



REVITALIZING SKIN : A REVIEW ON TARUNYAPIDIKAHARA LEPA

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**ABSTRACT**

Skin is the first line of defence against external chemical and microbial threats, being the most exposed organ to the external environment. It harbours a microbial habitat and varies considerably across the body surface.¹ Alongwith the several factors affecting skin integrity, the changing lifestyle patterns also influence skin health. Ayurvedic classics enumerate many oral and topical formulations for various skin conditions. Among them, one such topical formulation named *Tarunyapidikahara Lepa* has been studied in this paper. An enhanced understanding of the properties of its ingredients is necessary to gain insight into their way of functioning in dermal care and to enable novel therapeutic approaches for the same.

INTRODUCTION

Twacha, being the site of *Sparshanendriya* among *Pancha Gyanendriyas*, carries the sensation of touch, which is in turn because of *Vayu Mahabhuta*. *Twacha* is a specialised sense organ that acquires special sensory perception of pain, touch, pressure, heat, and cold. Various names like Derma, Dermis, *Twacha*, Charma, Sparshan, Chavi, Chadani, Asrugdhara, Romabhumi, Ajin, Kruti and many more know skin.² Skin, being the largest sense organ, comprises the integumentary system along with its appendages. This system defends the body from undesired influences that one could receive from the external environment. It acts as the body's armour and first defence against bacteria, viruses and other organisms. In addition to performing a barrier function, this system also executes several complex activities, i.e., regulation of body temperature (Homeostasis), keeping up cell fluid, synthesising vitamin D and perception of stimuli.³ There are several factors, i.e., health, habits, job routine, climatic circumstances, etc., that directly or indirectly influence skin integrity. Intemperate exposure to heat causes skin dehydration during summer and leads to wrinkles, blemishes, pigmentation, sunburns, etc. The frosty season gives rise to impairment of the skin and hair in the form of cracks, cuts, infections, hair fall and dandruff.⁴ Age-linked physiological alteration negatively impacts the functions by weakening the skin's barrier function, declining epidermal cell turnover and keratinocyte and fibroblast proliferation and diminishing the vascular network responsible for delivering oxygen and nutrients to the tissues while eliminating metabolic byproducts.⁵ Skin is exposed to variable environmental aspects; the ultraviolet (UV) portion of sunlight is liable for various skin disorders. Prolonged exposure to ultraviolet-B radiation leads to various adverse effects on the skin.⁶ There has been a massive surge in demand for herbal skincare products as people become more aware of these elements and their negative impact on the skin. The growing inter-

est in herbs is a part of the movement towards change in lifestyles. The premise behind this movement is that there is much promise for using plants as curative medicine.⁷

In classical texts, a formulation called *Tarunyapidikahara Lepa* consisting of equal amount of *Lodhra* (*Symplocos racemosa* Roxb), *Dhanakya* (*Coriandrum sativum* Linn.) and *Vacha* (*Acorus calamus* Linn) is prescribed for topical application in *Mukhadushika* in renowned text *Chakradatta, Kshudra Roga Chikitsa*. According to the studies on these ingredients individually, these herbs could prove promising skin care agents. In this review, we have compiled the most pertinent data on these plants and their role in the form of extracts and natural compounds that can improve skin health.

PLANT PROFILE

Lodhra (*Symplocos racemosa*)

Symplocos racemosa is a small, evergreen tree, up to 6-8.5 m tall, found in the plains and lower hills throughout North and East India, ascending in the Himalayas up to an elevation of 1400 m, Bengal, Assam and Chota Nagpur.⁸

Dhanyaka (*Corriandrum sativum*)

Coriandrum sativum Linn (*Apiaceae*), commonly known as *Dhanyaka*, is an aromatic herb that is extensively grown in India. It is cultivated in all states and is a critical subsidiary crop in black cotton soils of Deccan, South India and North India.⁹

Vacha (*Acorus Calamus*)

A. calamus is a semi-evergreen perennial hairless herb with a creeping rhizome cultivated throughout India, ascending to an altitude of about 2200 m. It is found/grown in the states of Jammu Kashmir, Himachal Pradesh, Manipur, Naga land, Uttarakhand, Uttar Pradesh, Tamil Nadu, Andhra Pradesh, Maharashtra and Karnataka.¹⁰

TAXONOMICAL CLASSIFICATION

Category	Lodhra ¹¹	Dhanyaka ¹²	Vacha ¹³
Kingdom	Plantae	Plantae	Plantae
Division	Magnoliophyta	Magnoliophyta	Magnoliophyta
Class	Magnoliopsida	Magnoliopsida	Liliopsida
Order	Ericales	Apiales	Acorales
Family	Symplocaceae	Apiaceae	Acoraceae
Genus	<i>Symplocos</i>	<i>Coriandrum</i>	<i>Acorus</i>
Species	<i>racemosa</i> Roxb.	<i>sativum</i>	<i>calamus</i>

PHYTOCHEMISTRY

Lodhra (*Symplocos racemosa*)

Bark contains flavanol glucosides like symplocoside, symposide, leucopelargonidin 3-glucoside, ellagic acid, flavanol glycoside like rhamnetin 3-digalactoside, triterpenoids like 19 a-hydroxyarjunolic acid-3, 28-O-bis- β -glucopyranosides, 19 a-hydroxyasiatic acid-3, 28-O-bis- β -glucopyranosides, betulin Oleanolic acid, β -sitosterol and α -amyrin. Along with these chemical constituents, the bark mainly contains alkaloids loturine, isoloturine and harmane.¹⁴

Dhanyaka (*Coriandrum sativum*)

The compounds isolated from Coriander essential oil included: Monoterpene hydrocarbons (p-cymene, camphene, Δ -3-carene, limonene (dipentene), myrcene, cis- and trans-ocimene, α -phellandrene, β -phellandrene, α -pinene, β -pinene, sabinene, α -terpinene, γ -terpinene, terpinolene, α -thujene); Monoterpene oxides and Carbonyls (Camphor, 1,8-cineole, linalol oxide, carvone, geranial); Monoterpene alcohols (Borneol, citronellol, geraniol, linalool, nerol, α -terpineol, 4-terpinenol); Monoterpene Esters (Bornyl acetate, geranyl acetate, linalyl acetate, α -terpinyl acetate); Sesquiterpenes (β -Caryophyllene, caryophellene oxide, elemol, nerolidol); Phenols (Anethole, myristicin, thymol); Aliphatic hydrocarbons (Heptadecane, octadecane); Aliphatic alcohols (Decanol, dodecanol); Aliphatic aldehydes (Octanal, nonanal, decanal, undecanal, dodecanal, tridecanal, tetradecanal, 3-octenal, 2-decenal, 5-decenal, 8-methyl-2-nonenal, 8-methyl-5-nonenal, 6-undecenal, 2-dodecenal, 7-dodecenal, 2-tridecenal, 8-tridecenal, 9-tetradecenal, 10-pentadecenal, 3,6-undecadienal, 5,8-tridecadienal) and Miscellaneous compounds: Acetic acid, α -pdimethyl styrene).¹⁵

Vacha (*Acorus calamus*)

The rhizomes of *A. Calamus* have been found to contain a large number of different chemical compo-

nents. The oil of *A. Calamus* Linn contains concentrations of a-asarone, b-asarone, c-asarone, calamine, calamenol, calameone, a-pinene, b-pinene, camphene, p-cymene, eugenyl acetate, eugenol, isoeugenol, methyl isoeugenol, calamol, azulene, eugenol methyl ether, dipentene, methyleugenol, asaronealdehyde, terpinolene, 1,8-cineole, camphor, α -caryophyllene, and hydrocarbons. Thirteen amino acids were discovered in the root, of which amino acids were necessary: arginine, lysine, phenylalanine, threonine, and tryptophan. The other amino acids found were a-alanine, asparagine, aspartic acid, glutamic acid, norvaline, proline, and tyrosine.¹⁶

PROPERTIES FOR DERMAL CARE

The use of bioactive extracts or phytochemicals from various botanicals in cosmetics accomplishes two functions: care of the body and as ingredients to influence the biological functions of the skin, providing nutrients for healthy skin. Generally, botanical products are a rich source of vitamins, antioxidants, essential oils and oils, hydrocolloids, proteins, terpenoids and other bioactive compounds. According to their composition, these extracts can provide different properties.¹⁷

The properties contributing to dermal care are: -

ANTI-ACNE PROPERTIES

Acne vulgaris, or acne, is one of the most common dermatological diseases. It is a chronic inflammatory pilosebaceous skin disorder that affects the face, chest, and back. Acne is associated with increased sebum production by overactive oil glands, hyperkeratinisation by blocking skin pores, successive release of skin inflammatory mediators, and bacterial colonization in the follicles, leading to commensal skin microorganisms. Three main Gram-positive bacteria, *Cutibacterium acnes* (formerly *Propionibacterium acnes*), *Staphylococcus epidermidis* and *Staphylococcus aureus*, are involved in the bacterial colonisation of the follicle.¹⁸

Lodhra (*Symplocos racemosa*) In a study by G S Kumar et al. (2007), the ethanolic extract of *Symplocos racemosa* exhibited outstanding antimicrobial property against *Propionibacterium acnes* based on the disc diffusion assay; each had a MIC value (minimum inhibitory concentrations) of 0.685 mg/ml and an MBC (minimum bactericidal concentrations) of 1.35 mg/ml for *Propionibacterium acnes*. Also, Salireposides isolated from its extract have well-documented activity against acne-producing bacteria.¹⁹

Dhanyaka (*Corriandrum sativum*) As per Aditi Vats et al. (2012), the aqueous extract of coriander leaves and seeds manifested the zone of inhibition of 21.5 ± 1.4 and 20.6 ± 1.09 mm for the anti-bacterial activity as well as the MIC values of 1.7 mg/ml and 2.1 mg/ml against *P.acne* and *S. epidermidis* respectively.²⁰

Vacha (*Acorus Calamus*) Wan-Jae Kim et al. (2011) evaluated the antimicrobial activity of the essential oil, hexane extract and the main constituents of *A. calamus*, i.e. Methyl isoeugenol against *Escherichia coli*, *Salmonella typhimurium*, *Staphylococcus aureus*, *Bacillus subtilis*, *Propionibacterium acne* and *Candida albicans*. The essential oil has shown a strong and wide range of antimicrobial activity, except against *Escherichia coli*.²¹

DEPIGMENTATION

Pigmentation disorders are characterised by altered melanocyte density, melanin concentration, or both. Numerous mechanisms are targeted for treating hyperpigmentation, particularly the regulation of melanogenesis, with the help of inhibiting tyrosinase activity, a crucial enzyme in melanin synthesis.²² In Ayurveda, *Varnya*, *Raktaprasadana*, and *Tvacya* are a few terms specifying skin lightening concerning its modern counterpart, i.e., Tyrosinase inhibition, the most commonly reported skin lightening method.

Lodhra (*Symplocos racemosa*) As per Vaibhav S et al. 2012, Salireposides isolated from its extract has reported to show 6.60% mean tyrosinase inhibitory activity contributing as a mild depigmenting agent.²³

Dhanyaka (*Corriandrum sativum*) On evaluating the tyrosinase inhibitory activity, the alcoholic extracts of fruits of *Corriandrum sativum* (coriander) showed 47.76% inhibition.²⁴ **Vacha (*Acorus Calamus*)** has shown positive results in various skin related studies. According to one such study, essential oil extracted from the leaves of *A. macrospadiceus* inhibits melanin synthesis, by having inhibitory action on the signaling pathway regulating tyrosinase activi-

ty. This shows the considerable depigmentation potential of *A. macrospadiceus* essential oil.²⁵

ANTIOXIDANT ACTIVITY

Antioxidants are substances that combine to neutralize reactive oxygen species preventing oxidative damage to cells and tissues. Maintenance of cellular integrity involves a series of chemical reactions that generate reactive oxygen species - highly reactive molecules that can rapidly alter molecules fundamental to cutaneous homeostasis, such as proteins, lipids, or DNA. Endogenous or exogenous antioxidant mechanisms act by neutralizing these reactive molecules.²⁶

Lodhra (*Symplocos racemosa*)

The results of a study by Vijayabaskaran M et al., (2010) elucidated that the Ethanolic extract of **Symplocos racemosa** (EESR) showed potent antioxidant activity against ABTS [2, 2'-azinobis-(3-ethyl-enzothiazoline-6-sulfonic acid)] assay method. Concentration of sample at which the inhibition percentage reaches 50% is the IC50 value. The lower the IC50 value, the higher the antioxidant activity of the tested sample. EESR exhibited potent ABTS radical scavenging activity with IC50 value $41.45 \pm 0.51 \mu\text{g/ml}$.²⁷

Dhanyaka (*Corriandrum sativum*)

In a study done by Kamel Msaada et al., (2017) fruit methanolic extract of three coriander (*Corriandrum sativum* L.) varieties (Tunisian, Syrian and Egyptian) was assayed for their antioxidant activities. Obtained results showed that there are significant ($P < 0.05$) variations in total polyphenols (0.94 ± 0.05 – 1.09 ± 0.02 mg of gallic acid equivalents per gram of dry weight (mg GAE/g DW), total flavonoids (2.03 ± 0.04 – 2.51 ± 0.08 catechin equivalents in milligrams per gram of dry weight (mg EC/g DW) and total condensed tannin (0.09 ± 0.01 – 0.17 ± 0.01 mg EC/g DW) contents. Moreover, fruit methanolic extracts exhibited remarkable DPPH radical scavenging activity with IC50 values (the concentration required to cause a 50% DPPH inhibition) ranged from 27.00 ± 6.57 to 36.00 ± 3.22 lg/mL. The results indicated that coriander fruit might constitute a rich and novel source of natural antioxidants and may be suggested as a new potential source of natural antioxidant.²⁸

Vacha (*Acorus Calamus*)

Kho See Li et al., (2017) measured the antioxidant activity of *A. calamus* by determining the ability to scavenge free radical. Methanol leaf extract and rhizome extracts showed significant highest level of DPPH scavenging activity. The order of DPPH radi-

cal-scavenging activity of the extracts was found to be as follows: methanol rhizome extract, methanol leaf extract, water leaf extract, water rhizome extract, hexane rhizome extract and hexane leaf extract.²⁹

ANTI WRINKLES EFFECT

Skin aging is a complex biological process that results from genetic programming—or intrinsic aging—and cumulative environmental damage—or extrinsic aging. Endogenous or intrinsic aging is usually attributed to the passage of time, largely influenced by genetics, cellular metabolism, hormone, and metabolic processes, whereas exogenous or extrinsic aging is influenced by chronic exposure to sunlight, pollution, and ionizing radiation among other factors. In addition to roughness, loss of elasticity, wrinkling, and pigmentary disorders can occur in sun-exposed areas, and they significantly impact on a person's quality of life and psychological well-being.³⁰

Dhanyaka (Coriandrum sativum)

In a study by Salem et al., Coriander essential oil was evaluated for anti-wrinkle cosmetic potential activity in UV-induced skin photoaging mice. It was observed that coriander essential oil showed the highest collagenase, elastase, hyaluronidase and tyrosinase inhibitory activities.³¹

Vacha (Acorus Calamus)

In a study done by Ishwarya S, methanolic extract of *Acorus calamus* displayed significant collagenase inhibition activity by simple plate method. Collagenase inhibition activity was further confirmed by gelatin zymogram method and the plant extracts shown to inhibit collagenase activity at 50µg/ml concentration level.³²

ANTI-INFLAMMATORY

The skin encounters daily onslaught by exogenous stimuli. Noxious stimuli sometimes result in injuries and/or infections, leading to wounds, inflammatory dermatoses, skin aging, or skin carcinogenesis. Inflammation takes place in response to these damages to the normal skin barrier.³³ Inflammation is a combination of reactions generated by the body due to an aggression which can be external, such as an injury, infection or trauma, or internal, such as those observed in autoimmune diseases.³⁴ Natural components and phytoconstituents are able to interfere with the inflammatory mechanisms by preventing prolonged inflammation which promotes health.³⁵

Lodhra (Symplocos racemosa)

In-vitro evaluation of the Anti-Inflammatory Activity of *Symplocos racemosa* using Protein Denaturation Assay showed a positive response. The results de-

scribed the biosynthesised *Symplocos racemosa* has a percentage of inhibition of protein denaturation upto 76%, which was close to the standard drug (Diclofenac sodium in different concentrations) used (86%).³⁶ Huong et al., in a study had revealed that the genus *Symplocaceae* inhibits the pro-inflammatory mediator NO (nitric oxide) radicals production and the expression of iNOS and COX-2 proteins, thus acting against inflammation.³⁷

Dhanyaka (Coriandrum sativum)

In a study conducted by Sonika et al. relating anti-inflammatory activity of *Coriandrum sativum* at dose 200 mg/kg. The ethanolic extracts were tested for anti-inflammatory activity by carrageenan-induced rat paw edema. The study reported that *Coriandrum sativum* L. extract exhibited 40.81% inhibition of edema after the third hour at a dose of 200 mg/kg.³⁸ In another anti-inflammatory evaluation in albino Wistar rats of the *Coriandrum sativum* L. seeds ethanol extract at a dose of 250 mg/kg and 500 mg/kg showed significant anti-inflammatory activity in Carrageenan-induced paw edema while only the high-dose aqueous group exhibited significant results in the Cotton-pellet granuloma model when compared to the respective control group.³⁹ Furthermore, in an *in-vitro* study, the isolated compound (coriander lactone C) from *Coriandrum sativum* L. showed anti-inflammatory activity with IC 6.25 µM as an inhibitory effect on nitric oxide (NO) levels. In addition, a decrease in the generation of lipopolysaccharide-stimulated ROS and inflammatory cytokines (IL-6 and TNF-alpha). Mechanism exploration has shown that coriander lactone C suppresses the expression of inflammatory mediators, such as COX-2 and iNOS.⁴⁰

Vacha (Acorus Calamus)

In an *in vitro* anti-inflammatory study was done using protein denaturation assay. The essential oil isolated from *A. calamus*, where at the concentration level of 300 g/mL, 69.56% of the inhibition level was observed.⁴¹ An extract of the rhizome was studied in acute, chronic and immunological model of inflammation; including carrageenan- induced rat paw edema and compared with the activity of the hydrocortisone. The extract showed significant anti-inflammatory activity with the reduction of 44%.⁴² The anti-inflammatory activity of *A. calamus* in rats using acute and chronic experimental models was evaluated. The oral administration of the extract showed inhibition of the carrageenan-induced rat paw oedema, cotton pellet granuloma formation, and cotton oil granuloma pouch inflammatory response.⁴³

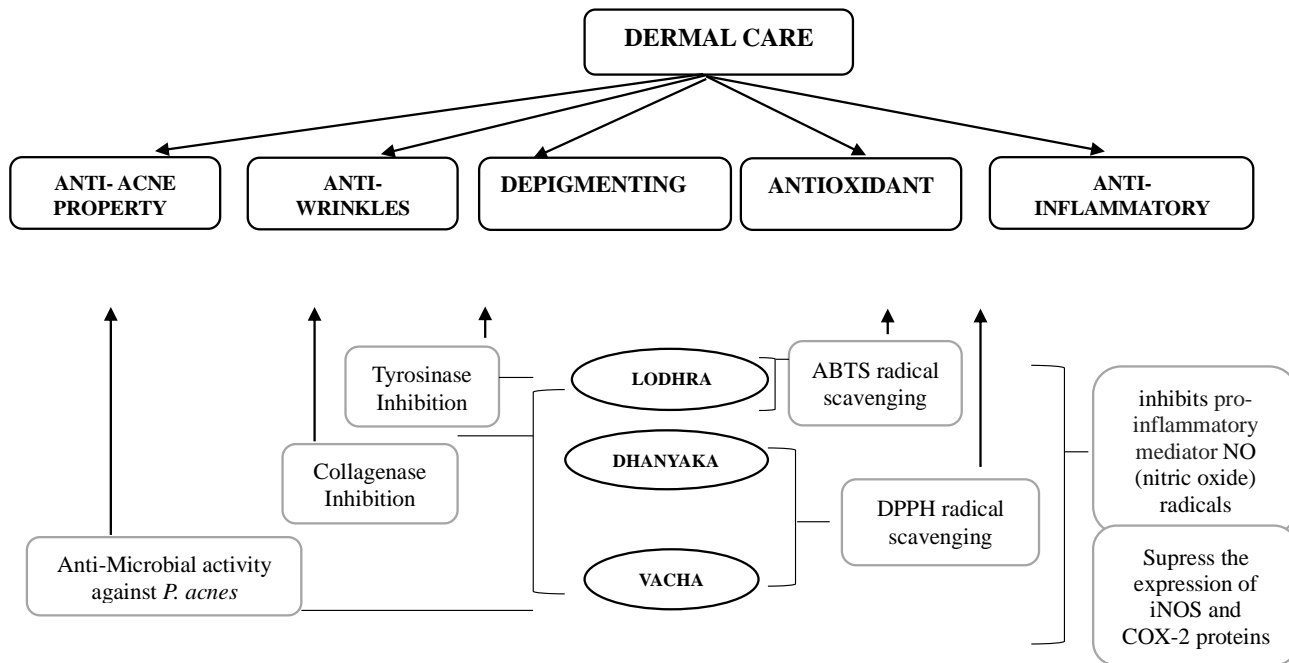
The rhizome extracts also showed significant anti-inflammatory effects in acute, chronic, and immunologic models of inflammation.⁴⁴ Mehrotra et al. (2003) demonstrated the immunomodulatory properties of the ethanolic extract of *A. calamus* rhizome. The extract inhibited the proliferation of mitogen (phytohaemagglutinin; PHA) and antigen (purified protein derivative; PPD)-stimulated human peripheral blood mononuclear cells (PBMCs), nitric oxide and interleukins-2 production.⁴⁵

DISCUSSION

Skin, being the outermost covering, aids in protecting from various factors, i.e. both exogenous and endogenous. The negative impact of such factors can be managed to an extent by using skin care products composed of herbal ingredients. A topical formulation named *Tarunyapidikahara Lepa* is prescribed for *Mukhadushika* in renowned text Chakradatta, *Kshudra Roga Chikitsa*. This formulation is composed of an equal amount of *Lodhra* (*Symplocos racemosa* Roxb), *Dhanayaka* (*Coriandrum sativum* Linn.) and *Vacha* (*Acorus calamus* Linn). The parts to be used are bark, fruit and rhizome, respectively. The basic properties required for Dermal care are Anti-Acne, Depigmenting, Antioxidants, Anti-Wrinkles and Anti-Inflammatory Properties. As per studies, each for-

mulation ingredient can contribute as an effective dermal care agent.

Extracts of all three ingredients possess antimicrobial activity against *Cutibacterium acne* (formerly *Propionibacterium acne*), thus enriching the formulation's anti-acne properties. The depigmenting potential of these ingredients can be verified by the tyrosinase inhibitory activity shown by their respective extracts. The antioxidant activity of the ingredients can be evaluated by determining the ability to scavenge free radicals. Extracts with strong scavenging ability indicate themselves as a promising antioxidant agent. Extract from *Lodhra* showed potent ABTS radical scavenging activity, the extract from *Dhanyaka* and *Vacha* exhibited remarkable DPPH radical scavenging activity. In this review, the anti-wrinkle property is determined through collagenase inhibitory activity. Studies revealed significant collagenase inhibition potential of both *Dhanyaka* and *Vacha*. Studies need to be done to explore *Lodhra*'s collagenase inhibitory activity. In an *in-vitro* study using protein denaturation assay for Anti-Inflammatory Action, *Lodhra* responded positively, and an *in-vivo* study for the anti-inflammatory activity of *Dhanyaka* and *Vacha* by carrageenan-induced rat paw oedema also recorded their positive response. Thus, the anti-inflammatory potential of the composition is elucidated.



Furthermore, medicinal plants have been an exciting source for obtaining new active compounds. The class of secondary plant metabolites has gained increasing interest over the last few decades due to various biological activities. Although more research on these plants needs to be done to explore their potential in dermatology, the present records affirm their vast calibre in devouring fledgling skin conditions.

CONCLUSION

This article briefly reviews the available data on the biological influences of the ingredients of topical skin formulation named *Tarunypidikahara Lepa* and their significant role in dermal care.

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