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Topical Herbal Therapies an Alternative and Complementary Choice to Combat Acne

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ABSTRACT

Acne vulgaris is the most common cutaneous chronic inflammatory disorder of multifactorial origin with prevalence in adolescents. Acne is common among 95 and 83% of teenage boys and girls, respectively and affects 85, 8 and 3% of people aged between 12-25, 25-34 and 35-44 years, respectively. Numbers of topical and systematic therapies using synthetic ingredients are available since so long to cure acne. Due to risk and side effects associated with previously used therapies, internal and external herbal remedies are considered to be effective and safe alternative treatment for acne. Furthermore, scientific analysis of herbs reveals that they possess enormous therapeutic capabilities that modern medicine is searching for. With the multitude of treatment options and the rapidly expanding newer technologies available to researcher's, scientist, industrialist, cosmeticians and dermatologist, it is important to review and be aware of the current literature and studies regarding herbs and their actives role in the management of acne. This review emphasizes on the astounding effect of herbs in the topical treatment of acne with scientific datas. Inclusion of discussed various herbal extracts, gels and oils, in future developments of dermato-cosmetic herbal formulations could provide complementary and alternative therapy for acne to consumers.

Key words: Acne, herbs, therapy, topical, formulation

INTRODUCTION

Skin is perhaps the most vulnerable part of our body. It is a well-known fact that day to day exposure of human skin (Shweta and Swarnlata, 2009) lead to number of problems such as acne, pimples, pigmentation and sunburn marks. Acne is one of the most common skin diseases. The affected patients are prone to embarrassment, depression, anger, social withdrawal, anxiety, scorn and stigmatization (Thomas, 2004). *Acne vulgaris* typically begins around puberty and early adolescence, it tends to present earlier in females, usually at about 12 or 13 years, than in males, 14 or 15 years, due to later onset of puberty in males. Acne has been estimated to affect 95-100% of 16 to 17 year-old boys and 83-85% of 16- to 17 year-old girls. Acne is a polymorphic disease that occurs on the face (99%), back (60%) and chest (15%). The individual lesions of *Acne vulgaris* are divisible into three types: non-inflamed lesions, inflamed lesions and scars. Even though *Acne vulgaris* is the most common type of acne, other forms also exist like *Acne vulgaris*, *Acne conglobata*, *Acne fulminans*, *Acne excoriée*, *Acne mechanica*, *Acne rosacea* (Bettoli *et al.*, 2006). Factors that are responsible to cause acne are hormones, excess sebum, dead cells, *Propionibacterium acnes* and inflammatory response. Functioning of these five factors is varying from people to people.

Formation of acne: Acne emerges from a point which requires 2-3 weeks to take a defined form of ace. This process happens deep under your skin. Pores are little holes present on your skin. These pores are actually hair follicles containing very fine hair. Each hair follicle is connected to a sebaceous gland. The sebaceous gland produces an oily substance called sebum. Sebum helps in keeping the skin soft. This sebum reaches the surface of the skin through the hair follicle. The hair follicle is lined with cells called Keratinocytes. Now, during puberty, a hormone presents both in males and females increases. This increase in testosterone encourages the sebaceous gland to produce more sebum. This sebum, hair and keratinocytes fill and plug the hair follicle. Plugging of the follicle is the earliest sign of acne. Because the follicle is plugged, sebum cannot reach the surface of the skin. This means that the follicle is filled with oil (sebum) and cells (keratinocytes). A mixture of both these causes *Propionibacterium acnes* or *P. acnes* which is present on the skin, to grow in the plugged follicle. This bacteria in the plugged follicle, induces the white blood cells to attack it. When the white blood cells attack, they cause the skin to inflame. This is characterized by heat, swelling, redness and pus. In due course of time, the wall of the hair follicle breaks down, spilling everything that is sebum, dead cells and bacteria on the nearby skin (www.acnetalks.com). This leads to acne, it can be mild, moderate or severe.

Treatment of acne: Common therapies that are used for the treatment of acne include topical, systemic, hormonal, herbal and combination therapy. Topically used agents are benzoyl peroxide, antibiotics and retinoids. Systemically used agents are antibiotics and isotretinoin. For decades, antibiotics and retinoids have been used and they still remain a good choice for the topical and systemic treatment of *Acne vulgaris*. But, these drugs produce a number of potential side effects and development of resistance to frequently used antibiotics. This leads to treatment failure with previously used successful therapy. Therefore, an alternative for the treatment of acne have been studied and developed and as a result natural approaches to combating acne and its disfiguring effects have gained popularity. Numbers of conventional and novel herbal cosmetics are useful to treat damaged skin (Ashawat *et al.*, 2007a; Amit *et al.*, 2007; Ashawat *et al.*, 2007b; Chanchal and Swarnlata, 2008).

The negligible adverse effects of herbal drugs compared with modern medicines will become another important aspect in the treatment of this condition. In upcoming years herbal therapies are gaining attention of researchers, academicians, industrialist, cosmetician, dermatologist and scientist for acne treatment. Acne can be cured by herbs either consuming internally or externally or with both. Topical treatment of herbs is preferable choice of consumers as ease of application and it surpasses the bitter taste of herbal formulation (when taken internally). Because herbs are safe, efficacious and the added advantage of multifunctionality, herbs are increasingly being used in mainstream cosmetic products, including acne-fighting compositions. Although some of the herbs are scientifically explored for their efficacy in treatment of acne but still many herbs are remain untouched by scientist. This review focuses on the topical benefits of some herbals extracts, gel, oil, for the treatment of *Acne vulgaris*. The purpose of this study is to open new avenues and set trends for the improvement of medicinal uses of herbs for acne and also reflects the traditional knowledge which provides the base for clinical research to be carried out to explore the active compounds which are responsible for anti-acne activities.

Herbal therapy: The quest for medications and cosmetic measures to combat acne continues to be a major research and development initiative in the pharmaceutical and personal care industries.

Number of herbs with a history of use in traditional cultures have entered the growing 'cosmeceuticals' market. Herbal formulations which contain many herbal extracts and have negligible adverse effects compared with modern medicine, are commonly indicated for moderate and severe forms of acne. The efficacy of these herbal agents in acne treatment is not only based on antimicrobial activity but on their possessed antioxidant and anti-inflammatory properties by which they inhibit neutrophil migration and generation of Reactive Oxygen Species (ROS). Also various herbs used in acne due to their skin detoxification property. Herbal extracts or oil may be used as monotherapy or in combination therapy. There are certain herbal extracts such as *A. dahurica*, *M. alternifolia*, *A. indica*, *R. coptidis* and *P. quajava* that are proved to be more effective than antibiotics and retinoids (Kumar *et al.*, 2008). Below some herbs are discussed in details for their efficacy in acne treatment. Table 1 describe their common and hindi name, family, parts, chemical constituents and forms which are responsible to treat acne.

Holy basil: In India, *Ocimum sanctum* or Kovil Tulsi, is a powerful medicinal plant. Studies shown that when basil oil was tested in trials as an antibacterial treatment for acne, it produced good results. An excellent study of oils from four types of *Ocimum* species found that although there was variation in contents but all the oils were found to have antimicrobial activity at fairly low dilutions (Koga *et al.*, 1999; Lachowicz *et al.*, 1998; Sivropoulou *et al.*, 1996). *Ocimum sanctum* is also included in the liste of commonly used herbal plants against diabetes in Pakistan (Karim *et al.*, 2011). Basil oil obtained from leaves of *O. gratissimum* species is used as an antibacterial treatment for acne (Orafidiya *et al.*, 2002). The linolenic acid present in basil has the capacity to block both the cyclooxygenase and lipoxygenase pathways of arachidonate metabolism which could be responsible for the antiinflammatory activity of the oil (Singh and Majumdar, 1997) and hence helpful to decrease the inflammation associated with acne. This also has been observed when 2% ocimum oil is used with aloe vera gel, the activity against acne increases due to synergistic effect of these agents.

Red sandal wood: *Pterocarpus santalinus*, used as an astringent and tonic for external application in inflammation and it is also used in treating skin diseases (Chopra *et al.*, 1956). It has been found in research that the secondary metabolites of various chemical types present in the plant species are known to possess antimicrobial activities (Manjunatha, 2006). Flavonoids present in it are found to be effective antimicrobial substances against a wide range of microorganisms (Tsuchiya *et al.*, 1996). In Kerala, it is ground to a paste with water or honey and applied topically as a popular home remedy for post-acne and other facial scars.

Sandal wood: *Santalum album* is famous for its volatile oil and useful in cutaneous inflammation. Studied reflects that it has been widely used in skin care as an antiseptic and a skin softener. It acts as a prophylactic against skin diseases and allergic conditions. Studies revealed that sandal powder paste is one of the most effective remedies for acne and acne scar removal. It is found to be effective against *Streptococcus aureus*. It relieves itching and inflammation of the skin and acts as an antiseptic in acne (Tisserand, 1987). Good astringent for oily skin and also removes skin blemishes.

Ceylon leadwort: Chitrak (*Plumbago zeylanica*) is a herb that grows wild in India and has been used by rural and tribal people for hundreds of years as a traditional system of medicine (Tilak *et al.*, 2004). *P. zeylanica* is enormously accepted throughout Africa and Asia as a remedy for parasitic skin diseases. *Acne vulgaris* is one of such skin disease which can be cured by chitrak

Table 1: Various herbs used in the treatment of acne

Common name	Hindi name	Family	Parts used	Useful forms	Chemical constituents
Holy basil	Tulsi	Lamiaceae/ Labiatae	Leaf	Oil	Linolenic acid
Red Sandalwood	Raktachandana	Fabaceae	Leaf, stem, bark	Powder	Flavanoids
Sandalwood	Chandan	Santalaceae	Wood	Oil	α - and β -santalols
Ceylon Leadwort	Chitrak	Plumbaginaceae	Root	Powder	Plumbagin
Pea	Matter	Leguminosae	Seed	Crushed seeds	Protein, lecithins
Camphor	Kapur	Lauraceae	Leaf	Oil	Cineole, lignans
Pumpkin	Chappan Kaddu	Cucurbitaceae	Seed, root	Oil, extract	Linoleic acid
Chaste Tree	Nirgundi	Verbenaceae	Leaf	Juice	Casticin
Dandelion	Karanphool	Asteraceae	Root, leaf	Tea	Sesquiterpene lactones
Black Walnut	Akhrot	Juglandaceae	Leaf, bark, fruit	Tincture, decoction	Ellagitannins
Wild Pansy	Banafshah	Violaceae	Flower, root	Compress	Salicylates, rutin
Neem	Nim	Meliaceae	Whole plant	Oil, powder	Quercetin, nimbidin
Purple Coneflower	Coneflower	Compositae	Root, rhizome	Tincture, paste	Cichoric acid, echinacoside
Onion	Fyaaz	Alliaceae/ Liliaceae	Bulb	Poultices	Allicin, quercetin, kampferol
Mugwort	Nagdona	Asteraceae	Leaf	Oil	1,8-cineole, monoterpene alcohols fraction
Soapwort	Unkown	Caryophyllaceae	Leaf, stem, root	Decoction	Saponins
Chamomile	Chameli	Compositae	Flower, stalk	Extract,oil,compress	Flavanoids
Scented Geranium	Geranium	Geraniaceae	Leaf	Oil	Linalol, geraniol
Tea Tree	Tea Tree	Myrtaceae	Leaf	Oil	Terpinen-4-ol
Castor	Eranda	Euphorbiaceae	Seed	Oil	Ricinoleic acid
Licorice	Mulethi	Fabaceae	Root, rhizome	Extract	Glycyrrhizin
Burdock	Burdock	Asteraceae	Root, leaf	Extract	Arctiopierin
Oregon Grape	Chitra	Berberidaceae	Rhizome	Extract	Berberamine, berberine
Golden Seal	Indian turmeric	Ranunculaceae	Root	Extract	Berberine
Calendula	Zergul	Asteraceae	Flower	Infusion	Triterpenoids, flavanoids
Coleus	Patharchur	Labiatae/ Lamiaceae	Root	Oil, extract	Forskolin
Lesser Galangal	Kencur/Rasna	Zingiberaceae	Root	Extract	Galangin, Quercetin
Turmeric	Haldi	Zingiberaceae	Rhizome, root	Extract, powder	Tetrahydrocurcuminoids
Black Pepper	Kalimirsch	Piperaceae	Fruit	Oil, extract	Tetrahydropiperine
Eucalyptus	Nilgiri	Myrtaceae	Leaf	Oil	1,8-cineole
Papaya	Papita	Caricaceae	Fruit, seed, peel	Juice	Papain
Witch Hazel	Unknown	Hamamelidace	Leaf	Extract	Flavonoids
Black Cumin	Kalonji	Ranunculaceae	Flower, seed	Extract	Thymoquinone
Lavender	Dharu	Lamiaceae	Spike, flower	Oil	α - pinene, linalool
Clove	Laung	Myrtaceae	Bud	Oil	Eugenol
Rosewood	Rosewood	Lauraceae	Wood	Oil	(-)-linalool
Coconut	Nariyal	Arecaceae	Nut	Oil	Lauric acid, capric acid, Vit E
Evening Primrose	Ban long	Onagraceae	Seed	Oil	Gamma-linolenic acids
Arnica	Arnica	Asteraceae	Flower	Powder	Sesquiterpene lactones
Thyme	Unkwon	Lamiaceae	Aerial parts	Oil	Linalool thymol

powder (Dalziel, 1956; Kokwaro, 1976). Researches by scientist shown that root contain plumbagin, a yellow naphthoquinone which is responsible for its antimicrobial and antibiotic activity (Bever, 1986; Atkinson and Brice, 1955). Research indicated that a very dilute solution (i.e., a concentration of 1:50,000) of plumbagin is lethal to a wide spectrum of bacteria (Skinner, 1955).

Pea: *Pisum sativum* has significance in the treatment of acne (Chiej, 1988). The seeds contain proteins, lecithins, carbohydrates, fats and salts and are nutritive and antidermatosis. Their effects are clinically well proved for many types of skin complaints, for example face masks made from crushed peas are used in cases of acne and on wrinkled skins (Dweck, 1997a).

Camphor: *Cinnamomum camphora* is famous for its aroma that is fresh, clean and very piercing. The species of *Cinnamomum* have aromatic oils in their leaves and barks, some of the oils have been reported to be good source of antifungal and antibacterial compounds (Mastura *et al.*, 1999; Ali *et al.*, 2002). The oils are widely known as sources of aroma chemicals and used in food preparation, pharmaceutical products, cosmetics, toiletries and detergents (Ali *et al.*, 2010). Phytochemical works on the *Cinnamomum* species revealed the presence of a number of aromatic compounds such as flavanols, phenyl propanoids, lignans, terpenoids, alkaloids and proanthocyanadins (Mukherjee *et al.*, 1994; Wu *et al.*, 1994), imparts cooling action on the skin, therefore, reduces inflammatory conditions. Its maximum benefits seen on oily skins hence useful in treatment of acne (Sellar, 1992).

Pumpkin: *Curcubita pepo*, used in medical applications, is an annual plant with yellow flowers. Obi *et al.* (2009) work revealed that its seeds apart from as food additives and supplements, used as effective and cheap antibacterial agent for the treatment of bacterial infections (Obi *et al.*, 2009). Linoleic, oleic, palmitic and stearic acid isolated from its seed oil have been used in medicine for their antiinflammatory properties (Nesterova *et al.*, 1990; Akhtar *et al.*, 1980). The natives of Central America and India rub the oil extracted from the seeds of *Curcubita pepo* on *Acne vulgaris*. The roots are made into an infusion and used on syphilitic sores, herpes lesions, acne and blackheads (Morton, 1981).

Chaste tree: Botanically it is *Vitex negundo/Vitex agnus-castus*. Its leaf juice contains casticin, isoorientin, chrysofenol D, luteolin, p-hydroxybenzoic acid and D-fructose. Researches confirmed its anti-inflammatory (Dharmasiri *et al.*, 2003), antibacterial (Samy *et al.*, 1998), antifungal (Sathiamoorthy *et al.*, 2007; Damayanti *et al.*, 1996) and analgesic (Gupta and Tandon, 2005; Gupta *et al.*, 1999) activities. Scientist examined and proved its use in the treatment of acne in both men and women (Amann, 1975, 1967). It was notified by Menghani *et al.* (2011) that *V. negundo* possessed enough potentials against *S. aureus* positive. This plant acts in the pituitary gland to balance secretion of lutetizing and follicle-stimulating hormones, thus regulating estrogen and progesterone levels (Bone, 1994) and hence used in acne caused by hormonal imbalance. It was noticed, when *Vitex* is used together with Vitamin B6 proven to be quite helpful for resolving hormonal acne.

Dandelion: *Taraxacum officinale* is a plant that is common universally in many traditional and modern herbal medical systems, as particularly has been documented in Asia, Europe and North America. Among the most important compounds in dandelion are sesquiterpene lactones believed to have antiinflammatory effects. Major sesquiterpene lactones, generally occurring as glycosides (sugars), include taraxacosides, taraxacolides, dihydrolactucin, taraxinic acids and ainslioside (Schutz *et al.*, 2006). Its root has a long history of use for dermatological disorders (Fleming, 1998; Jaqueline, 2009) such as spots, pimples and acne (Evans, 1990; Back, 1987).

Black walnut: Hutchens refers to *Juglans nigra* as Black walnut (Hutchens, 1973). There are six species of the walnut, genus *Juglan* which are native to the United States. The bark (Lust, 1986), leaves, peel and green nut are commonly used, where a tincture of leaves and rind of green fruits is used for acne, chancre and herpes (Heinerman, 1996; Nahrstedt *et al.*, 1981). *Juglans regia* is known as the English walnut, where the leaves are the medicinal part used in India. The main constituents include 10% tannins ellagitannins (responsible for the astringent properties), naphthalene derivatives juglone, flavonoids (hyperoside and quercetin) (Wichtl, 1994).

Heartsease/wild pansy: Different species *Viola tricolor*, *Viola odorata* and *Viola yedoensis* are healing herb used in skin disorders (Daniel, 1993) like acne, pruritis, eczema etc. Its flowers and roots are useful parts (Palaiseul, 1986). It can be applied externally to the skin by means of a compress (Lauert, 1989), it soothes and relieve pain associated with acne. The active ingredients are saponins, glycoside gaultherine, salicylic compounds, tannin, mucilage, flavonoids which are found to be effective against skin infections.

Neem: Botanically it is *Azadirachta indica*, well known for its therapeutic effect. Its leaves contain nimbin, nimbinene, 6-desacetylnimbinene, nimbandiol, nimbolide and quercetin. The presence of β -sitosterol, n-hexacosanol and nonacosane is also reported by Basak and Chakraborty (1968) and Awasthi and Mitra (1971). Neem seed oil has been confirmed as an anti-inflammatory and antibacterial agent (Trease and Evans, 1989; Rao *et al.*, 1968; Patel and Venkatakrisna, 1988). There are also reports that the plant has insecticidal and spermicidal properties (Martindale, 1989; Tyler *et al.*, 1988). Literatures revealed that it can work wonders for a variety of skin problems. Research has shown that it has been extremely effective in curing acne (The British Pharmaceutical Codex, 1923). This herb contains gedunin and nimbidol that exhibit fungicidal properties. Applying paste of crushed neem leaves on the part of the face affected by acne is a popular home remedy, in which a noticeable improvement in the acne size has been observed (Soforowa, 1982; Wood and Bache, 1883).

Purple coneflower: *Echinacea purpurea*, is native to eastern North America and grows in the wild in much of the Eastern, Southeastern and Midwest United States. Its traditional use in management of acne, boils and mastitis (Trattler, 1987), may be due to antiseptic property of the plant. Researches indicated that it is very effective herb in increasing the ability of the immune system to fight infections (Evans, 1990). It has been used to lessen the pain and inflammation of acne and skin irritation (McLaughlin, 1992). In another study root and rhizome were reported for their effectiveness against eczema and acne (Morelli *et al.*, 1983). *Echinacea* prevents bacteria proliferation, hence reducing the number of acnes. By inducing a substance called fibroblasts, it encourages the growth of new skin cells that helps to treat acne scars.

Onion: It is obtained from *Allium cepa*, contains volatile oil with many organic sulphur compounds such as allicin, allyl propyl disulphide, alliin, flavonoids, phenolic acids and sterol, its esters and glycosides. It has been used externally as a poultice for acne to draw out inflammation and the juice applied to blemished skin (Castro, 1990; Body *et al.*, 1984; Sigerist, 1944). Studies have found that onions possess antiallergic and antiinflammatory effects due to the presence of flavonoids (quercetin and kampferol) (Griffiths *et al.*, 2002; Dorsch *et al.*, 1990) and in addition onion juice has antimicrobial (Dorsch, 1996; Arunachalam, 1980) and antifungal effects (Conner and Beuchat, 1984) because of these proven activities it is responsible for anti-acne property.

Mugwort: The genus *Artemisia* is one of the largest in the Asteraceae family, consisting of more than 800 species which are widespread over the world. Many of *Artemisia* species grow in Eurasia, North and Central America and Northern Africa. Several *Artemisia* species (*A. campestris*, *A. absinthium* and *A. vulgaris*) grow in Lithuania. *Artemisia vulgaris* and *Artemisia absinthium* are used traditionally in Philippines for skin diseases. *Artemisia vulgaris* essential oils are used for their insecticidal, antimicrobial and anti-parasitical properties (Kaul *et al.*, 1976; Milhau *et al.*, 1997; Laxmi and Rao, 1991). Its dried leaves cut into small fragments and used to induce more rapid healing of acne wounds (Dweck, 1997b).

Soapwort: *Saponaria officinalis* is a perennial herbaceous plant native to northern Europe, contains saponins (to 5%), comprising saporubin and saporubric acid, gums, flavonoids, Vitamin C and vitexin (Wren, 1985). It has been apply topically for the treatment of certain skin conditions including acne (Der Marderosian, 2001). The leaf, stem and root are used cosmetically, by boiling in soft water and act as surface active agent to facilitate cleansing of skin. Medicinally, the root decoction is used as a wash for acne and psoriasis (Dweck, 1997a).

Chamomile: *Matricaria recutita*, *Anthemis nobilis* and *Matricaria Chamomilla* are the members of the family Compositae. Extracts of the plant are used in the form of ointments, lotions and inhalations intended for local application. Chamomile extract, essential oil and isolated constituents, possess antiinflammatory and analgesic effects and are useful for treating hence safe treating chronic skin disorders (Bruneton, 1999; Hoermann and Korting, 1994; Carle and Gomaa, 1992; Safayhi *et al.*, 1994). Soak a piece of cloth in a mixture of hot water and chamomile, to soothe the irritated skin. This is indeed a nice technique to treat inflamed skin. Chamomile compress can also reduce acne scars and blackheads (www.buzzle.com).

Scented geranium: Botanically it is called as *Pelargonium graveolens*. Essential oil obtained through steam or water plus steam distillation of shoot biomass is extensively used in the fragrance industry and in aromatherapy (Rao *et al.*, 2002). Effect of geranium oil is aromatic, anti-inflammatory, antiseptic, astringent, balancing, calming, distressing, harmonizing, refreshing sweet and sedative. On the skin, oil helps to balance the secretion of sebum and clears sluggish and oily skins, hence so helpful with those problems that come with greasy, over-oily skin and acne. Care should be taken since there is the possibility of contact dermatitis in hypersensitive individuals. It is a very important component of high grade perfumes due to its strong rose-like odour (Parameswaran *et al.*, 2000).

Tea tree: Essential oil of *Melaleuca alternifolia*, is obtained from steam distillation of its leaves. It is the native herb of Australia and effectively fights with acne. Tea tree oil is employed in personal care products, cosmetics, hair preparations and skin creams (Priest, 1999). Its topical antibacterial property due to terpinen-4-ol (Shapiro *et al.*, 1996; Carson and Riley, 1995) was well documented in literatures. Tea tree oil is effective against twenty seven of the 32 strains of *Propionibacterium Acnes* that lives on the skin and causes acne (Bassett *et al.*, 1990). Due to its anti-inflammatory effect (Brand *et al.*, 2002), it is widely employed in acne care products (Carson and Riley, 1994; Bassett *et al.*, 1990). A study revealed that topical use of gel containing 5% tea tree oil has been as effective in the treatment of acne as a lotion with 5% benzyl peroxide with far less scaling and itching (Bassett *et al.*, 1990). Although the tea tree oil was slower and less

potent in its action, it had far fewer side effects and was considered more effective overall. For topical treatment of acne, it is recommended to use tea tree oil at a dilution of 5 to 15%.

Castor: This is obtained from the Castor bean, *Ricinus communis*. The seeds contain 50% of the fixed oil which is a viscous fluid, almost colourless when pure, possessing only a slight odour. Castor oil is commonly used in Chinese medicine for inflammation, to remove toxins. Castor oil is an important ingredient of cosmetic and pharmaceutical product used for skin care. Ricinoleic acid and its many derivatives have skin smoothing and moisturizing qualities and improve various skin conditions such as rough skin and acne (Miyahara and Sanbe, 2002).

Licorice: Botanically, it is called as *Glycyrrhiza glabra*. Its root and rhizome are the parts which have been widely used as a traditional medicine all over the world. Licorice root is particularly rich in flavanoids and this is probably a relevant factor in its history as a medicinal plant capable of treating a variety of conditions (Khare, 2004). The root contains 5-10% glycyrrhizin, licochalcone, glabridin, glibrene. Because of its antimicrobial activity (Saeedi *et al.*, 2003), it has been used for skin disorders. Licorice is a good antiinflammatory agent (Lee *et al.*, 1997) and used for skin irritations and in cosmetics for acne and sunburn (Ammosov and Litvienko, 2003; Aburjai and Natsheh, 2003; Marks, 1997).

Burdock: Obtained from *Arctium lappa*, belonging from family Asteraceae. The main constituents are arctiopicrin, arctigenin, inulin and mucilage (Jeffery *et al.*, 1999). The burdock extract has sebum-balancing properties, maintaining a correct secretion of the sebaceous gland. It is a herb which has been used as skin detoxifier for skin disorders (Mowrey, 1986; Fetrow and Availa, 1999). The roots and leaves are most widely used for treating chronic skin problems including acne (Foster, 1998; Bradley, 1992).

Oregon grape: *Berberis aquifolium* was often used by several native North American Indian tribes (Chevallier, 1996). The root and root bark is alterative, blood tonic, cholagogue, diuretic, laxative and tonic (Moerman, 1998). However, one recent study, using *Mahonia* topically showed this herb to decrease sebum, reduce infection and inflammation. The antibacterial (Duke and Ayensu, 1985) compounds berbamine and berberine are universally present in rhizomes of *Mahonia* species, on topical application which are believed to reduce sebum production and kill bacteria present on skin. It can be externally applied in the form of cream and gel to treat acne due to above mentioned properties.

Golden seal: Its botanical name is *Hydrastis canadensis* member of butter cup family Ranunculaceae. Historically, Native Americans have used goldenseal for various health conditions such as skin diseases (Weiner, 1980). The Indians used goldenseal for local inflammations and infections. The active ingredients of goldenseal include a group of alkaloids, hydrastine and berberine. Topically, golden seal is an effective antibacterial, mainly due to its berberine content (Coffey, 1993). Although less clinical studies have been carried out to confirm its use in acne, it has been noticed by natives, when used in combination with Marshmallow to sooth inflamed skin it will reduce redness and kill bacteria causing acne infection (www.herbal-supplement-resource.com). Modern uses have included as a laxative, diuretic, antiseptic and for hemorrhoids, mouth sores, eye infections, acne and sorethroats.

Calendula: *Calendula officinalis*, a herb contains flavanoids, saponins, triterpenoid, essential oils and polysaccharides (Trease and Evans, 1989). Due to its anti-inflammatory and anti-bacterial properties, has long been used for the treatment of various skin ailments (James and Tyler, 1999). Strong infusion of this herb useful for treating acne patients, this beautiful flowering herb accelerates the healing process of the damaged skin tissue. It contains sulphur derivates, if applied directly on the acne, performs the task of drying. *Calendula* creams for acne are also available at various drug stores.

Coleus: *Coleus forskohlii* belongs to the natural order Labiatae (Lamiaceae), a family of mints and lavenders. In traditional ayurveda systems of medicine, it has been used for a variety of purposes, including skin disorders. In laboratory studies, coleus oil is an essential oil extracted from its roots and was found to more effectively inhibit the growth of skin pathogens including *Propionibacterium acnes* associated with acne (Majeed and Badmaev, 2003; Nishijima *et al.*, 2000), *Staphylococcus aureus*, a bacterial strain found in skin eruptions including acne (Nishijima *et al.*, 1994) and *Staphylococcus epidermidis*, a bacterial strain occurring in a variety of opportunistic bacterial skin infections and in acne (Nishijima *et al.*, 2000). Majeed and Prakash (2007) showed the comparative effects of coleus oil, tea tree oil and the conventional antimicrobial clindamycin against *Propionibacterium acnes*. The extract was found to be safe to use in cosmetic formulations.

Lesser galangal: Botanically known as *Kaempferia galangal*, commonly used as spice ingredients and medicinal herbs in South-east Asia and are valued traditionally for their wound healing (Shanbhag *et al.*, 2006) and skin protectant action (Kiuchi *et al.*, 1987; Gupta *et al.*, 1976). Extract prepared by proprietary extraction (Majeed and Prakash, (2007) process showed several fold greater inhibitory activity against *Propionibacterium acnes* as compared to conventional extract. The resultant extract has found to be of specific composition which has antimicrobial action and tyrosinase inhibitory functions, suggesting its multifaceted benefits in acne fighting formulations. Use of this extract in topical cosmetic and pharmaceutical formulations proves to be potentially beneficial in the management of acne as well as in reducing post-acne scarring, pigmentation and blemishes.

Turmeric: Turmeric is the processed rhizome of *Curcuma longa*. South Asian women have traditionally used turmeric roots for skin care. Scientist has adapted an innovative approach and developed a colorless derivative i.e tetrahydrocurcuminoids which retains same health benefits as of yellow turmeric extract. The UV protectant, protein integrity support, tyrosinase inhibitory and antioxidant properties of tetrahydrocurcuminoids would work together in an anti-acne formulation to provide multifaceted benefits (Majeed *et al.*, 1999; Majeed and Prakash, 2003). Popular home remedy used by local peoples is paste of turmeric and coconut oil, they apply this paste over the affected portion and the surrounding area and allow it to remain overnight and next day magical reduction in the size of acne has been noticed. Because of its wonderful effects on skin it is used as a key ingredient in some cosmetic products like cream, soaps and cleansers.

Black pepper: It is known as *Piper nigrum*. Oil obtained from it found to be potent antibacterial properties (Dorman and Deans, 2000). Studies have found that the essential oil containing the sesquiterpenes betacaryophelene and alpha-humulene, is highly effective against the *P. acne*, hence used to cure acne infection (Kubo *et al.*, 1994).

Eucalyptus: *Eucalyptus globules*, is an important ethnomedicinal plant. The antimicrobial activities of the methanolic extracts of its leaves have been reported in literatures (Akin-Osanaiye *et al.*, 2007; Mehraban *et al.*, 2005). Topical ointments containing eucalyptus oil have also been used in traditional aboriginal medicines to heal wounds and fungal infections. Researches indicate, eucalyptus oil obtained by steam distillation and rectification of the fresh leaves has eucalyptol (1,8-cineole) as its active ingredient and this is responsible for its various pharmacological actions (Trivedi and Hotchandani, 2004). The essential oil derived from its leaves known to have great antiseptic properties and even works as an excellent astringent to treat the acne prone skin.

Papaya: Botanically famous as *Carica papaya*. Fruit, seeds, peel and leaves of the papaya are all rich in essential enzymes that give outstanding topical medicinal properties for the treatment of skin conditions. Studies done in the West Indian Medical Journal confirm the healing abilities of papaya and its capability to rejuvenate and repair the skin (Hewitt *et al.*, 2000).

This fruit contains the enzyme papain which has wonderful exfoliating properties such as removing dead cells and specifically damaged skin (Laidet and Letourneur, 1993; Beck and Gent, 1953). The juice of raw papaya has been shown to be beneficial in the treatment of swollen acne and prevents pus formation. Enzyme papain can dissolve all the unnecessary proteins, dead skin cells, hence prevents clogged pores and the subsequent development of acne. It also softens our skin and helps promote an overall healthy complexion.

Witch hazel: *Hemamelis virginiana*, plant has for centuries been sought after for its magical, medicinal and healing properties. Witch hazel is native to North America's Midwestern woodlands. It is mainly used externally on sores, bruises and swelling. The main constituents of its extract include tannin, gallic acid, catechins, proanthocyanins (Wang *et al.*, 2003), flavonoids (kaempferol, quercetin), essential oil (carvacrol, eugenol, hexenol), choline, saponins and bitters. Because of its astringent qualities, helps to remove the impurities from the skin, even unclogs the blocked skin pores and used in treating acne (www.acnetalks.com).

Black cumin: The fennel flower botanically belongs to the *Nigella sativa*. People have been cultivating this plant from centuries for its medicinal qualities and also as a spice. *Nigella sativa* consists of proteins, carbohydrates, fatty acids, vitamins and minerals. Numbers of pharmacological effects of profound therapeutic value like analgesic, anti-inflammatory, immune stimulation, anti-bacterial, antifungal have been reported by Houghton *et al.* (1995), Mutabagani and El-Mahdy (1997), Al-Ghamdi (2001) and Morsi (2000). Its flower is an effective herbal cure against acne. It is used for treating acne because acne can get aggravated due to a weak immune system and *Nigella* makes the immune system stronger (El-Kadi and Kandil, 1986).

Lavender: Most commonly used species being *Lavendula angustifolia*, *L. latifolia*, *L. stoechas* and *L. xintermedia*. Essential oils distilled from members of the genus *Lavandula* have been used both cosmetically and therapeutically for centuries (Dermott, 2000). It is extensively employed in all types of soaps, lotions and perfumes. Lavender oil antibacterial property makes it apt for acne treatment (Cavanagh and Wilkinson, 2002; Boelens, 1995). Its essential oil not only just treats acne but also restores dull and damaged skin. It soothes the itching and also neutralizes the redness that is accompanied with acne (Leung, 1980). Experts suggested using a diluted form of this essential oil.

Clove: Botanically it is famous as *Syzygium aromaticum* and used in Ayurveda, Chinese medicine and Western herbalism. Clove oil tops the list of essential oils for acne treatment in terms of efficacy. It is highly effective and destroys the acne causing bacteria completely. Clove oil not just treats acne and zits but is also helpful in treating acne scars, blemishes and spots (Saeed and Tariq, 2008). Since clove oil is very strong, it should be used in diluted form and more beneficial when mix with grapeseed oil. Using this essential oil in high concentration may help clear stubborn acne but can cause extreme burning of skin. The clove oil is also used as a topical application to relieve pain and to promote healing and also finds use in the fragrance and flavouring industries (Chaieb *et al.*, 2007).

Rosewood: The rosewood was obtained from one of the species of the Lauraceae family, the *Aniba rosaeodora var. amazonica*, an evergreen tree. Rosewood oil obtained from steam distillation chipped wood of the tree, its main constituent is (-)-linalool which can be transformed into a number of derivatives of value to the flavour and fragrance industries (Letizia *et al.*, 2003; Simic *et al.*, 2004). The pharmacological effects attributed to linalool include antiinflammatory, sedative and hypothermic effects (Elisabetsky *et al.*, 1995; Peana *et al.*, 2002), other therapeutic benefits include antiseptic, antibacterial and antifungal etc. Rosewood oil shows its miracle on extremely oily skin it doesn't work on very sensitive or dry skin. This essential oil scours away excessive sebum and also limits the sebum production, thus treating acne. The splendid aroma of this essential oil is known to have a rejuvenating effect on dull and damaged skin. Rosewood stimulate the circulation and new cell growth, regenerate tissues, create skin elasticity and help minimize lines and wrinkles in ageing or mature skin.

Coconut: All parts of *Cocos nucifera* are useful. Coconut oil has been confirmed to possess antimicrobial, antiviral and antiprotozoal activities (Isaacs and Thormar, 1991). The wide applications of coconut can be justified by its unique chemical composition of fatty acids (lauric acid and capric acid), sugars, vitamins, minerals, amino acids and phytohormones. The oil from the nuts is valued as an emollient and used as an ingredient in remedies for skin infections. The most common confusion regarding the use of coconut oil for acne treatment is that acne is basically a problem of the oily skin and hence, one should stay away from any skin care product that is oily. But, coconut oil can be used on acne prone skin, reason being its antimicrobial properties and vitamin E content. Two fatty acids are converted into monolaurin and monocaprin, by some harmless bacteria present on the skin, these substances help to protect the skin from acne and other infections, by destroying the harmful bacteria and microbes. Apart from curing and preventing acne, one can also use coconut oil for acne scars and blemishes.

Evening primrose: *Oenothera biennis* is a common plant, found in the temperate regions of North America, Europe and South America. Evening primrose is basically a wild flower that belongs to the genus of *Oenothera*. The plant has been known for a long time as a herbal remedy for treating a number of ailments including infections of the respiratory tract, digestive problems and acne (Shahidi and Miraliakbari, 2005). Evening primrose oil obtained from extraction of its seed and incredibly rich in essential fatty acids like linoleic acids and gamma-linolenic acids (Fan and Chapkin, 1998; Huang and Ziboh, 2001) which belong to the family of omega-6 fatty acids. It has been found that lack of essential fatty acids in the body can lead to frequent flare ups of acne. Being a rich source of linoleic acid and gamma-linolenic acids, evening primrose oil can be

quite beneficial in reducing the inflammation (Yoshimoto-Furuie *et al.*, 1989) caused by acne. Beside above property, it is useful to restore the hormonal balance (Cheung, 1999), for which many women also face the problem of acne. By helping to restore hormonal balance, evening primrose oil can help to prevent acne flare ups during this period.

Arnica: *Arnica montana* has recently become popular as a topical treatment in gel or cream form to improve inflammatory skin conditions and heal chronic wounds. The antiinflammatory activity of the dried flower heads of this plant is ascribed to its constituent sesquiterpene lactones (Wagner *et al.*, 2004) such as helanalin, 11 α , 13-dihydrohelenalin, chamissonolid and their ester derivatives. It appears that these components act to reduce inflammation by inhibiting the transcription factor nuclear factor- κ B and hence useful in the treatment of acne, bruises and sprains (James and Tyler, 1999).

Thyme: Botanical name is *Thymus vulgaris*, a hardy perennial shrub. Herb is rich in essential oils and antioxidative phenolic substances. The published results reveal that major volatile constituents obtained from the aerial parts of the plant are geranial, linalool, Υ -terpineol, carvacrol, thymol and trans-thujan-4-ol/terpinen-4-ol (Piccaglia *et al.*, 1993). Plant essential oils and extracts have been used for many thousands of years, especially in food preservation, pharmaceuticals, alternative medicine and natural therapies (Lis-Balchin and Deans, 1997). Studies have shown that it has anti-spasmodic, carminative, anti-oxidant and anti-microbial properties (Biskup and Saez, 2002). Thyme is a stimulating skin tonic and gentle antiseptic cleanser. Ointment prepared from the leaves is useful in the treatment of cuts, burns, acne and rashes (Heinerman, 1996).

CONCLUSION

Acne vulgaris is a common skin affliction impacting the lives of millions. Many different treatment options are available for the treatment of acne. Study revealed that our traditional heritage is hiding number of miraculous herbs which are safe and effective alternate to cure acne. Pharmaceuticals are searching a viable option for desperate teens and other peoples to escape from conditions ranging from unsightly blemishes to disfiguring inflammation occurred due to acne. Need is to involvement of sustained and continuous research using innovative technologies targeting these herbs as effective contemporary skin care ingredients. It is expected that this paper will motivate and aid researchers, cosmetician, academician, pharmacist, industrialist and dermatologist to utilize more precisely these herbs in topical dermato-cosmetic formulation so that consumers can get maximum benefits of natural substances.

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