



Review

A review of phytotherapy of acne vulgaris: Perspective of new pharmacological treatments



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ABSTRACT

Aim: This review focuses on plants currently used and those with a high potency for the future development of anti-acne products.

Methods: All relevant literature databases were searched up to 25 March 2011. The search terms were plant, herb, herbal therapy, phytotherapy, and acne, acne vulgaris and anti-acne. All of the human, animal, and in vitro studies, and reviews were included. Anti-bacterial, anti-inflammatory, anti-oxidant, and anti-androgen effects were the key outcomes.

Results: Studies on cell lines revealed that flavonoid, alkaloid, essential oil, phenol and phenolic compound, tannin, xanthone and xanthone derivative, and the bisnaphthquinone derivative are effective in treatment of acne. Animal studies showed that diterpene acid, phenylpropanoid glycosides, acetoside and flavonoids have anti-inflammatory activity. Eleven human studies revealed that *Camellia sinensis* has 5 α -reductase inhibitory and anti-inflammatory activities. Also anti-bacterial effect was shown by oleoresin of *Commiphora mukul*.

Conclusion: In addition to the standardization of these herbs, screening herbs as anti-acne agents may help to find new sources of therapy for acne.

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1. Introduction

Acne, as a family of skin disorders is one of the most prevalent dermatologic diseases in the world. It usually affects almost everybody during the life [1]. The pathogenesis of acne is complex but dependent on four key factors including androgen-mediated stimulation of sebaceous gland activity, follicular hyperkeratinization, colonization of the bacterium *Propionibacterium acnes* (an anaerobic bacterium as a normal constituent of the skin microbial flora), and inflammation [2]. The high levels of sebum elicited by androgen cause proliferation of *P. acnes* in the pilosebaceous ducts and this proliferation triggers the host inflammatory response with a discharge of the proinflammatory cytokines, interleukin-1b (IL-1 b), IL-8, granulocyte–macrophage colony-stimulating factor (GM-CSF), tumor necrosis factor α (TNF- α) and complement deposition [3]. In addition to *P. acnes*, as the main causative microorganism, *Pityrosporum ovale* and *Staphylococcus epidermidis* are present in acne lesions [4]. There are 3 types of acne: comedonal, nodular, and papulopustular. Comedonal is non-inflammatory while nodular and papulopustular are the inflammatory types [5]. There is a variety of medications for acne vulgaris including topical agents, oral antibiotics, oral retinoids and oral hormonal therapies.

The use of natural remedies, particularly herbal medicine, dates back thousands of years. Over the last decade, in view of increasing resistance to existing anti-microbial agents, side effects and sometimes high cost of treatment, interest in medicinal herbs has been progressively increased [6–8]. The present review followed the herbs currently used and those with a high potency for the future development of anti-acne products. The anti-acne effects of these medicinal plants include four mechanism i.e. anti-bacterial, anti-inflammatory, anti-oxidant, and anti-androgen activities (See Tables 1, 2 and 3).

2. Methods

Data sources: all electronic databases were searched up to 25th March 2011 for studies investigating anti-acne properties of medicinal plants and their active compounds. The search terms were plant, herb, herbal therapy, phytotherapy, acne, acne vulgaris, and anti-acne. In addition, the reference lists of articles were reviewed for extra relevant studies.

2.1. Study selection

All of the human, animal, and in vitro studies about anti-acne effects with key outcomes of anti-bacterial, anti-inflammatory, anti-oxidant, and anti-androgen activities were followed. Data

were extracted according to study design, medicinal plant, family name, part of use, active compound and effects.

3. Results

3.1. Anti-bacterial effect

3.1.1. In vitro studies

Abies koreana essential oil (AKE) showed strong anti-bacterial activities against drug-susceptible and -resistant *P. acnes* and *S. epidermidis*. Furthermore, AKE reduced the lipopolysaccharide (LPS)-induced secretion of TNF- α , IL-1 β , IL-6, nitric oxide (NO) and prostaglandin E2 (PGE2) demonstrating AKE's anti-inflammatory effects [9]. Some Indian medicinal plants including *Ammania baccifera*, *Hibiscus syriacus*, *Quercus infectoria*, *Berberis aristata*, *Couroupita guianensis*, *Symplocos racemosa* and *Mucuna pruriens* showed excellent anti-bacterial inhibitory effects. In addition, the ethanol extract of *S. racemosa* showed the greatest activity because of its anti-bacterial alkaloid harmine [10]. *Hemidesmus indicus*, *Coscinium fenestratum*, *Tephrosia purpurea*, *Euphorbia hirta*, *S. racemosa*, *Curcubito pepo*, and *Eclipta alba* gave strong inhibitory effects against *P. acnes*. Based on a broth dilution method, the *C. fenestratum* extract showed the most anti-microbial activity. Phytochemical screening revealed the alkaloid of ethanol extract could have the main role in *C. fenestratum* effect [11]. The essential oils of *Anthemis aciphylla* BOISS. var. *discoidea* BOISS. acquired by hydrodistillation showed weak to moderate inhibitory effect against *S. aureus* and *S. epidermidis*. The monoterpenes alpha-pinene and terpinen-4-ol were distinguished as the main constituents of essential oil. In addition, an unknown component was characterized as isofaurinone [12]. Lemon myrtle oil was identified as considerable anti-microbial against the organisms *S. aureus* and *P. acnes* comparable to its predominant component citral (3,7-dimethyl-2-7-octadienal). A product containing 1% lemon myrtle oil showed low toxicity to human skin cells and skin fibroblasts [13]. Thai medicinal plants i.e. *Senna alata*, *Eupatorium odoratum*, *Garcinia mangostana* and *Barleria lupulina* exhibited strong inhibitory effects against *P. acnes* while the *G. mangostana* crude extract produced the most anti-microbial effect. Mangostin, a xanthone derivative, as one of the active compounds in *G. mangostana* could be responsible for anti-bacterial activity [14]. Anti-oxidant and anti *S. aureus* activity of *Bauhinia variegata*, *Piper longum* and *Tinospora cordifolia* were evaluated and *T. cordifolia* extracts showed maximum inhibitory efficacy. However, ethyl acetate and acetone extracts of *P. longum* possessed the lowest minimum bactericidal concentration. The extracts showed dose-dependent anti-oxidant activity pattern that was directly correlated with the extent of total phenolic contents. As compared to *B. variegata*,

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