Flower, Fruit	Used for treatment of infertility, menopause symptoms and bone fractures		[45]
30	Manjishta	Rubia Cordifolia	Rubiaceae	Quinones, Iridoids, Triterpenoids.	Powder of roots	Antioxidan t, Antibacteri al		[46]

**Neem:** Neem is an essential medicinal plant which belongs to Meliaceae family originated from *Azadirachta indica*. Neem is mainly constituted of Azadirachtin, nimbin, azadirone, methyl stearate, salannin, meliantriol. The major parts which are medicinally used in neem plant are flowers, leaves, seeds, bark.<sup>[47]</sup> Neem has various medicinal activity such as Antihelmenthic, Anticancer, neem has the ability to heal ulcers in the digestive tract, it also acts as antibacterial. The leaf extract is used to reduce tooth plaque and to treat lice, neem also contains chemicals that might help to reduce blood sugar levels.<sup>[48]</sup>

**Indian Gooseberry (amla):** Amla has a precious amount of value in preparation of various herbal cosmetics, Amla is a type of medicinal plant belongs to Euphorbiaceae family primarily emerged from plant *Emblica officinalis* gourth. The major chemical constituents which are present in the amla are Ellagic acid, Gallic acid, Ascorbic acid, Glutamic acid, Lysine, citric acid, Cystine and pectin. The parts which are medicinally used from amla plants are fruits and seeds. Amla has wide variety of medicinal uses such as Antiaging, play main role in prevention of cancer, it also acts as antidiabetic, hepatoprotective, antiemetic, hypolipidemic, antioxidant properties potent against tested organisms.<sup>[49]</sup>

**Bitter Almond:** Almonds are familiar type of nuts, they can be sweet or bitter, which depend on the type of tree that produce them. Bitter almond has very important and major role in the production of recent medicinal products. This is a type of fruit kernels which generally produce volatile oil. This produced volatile oil have various medicinal uses. Bitter almond mainly belongs to family Rosaceae primarily from the *Prunus amygdalus Batsch var. amara*. There will be presence of various amount of chemical constituted such as benzaldehyde, benzoic acid and amygdalin. It also contains 40-50% of fixed oil and 20% of protein. The major parts which is rich in medicinal activity is the fruit and the oil which is extracted from the fruit of presence *amygdalus* plant. Bitter almond has wide variety of the medicinal use such as treatment of spasms. majority it acts as a sedative and oil is used as demulcent in skin lotion apart from medicinal uses it also used perfumery industry and liquor preparation. The fruit extract was evaluated for their antioxidant activities using various antioxidant methodologies including different type of activity.<sup>[50]</sup>

**Olive:** Olive is a subtropical broad leaved ever green tree which belongs to family Oleaceae. It is mainly from the tree called *Olea europaea*. The oil which is extracted from the olive seeds have immense medicinal property which is extensively using in modern days. The major chemical constituents that are present in the olive are oleuropein, hydroxytyrosol, tyrosol, amyryl, oleanolic acid, vanillic acid and some other essential acids such as gallic acid, cinapinic acid. The prime parts which are medicinally active in the olive plants are its fruit and seeds. Olive has very specific medicinal uses which are

widely used in modern society and have the ability to treat several heart diseases. The oil of olive is utmost used as antidiabetic and antihypertensive. Another prime use of olive is it acts as an antihyperlipidemic by reducing the blood Cholesterol. Olive oil and its minor components are being actively investigated in several areas, which describes its consumption has relevant healthy activities.<sup>[51]</sup>

**Ashwagandha:** Ashwagandha is the most important herb of ayurveda which is the traditional system of medicine in India. It is commonly known Indian winter cherry or 'Indian Ginseng'. Which is generally originated from plant called *withania somnifera* belongs to family Solanaceae. Ashwagandha is evidently composed of many chemical constituents such as alkaloid like isopelletierine, anaferine, anahygrine. It also constituted from steroidal lactones such as withanoloides, withaferine. Some other major constituents present in the *withania somnifera* are saponins, sitoindosides and acyl steryl glucosides. The parts which are medicinally active in the Ashwagandha plant are its fruits or berry and its roots also have some special medicinal property which used in various herbal preparations. It has wide variety of uses in the present scenario of herbal medicines and herbal cosmetics. Ashwagandha predominately shows the positive effects on the treatment of the various inflammatory diseases. Hence, it is generally used as plant ant inflammatory agent. In continued with above part Ashwagandha and its extract is a powerful antioxidant which is specific effect during formulation of various cosmetics such as anti-acne cream.<sup>[52]</sup>

**Pepper:** Pepper is one of the most commonly used spice worldwide. Apart from its flavouring and additive nature it also has many surprising elements which are generally used as herbal cosmetics as anti-acne cream. Pepper are the dried berries which are originated from the plant *Piper longum* which belongs to family Piperaceae. The major chemical constituents which are present in the pepper is piperine, piperlongumine, capsaicin, caryophyllene, capsaenone. It also constituted by various volatile oil such as o-cymene, eugenol. There will be presence of potassium, calcium, phosphorous and magnesium. The parts which are medicinally active in the pepper plant are its fruits and also dried roots of pepper plant. Black pepper is an important plant which have antioxidant property. This property leads to formulation of various herbal cosmetics such as creams and lotions. Pepper has also many health benefits such as antiacne, prevents constipation and prevents the skin deformation and acne. It also has widely used as weight loss supplement to lose weight.<sup>[53]</sup>

**Manjistha:** Manjistha is one of the prime medicinal plants which is widely used in the Ayurveda for formulation of many herbal medicine and herbal cosmetics. It is an herbaceous branched climber or creeper of evergreen origin that grows up to 10m.

Manjistha is a type of herb which is derived from plant *Rubia cordifolia* which is type of flowering plant that belongs to family Rubiaceae. This incredible herb shows the presence of various bioactive constituents like purpurin, manjistin, xanthopurin, pseudopurpurin. It also enriched with different kinds of phytochemical constituents such as potent hepatoprotective, anti-splenomegaly. Especially it has extensive property to treat some common skin condition such as pimple, eczema, acne, psoriasis and vitiligo. It also has potent, antihepatomegaly, anti-peptic, manjistha rich as detoxifying agent. There are many parts of manjistha plant is used as medicinal purpose but importantly the powder of manjistha roots have special ability to treat acne and other skin conditions hence it is using in some of antiacne preparations. by such above discussion we came to know that basically manjistha have the property to treat acne and papules.<sup>[54]</sup>

**Hemp:** Hemp plant is a stout, aromatic, erect annual herb which belongs to family Cannabaceae although hemp produces psychoactive effect in the human. It also has some of the cosmeceutical property which are applied in the various cosmetic preparation. Hemp is generally originated from the plant *Cannabis sativa*. The various parts in the hemp plant have the special medicinal property. Some have cosmeceutical and some have medicinal property. Majority the powder of seeds has specific effect in treating acne, pimples and other skin condition. The major chemical constituents present in the hemp are cellulose (53-91%), hemicellulose (4-18%), pectin (1-17%), lignin. It also composed of major of acids such as cannabinoic acid, cannabinodiolic acid, cannabichromic acid. The latest sector to tap in on hemp is beauty with a range of skincare and makeup products. We can ensure skin hydration for a longer period. The omega and vitamin rich hemp seed oil have been proven to ensure a soothing and calming effect on skin which in turn helps to reduce inflammation and treat acne.<sup>[55]</sup>

**Black cumin:** Black cumin or black caraway is a well-known medicinal plant which has extremely used in preparation of various cosmetics. Black cumin belongs to Ranunculaceae family which originated from the plant called *Nigella sativa*. There will be presence of extensive chemical composition which has variety of medicinal and cosmeceutical property. The fixed oil which of 32-40% contains unsaturated fatty acids which include arachidonic, eicosadienoic, linoleic, linolenic, oleic, palmitic acid, stearic acid and myristic acid. It also constituted of thymoquinone, thymol, thymohydroquinone and dithymoquinone. In above constituents thymoquinone exhibit a potent antioxidant property which is the basic need or any other skin formulation. As of now the only part which is medicinally active in the black cumin plant are its seeds. The dried powder of seeds and extract of seed are majority used in mainly type of skin formulation.<sup>[56]</sup>

**Camphor:** In the recent studies and research the traditional system of medicine takes an immense part in the treating the human health care system. which have become an advantageous condition for easily available and less toxic effect of drugs used in this system. Camphor is a terpene which is generally derived from the tree called *Cinnamomum camphor* belongs to family Lauraceae. Camphor is found in the wood of camphor laurel which is large evergreen tree found in east Asia. There will be presence of enormous number of chemical constituents in camphor which each constituents have various medicinal uses. The major chemical composition is linalol, linalyl acetate, alpha-terpineol, beta-pinene. Camphor used to be made by distilling the bark and wood of camphor tree. Camphor has wide variety of applications in human health care system, but majorly it is used to treat some of the serious skin conditions. Lotions and creams which primarily containing camphor have the ability to relieve skin irritation and itchiness. It also has the ability to improve overall appearance of skin, its antibacterial and antifungal properties define its use in many skin conditions such as acne, wrinkles, which are induced by ultra violet light. Camphor mainly has a potent antiaging effect hence; it is widely used in different types of cosmetic formulations such as anti-acne creams and lotions.<sup>[57]</sup>

#### SUMMARY

Herbal anti acne cream is one of the most well recognised and derived treatment for the acne and scars. This cream has not only have the property to treat acne but also it reduces the pimples and increases the appearance of skin. This cream provides various essential nutrients and vitamins to avoid the blockage or clogging of pilosebaceous glands which secrete oil also called as sebum to keep the skin moist. This can be determined by performing various physical and chemical parameters.<sup>[58]</sup> In Indian traditional system of medicine herbs plays an important role in human health care system and also cosmeceuticals. Herbs and its extracts are used for embellishment of various skin conditions as cosmetic preparation.<sup>[59]</sup> The major aim of present study involve preparation of herbal antiacne cream using the seeds and other parts of herbs. The prepared herbal cream is subjected to various phytochemical screening. General characterization, physical and biological evaluation like colour, odour, density, pH, viscosity, saponification value, acid value, spread ability and irritation test of herbal antiacne cream were evaluated.<sup>[60]</sup>

#### CONCLUSION

In contrast to earlier times, modern pharmaceutical preparations place a large emphasis on herbs and plants with unique medicinal properties. People are becoming more knowledgeable and interested in medicinal plants, their cultivation, uses, and advantages over synthetic versions. In India, more than 70% of people utilise herbal cosmetics for personal care. According to the study mentioned above, numerous plants can treat and cure a wide range of skin problems and disorders. Various

natural ingredients, natural colours, and natural perfumes derived from diverse plant components, such as flowers, leaves, seeds, etc. are also used in the formulation of various herbal cosmetics. When compared to synthetic cosmetics, this composition counteracts the economic downturn and makes it more affordable. The earlier research.

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