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## Research Article

# Formulation And Evaluation of Anti-Acne Bael Facewash

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## ABSTRACT

A herbal anti-acne face wash using Bael Patra (*Aegle marmelos*) as the main active ingredient, aloe vera, turmeric oil, eucalyptus oil, glycerine, vitamin E, carbopol, lemon juice, and rose water is being developed and evaluated in this study. Since Bael Patra has strong antibacterial and anti-inflammatory qualities, it can be used to treat acne and other skin conditions. Turmeric and eucalyptus oils have antiseptic and antibacterial properties, while aloe vera calms and hydrates the skin. As skin moisturizers and antioxidants, glycerine and vitamin E aid in skin restoration. A natural astringent is provided by lemon juice, rose water provides a refreshing and toning effect, and carbopol is utilized as a gelling agent for consistency. Physical appearance, pH, viscosity, spreadability, foam ability, skin irritation test, and stability tests were among the evaluation parameters that were applied to the manufactured face wash. The formulation's excellent consistency, foamability, stability over time, and pH (within the skin-friendly range of 5.5–7) were all indicated by the results. There was no skin irritation during the test. The face wash is safe and effective for everyday use because of the formulation's natural components, which showed synergistic anti-acne effects. A viable substitute for face washes with chemicals, this herbal composition helps treat acne-prone skin.

## INTRODUCTION

### Skin

The skin is made up of tissues that work together as a single structure to perform critical and specific functions, even though you would not think of it as an organ. The body is generally protected by the integumentary system, which consists of the skin

and the tissues that support it. The several layers of cells and tissues that comprise the skin are held to the underlying structures by connective tissue.<sup>1</sup>

The following are the three layers of skin:

- Epidermis
- Dermis

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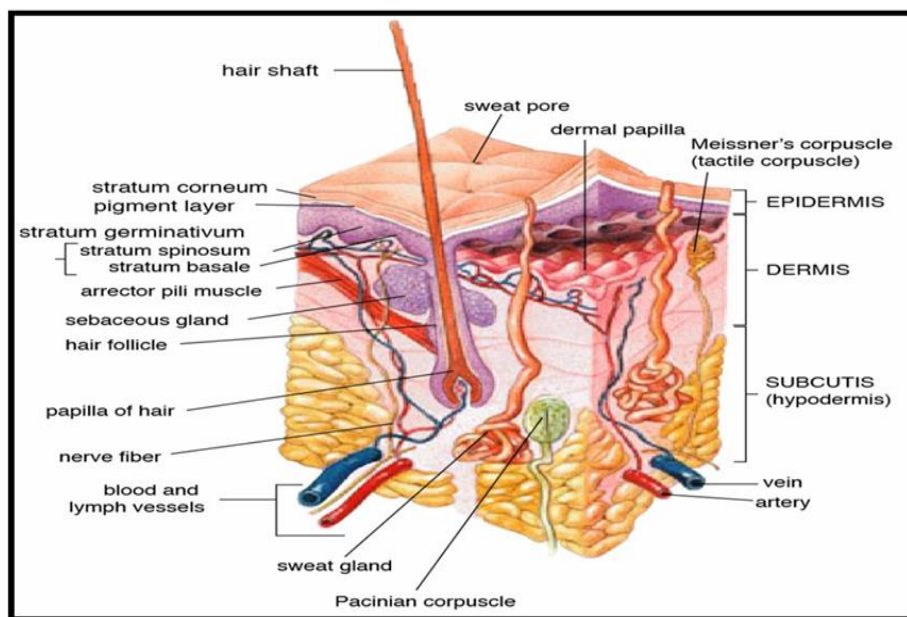
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- Hypodermis <sup>2</sup>



**FIG 1: STRUCTURE OF SKIN**

Function of skin: Skin plays numerous vital roles in the physiology of the body

- 1) Sensation
- 2) Protection
- 3) Thermoregulation
- 4) Immunity<sup>3</sup>

Types of skin:

- 1) Dry skin
- 2) Oily skin <sup>4</sup>

Skin related problem:

Acne:

Types of acne:

- Blackheads
- Whiteheads
- Nodules

➤ Papules

➤ Pustules

**Blackheads:** also known as open comedones, are small, dark or black pimples on the skin. Cause: Occur when dead skin cells and oil (sebum) clog a hair follicle. When exposed to air, the clogged pore stays open and the surface oxidizes, turning black.

**Whiteheads (Closed Comedones):** These are tiny, flesh-colored or white pimples. Cause: Like blackheads, they are caused by oil and dead skin cells clogging a hair follicle.

**Papules** Look: Tiny, elevated, red, sensitive pimples without a pus-filled core. Cause: Usually more severe than comedones but not yet pus-filled.

**Pustules** Looks like papules, except that the core is pus-filled and whitish or yellow. Cause: Occurs when hair follicles swell with pus after becoming irritated and infected.

**Nodules Look:** Huge, painful, solid lumps under the skin's surface. **Cause:** Occurs when a hair follicle deep within the skin becomes plugged and irritated.

excellent skincare practices are necessary. For more severe forms, including nodules and cysts, more aggressive therapies, like oral medications or expert dermatological procedures, are needed <sup>5</sup>

**Cysts Look:** For lesser forms of acne, like blackheads and whiteheads, topical drugs and

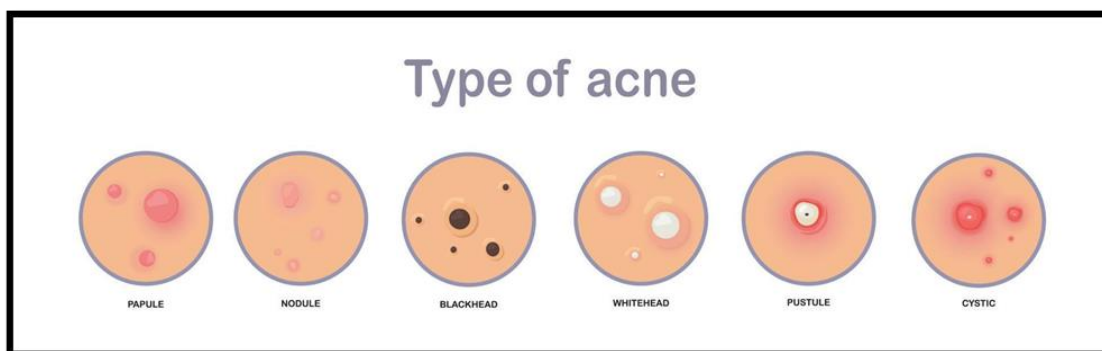


FIG 2: TYPES OF SKIN

### Herbal Cosmetics Related To Skin Care:

**Herbal cosmetics:** The safest skin care products are herbal ones that shield the skin from the elements. cosmetics are extremely safe and do not

cause any harmful <sup>6</sup>

### Skin Care Preparation for Face

- 1) Cleansing creams and lotions
- 2) Compact powders
- 3) Rouges
- 4) Face packs and masks
- 5) Face wash

### Facewash:

A cleanser or other facial care product is used to remove makeup, dead skin cells, oil, grime, and other pollutants from the face's epidermis. This protects against skin problems like pimples and makes pore cleaning easier. As part of a face care

regimen, a cleanser can be used in addition to a toner and moisturizer.<sup>7</sup>

### Benefit of Facewash:

- Exfoliating chemicals found in certain face washes aid in the removal of dead skin cells, resulting in a smoother complexion.
- By keeping the skin clean and renewed, regular use can improve its texture and tone.
- Other skincare products, such serums and moisturizers, are better absorbed by a clean face.
- Frequent washing aids in avoiding a number of skin problems, including inflammation, irritation, and dullness.
- Washing your face might make you feel refreshed right away.<sup>8</sup>

### Features of Facewash:

- The exfoliation encourages skin renewal and regeneration and speeds up blood circulation.

- The excessive production of sebum by sebaceous glands clogs the pores of the face and causes oily skin.
- Cleansers containing herbs and botanicals are necessary for oily skin since they will unclog pores and lessen oil accumulation.
- Anti-inflammatory and antioxidant ingredients found in these exfoliating cleansers help to repair and nourish damaged skin.
- Instead of absorbing, its physical activity should be to open pores and flush the skin. After use, a thin layer of emollient should still be present on the skin<sup>9</sup>
- Anti-inflammatory: A property of a drug or treatment that reduces inflammation or swelling.
- Anti-acne: Acne is a skin problem that results in a breakout of zits or blemishes that resemble pimples.<sup>12</sup>

#### **Additives used in Facewash:**

##### **Antioxidant:**

antioxidants have the ability to stop or postpone certain forms of cell damage. Vitamins A, C, E, and lycopene are a few examples.<sup>13</sup>

##### **Gelling agent:**

Gelling agents are substances that will cause water or oil to phase into a thicker but not rigid gel. For instance, carbopol 940 and carbopol 934.<sup>14</sup>

##### **Preservative:**

Preservatives are primarily used to make food safer by reducing the impact of biological elements. Methyl and propyl paraben are two examples.<sup>15</sup>

##### **Humectants :**

The antithesis of a desiccant, humectants are hygroscopic substances that are employed to keep things moist. Hexylene glycol, butylene glycol, and propylene glycol are a few examples.<sup>16</sup>

##### **Foaming agent:**

Agent that forms foams .A foaming agent is a substance, such as a blowing agent or surfactant that promotes the creation of foam. Examples include titanium hydride, azodicarbonamide, and sodium lauryl sulphate.<sup>17</sup>

#### **Advantages:**

- It helps to in removal and replacement of dead skin cells to the new skin cells.
- It helps to keep skin fresh and healthy.
- It makes the skin to look radiant.
- It help in skin pores exfoliation which further helps in prevention of skin problems like acne white heads, blackheads and total weary appearance that is caused due to the combination of dead skin cells and excessive oil which clog pores.
- It helps in dead skin removal which later on develops as wrinkles on the face <sup>10</sup>

#### **Agents used in face wash:**

- Antimicrobial: Medicinal compounds used in face washes Antimicrobial In its broadest sense, an antimicrobial is a material that inhibits the growth and reproduction of germs.<sup>11</sup>

#### **REVIEW OF LITERATURE:**



Sr. No	Year	Author Name	Journal Name/ Title	Insight
1.	2015	X.fatima grace	World journal of pharmacy and Pharmaceutical science. (Preparation and evaluation of a polyherbal facewash gel	The work in this paper is discussing on the formulation and Evaluation of a polyherbal facewash gel. The facewash have Antioxidant, antibacterial and antiseptic properties. Which are necessary to keep the skin moist , smoot and Good looking
2.	2015	Harsharan Pal Singh	World Journal of Pharmaceutical Research (Anti-acne Synergistic Herbal Face Wash Gel: Formulation, Evaluation and Stability studies)	Tha work in this paper is deals with formulation & evaluation of Herbal facewash whether it is gel and cream form. Th goals of current work are prepare tablets for herbal facewash and designed to reduce costs, packaging size and also use of harmful Preservatives. They are also conveniently portable.
3.	2015	Mishra baidynath	International journal of bioassays (Gentle cb b neem facewash)	The study conducted on a clinical trial with ten healthy volunteers who used the gentle neem facewash twice daily for 15 Days. The main study aimed to evaluate skin safety. The study found that the gentle neem facewash
4.	2016	Dhanashri Sanjay koli	World journal of pharmacy and Pharmaceutical science. (Formulation of herbal anti acne facewash )	The work in this paper is deal with developement and evaluation of Herbal antiacne facewash. The ingredients in this paper include Extract of neem , turmeric, Shahi jeera , nutmeg etc. It is mentioned that the natural remedies facewash is more acceptable
5.	2017	Poonam Ankush Jadhav <sup>19</sup>	Vol. 3.pp-701 Poonam Ankush Jadhav (2017) World Journal of Pharmacy and pharmaceutical sciences Vol.6.pp-1515.	The present work deals with the formulation and evaluation of the herbal extract of curry leaf ( <i>Murraya koenigii</i> ) and Bel patra ( <i>Bilva</i> ). In this formulation beal patra use as anti-acne. So we have to take extraction process and dose from this article
6.	2019	Kamble Manish	Journal of drug delivery and theaureptic. ( Formulation of anti-acne facewash gel using extract of guava	The paper is discussing on the preparation and evaluation of anti Acne gel facewash using extract of guava. After formulation, the facewash was evaluated by some physical parameter test like spreadability, washability, ph and grittiness.
7.	2020	Avinash Kumar Reddy	International journal of research	The paper discusses the need for herbal facewash as compared to



			(Formulation and evaluation of fruit facewash)	synthetic facewash, because synthetic facewash have High side Effects. The ingredients include in this paper is grape , seed , Cucumber juice, orange juice and lemon juice. The fruit facewash Show good consistency.
8.	2021	Khandagale Ganesh Sarjerao	International Research Journal of Modernization in Engineering Technology and Science	The work in this paper is focusing on formulation and evaluation Of herbal facewash from natural ingredients by simple matched. The ingredients are leaf of neem , Aloe Vera, tulshi, vit-c, tocopheryl acetate, turmeric powder, vit. E, rose water, lavender Essential oil. ayurvedic Cosmetics is helpful and does not give it side effects.
17.	2022	Shraddha Tate	International journal of pharmaceutical science review And research. ( Method for extraction of herbal ingredients)	The paper is focusing on the formulation of the herbal Facewash .the ingredients in this paper include turmeric,pumpkin , lavender oil , orange peel etc .it suggest that the herbal Facewash is more effective than synthetic facewash
20.	2023	Koushik das	International journal for research in applied science and Engineering technology. (Herbal facewash for preventing dermatological problem)	The work in this paper is discussing on the formulation of herbal Facewash for preventing dermatological problem. The ingredients containing in this paper is aloe vera , turmeric , rosewater , chandan etc .In this study ,it is also mentioned that the natural ingredient facewash have an optimum theaureptic and Pharmacological effect on the skin.

## VARIOUS INGREDIENTS USED IN FORMULATION OF BAELEAVES:

### 1) Bael patra



FIG 3: AEGLE MARMELOS

- **Synonyms:** Aegle Marmelos
- **Biological sources:** Native tree from India
- **Family:** Rutaceae

#### Chemical Constituents:

**Alkaloids:** Alkaloids such as Angeline, marmeline, skimmianine, and N-methylflindersine.

**Flavonoids:** Rutin, quercetin, and kaempferol, which contribute to its antioxidant and anti-inflammatory effects.

**Description:** Aegle marmelos is a small to medium-sized deciduous tree or shrub with a maximum height of 13 meters (43 ft.). Its branches droop a little, and its crown is rather open and uneven. The bark is gray or pale brown, peeling, and smooth or finely fissured. Its long, straight spines, which range in length from 1.2 to 2.5 centimeters (1/2 to 1 inch), either on their own or in pairs. Slimy sap frequently leaks from the bark's cut areas. The gum can also be described as a clear, sticky sap that drops from damaged branches and has a similar consistency to gum Arabic.

#### Uses:

- 1) Bael Patra is rich in laxatives properties.
- 2) It has anti-inflammatory effects.
- 3) It detoxifies body naturally.
- 4) Loaded with vitamins and essential minerals.
- 5) It is a natural source of anti-oxidant
- 6) Anti-inflammatory Cures skin infections  
Wound healing

#### Aloe vera:



FIG 4: ALOE VERA

- **Synonyms:** Aloe barbadensis Mill.
- **Biological sources:** the dried juice or gel obtained from the leaves of various Aloe species, particularly Aloe barbadensis (also known as Aloe Vera).
- **Family:** Asphodelaceae

#### Chemical Constituents

Acemannan is a key bioactive component found in polysaccharides.

Vitamins: folic acid, B12, C, E, and A.ABC, lipase, and bradykinase are examples of enzymes.

Phenolic substances: anthraquinones and aloin..

#### Turmeric oil:



**FIG 5: TURMERIC OIL**

- **Synonyms :** Curcuma longa
- **Biological sources:** Turmeric's biological source is the dried rhizome of the plant *Curcuma longa*, a perennial herbaceous plant belonging to the ginger family Zingiberaceae.
- **Family :** Zingiberaceae (Ginger family)

#### Chemical Constituents

- Curcuminoids: Curcumin, demethoxycurcumin, and bisdemethoxycurcumin .
- Curcumin: antibacterial, antioxidant, and anti-inflammatory qualities.
- Turmerones: Ar-,  $\alpha$ -,  $\beta$ -, and curlone are among the turmerones that are present in the essential oil fraction of turmeric.

#### Eucalyptus oil:



**FIG 6: EUCALYPTUS OIL**

- **Synonym:** Eucalyptus camphor
- **Biological Source :-** Eucalyptus oil is the volatile oil obtained by the hydrodistillation of fresh leaves of eucalyptus globulus
- **Family :** Myrtaceae

#### Chemical Constituents

Cineole (eucalyptol, 70-85%)

Citronellal Terpenes: - pinene, camphene, phellandrene

Polyphenolic acid: caffeic acid, gallic acid

Flavanoids: Eucalyptin, Rutin

#### Glycerine:





FIG 7: GLYCERIN

- **Structure formula** –  $C_3H_8O_3$

#### GLYCERIN

- **Molar mass** -  $92.094 \text{ g}\cdot\text{mol}^{-1}$
- **Appearance** - Colourless hygroscopic liquid
- **Odour** – Odour less
- **Density** -  $1.261 \text{ g/cm}^3$
- **Melting point** -  $17.8^\circ\text{C}$  ( $64.0^\circ\text{F}$ ;  $290.9 \text{ K}$ )
- **Boiling point** -  $290^\circ\text{C}$  ( $554^\circ\text{F}$ ;  $563 \text{ K}$ )
- **Solubility in water** – miscible

#### 1) Carbapol:

FIG 8: CARBAPOL 934 P

- **IUPAC Name:** Poly (acrylic acid)
- **Other names:** PAA, PAAc, Acrysol, Acumer.
- **Chemical formula:**  $(C_3H_4O_2)$
- **Molar mass:** variable

#### Lemon juice:

- **Biological source:** The biological source of Lemon is Citrus Limon.
- **Family:** Rutaceae



FIG 9: LEMON JUICE

#### Chemical constituents;

Water ( $H_2O$ ), Citric Acid ( $C_6H_8O_7$ ), vitamin C (ascorbic acid), Flavonoids.

#### Rose Water:

**Description:** Rose water is a flavoured water made by steeping rose petals in water.



FIG 10: ROSE WATER

#### EXPERIMENTAL SECTION

## MATERIALS AND METHODS

The herbal face wash was prepared by collecting and using various plant material. These are bael patra, Aloe Vera, Turmeric oil, Eucalyptus oil,

Glycerine, vitamin e, lemon juice, Rose water. All were collected from agriculture fields.

### Formulation of bael facewash:

**Table 1: The Formulation Of Herbal Bael Facewash Are As Follows:**

INGREDIENTS	QUANTITY
Bael Extract	10-15%
Aloe Vera Gel	20-25%
Turmeric Oil	1-2%
Eucalyptus Oil	1-2%
Glycerine	5-10%
Vitamin E	1-2%
Lemon Juice	2-3%
Rose Water	10-15%
Carbapol	0.5-1.5%
Methyl paraben	0.2%
Sodium lauryl sulphate	5-10%



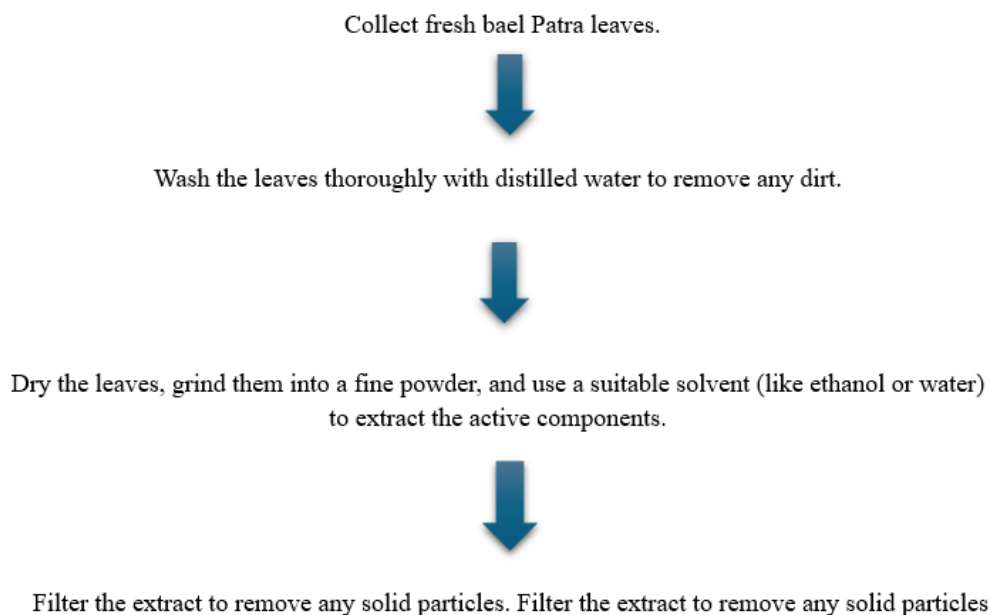
**FIG 11: INGREDIENTS USED IN FACEWA**

**Table 2: List Of Material Used In Facewash Formulation**

Sr. No	Material / reagents	Uses
1.	Beal patra	Helps reduce acne, soothes skin irritation, and balances oil secretion Antibacterial, antifungal, and anti-inflammatory properties
2.	Aloe Vera	Hydrates and soothes the skin. Helps in healing and reducing inflammation. Acts as a base for natural gel consistency
3.	Turmeric oil	Antiseptic and antimicrobial properties. Brightens skin and reduces blemishes. Fights acne-causing bacteria

4.	Eucalyptus oil	Refreshing and cooling effect Antimicrobial and anti-inflammatory. Helps clear clogged pores and soothe acne-prone skin
5.	Glycerine	Humectant: draws moisture into the skin. Keeps skin soft, smooth, and hydrated. Reduces skin dryness caused by cleansing agents.
6.	Vitamin E	Antioxidant and skin-conditioning agent. Helps repair damaged skin and reduce scars. Enhances skin elasticity
7.	Carbapol	Thickening agent. Helps create a gel-like consistency. Stabilizes the formulation
8.	Lemon Juice	Astringent, brightens skin, and fades dark spots.
9.	Rose Water	Adds fragrance and calming effect. Rose extract soothes the skin and provides antioxidant benefits.

### Preparation of bael patra extract:





**FIG 12: Preparation Of Bael Extract**

**Process:**

**1) PREPARATION OF CARBOPOL GEL**

In a beaker filled with distilled water (about 70–80% of the formulation volume), weigh out and add 1% (w/v) Carbopol 934.



Give the Carbopol time to fully hydrate, which could take a few hours or even overnight.  
To get the finest effect.



To prevent the introduction of air bubbles, gently stir



**FIG 13: CARBOPOL GEL**

**2) FORMULATION OF THE BASE GEL**

Gradually add lemon juice to the hydrated Carbopol gel while stirring  
Continuously.



This will neutralize the Carbopol and cause the gel to thicken.



Adjust the pH to around 6-7 using Lemon juice, as this is optimal for skin products.



**FIG 14: FORMULATION OF BASE GEL**

### 3) ADDITION OF SURFACTANT

Dissolve sodium lauryl sulphate (SLS) in a small amount of distilled water.



Add the SLS solution to the Carbopol gel base while stirring gently

### 4) INCORPORATION OF BEL PATRA EXTRACT

Dissolve methyl paraben in a small amount of distilled water.



Add it to the mixture to prevent microbial growth.

### 5) ADJUSTMENT OF FINAL VOLUME



Add the prepared Bael Patra and other extract to the gel base.



The concentration of the extract should be determined based on preliminary studies to ensure efficacy without causing irritation.



Mix thoroughly to ensure even distribution of the extract throughout the gel.

## 6) FINAL MIXING

Add distilled water to adjust the final volume of the face wash formulation



Ensuring all components are well mixed.

## FINAL MIXING

Stir the mixture gently to achieve a homogeneous gel.



Check and adjust the pH to ensure it is within the desired range (6-7).



By following these steps, you can formulate and evaluate an herbal face wash using Bael patra and other specified ingredients, ensuring it is effective, stable, and safe for use.

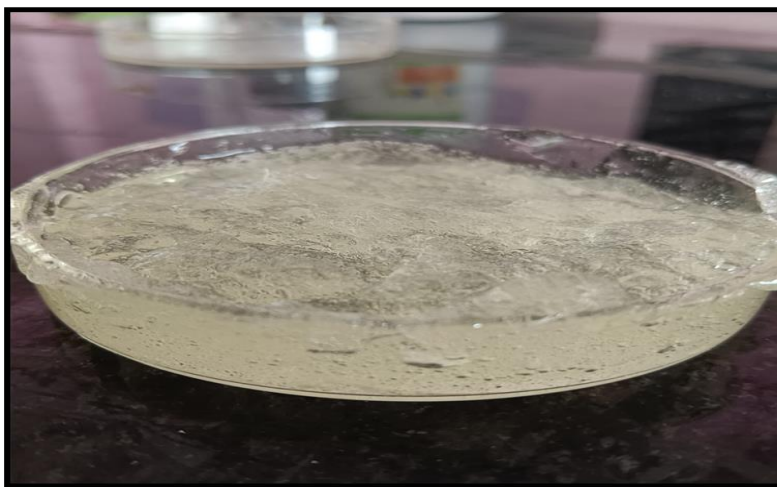




Fig 15: Bael Face Wash Gel

Table 3: Identification Test For Beal

Test	Observation	Inference	Image
<b>Alkaloids;</b>  1) By adding 1 mL of <b>Dragendorff's reagent</b> to 2 mL of extract, an orange red precipitate was formed, indicating the presence of alkaloids.	Orange-red precipitate	Alkaloids is present	
2) By adding 2 ml of Hager's reagent to two ml of extract	Formation of yellow colour ppt	Alkaloids is present	
3) By adding 2 ml of Wagner's reagent to 2 ml of extract by dissolving 2mg of iodine with 4 mg of potassium iodide	Orange red Ppt	Alkaloids is present	

<b>Flavanoids ;</b>  Alkaline reagent test ; Two to three drops of sodium hydroxide were added to 2 mL of extract.	Colourless colour appeared	Flavonoids is present	
<b>Phenolic ;</b> a) Ferric chloride test. Two millilitres of 5% neutral ferric chloride solution were added to 1 mL of extract, the dark blue colouring indicating the presence of phenolic Compounds and tannins.	Dark blue colour appeared	Phenolics and tannins is present	

### Evaluation of bael facewash:

**TABLE 4: EVALUATION TEST**

Sr. No	Parameter	Observation
1	Color	Green
2	Odour	characteristics
3	Consistency	Semisolid
4	pH	7
5	Spreadability	3.35 gm
6	Washability	Washable
7	Foamability	Foam appear
8	Viscosity	4405.2 cp

#### 1) Physical Test :

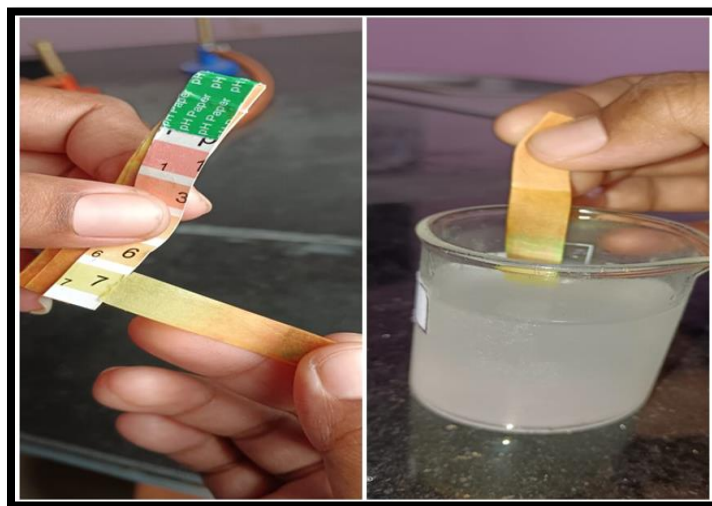
It contains the consistency, color, and odor that were achieved. Herbal face wash gel's hue was dark green, its odor was distinctive, and its semisolid consistency was noted when it was visually investigated. The face wash's formulation was examine visually for color. Smelling the composition allowed for the

evaluation of its odor, and Consistency was manually selected.

#### 2) pH of Face Wash Gel :

A 1% aqueous solution of the formulation was heated to a constant temperature and its pH was measured using a calibrated digital pH meter. No adverse effects were seen since the pH of the improved formulation was 7 which is near the pH

of the skin. It was concluded that the pH of the formulation was suitable for topical use.



**FIG16: PH TEST**

### 3) Spreadability of Face Wash Gel:

Spreadability was assessed by hand. Spreading our gel was simple. According to the spreadability tests, the gel can be swiftly spread with a small degree of shear. 3.35 gm/cm/sec was the formulation's spreadability.

### 4) Washability of Face Wash Gel

Water washing ease and extent were tested after the product was applied to the skin. With the semisolid face cleanser gel, washing was easy

### 5) Foamability of Face Wash Gel:

In a beaker, water was mixed with a tiny amount of gel. Ten shakes of the beaker were made after the initial volume was recorded in order to record the final volume. The foam was showing up either normally or in considerable amounts.



**Fig 17: Foamability Test**

#### 6) Viscosity of Face Wash Gel:

A produced 10-milliliter sample was put in a beaker and tested using a digital viscometer. The outcome was Gel 4405 herbal face wash. A viscosity of 2 cp is noted.

### RESULT & DISCUSSION:

Recent research has explored the formulation and evaluation of herbal anti-acne face wash gels incorporating Bael Patra (*Aegle marmelos*) due to its known antimicrobial, antioxidant, and anti-inflammatory properties. These studies aimed to develop effective, stable, and skin-friendly herbal formulations for acne treatment.

### CONCLUSION:

The formulated anti-acne face wash containing *Aegle marmelos* (Bael) presents a compelling natural strategy for acne treatment. Bael exhibits notable antimicrobial, anti-inflammatory, and antioxidant characteristics, which contribute to the reduction of acne-causing microorganisms, soothing of skin inflammation, and mitigation of oxidative damage. This preparation efficiently purifies the skin, eliminates surplus sebum and contaminants, and facilitates dermal regeneration without inducing desiccation or sensitization. Consequently, this Bael-enriched facial cleanser emerges as a mild yet efficacious option for consumers desiring a plant-based alternative for managing acne-susceptible skin.

The formulated anti-acne Facewash, enriched with Bael (*Aegle marmelos*), Turmeric oil, Aloe vera, and Eucalyptus oil, offers a synergistic blend of natural ingredients that effectively target acne-related concerns. Bael provides antimicrobial and anti-inflammatory action, helping to combat acne-causing bacteria and reduce skin irritation. Turmeric oil enhances this effect with its strong antioxidant and antiseptic properties, aiding in the

reduction of blemishes and prevention of further breakouts. Aloe vera soothes and hydrates the skin, promoting healing and reducing redness, while Eucalyptus oil contributes additional antibacterial and cleansing benefits. Together, these ingredients work harmoniously to cleanse the skin, reduce acne lesions, and support overall skin health, making the formulation a gentle yet potent solution for acne-prone skin.

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