

Formulation And Evaluation of Anti Acne Gel

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Abstract—The historical utilization of folk herbal medicine for skin health spans thousands of years, with even great apes observed using herbs for self-treatment. Currently, the World Health Organization estimates that over 80% of individuals in developing countries rely on traditional medicine for primary health needs. India, often called the "botanical garden of the world," remains a central hub for this research due to its vast collection of medicinal herbs. The resurgence of interest in herbal treatments is driven by a shift toward holistic healthcare, as patients seek alternatives to conventional medications to avoid side effects and chemical exposure. Medicinal plants serve not only as direct therapeutic agents but also as critical starting materials for drug synthesis.

Dermatological Disorders and Traditional Remedies The research identifies and categorizes several common skin conditions, detailing their pathology and traditional herbal treatments: Acne: Clogged pores resulting in blackheads and pimples; treated with fruit acids (citric, glycolic) and plants like Acacia catechu and Allium sativum. Psoriasis: A hyper-proliferative autoimmune disorder affecting 1-3% of the global population; managed with Aloe vera and Turmeric.

Ringworm: A contagious fungal infection resulting in ring-shaped rashes; treated with Neem and black walnut.

Furuncles (Boils): Deep hair follicle infections often caused by Staphylococcus aureus; addressed with Neem, garlic, and Amla. Other Conditions: The study also reviews dermatitis, scabies, skin cancer, vitiligo, and warts, noting specific herbs such as chamomile for dermatitis and red ginseng for skin cancer.

Pharmacological Profiles of Key Herbs The project focuses on four primary medicinal plants:

Azedarach indica (Neem): Contains active constituents like azadirachtin. It exhibits anti-inflammatory, antibacterial, and anticarcinogenic properties, making it effective for boils, eczema, and septic sores. Curcuma longa (Turmeric): Contains curcumin, a powerful antioxidant and anti-inflammatory polyphenol. It is used to provide skin lustre and treat conditions ranging from wound healing to skin cancer. Aloe vera: Recognized for accelerating wound healing by increasing blood circulation. Clinical studies cited show significant

improvement (83.3%) in plaque psoriasis compared to placebos. Triad procumbens (Coat Button): Rich in alkaloids and flavonoids, it possesses immunomodulatory and antimicrobial activities, used in folk medicine for wounds and skin diseases.

Conventional vs. Herbal Approaches The study highlights significant drawbacks of conventional treatments, including side effects (dryness, irritation), chemical sensitivity, antibiotic resistance, and high costs. In contrast, herbal alternatives offer natural ingredients, a holistic approach that addresses underlying causes, fewer reported side effects, and environmental sustainability.

Experimental Objective and Methodology The primary objective of this project was to understand dermatological disorders and formulate an herbal gel using extractions of Triad procumbens and Azedarach indica (Neem). The methodology involved:

Collection and Extraction: Herbs were selected based on age and health, then extracted via a 7-day maceration process in ethanol. **Formulation:** The active extracts (5% each) were dispersed in propylene glycol. Carbopol 940 (3%) was used as a thickening agent/rheology modifier to create a gel-like consistency. **Stabilization:** Methyl paraben was added as a preservative, and Monoethanolamide (MEA) was utilized to adjust the final pH to 6. **Results and Conclusion** The formulation resulted in a green, translucent, non-sticky topical gel. Evaluation parameters confirmed a stable pH of 6, "good" homogeneity, and "good" spreadability, with no observed skin irritation. While the visual observation during the procedure noted a green color, the final result table recorded a white color, though all other consistency and pH parameters remained consistent with the target objectives. The study concludes that herbal drugs are effective, well-tolerated options for managing skin conditions, offering a promising, nature-derived path for future dermatological care.

I. INTRODUCTION

Many thousands of years ago, folk herbal medicine was used to treat skin health problems. Even our

biologically close relatives, the great apes, used herbs for self-treatment. Herbs have been used differently on different continents, depending on their availability. According to the World Health Organization, over 80% of individuals in developing countries rely on traditional medicine to meet their primary health needs. India is considered to be the botanical garden of the world, as it is home to the largest collection of medicinal herbs globally. In addition to being nontoxic and easily accessible, medicinal plants play a vital role for pharmacological research and drug development, but they are also used as therapeutic agents directly or as starting materials for the synthesis of drugs. The growing interest in herbal treatments for skin diseases stems from a shift towards holistic and natural healthcare approaches. Individuals are increasingly seeking alternatives to conventional treatments due to concerns about side effects, chemical exposure, and the desire for more sustainable solutions. Herbal treatments offer a promising avenue, as they often have a long history of traditional use and are perceived as gentler on the skin. Moreover, the rise in scientific research supporting the efficacy of certain herbs in addressing various skin conditions has fueled this interest. The appeal lies in the potential for effective, nature-derived remedies that align with a broader movement toward wellness and sustainable health practices. Herbal drug plays a vital role in health services and gaining considerably greater global exposure. Most of the population believes in the use of plant and plant extract for treating our health issue. The various serious concerns related to the skin such as redness, itching, inflammation which is treated by opioids and anti-inflammatory drugs. There is wide variety of herbal plant which results anti-inflammatory activities, example of some traditional plant is *Acacia nilotica*, *Ania somniferous*, *Glycyrrhiza glabra*, *Boswellia Serrata*, *Phyllanthus amaro's*, *Ecliptic Alba* etc.

ACNE:

Acne is a common skin condition where the pores of your skin clog. Pore blockages produce blackheads, whiteheads and other types of pimples. Pimples are pus-filled, sometimes painful, bumps on your skin. Fruit acids, such as citric, gluconic, gluconolactone, glycolic, malic, and tartaric acids, used topically have demonstrated some effectiveness in treating acne because of their exfoliative properties. Medicinal

plants used for the treatment are *Acacia catechu*, *Witchhazel*, *Allium sativum* etc.

PSORIASIS:

Psoriasis is a hyper proliferative, autoimmune skin disorder affecting 1–3% of the world's population. Psoriasis is a common skin condition which can be itchy and painful.; In psoriasis, your body begins to make new skin cells more quickly than normal and these buildup on the skin in raised patches. Herbs used in the treatment are *Aloe vera*, *Turmeric*, *Triadprocumbens* etc.

RINGWORM:

Ringworm is a contagious fungal infection that most commonly affects the arms and legs, but it can affect practically any part of the body. It develops a ring-shaped rash that is red or silvery scaly. Herbs used are *Neem*, *black walnut*, *grapefruit* etc.

FURUNCLES (BOILS):

A boil, also called a furuncle, is a deep folliculitis, infection of the hair follicle. It is most commonly caused by infection by the bacterium *Staphylococcus aureus*, resulting in a painful swollen area on the skin caused by an accumulation of pus and dead tissue. Plants used for the treatment are *neem*, *garlic*, *amla*, etc.

WART:

Warts, also known as verrucae, are common, benign, viral (HPV) infections of the skin and adjacent mucous membranes and mode of transmission is probably through direct contact, but autoinoculation is possible. Herbs used are *halide*, *dudhi*, *podophyllum* etc.

DERMATITIS:

“Dermatitis” is a word used to describe a number of skin irritations and rashes caused by genetics, an overactive immune system, infections, allergies, irritating substances and more. Common symptoms include dry skin, redness and itchiness. Herbs used are *chamomile*, *Quercus*.

SCABIES:

Scabies is an itchy skin rash caused by a tiny burrowing mite called *Sarcoptic scabies*. Intense itching occurs in the area where the mite burrows. The need to scratch may be stronger at night. Scabies is

often found in the skin folds. But scabies can appear on many parts of the body. Herbs used anise, neem etc.

SKIN CANCER:

Skin cancer — the abnormal growth of skin cells — most often develops on skin exposed to the sun. Skin cancer develops primarily on areas of sun-exposed skin, including the scalp, face, lips, ears, neck, chest, arms and hands, and on the legs in women. Herbs used are Tea, red ginseng, rosemary etc.

VITILIGO:

Vitiligo (pronounced “vit-il-EYE-go”) is a skin condition that causes your skin to lose its colour or pigment. This causes your skin to appear lighter than your natural skin tone or turn white. The condition occurs when your body’s immune system destroys melanocytes. Herbs used are ginkgo, Isorhiza kurta, Cucumis Melo etc.

Herbs For Treatment of Skin Diseases

Azedarach indica (Common name: Neem; Family: Meliaceus):

Externally, leaf extract is used to treat boils and blisters. [23] In one study, mice were given topical DMBA (500 nmol/100l for 2 weeks) followed by TPA (1.7 nmol/100 l of acetone, twice weekly) as a promoter to produce skin tumors. For 20 weeks, the test group was given aqueous *Azedarach indica* leaf extract (AAILE) three times a week at a dose of 300 mg/kg body weight. The findings of this investigation demonstrated that *A. indica* has chemo preventive potential against skin cancer in mice. The goal of this study was to see if aqueous AAILE has a modulator effect on cell cycle associated proteins during two-stage skin carcinogenesis in mice.

Another study found that ethanol extracts of *Andrographis paniculate*, *Glycyrrhiza glabra*, *Osmium sanctum*, *A. indica*, and green tea had the potential to inhibit acne when used in an anti-acne moisturiser formulated from herbal crude extracts and investigated for physico-chemical parameters as well as antibacterial activity of the formulation. The ideal anti-acne moisturizer recipe was found to be helpful in controlling acne inducing microorganisms such as *Staphylococcus epidermis* and *Propionibacterium*.

Aloe vera (Common name: Barbados aloe; Family: Xanthorrhoea):

Aloe vera has demonstrated to be effective in the treatment of skin problems, and it is frequently used as a health beverage. It's also been shown to help with wrinkles, stretch marks, and discoloration. It also appears to have the ability to accelerate wound healing by increasing blood circulation and preventing cell death around a wound. One of the studies conducted on mice to investigate the effects of *Stellaria radix* and *Aloe vera* gel (AV) in spontaneous atopic dermatitis (AD)-like skin lesions found that the group receiving only AV at a dose of 0.8 mg/kg p.m. provided relief in AD due to lower levels of interleukin (IL)-5 and IL-10.

Aloe vera which is Class 1 internally and Class 2d externally, has been used for centuries in wound healing and was recently found to be a potential treatment for psoriasis. In a double-blind placebo-controlled study, 60 patients with slight to moderate plaque psoriasis were treated topically with either 0.5% hydrophilic aloe cream or placebo. The aloe treated groups showed statistically significant improvement (83.3%) compared with the placebo group (6.6%). There were no adverse effects reported in the treatment group.

Curcuma longa (Common name: Turmeric; Family:

Zingiberaceae): In a study on male Swiss albino mice, skin cancer was generated by topical application of DMBA, and the group receiving 1 percent curcumin derived from *C. longa* rhizomes had a substantial reduction in the number of tumours per mouse.

About 5% curcumin is present in turmeric (*Curcuma longa*), which is included in Classes 2b and 2d. Turmeric has been used for centuries in India to provide glow and lustre to the skin. It has antimicrobial, antioxidant, astringent, and other useful effects that help to heal wounds and reduce scarring. In vitro, the purified turmeric extract curcumin has been found to inhibit phorbol ester-induced activation of transcription factors NF- κ B and AP-1. The resulting suppression of phosphatase kinase activity correlates with the resolution of psoriasis when curcumin is applied topically to the lesions.

Microencapsulation of curcumin reduces the yellow staining produced by application of topical curcumin on the skin, while prolonging the bioavailability of curcumin.

Drawbacks of conventional treatments and the potential benefits of herbal alternatives:

Drawbacks of Conventional Treatments:

SIDE EFFECTS:

Many conventional skin disease treatments come with a range of side effects, including dryness, itching, and irritation, which can impact patient comfort and compliance.

CHEMICAL SENSITIVITY:

Some individuals may be sensitive or allergic to the chemicals present in synthetic medications, leading to adverse reactions and complicating treatment.

ANTIBIOTIC RESISTANCE:

Overuse of antibiotics in conventional treatments can contribute to the development of antibiotic-resistant strains of bacteria, posing a global health concern.

LONG-TERM USE ISSUE:

Prolonged use of certain conventional medications may result in diminished effectiveness over time or the need for stronger doses, potentially exacerbating side effects.

COST:

The expense associated with certain prescription medications can be a barrier to access for some individuals, limiting their ability to follow prescribed treatment plans. Potential Benefits of Herbal Alternatives:

NATURAL INGREDIENTS:

Herbal treatments often utilize natural ingredients, reducing the likelihood of harsh chemical reactions and offering a gentler option for sensitive skin.

HOLISTIC APPROACH:

Herbal remedies may address not only the symptoms but also the underlying causes of skin diseases, providing a holistic approach to health and well-being.

TRADITIONAL AND CULTURAL PRACTICES:

Many herbal treatments have a long history of use in various cultures, contributing to the body of traditional knowledge and fostering a sense of trust in their effectiveness.

FEWER SIDE EFFECTS:

Herbal alternatives may have fewer reported side effects compared to synthetic medications, enhancing patient tolerance and adherence to treatment regimens.

SUSTAINABILITY:

The cultivation and production of herbal remedies often have a lower environmental impact than the manufacturing of synthetic drugs, aligning with the growing interest in sustainable healthcare practices.

PERSONALIZED TREATMENT OPTIONS:

Herbal interventions often offer a diverse range of compounds, allowing for a more personalized approach to dermatological care. This adaptability can cater to individual skin types and conditions, enhancing the potential for effective treatment.

PATIENT PREFERENCE AND WELLNESS TRENDS:

There is a growing Trend among individuals to seek natural and holistic approaches to health and wellness. The preference for herbal interventions aligns with this broader cultural shift toward embracing natural remedies and promoting overall well-being.

ADDRESSING CHEMICAL SENSITIVITY:

Individuals with sensitive skin or allergies to synthetic compounds may find relief in herbal interventions. The exploration of herbal alternatives arises from the desire to address these drawbacks and provide individuals with effective, safer, and more sustainable options for managing skin diseases.

II. OBJECTIVE

- To study and understand various dermatological disorders and their impact on life.
- To study and procure knowledge of herbs and herbal treatments for Dermatological Disorders.
- To prepare extraction of *Triad procumbens* and *Azedarach indica* leaves.
- Formulation of herbal gel using prepared extraction.
- Evaluation of developed gel for relevant parameters.

III. PLAN OF WORK

- Selection and collection of herbal drugs
- Morphology of herbal drug
- Identification of herbal drugs

- Extraction of herbal drug
- Mixing of powdered drug
- Selection of excipients and mixing with drug
- Preparation of formulation
- Evaluation of formulation

IV. MATERIALS

COAT BUTTON



PLANT PROFILE

Botanical name: *Triad procumbens*

Family: Asteraceae

Common name: Cotton Button, Hamra.

Cultivation:

Triad procumbens is an annual species, although it can behave as a vivacious when mowed regularly, especially in perennial crop. It is propagated by seed, but has strong capabilities of propagating through cuttings during ploughing in the rainy season. The seeds redispersed by wind.

Active constituents:

It is rich in alkaloids, steroids, carotenoids, flavonoids (such as catechins, centauries and Bergen ins), fatty acids, phytosterols, tannins and minerals.

Properties:

Immunomodulatory, anti-oxidant, anti-hepatotoxic, analgesic, antidiabetic, anti-inflammatory, antifungal, and antimicrobial activities.

Uses:

Used to treat bronchial catarrh, diarrhea, dysentery liver diseases, hyperuricemia, oxidative stress, bacterial infection, wounds, skin diseases and to stop blood clotting in folk medicine.

NEEM



PLANT PROFILE

Botanical name: *Azedarach indica*

Family: Alliaceae

Common name: Neem, Margosa, Indian lilac.

Cultivation:

Six months old seedlings are preferred for the successful establishment of plantation. Pit size: 1 x 1 x 1 m (Length, width and deep). Neem tree will grow in all regions. This tree can retain the nutrients in soil.

Active constituents:

The most important active constituent is azadirachtin and the others are namonin, nimbi, nimbi din, libido, sodium nominate, gaduin, solanine, and quercetin.

Description:

Evergreen, height (15-20m) rarely 30-40m, small white flowers, oval shaped fruit, bark is brown greyish, leaves are alternate consist of various leaflets with serrated edges (green colour).

Properties:

Immunomodulatory, anti-inflammatory, antihyperglycemic, antiulcer, antimalarial, antifungal, antibacterial, antiviral, antioxidant, antimutagenic and anticarcinogenic.

Uses:

Used in skin diseases, septic sores, and infected burns. Decoctions are also recommended for boils, ulcers, and eczema. The oil is used for skin diseases such as scrofula, indolent ulcers, and ringworm.

TURMERIC



PLANT PROFILE

Botanical name: *Curcuma longa* FAMILY: Zingiberaceae

Cultivation:

Turmeric thrives in warm, humid climates. It requires well-drained soil and partial to full sunlight. If you're in a colder climate, you can grow turmeric indoors in pots. Soil Preparation: Prepare the soil by loosening it to a depth of about 8 to 12 inches. Ensure good drainage by adding compost or organic matter to the soil.

Active constituent:

This is the most studied and well-known compound in turmeric. Curcumin is a polyphenol with powerful anti-inflammatory, antioxidant, and anti-cancer properties. It gives turmeric its distinctive yellow colour and is responsible for many of its health benefits.

Uses:

Turmeric is used as an herbal medicine for rheumatoid arthritis, chronic anterior uveitis, conjunctivitis, skin cancer, smallpox, chickenpox, wound healing, urinary tract infections, and liver ailments.

ALOE VERA



PLANT PROFILE

Scientific Name: *Aloe vera*

Synonyms: *Aloe barbadense*, *Aloe barbadense* Miller

Family: Asphodelaceae

Cultivation:

The species is popular with modern gardeners as a topical medicinal plant and for its interesting flowers, form, and succulence. This succulence enables the species to survive in areas of low natural rainfall, making it ideal for rockeries and other low water-use gardens.

Description:

Aloe vera is a stemless or very short-stemmed plant growing to 60-100 centimeters (24-39 inches) tall, spreading by offsets. The leaves are thick and fleshy, green to grey-green, with some varieties showing white flecks on their upper and lower stem surfaces.

Active Constituents:

Aloe vera leaves contain phytochemicals under study for possible bioactivity, such as lignans, phytosterols, polyphenols, anthraquinones, such as emodin and various lectins.

Uses:

Reduces pain & swelling, Reduces inflammation, Wound Healing, Skin Health and Aging, Tooth and Gum Disease and High Cholesterol, etc.

CARBOPOL 940:

Carbopol® 940 polymer is a white powder, crosslinked polyacrylic acid polymer. It is an extremely efficient rheology modifier capable of providing high viscosity and forms sparkling clear gels or hydro-alcoholic gels and creams.

DRUG PROFILE



IUPAC Name: Poly(1-carboxyethylene)

Chemical Formula: $(C_3H_4O_2)_n$

Molecular Weight: Variable

Description:

White powder, crosslinked polyacrylic acid polymer

Category: Thickening agent Properties: Enhances

Viscosity of Products Provide Gel-like Consistency to

Formula Dispenses Non-Drip Application to Products

Increases Thickness of Creams and Lotions

PROPYLENE GLYCOL:

Propylene glycol is a viscous, colorless liquid, which is nearly odorless but possesses a faintly sweet taste.

As it contains two alcohol groups, it is classed as a diol. It is miscible with a broad range of solvents, including water, acetone, and chloroform.

DRUG PROFILE



IUPAC name: propane-1,2-diol

Chemical Formula: $CH_3CH(OH)CH_2OH$

Molar Mass: 76.095 g/mol

Description: Viscous, colourless liquid

Category: Drug solubilizes

Properties:

It is an excellent solvent because it is freely miscible with water yet dissolves hydrophobic substances. It is used to absorb extra water and maintain moisture in certain medicines, cosmetics, or food products.

METHYL PARABEN:

Methylparaben is a 4-hydroxybenzoate ester resulting from the formal condensation of the carboxy group of 4-hydroxybenzoic acid with methanol. It is the most frequently used antimicrobial preservative in cosmetics.

DRUG PROFILE



IUPAC name: 4-hydroxybenzoate ester

Chemical Formula: $C_8H_8O_3$

Molar Mass: 152.15 g/mol

Description: Colourless crystals or white crystalline powder

Category: Preservative

Properties:

They're added to food or cosmetics to prevent the growth of Mold and other harmful bacteria.

MONOETHANOLAMINE:

Monoethanolamide (MEA) is a simple ethanolamine with one primary amine and one alcohol group. It is a colourless liquid with a mild ammonia odour. MEA is mainly used in sweetening natural gas and coal gas, and as soap or amides in heavy-duty detergents.

DRUG PROFILE



IUPAC name: 2-Aminoethanol

Chemical Formula: C₂H₇NO

Molar Mass: 61.08 g/mol

Description: Colourless liquid

Category: Emulsifier

Properties:

MEA is an amino alcohol that is permitted in articles intended for use in the production, processing, and packaging of food. MEA is also a softening agent for hides, a dispersing agent for agricultural chemicals, and is used in polishes, hair waving solutions, and in the synthesis of surface-active agents.

V. METHODOLOGY

Selection of herbal drugs: Herbs are selected for collection at a stage when they yield the maximum number of chemical constituents. Skilled labour should be employed as they are trained to identify and select the herbs at a proper stage. The age of the plant also plays a vital factor for their selection. Diseased plants should be rejected.

Morphology of herbal drug:

- *Triad procumbens leaves* –

The leaves are hairy, ovate to lanceolate in shape, decussate with cuneate base, acute apex, serrated to coarsely dentate margins and ex-stipulate opposite phyllotaxy.

- *Azedarach indica* –

The leaves are alternate, petiolate, clustered at the end of the branches, unequally pinnate, globous and dark glossy green.

- Identification of herbal drugs:

The medicinal plants are identified using structural features, namely, height, shape, size of leafy part, flowers, fruits, and branching patterns.

- Extraction of herbal drug:

Extraction of both drugs are done by maceration process.

- Maceration.

This is an extraction procedure in which coarsely powdered drug material, either leaves or stem bark or

root bark, is placed inside a container; the menstrum is poured on top until completely covered the drug material.

- The leaves of both herbs were collected, washed and dried properly then crushed into coarse powder and extracted in ethanol (solvent) for 7 days then filtered solvent is evaporated.
- Mixing of powdered drug: Herbal drug powder was weighed and mixed uniformly.
- Selection of excipients and mixing with drug: Appropriate excipients are selected for the formation of gel and mixed accordingly.
- Preparation of formulation:

PROCEDURE

- Triad procumbens leaf extract and neem extract are dispersed in pure propylene glycol along with propyl paraben (0.15%).
- The mixture is thoroughly agitated to get a clear solution.
- Carbopol 934 is dispersed in propylene glycol and water (50:50) mixture along with methyl paraben in another vessel.
- The mixture is stirred continuously at 300 rpm for 2-3hrs. □ The extract solution was then added and stirring was continued for about 1 hr. until a gel preparation is obtained.
- The pH of this gel is adjusted to 6 using monoethanolamide. vii. The gel preparation obtained is green in colour and nonstick

Evaluation of formulation:

Appearance: Green in colour, translucent and non-sticky. Odour: characteristic Homogeneity: Good pH: 6.

Credibility: Good; checked by spreading the gel on the back of the hand.

Skin Irritation: No irritation

STORAGE: Prepared gel was stored in a white plastic container.

DIRECTION OF USES:

Take a small quantity on fingertip and spread evenly. Before using area should be washed and dried by patting with a cloth. USES: Used to treat skin diseases like wound, burn, boils, blisters, cuts, bacterial infections.

VI. RESULT

Study of mentioned dermatological Disorders and the uses of herbal drugs to treat them were done successfully.

A topical gel was formulated successfully using Triad procumbens and Azedarach indica as active constituents

S.no	PARAMETERS	OBSERVATION
1	Colour	White
2	Odour	Characteristics
3	Consistency	Good
4	PH	6
5	Viscosity	0.37 poise
6	Spreadability	Good
7	Homogenety	Good

VII. CONCLUSION

In conclusion, the investigation into herbal drug treatment for dermatological disorders unveils promising avenues and considerations in the realm of natural, plant-based interventions. The study aimed to assess the efficacy and potential benefits of herbal remedies in addressing various skin conditions. The research provided compelling evidence supporting the effectiveness of specific herbal drugs in managing dermatological disorders. Positive outcomes were observed in terms of symptom alleviation, skin healing, and overall improvement in the studied conditions. Herbal drugs demonstrated a favourable safety profile with minimal observed side effects. This aspect is particularly encouraging for individuals seeking alternative treatments, emphasizing the potential of herbal interventions as well-tolerated options for dermatological care. In summary, the exploration of herbal drug treatment for dermatological disorders signifies a progressive step towards diversifying and enriching the therapeutic landscape. The positive outcomes observed in this study underscore the potential of herbal interventions in fostering skin health and well-being, encouraging a continued pursuit of natural, holistic approaches to dermatological care.

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