

Formulation and Evaluation of Herbal Anti-Acne Facial Toner Containing Sapodilla (*Manilkara zapota*) Leaf Extract

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Abstract—Acne vulgaris is a widespread skin condition that can affect individuals across various age groups, particularly teenagers. Many commercially available anti-acne products are made synthetically and can lead to side effects such as dryness, skin irritation, and increased sensitivity. Because of these concerns, there is a growing interest in herbal cosmetics due to their natural origin, safer profile, and beneficial effects on the skin. This review focuses on the creation and testing of a herbal anti-acne facial toner that includes Sapodilla (*Manilkara zapota*) leaf extract. Sapodilla leaves are rich in flavonoids, tannins, phenolic compounds, and antioxidants, which have antimicrobial and anti-inflammatory properties that are helpful in managing acne. The toner formulation includes Sapodilla leaf extract, rose water, aloe vera, glycerin, vitamin E, a preservative, essential oil, and distilled water. To prepare the extract, the maceration method was used, followed by rotary evaporation. The resulting toner was assessed for pH level, appearance, stability, consistency, and antimicrobial effectiveness. The formulation demonstrated favorable cosmetic characteristics and was found to be compatible with the skin. This review emphasizes the value of herbal components in cosmetic development and promotes the use of Sapodilla leaf extract in natural skincare solutions for acne.

Index Terms—Herbal toner, Sapodilla leaves, Acne vulgaris, Herbal cosmetics, Antimicrobial activity.

I. INTRODUCTION

Skin serves as the body's outer protective layer and plays a key role in maintaining body temperature, sensing the environment, and protecting against harmful microorganisms and pollutants.¹ Healthy skin not only enhances physical appearance but also boosts confidence. One of the most prevalent skin

disorders affecting both adults and teenagers is acne vulgaris.²

Acne typically forms due to overproduction of sebum, clogged hair follicles, bacterial growth, and skin inflammation.³

Many traditional acne treatments use synthetic chemicals that can cause side effects like redness, dryness, flaking, irritation, and allergic reactions. These problems have led to an increase in interest in herbal cosmetics.⁴ Because of their natural origin and increased acceptance, herbal skincare products have become more and more popular in recent years, among users, and fewer side effects. These products contain plant-derived components such as flavonoids, tannins, alkaloids, saponins, and phenolic compounds, which offer antimicrobial, antioxidant, and anti-inflammatory benefits. Medicinal plants contain natural bioactive substances like flavonoids, alkaloids, tannins, phenolics, and antioxidants that deliver therapeutic benefits. Herbal cosmetics are made from plant-based materials that have both medicinal and cosmetic properties. These products are frequently thought to be more cost-effective, safer, eco-friendly, and skin-friendly.

Sapodilla, scientifically known as *Manilkara zapota*, is a medicinal plant from the Sapotaceae family.⁵

Its leaves contain antioxidant and antimicrobial properties that can help control acne-causing bacteria and reduce inflammation. As a result, Sapodilla leaf extract can be used in the formulation of herbal facial toners for managing acne.

However, factors such as pollution, stress, hormonal changes, poor diet, and microbial infections can lead to various skin problems⁶

II. ACNE VULGARIS



Fig No 1: Acne Vulgaris

Acne vulgaris is a long-term condition that causes inflammation in the sebaceous glands and hair follicles. It often appears on the face, chest, shoulders, and back. It can affect both men and women, particularly during the time of puberty.⁷

Causes of Acne

- Too much oil production
- Imbalance in hormone levels
- Infection caused by bacteria
- Stress and feelings of anxiety
- Exposure to dust and polluted air
- Reactions to cosmetics
- Poor eating habits

Symptoms of Acne

- Pimples
- Blackheads
- Whiteheads
- Redness
- Inflammation
- Scarring

Pathogenesis of Acne

Acne develops when the sebaceous glands produce too much oil, which can block the skin's pores. This blockage creates an environment that allows bacteria like *Cutibacterium acnes* to grow, leading to inflammation and the formation of pimples.⁸

III. HERBAL COSMETICS

Natural elements taken from plants are used to make herbal cosmetics. These formulations not only enhance the appearance of the skin but also offer therapeutic benefits. Herbal cosmetics are formulations that use plant-based substances to enhance skin health and appearance. These products are generally safer because they do not contain harsh synthetic chemicals. Herbal cosmetics have various beneficial properties, including antioxidant, antimicrobial, anti-inflammatory, and moisturizing effects.⁹

Advantages of Herbal Cosmetics

- Minimal side effects
- Suitable for long-term use
- Environmentally friendly
- Cost-effective
- Good skin compatibility
- High in antioxidants¹⁰

Herbal skincare products are commonly found in creams, lotions, gels, face washes, and toners.

IV. SAPODILLA (*Manilkara zapota*) PLANT PROFILE

Fig No 2: Sapodilla

Tab No 1: Sapodilla Plant Profile

Parameter	Description
Botanical Name	<i>Manilkara zapota</i>
Family	Sapotaceae
Common Name	Sapodilla, Chikoo
Plant Type	Evergreen tree
Part Used	Leaves
Major Constituents	Flavonoids, tannins, phenolics

Sapodilla leaves have been traditionally used for treating wounds, reducing inflammation, fighting microbial infections, and managing various skin conditions.¹¹

V. PHYTOCHEMICAL CONSTITUENTS OF SAPODILLA LEAVES

Sapodilla leaves contain multiple active phytochemicals that contribute to their medicinal properties.

Important Constituents

- Flavonoids
- Tannins
- Phenolic compounds
- Saponins
- Glycosides
- Alkaloids

Pharmacological Activities

- Antioxidant activity
- Antimicrobial activity
- Anti-inflammatory activity
- Wound healing activity

These properties make Sapodilla leaves beneficial for use in anti-acne cosmetic formulations.¹²

VI. ROLE OF INGREDIENTS IN HERBAL TONER

Tab No. 2: HERBAL TONER'S INGREDIENT ROLE

Ingredient	Function
Sapodilla leaf extract	Anti-acne and antimicrobial activity
Rose water	Skin soothing and refreshing agent
Aloe vera	Moisturizing and anti-inflammatory effect
Glycerin	Humectant and skin hydration
Vitamin E	Antioxidant activity
Essential oil	Fragrance and antimicrobial effect
Preservative	Prevents microbial contamination
Distilled water	Vehicle

Rose Water



Fig No 3: Rose Water

Rose water serves as a natural skin toner and gentle astringent. It aids in calming redness and irritation while helping to keep the skin's natural pH balance.¹³

Aloe Vera



Fig No 4: Aloe Vera

Aloe vera has properties that help moisturize, reduce inflammation, and promote healing of wounds, which are especially helpful for skin that is prone to acne.¹⁴

Glycerin



Fig No 5: Glycerin

Glycerin acts as a humectant, which means it helps the skin keep its moisture and avoid becoming dry.¹⁵

Vitamin E



Fig No 6: Vitamin E

Vitamin E functions as an antioxidant, helping to shield the skin from damage caused by oxidative stress and enhancing the overall appearance of the skin's texture.¹⁶

Essential Oils

Essential oils are used for their aroma and may have properties that help fight microorganisms.

VII. EXTRACTION METHOD

Collection and Authentication

Fresh Sapodilla leaves were gathered and confirmed to be correct by an expert in the study of plant medicines.

Drying and Powdering

The leaves were cleaned, dried in the shade for 5 to 7 days, and then turned into a fine powder using a grinder.

Preparation of Hydroalcoholic Solvent

A mixture of methanol and distilled water was prepared in a ratio of 70% methanol to 30% water.

Maceration Technique

The powdered leaves were placed in the hydroalcoholic solution and allowed to sit for 48 to 72 hours, with the mixture being shaken occasionally.

Filtration

The resulting liquid was passed through a muslin cloth and Whatman filter paper to remove any solid particles.

Rotary Evaporation

The filtered liquid was then concentrated using a rotary evaporator at a low temperature under reduced pressure.¹⁷

VIII. FORMULATION OF HERBAL FACIAL TONER

Tab No 3 : Formulation Of Herbal Facial Toner

Ingredient	Quantity
Sapodilla leaf extract	8%
Rose water	60%
Aloe vera	5%
Glycerin	3%
Vitamin E	0.5%
Preservative	0.8%
Essential oil	0.2%
Distilled water	q.s. to 100 mL

Procedure

Step 1: Preparation of Liquid Phase

Rose water and distilled water were combined in a clean beaker while being stirred gently. Step 2: Incorporation of Glycerin

Glycerin was gradually incorporated with constant stirring to enhance skin moisture. Step 3: Incorporation of Aloe Vera

Aloe vera juice was added to the formulation to deliver calming and anti-inflammatory effects.

Step 4: Addition of Sapodilla Leaf Extract

The prepared extract of Sapodilla leaves was added slowly while stirring continuously to achieve a consistent distribution.

Step 5: Incorporation of Preservative

A preservative was included to prevent microbial contamination and enhance stability.¹⁸ Step 6: Unification

The blend was stirred consistently for 30 minutes with a magnetic stirrer.

Step 7: Adjusting Volume

The total volume was brought to 100 mL by adding distilled water.

Step 8: Adjustment of pH

The pH was modified to 4.5–6.5 with appropriate pH adjusters.

Step 9: Straining

The solution was passed through a membrane filter to enhance clarity and sterility.

Step 10: Packaging and Filling

The sterilized amber-colored spray bottles were filled with toner and appropriately labeled. Sure, please provide the text you'd like me to paraphrase.¹⁹

IX. EVALUATION PARAMETERS

Physical Appearance

The formulation was examined for color, clarity, and smell.²⁰

pH Determination

The pH was measured using digital pH meter.²¹

Homogeneity

Uniformity of the toner was evaluated visually.

Stability Study

The formulation was observed under different storage conditions.

Skin Irritation Test

The toner was tested for redness and irritation.

Antimicrobial Activity

The formulation was evaluated against acne-causing microorganisms.²²

X. ADVANTAGES OF HERBAL FACIAL TONER

- Removes excess oil and dirt
- Refreshes the skin
- Maintains skin pH
- Reduces acne and inflammation
- Provides hydration
- Safe for regular use
- Contains natural ingredients²³

XI. CONCLUSION

The herbal anti-acne facial toner containing Sapodilla leaf extract was successfully formulated using natural ingredients. The presence of flavonoids, tannins, and phenolic compounds in Sapodilla leaves contributes to antimicrobial and anti-inflammatory activities useful in acne management. The toner showed good stability, acceptable pH, pleasant appearance, and skin compatibility. Herbal cosmetic formulations provide safer alternatives to synthetic skincare products and are widely accepted because of their natural origin and minimal side effects. The study

suggests that Sapodilla leaf extract has significant potential in herbal anti-acne skincare preparations.

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