

Recent Advancements in Field of Medicinal Plant Research With special reference to Acne Therapy

Review Article

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Abstract

Acne is an exclusive disease associated with skin occurs when sebaceous glands attain special conditions at face, chest and back in the pre pubertal child. This disease occurs in both male and female, there is no preference among them but the course is more severe in males. Though, there are several treatment methods to treat acne, no particular medication claims a satisfactory and complete remedy. A wide range of synthetic therapeutic agents have also been reported to treat acne but have severe adverse effect. 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.

Key Words: *Acne, Acne therapy, Propionibacterium acnes, Medicinal plant etc.*

Introduction

Medication and cosmetic measures to overcome skin problems continue to be a foremost research and development initiatives by pharmaceutical, cosmeceutical and personal care industries. Herbal medicines with the history of use from ancient time have entered the growing 'cosmeceutical' market for combating various skin problems (1). It is attracting renewed attention from both practical and scientific view even though the mode of action of phyto-constituents from herbal origin is more complex than mechanisms of one bioactive factor. Ancient records show that herbal approaches are proven to be effective for primary health care and treatment of various diseases (2).

Skin is most important and sensitive part of the human body. The external environmental exposure leads to many kinds of skin problems and disorders like acne, sunburn and pigmentation (1). Acne is common skin disorder encountered in the age group of 15-25 years owing to increased production of sebum followed by the attack of *Propionibacterium acnes*. It usually

begins at puberty and worsens during adolescent age, usually early 12-13 years in females and 14-16 years in males. It has been estimated to effect 90% males and 85% females at teenage (3). Statistic study revealed that globally around 85% of young adults aged 12-25 aged old, 8% of adult aged 25-34 years old, 3% of adults aged 35-44 years old experienced certain degree of acne and in the age of twenty, both men and women continuous suffered by acne with 42.5% and 50.9% respectively. Recent research shows that, around 30% of women with their fertile period faced persistent acne (4). One population study in Germany shows that 64% of aged 20 to 29 years old and 43% of aged 30 to 39 years old have visible acne and another study of more than 2000 adults found that 3% of men and 5% of women still have definite mild acne at the age of 40 to 49 years (5). In USA, 61.9% of patients aged 18 years and older were seen in clinics for acne (6). Due to hormonal changes 99.5% of teenage boys and 83% of teenage girls are affected by acne (7).

Natural alternatives are blooming as they are being explored for healing multiple factors related with acne (8). Topical approach is useful in treatment of acne whereas it can also be effectively used for dermatophytosis, candidiasis, Tinea nigra and fungal keratitis (9). Natural products research play important role in the identification of bioactive lead molecule for the management of acne (4). The plants producing antioxidant, antimicrobial, anticomedogenic activity

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and in certain cases hormone balancing properties can be beneficial as acne involve production of free radicals in inflammatory conditions, microorganism invasion and hormone imbalance. But still there is need for comprehensive studies of combining various herbs which can help people at preliminary stages of acne and other skin diseases (10, 11).

Etiology

It includes increased sebum production influenced by hormone, altered follicular keratinisation, immune hypersensitivity, oxidative stress, inflammation and bacterial (*Propionibacterium acnes*) colonisation on the face, neck, chest, and back (4). The factors that are involved in the pathogenesis of acne are inter-connected with each other (12). Acne is mainly characterized by seborrhoea, inflammatory lesions, non-inflammatory lesions and degrees of scarring (5). The higher density of their occurrence depends upon the amount of oil glands present on body part and most areas affected are face, neck, shoulders, upper chest and back (13). There are different micro-organisms which are responsible for outbreak of acne. *Propionibacterium acnes* is the main causative organisms, *Staphylococcus epidermidis* and *Malassezia furfur* are also present in acne lesions (14). *Propionibacterium acnes* is an anaerobic micro-organism which is part of normal skin flora and *Staphylococcus epidermidis* is aerobic microorganism which take participate in superficial infection within pilosebaceous unit (15). Increased sebum production by sebaceous gland provides the growth medium for P.acne that are responsible for inflammation and oedema by secreting chemo tactic factors like substance along with lipolytic and proteolytic enzymes (10). *M. furfur* is lipophilic yeasts that mainly found in the skin diseases like pityriasis versicolor, pityriasis capitis, and folliculitis (16-18).

Pathogenesis of acne:

Pathogenesis of acne involves multiple factors which further worsen the condition of acne. At the age of puberty, the androgen concentration increases which ultimately leads to the increase in sebum production (18). Composition of sebum mainly consists of a mixture of lipid, wax, squalene and cholesterol that normally provide the barrier to the skin. Hormonal effects ultimately alter the sebaceous gland function and sebum composition, particularly Linoleic acid (13). Due to the increase in amount of sebum, the hair follicles get plugged. These plugged hair follicles containing an anaerobic lipid-rich environment which provides a growth medium for *P. acnes* (10). *P. acnes* is a member of normal flora on skin that multiplies in clogged hair follicles (19). It is responsible for the release of lipase that metabolises sebaceous triglycerides into free fatty acids which are

highly chemotactic and lead to the production of various cytokines like IL-8 and IL-1 α which lead to inflammation. Depending on conditions, the lesion may be inflammatory or non-inflammatory (open or closed comedones, papule, pustule or nodule) (20).

Treatment of acne

Aim of treatment of acne is:

- Antibacterial, anti-inflammatory, anti-oxidant activity.
- Decreasing the excess sebum production
- Correcting altered follicular keratinisation.
- Decreasing *P. acnes* population. (19)

Synthetic approach

There are several medications used for its treatment from which topical preparations like creams, ointments, and gels are common. Other oral hormonal, oral antibiotics and antibacterial medications may be prescribed for severe cases. History and cause of acne is an important factor of identification before its treatment (11). These agents have an impact on the pathogenetic factors and are chosen according to the type of acne lesions (21). Various approaches for combating acne are as follows:

- Topical and oral retinoid E.g. (Tretinoin and isotretinoin)
- Topical antimicrobials. E.g. (Erythromycin and clindamycin)
- Oral antibiotics E.g. (tetracycline's and macrolides)
- Keratolytics E.g. (Azelaic acid)
- Hormonal therapy that includes oral contraceptives as well as androgen blocking agents. E.g. (cyproterone acetate and ethinylestradiol) (4).

For many years, antibiotic and retinoid have been used in the treatment of acne vulgaris but these drugs produce a number of side effects and develop multifactorial resistance due to irrational use of antibiotics (1). Drugs like Benzoyl peroxide, anti-androgens, and antibiotics are exhibiting several side effects after withdrawal (3).

Herbal approach

Synthetic agents are accompanied by various side effects like itching, redness, skin peeling, stinging, photosensitivity and drug resistance. Therefore, herbal approaches which have negligible adverse effects compared with allopathic medicine are commonly indicated for moderate to severe forms of acne. These herbal agents possess not only antimicrobial activity but they also exhibit antioxidant, anti-inflammatory activity. Various herbs have skin detoxifying properties which are considered as good sources for the treatment of acne (1). There are some Indian medicinal plants used in the treatment of acne vulgaris that are listed below:

Table no: 1

Plant	Common Name	Family	Part in use	Active compound	Activity	References
<i>Cosinium fenestratum</i> (Gaertn.) Colebr.	Jhar-i-hald	Menispermaceae	Extract	Alkaloid	Antibacterial	(22)
<i>Arctium lappa</i> L.	Burdock	Asteraceae	Extract	Arctiopicrin	Anti-inflammatory	(23)
<i>Azadirachta indica</i> A. JUSS.	Neem	Meliaceae	Aerial part	Azadirachtin	Antibacterial	(24)
<i>Eucalyptus globules</i> LABILL	Safeda	Myrtaceae	Extract	α -pinene, β -pinene	Antibacterial	(25)
<i>Ammania baccifera</i> L.	Dadamari	Lytharaceae	Extract	β -sitosterol	Antibacterial	(26)
<i>Berberis vulgaris</i> L.	Kasmal	Berberidaceae	Root	Berberine	Antibacterial	(27)
<i>Berberis aristata</i> DC.	Daruharidra	Berberidaceae	Stem	Berberine	Antiacne	(3)
<i>Curcuma longa</i> L.	Haldi	Zingiberaceae	Root	Curcumine	Anti-inflammatory	(28)
<i>Hemidesmus indicus</i> (L.) SCHULT.	Anantamul	Apocynaceae	Root	Coumarine	Antioxidant	(24)
<i>Carica papaya</i> L.	Papita	Caricaceae	Seeds, peel	Enzymes	Antioxidant	(29)
<i>Coleus forskohlii</i> ANDR.	Gandira	Labiatae	Extract	Essential oil	Antibacterial	(30)
<i>Cymbopogon citrates</i> (DC.) STAPF.	Aghyaghas	Poaceae	Leaves	Essential oil	Antibacterial	(31)
<i>Lonicera japonica</i> Thunb.	Madhumathi	Caprifoliaceae	Flower	flavonoids	Antibacterial	(32)
<i>Ocimum sanctum</i> L.	Tulsi	Lamiaceae	Oil	Eugenol	Antibacterial	(33)
<i>Allium cepa</i> L.	Piyaj	Alliaceae	Bulb	Flavonoids	Anti-inflammatory	(1)
<i>Eclipta alba</i> HASSK.	Bharangi	Asteraceae	Extract	Wedololactone	Antibacterial	(34)
<i>Pterocarpus santalinus</i> L.F.	Rakta-chandana	Fabaceae	Leaves stems	Sesquiterpenes	Antibacterial	(35)
<i>Terminalia arjuna</i> (ROXB.) WIGHT & ARN.	Arjun	Combretaceae	Bark	Tannin	Antibacterial	(36)
<i>Cocos nucifera</i> L.	Nariyal	Arecaceae	Nut	Fatty acids	Anti-inflammatory	(37)
<i>Nigella sativa</i> L.	Kalajira	Ranunculaceae	Flowers		Anti-inflammatory	(38)
<i>Calendula officinalis</i> L.	Zendu	Asteraceae	Extract	Glycosides	Antibacterial	(39)
<i>Glycyrrhiza glabra</i> L.	Mulathee	Fabaceae	Rhizomes	Flavonoids, saponin	Antibacterial	(40)
<i>Saraca asoka</i> (ROXB.) DE WILDE	Ashoka	Caesalpiniaceae	Extract	Tannin	Antibacterial	(41)
<i>Rubia cordifolia</i> L.	Manjith	Rubiaceae	Root		Antioxidant	(42)
<i>Curcubita pepo</i> L.	Kadimah	Curcubitaceae	Extract	Linoleic acid	Anti-inflammatory	(43)
<i>Plumbago zeylanica</i> L.	Chitarak	Plumbaginaceae	Extract	Naphthoquinones Polyphenolics compounds, Plumbagin	Antibacterial	(44) (11)
<i>Plumbago indica</i> L.	Lal-Chittrak	Plumbaginaceae	Acetone extract, Plumbagin	Naphthoquinones Polyphenolics compounds Plumbagin	Antiacne	(9-10)
<i>Piper longum</i> L.	Pipli	Piperaceae	Extract	Phenolic compounds	Antioxidant	(45)
<i>Tephrosia pupurea</i> PERS.	Biyani	Menispermaceae	Extract	Sesquiterpene	Antioxidant	(46)
<i>Tinospora cordifolia</i> (WILLD.) HOOK.F. & THOMS.	Giloe	Menispermaceae	Extract	Alkaloids	Antioxidant	(47)
<i>Santalum album</i> L.	Chandan	Santalaceae	wood	Santalons	Antibacterial	(1)
<i>Arnica Montana</i> L.	Arnica	Asteraceae	Dried flower head	Sesquiterpenes	Anti-inflammatory	(48, 49)
<i>Vitex negundo</i> L.	Nirgundi	Verbenaceae	Extract	Terpenoids	Antioxidant	(50)
<i>Juglans nigra</i> L.	Black walnut	Juglandaceae	Leaves	Tannins	Antibacterial	(1)

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<i>Phyllanthus emblica</i> GAERTN.	Amla	Phyllanthaceae	Extract	Tannin	Antioxidant	(4)
<i>Quercus infectoria</i> Oliv.	Majuphal	Fagaceae	Extract	Tannin	Antioxidant	(46)
<i>Zingiber cassumunar</i> Roxb.	Cassumunar ginger	Zingiberaceae	Oil	Terpine-4-ol	Antibacterial	(51)
<i>Camellia sinensis</i> (L.) O.KUNTZE	Chha	Theaceae	Extract	Uronic acids	Antibacterial	(52)

Conclusion

Natural remedies are more acceptable in the belief that they are safer with fewer side effects than the synthetic ones. So, herbal anti-acne solution which is non-toxic, safe, effective, and improves patient compliance by the utilisation of herbal extracts / isolated constituent would be highly acceptable.

Conflict of interest: Nil

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