**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 effects. 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.

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**Introduction**

Medication and cosmetic measures to overcome skin problems continue to be a foremost research and development initiates 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 affect 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 deramatophytosis, 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
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 acне is an anaerobic micro-organism which is part of normal skin flora and Staphylococcus epidermidis is aerobic microorganism which take part 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 worse the condition of acne. At the age of puberty, the androgen concentration increases which ultimately leads to the increase sebum production (18). Composition of sebum mainly consist 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 increase amount of sebum, the hair follicles get plugged. These plugged hair follicle containing anaerobic lipid-rich environment which provides a growth medium for P. acnes (10). P. acне is a member of normal flora on skin that multiplies in plugged hair follicles (19). It is responsible for release of lipase that metabolise sebaceous triglycerides into free fatty acids which are highly chemo tactic and lead to the production of various cytokines like IL-8 and IL-1a 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. acне 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 severity cases. History and cause of acne is important factor of identification before its treatment (11). These agents have impact on the pathogenetic factors and chosen according to type of acne lesions (21). Various approach for combating acne is as follow:

- Topical and oral retinoid E.g. (Tritinoin and isotretinoin)
- Topical antimicrobials. E.g. (Erythromycin and clindamycin)
- Oral antibiotics E.g. (tetracycline’s and macrolides)
- Keratolytics E.g. (Azaleic acid)
- Hormonal therapy that include oral contraceptives as well as androgen blocking agents. E.g. (cyproterone acetate and ethinyloestradiol) (4).

For many years, antibiotic and retinoid have been used in 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 form of acne. These herbal agents possessed not only the antimicrobial activity but they also exhibit the antioxidant, anti-inflammatory activity. Various Herbs have skin detoxifying property which is consider as good source for the treatment of acne (1). There are some Indian medicinal plants used in the treatment of acne vulgaris that are listed below:
<table>
<thead>
<tr>
<th>Plant</th>
<th>Common Name</th>
<th>Family</th>
<th>Part in use</th>
<th>Active compound</th>
<th>Activity</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cosinium fenestratum</em> (Gaertn.) Colebr.</td>
<td>Jhar-i-hald</td>
<td>Menispermaceae</td>
<td>Extract</td>
<td>Alkaloid</td>
<td>Antibacterial</td>
<td>(22)</td>
</tr>
<tr>
<td><em>Arctium lappa</em> L.</td>
<td>Burdock</td>
<td>Asteraceae</td>
<td>Extract</td>
<td>Arctiopicrin</td>
<td>Anti-inflammatory</td>
<td>(23)</td>
</tr>
<tr>
<td><em>Azadirachta indica A. JUSS.</em></td>
<td>Neem</td>
<td>Meliaceae</td>
<td>Aerial part</td>
<td>Azadirachtin</td>
<td>Antibacterial</td>
<td>(24)</td>
</tr>
<tr>
<td><em>Eucalyptus globules LABILL</em></td>
<td>Safeda</td>
<td>Myrtaceae</td>
<td>Extract</td>
<td>α-pinene, β-pinene</td>
<td>Antibacterial</td>
<td>(25)</td>
</tr>
<tr>
<td><em>Ammania baccifera</em> L.</td>
<td>Dadamari</td>
<td>Lythraceae</td>
<td>Extract</td>
<td>β-sitosterol</td>
<td>Antibacterial</td>
<td>(26)</td>
</tr>
<tr>
<td><em>Berberis vulgaris</em> L.</td>
<td>Kasmal</td>
<td>Berberidaceae</td>
<td>Root</td>
<td>Berberine</td>
<td>Antibacterial</td>
<td>(27)</td>
</tr>
<tr>
<td><em>Berberis aristata</em> DC.</td>
<td>Daruharidra</td>
<td>Berberidaceae</td>
<td>Stem</td>
<td>Berberine</td>
<td>Antiacne</td>
<td>(3)</td>
</tr>
<tr>
<td><em>Curcuma longa</em> L.</td>
<td>Haldi</td>
<td>Zingiberaceae</td>
<td>Root</td>
<td>Curcumine</td>
<td>Anti-inflammatory</td>
<td>(28)</td>
</tr>
<tr>
<td><em>Hemidesmus indicus</em> (L.) SCHULT.</td>
<td>Anantamul</td>
<td>Apocynaceae</td>
<td>Root</td>
<td>Coumarine</td>
<td>Antioxidant</td>
<td>(24)</td>
</tr>
<tr>
<td><em>Carica papaya</em> L.</td>
<td>Papita</td>
<td>Caricaceae</td>
<td>Seeds, peel</td>
<td>Enzymes</td>
<td>Antioxidant</td>
<td>(29)</td>
</tr>
<tr>
<td><em>Coleus forskohlii</em> ANDR.</td>
<td>Gandira</td>
<td>Labiatae</td>
<td>Extract</td>
<td>Essential oil</td>
<td>Antibacterial</td>
<td>(30)</td>
</tr>
<tr>
<td><em>Cymbopogon citrates</em> (DC.) STAPF.</td>
<td>Aghyaghas</td>
<td>Poaceae</td>
<td>Leaves</td>
<td>Essential oil</td>
<td>Antibacterial</td>
<td>(31)</td>
</tr>
<tr>
<td><em>Lonicera japonica</em> Thumb.</td>
<td>Madhumathi</td>
<td>Caprifoliaceae</td>
<td>Flower</td>
<td>Flavonoids</td>
<td>Antibacterial</td>
<td>(32)</td>
</tr>
<tr>
<td><em>Ocimum sanctum</em> L.</td>
<td>Tulsi</td>
<td>Lamiaceae</td>
<td>Oil</td>
<td>Eugenol</td>
<td>Antibacterial</td>
<td>(33)</td>
</tr>
<tr>
<td><em>Allium cepa</em> L.</td>
<td>Piyaj</td>
<td>Alliaceae</td>
<td>Bulb</td>
<td>Flavonoids</td>
<td>Anti-inflammatory</td>
<td>(1)</td>
</tr>
<tr>
<td><em>Eclipta alba</em> HASSK.</td>
<td>Bharangi</td>
<td>Asteraceae</td>
<td>Extract</td>
<td>Wedololactone</td>
<td>Antibacterial</td>
<td>(34)</td>
</tr>
<tr>
<td><em>Pterocarpus santalinus</em> L.F.</td>
<td>Rakta-chananda</td>
<td>Fabaceae</td>
<td>Leaves stems</td>
<td>Sesquiterpenes</td>
<td>Antibacterial</td>
<td>(35)</td>
</tr>
<tr>
<td><em>Terminalia arjuna</em> (ROXB.) WIGHT &amp; ARN.</td>
<td>Arjun</td>
<td>Combretaceae</td>
<td>Bark</td>
<td>Tannin</td>
<td>Antibacterial</td>
<td>(36)</td>
</tr>
<tr>
<td><em>Cocos nucifera</em> L.</td>
<td>Nariyal</td>
<td>Arecaceae</td>
<td>Nut</td>
<td>Fatty acids</td>
<td>Anti-inflammatory</td>
<td>(37)</td>
</tr>
<tr>
<td><em>Nigella sativa</em> L.</td>
<td>Kalajira</td>
<td>Ranunculaceae</td>
<td>Flowers</td>
<td></td>
<td>Anti-inflammatory</td>
<td>(38)</td>
</tr>
<tr>
<td><em>Calendula officinalis</em> L.</td>
<td>Zendu</td>
<td>Asteraceae</td>
<td>Extract</td>
<td>Glycosides</td>
<td>Antibacterial</td>
<td>(39)</td>
</tr>
<tr>
<td><em>Glycyrrhiza glabra</em> L.</td>
<td>Mulathe</td>
<td>Fabaceae</td>
<td>Rhizomes</td>
<td>Flavonoids, saponin</td>
<td>Antibacterial</td>
<td>(40)</td>
</tr>
<tr>
<td><em>Saraca asoka</em> (ROXB.) DE WILDE</td>
<td>Ashoka</td>
<td>Caesalpiniaeae</td>
<td>Extract</td>
<td>Tannin</td>
<td>Antibacterial</td>
<td>(41)</td>
</tr>
<tr>
<td><em>Rubia cordifolia</em> L.</td>
<td>Manjith</td>
<td>Rubiaceae</td>
<td>Root</td>
<td></td>
<td>Antioxidant</td>
<td>(42)</td>
</tr>
<tr>
<td><em>Curcubita pepo</em> L.</td>
<td>Kadimah</td>
<td>Curcumbitaceae</td>
<td>Extract</td>
<td>Linoleic acid</td>
<td>Anti-inflammatory</td>
<td>(43)</td>
</tr>
<tr>
<td><em>Plumbago zeylanica</em> L.</td>
<td>Chitarak</td>
<td>Plumbaginaceae</td>
<td>Extract</td>
<td>Naphthoquinones Polyphenolics compounds, Plumbagin</td>
<td>Antibacterial</td>
<td>(44)</td>
</tr>
<tr>
<td><em>Plumbago indica</em> L.</td>
<td>Lal-Chitrak</td>
<td>Plumbaginaceae</td>
<td>Acetone extract, Plumbagin</td>
<td>Naphthoquinones Polyphenolics compounds Plumbagin</td>
<td>Antiacne</td>
<td>(9-10)</td>
</tr>
<tr>
<td><em>Piper longum</em> L.</td>
<td>Pipli</td>
<td>Piperaceae</td>
<td>Extract</td>
<td>Phenolic compounds</td>
<td>Antioxidant</td>
<td>(45)</td>
</tr>
<tr>
<td><em>Tephrosia pupurea</em> PERS.</td>
<td>Biyani</td>
<td>Menispermaceae</td>
<td>Extract</td>
<td>Sesquiterpene</td>
<td>Antioxidant</td>
<td>(46)</td>
</tr>
<tr>
<td><em>Tinospora cordifolia</em> (WILLD.) HOOK.F. &amp; THOMS.</td>
<td>Giloе</td>
<td>Menispermaceae</td>
<td>Extract</td>
<td>Alkaloids</td>
<td>Antioxidant</td>
<td>(47)</td>
</tr>
<tr>
<td><em>Santalum album</em> L.</td>
<td>Chandan</td>
<td>Santalaceae</td>
<td>wood</td>
<td>Santalons</td>
<td>Antibacterial</td>
<td>(1)</td>
</tr>
<tr>
<td><em>Arnica Montana</em> L.</td>
<td>Arnica</td>
<td>Asteraceae</td>
<td>Dried flower head</td>
<td>Sesquiterpenes</td>
<td>Anti-inflammatory</td>
<td>(48, 49)</td>
</tr>
<tr>
<td><em>Vitex negundo</em> L.</td>
<td>Nirgundi</td>
<td>Verbenaceae</td>
<td>Extract</td>
<td>Terpenoids</td>
<td>Antioxidant</td>
<td>(50)</td>
</tr>
<tr>
<td><em>Juglans nigra</em> L.</td>
<td>Black walnut</td>
<td>Juglandaceae</td>
<td>Leaves</td>
<td>Tannins</td>
<td>Antibacterial</td>
<td>(1)</td>
</tr>
</tbody>
</table>
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

References


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