

Formulation & Evaluation of Micro Scrub Face Wash & Soap Bar

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ABSTRACT:

A micro scrub facewash and herbal soap bar containing amla microspheres were successfully formulated and evaluated using natural and skin-friendly ingredients. The microspheres were prepared by ionic gelation method using sodium alginate and calcium chloride as cross-linking agents. The prepared amla microspheres were incorporated into natural facewash, synthetic facewash, and herbal soap formulations to provide exfoliating, antioxidant, and skin cleansing effects. The natural facewash was prepared using xanthan gum, glycerine, coco glucoside, turmeric extract, and amla microspheres, whereas the synthetic formulation consisted of Carbopol 940 and sodium lauryl sulphate. The herbal soap bar was prepared by saponification using coconut oil and sodium hydroxide followed by incorporation of amla microspheres. Evaluation studies such as pH, spreadability, washability, stability study, organoleptic properties, and skin irritation test were performed. The pH of the natural facewash was found to be 5.22, indicating compatibility with skin pH, while the soap bar showed a pH of 9.28. Both formulations demonstrated satisfactory washability, stability for 15 days, pleasant appearance, and no signs of irritation on human volunteers. The study concluded that amla microsphere-based herbal formulations can be used as safe, effective, and natural alternatives for skin cleansing and exfoliation.

KEYWORDS:

Amla microspheres, Herbal facewash, Herbal soap bar, Microspheres, Ionic gelation, Skin care.

INTRODUCTION:

"The Greek word 'Kosm-tikos' means 'to have the power, arrangement, and skill in decorating,' from which the English word 'Cosmetics' was derived."^[1] Herbs-based cosmetics can also be called "natural cosmetics." Due to the absence of side effects in the herbal medicines, the need for such drugs is increasing rapidly. Cosmetic substances, which are used to enhance physical appearance, are called herbal cosmetics. Due to their greater availability and fewer adverse effects, herbs are preferred over chemicals. Cosmetics are helpful chemicals that are used globally for enhancing the natural beauty of different parts of the body, including the hand, mouth, finger, hair, eyes, and so forth." Powders, creams, facial packs, moisturizing agents, lotions, shampoos, hair oils, hair conditioners, nail polish, as well as other cosmetics, are included here. Smooth and glossy skin and hair are very important for an attractive man or woman.^[2]

Many different environmental factors, like microbes, chemicals, and chemical agents, lead to skin damage. Normal Indians usually make use of normal oils to scent their body, while henna is used to color their hands, hair, and sole. Bioactive ingredients or pharmaceutical agents are mixed up in cosmetic products to make herbal cosmetics. Many antioxidants, vitamins, lipids, hydrocolloids, essential oils, proteins, terpenoids, and other phytochemical compounds can be commonly identified from plants. The identification of phytochemicals can be facilitated due to our traditional experience with the utilization of plant resources, which have been well documented in Ayurvedic, Unani, Siddha, and Tibetan medicine systems.

By its mere name, it can be understood that the cosmetics made from herbs are naturally made and free from any toxic artificial chemicals that may be present and harmful to the skin. Such products, including coconut oil and aloe vera gel, make use of different plants or plant extracts rather than using any artificial materials. They are also enriched with vitamins, such as vitamin E, to ensure that they keep the skin healthy and attractive. Aloe Vera, for example, is a naturally occurring herb belonging to the family Liliaceae. In response to these materials such as artificial chemicals and mineral oil, many consumers are now demanding organic products that can be traced and are not harmful, but rather focus on the characteristics of herbs.^[1,3,4]

AIM:

To formulate and evaluate micro scrub facewash and herbal soap bar containing amla microspheres.

OBJECTIVES:

1. To prepare amla microspheres using ionic gelation method.
2. To formulate herbal facewash and soap bar.
3. To evaluate physicochemical properties and skin compatibility.

MATERIALS USED:

Sr. No.	Ingredient	Role
1	Amla powder	Active herbal ingredient
2	Sodium alginate	Polymer
3	Calcium chloride	Cross-linking agent
4	Xanthan gum	Thickening agent
5	Glycerin	Humectant
6	Coco glucoside	Natural surfactant
7	Carbopol 940	Synthetic polymer
8	Sodium lauryl sulfate	Surfactant
9	Turmeric extract	Antimicrobial and coloring agent
10	Lavender oil/fragrance	Fragrance
11	Sodium benzoate	Preservative
12	Coconut oil	Soap base
13	Sodium hydroxide	Saponifying agent
14	Sodium chloride	Salting-out agent

Table.1: Material Uses

METHOD OF PREPARATION:

1. Preparation of Amla Microspheres

The amla powder was sieved through several mesh sizes, and the powder which retained in sieve No. 80 was chosen. The sodium alginate solution was prepared by dissolving 1 g of sodium alginate in 100 mL of distilled water while stirring continuously. 4 grams of the amla powder was added to the polymer solution and stirred evenly. Calcium chloride solution was prepared separately by dissolving 16 g of calcium chloride in 100 mL of distilled water. The solution was added to the amla-alginate solution dropwise into the calcium chloride solution while stirring continuously. Immediately microspheres were formed due to ionic cross-linking and collected for drying.

Ingredient	Quantity	Role
Calcium chloride	16 g	Cross-linking agent
Sodium alginate	1 g	Polymer
Amla powder	4 g	Active ingredient

Table.2: Formulation Table for Microspheres

2. Formulation of Natural Facewash

A base was first made using glycerin (10 g) and xanthan gum (2 g). These ingredients were thoroughly mixed to form a homogenous gel-like substance. To this mixture, coco glucoside (15 g) was added and stirred gently. Next, fragrance along with sodium benzoate (0.1 g) was added followed by the addition of amla microspheres and turmeric (0.1 g).

Ingredient	Quantity	Role
Xanthan gum	2 g	Thickening agent
Glycerin	10 g	Humectant
Coco glucoside	15 g	Surfactant
Fragrance	q.s.	Perfuming agent
Sodium benzoate	0.1 g	Preservative
Amla microspheres	q.s.	Active ingredient
Turmeric extract	0.1 g	Antimicrobial and coloring agent

Table.3: Formulation Table for Natural Facewash

3. Formulation of Synthetic Facewash

In making the basis of the gel, 2 g of carbopol 940 was dissolved in 100 ml of distilled water. After which, 3 g of sodium lauryl sulfate was added gradually while stirring. Amla microspheres, sodium benzoate, fragrance, and turmeric extract were then added. Should it be needed, triethanolamine was used for pH adjustment.

Ingredient	Quantity	Role
Carbopol 940	2 g	Gelling agent
Distilled water	100 mL	Solvent
Sodium lauryl sulfate	3 g	Surfactant

Fragrance	q.s.	Perfuming agent
Sodium benzoate	0.1 g	Preservative
Amla microspheres	q.s.	Active ingredient
Turmeric extract	0.1 g	Coloring and antimicrobial agent

Table.4: Formulation Table for Synthetic Facewash

4. Formulation of Herbal Soap Bar

The sodium hydroxide solution was prepared by dissolving 15 g of NaOH in 50 ml of distilled water. On the other hand, the sodium chloride solution was prepared by dissolving 15 g of NaCl in 200 ml of distilled water.

Saponification process began by heating 60 ml of coconut oil, along with a sodium hydroxide solution and constant stirring. Sodium chloride solution was slowly introduced to remove the salt. With much care, amla microspheres were then added to the thickened soap solution.

EXPERIMENTAL WORK

1.FORMULATION OF MICROSPHERES:

Preparation of Amla Powder:

- In order to obtain the most suitable particle size, amla (*Emblica officinalis*) powder was subjected to sieving through meshes having counts of 80, 120, and 200.
- Considering the optimum flow and blendability, particle size obtained from sieve number 80 was selected among all tested sizes.

Preparation of Sodium Alginate Solution:

- 100 ml of distilled water was taken and placed in a magnetic stirrer.
- Following the addition of 1 g of sodium alginate to the above, it was stirred for 10 minutes continuously to get a homogeneous solution.

Incorporation of Amla Powder:

- Sodium alginate was added to the 4 g of amla powder which had been sieved earlier (through sieve 80).
- Then, the mixture was stirred using a magnetic stirrer till the desired uniform suspension was obtained.
- Once mixed thoroughly, the beaker was removed from the stirrer and kept aside.

Preparation of Calcium Chloride Cross-Linking Solution:

- A quantity of 100 ml distilled water was poured into another beaker and placed in the magnetic stirrer.
- A transparent solution was prepared using 16 grams of calcium chloride and continuously stirring until it was completely dissolved.

Formation of Microspheres:

- The syringe was charged with the amla-alginate mixture.
- Thereafter, the mixture was slowly added to the calcium chloride solution by stirring constantly using a magnetic stirrer.
- The interaction between the alginate and calcium ions gave rise to the formation of microspheres due to the formation of ionically bound cross-links.
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Sr.No.	Ingredients	Quantity	Role of ingredient
1.	Calcium Chloride (CaCl ₂)	16 g	Cross-linking agent; facilitates gelation of alginate to form microspheres
2.	Sodium alginate	1 g	Natural polymer; forms gel matrix to encapsulate amla powder
3.	Amla powder	4 g	Active herbal ingredient; provides antioxidant and therapeutic properties

Table.5: Formulation Table of Microspheres



Fig.1: Formulation of Microspheres

2. FORMULATION OF FACEWASH:

➤ FORMULATION OF NATURAL FACEWASH

Preparation of Gel Base:

- Precise weighing of 10 g glycerine was done in a clean beaker.
- For ensuring even mixing to achieve a smooth consistency without any lumps, 2 g of xanthan gum was mixed into the above while stirring continuously.
- To ensure proper hydration, the mixture was left for some time to hydrate properly.

Incorporation of Surfactant:

- Once the gel base was formed, addition of 15g of coco glucoside was carried out gradually.
- The solution was carefully mixed to blend the surfactant without the formation of foam.

Addition of Fragrance and Preservative:

- In order to give it a good smell, an adequate quantity (q.s.) of natural fragrance was added.
- To ensure its longevity and protection from microbial infection, 0.1 g of sodium benzoate was included.
- To ensure its uniformity, blending was performed.

Incorporation of Active and Coloring Agents:

- In order to avoid rupturing the microspheres, the previously prepared amla microspheres were added to the face wash base by stirring them gently.
- In view of its known antibacterial and antioxidant properties, 0.1 g of turmeric ethanolic extract was used as a natural colorant.
- To ensure that all components are well incorporated in the mixture, the mixture was stirred well.

Final Adjustment and Packaging:

- The formulated facewash was checked for consistency, clarity, and homogeneity.

Sr.No.	Ingredients	Quantity	Role of ingredient
1.	Xanthan gum	2 g	Natural thickening agent; forms gel base and provides desirable viscosity
2.	Glycerin	10 g	Humectant; retains moisture and provides a smooth texture
3.	Coco glucoside	15 g	Mild natural surfactant; provides cleansing and foaming action
4.	Fragrance	q.s.	Provides pleasant aroma to enhance user experience
5.	Sodium benzoate	0.1 g	Preservative; prevents microbial growth and extends shelf life
6.	Amla microspheres	Appropriate quantity	Herbal active ingredient; rich in antioxidants, improves skin tone and texture
7.	Ethanolic extract of turmeric	0.1 g	Natural coloring agent and antimicrobial; provides skin benefits and light yellow tint

Table.6: Formulation Table Natural Facewash



Fig.2: Formulation of Natural Facewash

➤ FORMULATION OF SYNTHETIC FACEWASH:

Preparation of Gel Base:

- The beaker was cleaned out and then 100 mL of distilled water was placed into the beaker.
- In order to ensure that the lumps do not form, 2 g of Carbopol 940 was slowly added to the water with stirring.
- Stirring of the mixture was continued until a homogeneous gel base was obtained.

Incorporation of Surfactant:

- The mixture was slowly made with the help of adding 3 grams of sodium lauryl sulfate (SLS).
- In order to ensure that minimal foam is produced, the mixture was done until it reached a homogeneous and clear solution stage.

Addition of Fragrance and Preservative:

- Due to its natural yellow color and bactericidal properties, 0.1 g of ethanolic extract of turmeric was added to the gel base.
- In order to enhance the sensory attributes of the formula, an adequate quantity of fragrance was incorporated.
- In order to increase shelf life and prevent microbial growth, 0.1 g of sodium benzoate was used as a preservative.

Incorporation of Amla Microspheres:

- Microspheres containing the pre-prepared amla were slowly added to the formulation.
- In order to achieve even distribution and prevent any breakage of the microspheres, stirring was carried out very slowly and cautiously.

pH Adjustment (if required):

- The pH value of the preparation was checked and, if required, was adjusted using a neutralizer such as triethanolamine (TEA) to 5.5 – 6.5.
- The adjustment of pH value also helps in activating the gelling action of Carbopol.

Final Processing and Packaging:

- The final facewash formulation was stirred thoroughly until a smooth, uniform consistency was achieved.

Sr.No.	Ingredients	Quantity	Role of ingredient
1.	Carbopol 940	2 g	Synthetic polymer; forms gel base and provides viscosity
2.	Distilled water	100 ml	Solvent; used to dissolve and disperse water-soluble ingredients
3.	Sodium lauryl sulfate (SLS)	3 g	Surfactant; provides cleansing and foaming action
4.	Fragrance	q.s.	Provides pleasant aroma to enhance user experience
5.	Sodium benzoate	0.1 g	Preservative; prevents microbial growth and extends shelf life
6.	Amla microspheres	Appropriate quantity	Active herbal ingredient; antioxidant-rich spheres that enhance skin nourishment
7.	Ethanolic extract of turmeric	0.1 g	Natural coloring agent and antimicrobial; provides light yellow tint

Table.7: Formulation of Synthetic Facewash



Fig.3: Formulation of Synthetic Facewash:

3. FORMULATION OF SOAP BAR:

Preparation of Sodium Hydroxide (NaOH) Solution:

- Exactly 15 grams of sodium hydroxide (NaOH) was carefully weighed.
- Mix continuously as the NaOH was dissolved in 50 mL of distilled water.
- The solution should be cooled slightly.

Preparation of Sodium Chloride (NaCl) Solution:

- On the other hand, 200 mL of distilled water were measured in another beaker.
- 15 grams of sodium chloride (NaCl) was then added, and mixed until it is completely dissolved.
- This will be used for the salting-out process.

Preparation of Soap Base (Saponification):

- Pour 60 ml of coconut oil into a clean beaker.
- The process of saponification is initiated by adding the prepared sodium hydroxide to the coconut oil and stirring.
- In order to aid the formation of the soap, the mixture is heated gradually and stirred for ten to twelve minutes.

Salting Out (Soap Separation):

- The resultant NaCl solution was slowly mixed into the saponified solution by constant stirring and heating.
- In doing so, this will reduce solubility, thus making it easier to separate the soap from the glycerine and other substances.

Incorporation of Amla Microspheres:

- After the mixture of the soap began separating and thickening, a premeasured quantity of Amla microspheres was added.
- In order to ensure uniform dispersion without disrupting their integrity, swirling was done.

Solidification:

- In order to accelerate the process of solidifying and phase separation, the mixture was allowed to remain outside of the heat source for about 30 to 40 minutes.
- Soap products were placed inside molds having certain shapes.

Curing:

- For complete hardening of the soap, it was allowed to harden by setting at room temperature for two to three hours.
- The soap bars were demolded and stored in a dry and cool place.



Fig.4: Formulation of Soap Bar

EVALUATION OF FACE WASH

➤ In-vitro evaluation

1) Rheological Characteristics:

Rheological characteristics were studied for colour, odour and feel properties.

Colour: Yellowish

Odour: Pleasant



Fig.5: Rheological Characteristic

2) Determination of pH:

The PH of formulations was determined using digital pH meter. One gram of face wash was dissolved in 100 ml of demineralised water and stored for two hours. The measurements of formulation were done. The pH was found to be 5.22



Fig.6: Determination of pH

3) Spreadability determination of formulations:

$$S = \frac{ml}{t}$$

Where,

s = spreadability in gm.cm/sec

m= weight tied to upper slide

l= length of glass slide

t= time in seconds

For Natural facewash:

$$S = \frac{1 \times 8.2}{2}$$

$$S = 4.1 \text{ gm} \cdot \text{cm} / \text{sec}$$

For Synthetic facewash:

$$S = \frac{1 \times 8.2}{3}$$

$$S = 2.73 \text{ gm} \cdot \text{cm} / \text{sec}$$

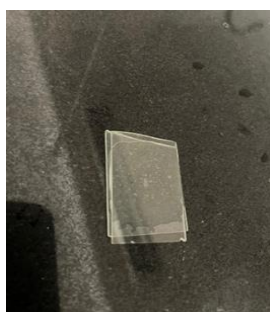


Fig.7: Spreadability Determination of Formulations

4) Washability:

In water flow, the product was subjected to examination through hands. With regards to washability of the formulation, it required 50 ml of water to eliminate all traces of the facewash within 10 seconds.



Fig.8: Washability

5) Stability study:

When performing stability studies on the instant face wash, it was also subjected to the following temperature and relative humidity for three weeks at ambient conditions. In the light of the storage conditions provided above, it became apparent that both the natural and synthetic variants of face wash exhibited physical stability for a period of 15 days.

➤ In-vivo evaluation

1) Skin irritation test:

Skin irritation testing was conducted on human subjects. Selected participants received application of 1.0g of the prepared face wash on their handbacks on a two-square-inch area. Lesions or irritation were observed on the selected participants.



Fig.9: Skin Irritation Test

2) Photographic evaluation human:

This was carried out on volunteer. Face wash was applied on skin. The photographs were taken before and after application of the product.

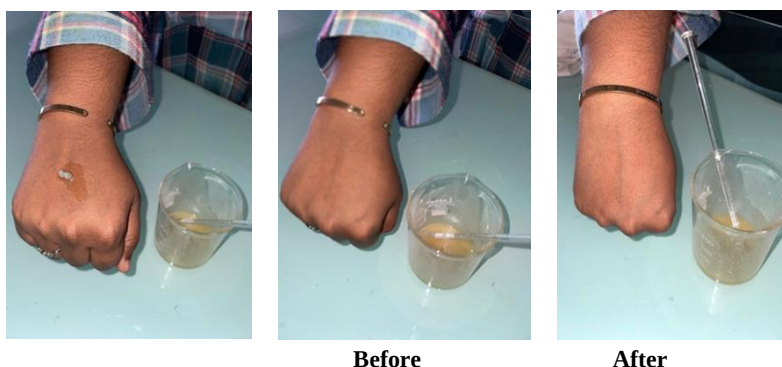


Fig.10: Photographic Evaluation Human

Sr.No.	Parameters	Observed value
1.	Colour/Odour	Yellow/Plaesant
2.	pH	5.22
3.	Spreadability 1) Natural facewash 2) Synthetic Facewash	4.1 gm*cm/sec 2.73 gm*cm/sec
4.	Washability	50 mL of water was required to completely remove the facewash within a time frame of 10 seconds.
5.	Stability study	Stable for a period of 15 days
6.	Skin irritation test	The volunteers were observed for lesions or irritation.
7.	Photographic evaluation human	The photographs were taken before and after application of the product.

Table.8: Evaluation of Parameters for Facewash

EVALUATION OF SOAP BAR

1) Organoleptic evaluation

Odour: Aromatic.

Appearance: Smooth texture.

2) pH

Take 10 ml of distilled water and dissolve, 2 g of the finished soap, yielding a dissolved sample. A pH meter was used to measure the pH. The pH was found to be 9.28

3) Washability

The product was applied on hand and was observed under running water. The washability of the formulation was evaluated, and it was observed that approximately 50 mL of water was required to completely remove the soap within a time frame of 10 seconds.

4) Skin irritation test

The skin irritation was carried out on human volunteers. No signs of redness, itching, inflammation, or discomfort were observed during or after the test period. The formulated soap was found to be non-irritant and safe for topical use on normal skin.

Sr.No.	Parameters	Observed value
1.	Odour/ Appearance	Aromatic/ Smooth texture.
2.	pH	9.28
3.	Washability	50 mL of water was required to completely remove the facewash within a time frame of 10 seconds.
4.	Skin irritation test	The volunteers were observed for lesions or irritation.

Table.9: Evaluation of Parameters for Soap Bar

RESULT AND DISCUSSION

The prepared formulations exhibited good spreadability, stability, washability, and acceptable pH. No irritation was observed during skin irritation studies.

CONCLUSION

The study concluded that amla microsphere-based herbal formulations can be used as safe and effective alternatives for skin cleansing and exfoliation.

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