

**DEVELOPMENT AND EVALUATION OF ANTIOXIDANT HERBAL
FACEWASH CONTAINING STAR FRUIT EXTRACT**

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ABSTRACT

Herbal face washes are increasingly preferred over synthetic formulations because they provide effective skin cleansing with fewer adverse effects. Averrhoa carambola (Star Fruit) is a rich source of natural antioxidants, flavonoids, phenolic compounds, and vitamin C, making it a promising ingredient for skin care applications. Objective: The present study aimed to develop and evaluate an antioxidant herbal face wash containing Star Fruit extract for effective cleansing, skin hydration, and antioxidant protection. The herbal face wash was formulated using Star Fruit extract, Cocamidopropyl Betaine, Decyl Glucoside, Glycerin, Xanthan Gum, Panthenol, Optiphen Plus, and purified water. The prepared formulation was evaluated for appearance, pH, viscosity, spreadability, foamability, foam retention, washability, skin irritation, and stability under different storage conditions.

KEYWORDS: Star Fruit Extract, Herbal face wash, Skin Care, Antioxidant Activity, Herbal Cosmetics.

INTRODUCTION

Skin is the largest organ of the human body and serves as a protective barrier against environmental pollutants, microorganisms, and harmful ultraviolet radiation. Exposure to dust, pollution, excess oil, and microorganisms often leads to skin problems such as acne, pimples, irritation, and dullness. Therefore, regular cleansing of the skin is essential to maintain healthy and attractive skin. Conventional facewash products generally contain

synthetic surfactants, preservatives, and chemicals that may cause dryness, irritation, and allergic reactions in sensitive individuals.

The word Cosmetics is taken from a greek word "Kosmeticos", which means to 'adorn' (addition of something decorative to a person or a thing) Since early days materials used for beautification or improvement of appearance comes under the category of cosmetics. people want to look beautiful and the concept of Cosmetics is as old as mankind and civilization.

Acne. Hygiene plays a critical role in maintaining healthy skin. Daily exposure to outdoor environments— such as sunlight, dust, bacteria, and pollution— can cause various skin issues, including dullness, irritation, and loss of skin elasticity.



Star Fruit (*Averrhoa carambola*) Scientific Name: *Averrhoa carambola* L.

Family: Oxalidaceae

Common Names: Star Fruit, Carambola

Star Fruit (*Averrhoa carambola* L.) is a tropical fruit widely cultivated in India, Southeast Asia, and other tropical regions. It is recognized for its characteristic star-shaped cross-section and is valued for its rich nutritional and medicinal properties. The fruit contains significant amounts of vitamin C, flavonoids, polyphenols, saponins, and other bioactive compounds that exhibit strong antioxidant activity. The antioxidant properties of starfruit help neutralize free radicals, thereby protecting skin cells from oxidative stress and premature aging. In addition, the fruit possesses anti-inflammatory and antimicrobial activities, making it a promising natural ingredient for cosmetic and dermatological formulations. These properties contribute to cleansing the skin, reducing irritation, and maintaining healthy skin.

Chemical Constituents of Star Fruit

Star Fruit (*Averrhoa carambola* L.) is rich in vitamin C, flavonoids, polyphenols, tannins, saponins, and organic acids. The bioactive compounds possess antioxidant, antimicrobial, and anti-inflammatory properties, making the fruit a valuable natural ingredient for skincare formulations.

Need of Herbal Face Wash

The skin is constantly exposed to dust, pollution, and harmful microorganisms, which may cause skin damage and premature aging. Herbal face washes containing natural ingredients are safer and gentler than synthetic products. Due to its antioxidant and skin-protective properties, Star Fruit extract is a suitable active ingredient for developing an effective herbal face wash.

Face washes are formulated according to different skin types to provide effective cleansing and skincare benefits.

The major types include.

- 1) Face wash for oily skin
- 2) Face wash for dry skin
- 3) Face wash for normal skin
- 4) Face wash for combination skin
- 5) Face wash for sensitive skin

Characteristics of an Ideal Face Wash

- 1) Effectively removes dirt, excess oil, impurities, and makeup.
- 2) Cleanses the skin without causing dryness or irritation.
- 3) Maintains the skin's natural moisture balance.
- 4) Has a smooth texture and spreads easily on the skin.
- 5) Provides a fresh, non-greasy feeling after use.
- 6) Remains physically and chemically stable during storage.

Properties of Face Wash

- 1) Should have good consistency and an attractive appearance.
- 2) Should spread easily without excessive rubbing.
- 3) Should not leave a sticky or greasy residue after rinsing.
- 4) Should maintain an appropriate pH suitable for the skin.

- 5) Should be stable throughout its shelf life.
- 6) Should leave the skin soft, smooth, and moisturized.
- 7) Leaves the skin soft, clean, and refreshed

Uses of Face Wash

- 1) Removes dirt, oil, pollutants, and makeup from the skin.
- 2) Helps prevent acne by reducing excess sebum and impurities.
- 3) Maintains skin hygiene and freshness.
- 4) Promotes healthy skin by supporting natural cell renewal.
- 5) Improves the absorption of skincare products applied afterward.
- 8) Contributes to a brighter and healthier-looking complexion.

1) Star Fruit



Botanical Name: *Averrhoa carambola* L.

Family: Oxalidaceae

Use: Natural antioxidant, rich in Vitamin C, protects skin from free radicals, improves skin brightness and provides mild cleansing benefit.

2) Xanthan Gum



Botanical Name: Xanthomonas campestris (Fermentation product).

Family: Xanthomonadaceae.

Botanical Name: Not applicable (Synthetic ingredient).

Use: Moisturizes the skin, improves skin barrier function, soothes irritation, and promotes healthy skin.

Ingredients Quantity use

Sr. No.	Herbal Drug	Uses / Benefits in Herbal Face Wash
1.	Star Fruit Extract	Rich in antioxidants and vitamin C; helps in skin brightening, anti-aging, cleansing and anti-inflammatory.
2.	Cocamidopropyl Betaine	Mild surfactant derived from coconut oil; increases foam, removes dirt, and is gentle on skin.
3.	Decyl Glucoside	Non-ionic surfactant from glucose and coconut oil; mild cleanser and improves foam stability.
4.	Glycerin	Humectant and moisturizer; helps in preventing dryness and keeps skin soft and smooth.
5.	Xanthan Gum	Natural thickening agent; provides viscosity and stability to the formulation.
6.	Panthenol (Provitamin B5)	Skin conditioning agent; hydrates and improves skin elasticity; soothes irritated skin.
7.	Natural Star Fruit Fragrance	Provides pleasant aroma; enhances user satisfaction and freshness.
8.	Optiphen Plus (Preservative)	Broad-spectrum preservative; prevents microbial growth and improves product stability.
9.	Sodium Hydroxide (10% Solution)	pH adjuster; helps to maintain optimum pH for skin compatibility and product stability.
10.	Distilled Water	Solvent and base of the formulation; helps in dissolving and dispersing ingredients.

METHODOLOGY

The herbal face wash was prepared by a simple mixing method. Initially, 10 g of glycerin was taken in a clean beaker, and 1 g of xanthan gum was slowly added with continuous stirring to form a smooth gel. A sufficient quantity of distilled water was then added gradually, and the mixture was stirred until a uniform gel base was obtained.

After the gel base was prepared, 45 g of Star Fruit Extract (*Averrhoa carambola*) was added slowly and mixed thoroughly. Then 1.5 g of Panthenol (Provitamin B5) was incorporated with continuous stirring until a homogeneous mixture was formed.

Next, 15 g of Cocamidopropyl Betaine and 10 g of Decyl Glucoside were added slowly with gentle stirring to avoid excessive foam formation. After complete mixing, 0.8 g of Optiphen Plus was added as a preservative, followed by 1 g of Natural Star Fruit Fragrance.

Finally, the pH was adjusted to 5.5–6.0 using 0.7 g of 10% Sodium Hydroxide solution. Distilled water was added q.s. to make 100 g, and the final formulation was stirred until a smooth, homogeneous gel was obtained. The prepared herbal face wash was filled into clean, airtight plastic bottles and stored at room temperature for further evaluation.

EVALUATION OF HERBAL FACE WASH

1. **Color:** The color of the prepared herbal face wash was observed visually under daylight. The formulation showed a light yellow to pale green color due to the presence of Star Fruit extract.
2. **Odour:** The odour of the formulation was evaluated by smelling the product. The face wash exhibited a pleasant fruity fragrance because of the natural star fruit fragrance.
3. **Appearance:** The formulation was visually examined for clarity, homogeneity, smoothness, and absence of any particulate matter or phase separation.
4. The consistency of the face wash was determined manually by rubbing a small quantity of the formulation between the fingers. The formulation exhibited a smooth, uniform, and semi-gel consistency.
5. **The pH:** was measured using a calibrated digital pH meter. A 1% aqueous solution of the formulation was prepared, and the pH was recorded at room temperature. The acceptable pH range was 5.5–6.5, which is suitable for skin.
6. **Spreadability:** A small amount of the face wash was applied to the skin and spread gently using the fingers. The formulation showed good spreadability and smooth application.

7. **Washability:** The applied formulation was washed under running tap water to evaluate the ease of removal. The formulation was easily washable without leaving any residue.
8. **Foamability:** Approximately 1 g of face wash was dispersed in 50 mL distilled water in a beaker and shaken 10 times. The foam volume and foam stability were observed and recorded.
9. **Viscosity:** The viscosity was determined using a digital Brookfield viscometer. About 10 mL of the formulation was placed in a beaker, and the viscosity was measured at room temperature.
10. **Stability Study:** The formulation was stored at room temperature ($25 \pm 2^\circ \text{C}$) and accelerated conditions ($40 \pm 2^\circ \text{C}$, 75% RH) for 30 days. Changes in color, odor, pH, viscosity, and phase separation were observed periodically.

Future Scope

The developed antioxidant herbal face wash containing Star Fruit (*Averrhoa carambola*) extract has significant potential for future research and commercial application. Further studies can be carried out to evaluate its long-term stability, antioxidant efficacy, antimicrobial activity, and skin compatibility through preclinical and clinical studies on human volunteers. Large-scale manufacturing, quality standardization, and shelf-life studies may facilitate its commercialization. In addition, advanced formulations incorporating other natural herbal extracts may further enhance its therapeutic and cosmetic benefits. The developed formulation has promising potential as a safe, effective, and eco-friendly herbal skincare product for commercial use.

CONCLUSION

An antioxidant herbal face wash containing Star Fruit (*Averrhoa carambola*) extract was successfully formulated and evaluated using natural and mild ingredients. The prepared formulation demonstrated acceptable physicochemical properties, including suitable pH, good spreadability, foamability, viscosity, washability, and stability. The antioxidant-rich Star Fruit extract may help protect the skin from oxidative stress while providing effective cleansing and maintaining skin hydration. The study suggests that the developed herbal face wash is safe, stable, and has potential for use as a natural skincare product.

RESULTS

The formulated antioxidant herbal face wash containing Star Fruit (*Averrhoa carambola*) extract was successfully prepared and evaluated. The formulation showed a light yellow color

with a pleasant fruity odor and smooth, homogeneous gel consistency. The pH of the formulation was found to be 5.8, which is suitable for skin application. The face wash exhibited good spreadability, satisfactory foamability, easy washability, and appropriate viscosity. No signs of phase separation, color change, or microbial growth were observed during the stability study, indicating good physical stability. The formulation was found to be non-irritant and suitable for regular skin cleansing.

CONCLUSION

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