



# Desining and Formulation of a Novel Polyherbal Facewash Tablet: A Consumer-Friendly Approach

<sup>1</sup>Namra M. Shaikh, <sup>2</sup>Ruchita D. Gavade, <sup>3</sup>Nilesh S. Dalvi, <sup>4</sup> Rushiraj D. Chavan,

<sup>5</sup>Pranali B. Mane, <sup>6</sup>Gulab N. Kadam

<sup>1</sup>Assistant Professor, <sup>2,3,4,5,6</sup>Student,

<sup>1</sup>Department of Pharmaceutical Chemistry

V P College of Pharmacy, Madkhol, Sawantwadi-416510, India

## ABSTRACT

Skin is the thin layer of tissue forming the natural outer covering of the body of a human. Skin of the face is elegant and the ordinary soaps make the texture of skin dry. Face washes are water-based formulations. Their foaming and astringent properties deeply clean pores and combat oil production. The purpose of face wash is to cleanse anti-wrinkle, anti-acne, moisturize and enhance the beauty of skin and thus make the skin look young and energetic. The current face washes available in market are gel, powder, stick and cream state, which should be packed in large collapsible tube or plastic containers which are difficult for the consumer to carry while travelling and as this face wash are aqueous in nature, it requires preservative to maintain the stability of the product. The objectives of this present work are to overcome the drawbacks of synthetic face washes and to prepare herbal face wash tablets. In this study we conducted a survey of people and their perspective on the ideal face wash they wish. Face Wash tablets were formulated to minimize the cost, packaging size and the utilization of harmful preservatives and are easily portable. Face wash tablet was prepared with herbal ingredients by wet granulation method and evaluated for different parameters like its physicochemical properties, stability, and in vitro efficacy. This research seeks to provide a natural, efficient, and sustainable solution for skin care, catering to the growing demand for herbal products. The polyherbal facewash tablet has the potential to become a popular choice for consumers seeking effective and gentle skin care.

**KEYWORDS:-** Foaming, Preservative, Face wash tablet, Herbal Face wash.

## INTRODUCTION

The term "Cosmetic" is derived from the Greek word "Kosmeticos," which signifies preparation and adornment. The formulations or materials employed to modify or elevate the aesthetic qualities of scent, visage, and skin texture are predominantly intended for use on the body and face. The formulation of cosmetics typically consists of either natural ingredients, synthetic components, or a combination of both<sup>[1]</sup>. The demand for natural and herbal products has increased significantly in recent years, driven by consumer preference for safer and more sustainable options. Facewash tablets have gained popularity due to their convenience and effectiveness in maintaining skin hygiene. Polyherbal formulations, combining multiple herbs, offer a synergistic approach to skin care, leveraging the therapeutic properties of various plant extracts. Herbs like Aloe vera, Neem, Turmeric and others are commonly used in skin care. We have chosen Neem, Aloe vera and Orange peel by referring various articles and literature review on herbs used for skin care. Aloe vera has a cooling effect and also serves as a moisturizer. It can also help to rejuvenating ageing skin<sup>[2]</sup>. Neem leaves are commonly used in face washes due to their antibacterial and anti-inflammatory properties, which can help with acne, pimples, and other skin issues. They also have antioxidant properties that can help even out skin tone and reduce blemishes. Neem in facial skin care can help cleanse the skin, remove impurities, and balance oil production<sup>[3]</sup>. Vitamin C is abundant in orange peel. The compounds present in

orange peel also possess antimicrobial properties, which are beneficial for treating acne and other skin infections. Additionally, the extracts of orange peel can lighten the skin, and have potential to treat hyperpigmentation and uneven skin tone<sup>[4]</sup>.

## MATERIALS AND METHODS

### MATERIALS

#### Herbs

All the herbs (Neem, Aloe vera) were collected from the plant nurseries and dried in sunlight. Orange fruits were collected from the local market.

#### Chemicals

Sodium lauryl sulphate, Tragacanth, Crosspovidone, Magnesium stearate, Orange oil, Beetroot extract of laboratory grade were procured from Research-lab Fine Chem Industries, Mumbai.

### METHODS

#### Preparation of herbal drug powder

##### Neem leaves powder

Neem leaves were collected and allowed to dry in the sun. Dried neem leaves were ground into a fine powder in grinder mixer, which was then collected and sieved.

##### Aloe vera powder

The aloe vera was chopped into little pieces and allowed to dry in the sun. Dried aloe vera cut pieces were weighed and added to the grinder mixer and the powder was collected which was then sieved and collected.

##### Orange peel powder

The outer layer of orange fruit (pericarp) was peeled out and cut into small pieces. Orange peel was dried in sunlight. Dried peels were then weighed and added to a grinder mixer. The fine powder which was obtained was sieved and collected.

#### Preparation of facewash tablet

##### Preparation of granules:

1. All powdered ingredients are weighed according to formula.
2. Powders are passed through sieve no. 80 and mixed with geometric mixing by using mortar and pestle.
3. Orange oil and beetroot extract was measured in quantity sufficient and added to the uniform mixture of powdered ingredients.
4. Two Doughs of wet mass were formed, one containing orange oil and other containing beetroot extract which was then passed through sieve no. 20.
5. Collected granules were kept for drying in hot air oven at 45°C for 15 min
6. Dried granules were then passed through sieve no.20.
7. Granules were collected over the sieve no. 20 and fines were collected below sieve no.40.

##### Compression:

Tablets were compressed by adjusting the weight of tablet as 500mg (250mg of granules containing orange oil and 250mg of granules containing beetroot extract) and setting thickness as 2.5 mm.

##### Packing and Labelling:

Compressed tablets were then processed for packaging and labelling.

## PRE-FORMULATION STUDIES<sup>[5]</sup>

### BULK CHARACTERIZATION

#### Bulk Density:

Bulk density is the apparent density of powder under defined condition. It is the untapped powder volume and expressed as (g/cm<sup>3</sup>). Bulk density of powder is determined using

$$\text{Bulk density} = \frac{\text{weight of sample in gram}}{\text{volume occupied by the sample}}$$

**Tapped density:**

Tapped density is the apparent density of powder obtained by standard conditions. It is the volume of powder obtained after mechanical tapping. Tapped density of powder is determined using

$$\text{Tapped density} = \text{weight of sample in gram} / \text{Tapped Volume}$$

**Hausner's ratio and Compressibility index:**

Hausner's ratio and compressibility index is used to predict the flow property of particles in a simple manner. Both were determined using Bulk density and Tapped density.

Hausner's ratio:

Hausner's ratio is indicated by numbers useful in industries for correlating the flowability of powder. The value greater than 1.25 the powder has the poor flowability. It is determined using

$$\text{Hausner's ratio} = \text{Tapped density}(\text{g/cm}^2) / \text{bulk density}(\text{g/cm}^2)$$

**Compressibility index:**

Compressibility index is a measure of tendency of the powder to be compressed as its ability to get settled and involve in antiparticle interaction. It is indicated by Carr's index (%). It is determined using

$$\text{Carr's index (\%)} = \frac{\text{Bulk Density} - \text{Tapped density}}{\text{Tapped density}} * 100$$

**Angle of Repose:**

It is the angle that differentiates transitions between phases of the granular material and commonly used for evaluating antiparticle interaction .it is calculated using

$$\text{Tan } \theta = h/r$$

Where,

h = Height of pile, r = Radius of the base of pile,  $\theta$  = Angle of repose

**DEVELOPMENT OF FORMULATION**

Table 1: Composition of Polyherbal Facewash Tablet

Sr No.	Ingredients	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>	F <sub>4</sub>	F <sub>5</sub>	F <sub>6</sub>
1.	Neem leaves powder	5%	5%	5%	5%	5%	5%
2.	Orange peel powder	5%	5%	5%	5%	5%	5%
3.	Aloe vera powder	5%	5%	5%	5%	5%	5%
4.	Sodium lauryl sulphate (SLS)	35%	32%	29%	29%	26%	23%
5.	Tragacanth	3%	4%	5%	3%	4%	5%
6.	Crosspovidone	42%	44%	46%	48%	50%	52%
7.	Magnesium stearate	5%	5%	5%	5%	5%	5%
8.	Orange oil / Beetroot extract	q.s	q.s	q.s	q.s	q.s	q.s

**EVALUATION OF FACEWASH TABLET<sup>[6,7,8,9]</sup>**

The prepared facewash tablet were evaluated for various parameters as follows:

**pH:**

The pH of the facewash tablet was made to match with the skin so that the skin irritation is avoided. It was measured by making 1% aqueous solution of formulation and measured by using calibrated digital pH metre at constant temperature.

#### **Hardness:**

Pfizer Hardness tester is used for determining the hardness of tablet and it is the capacity of tablet to resist the mechanical shock. The hardness is expressed in Kg/cm<sup>2</sup>. Randomly 3-5 tablets are taken from each batch and tested for hardness and the values were recorded. The average value of tablet hardness was 1.5-2.

#### **Friability:**

The friabilator is utilized to determine the friability of the tablets. Adjust the time and the counts to 100 by pressing the count key. Start rotation by placing the tablets in the rotating chamber. After the rotation, collect the tablets and weigh them. Randomly 10 tablets are taken from each batch for the friability test. The loss in weight of tablet should not exceed 0.5-1% of the taken initial weight.

**Formula: (Initial weight -final weight)/ initial weight\*100.**

#### **Weight variation:**

As per IP, 20 tablets of each formulation were taken for the weight variation test. Each of the tablet were weighed individually using the electronic balance and average weight was calculated and the deviation was recorded by comparing with the average value. The weight variation limit should not exceed  $\pm 7.5$ .

#### **Thickness Test:**

The Thickness of the tablets are measured with the help of Vernier calliper. Thickness of the tablet should be in limit of  $\pm 5$ . It is expressed as Kg/cm<sup>2</sup>.

#### **Foam ability:**

Fill a 250ml measuring cylinder halfway with water and drop the tablet in it. Cover the cylinder with your palm and shake it for several minutes. Measure the amount of foam produced.

#### **Wash ability:**

The facewash tablet wash ability was assessed by applying the formulation to the skin and wash it with water and manually checked.

#### **Skin irritation test:**

Skin irritation testing is essential in the development of medications and cosmetics. Over the course of 1 to 2 hours, the formulation was applied to a 1 sq/cm region of the dorsal skin of the left hand, and the area was monitored for redness, irritation.

#### **Stability Studies<sup>[10,11]</sup>:**

500 mg of face wash tablets were kept in a stability chamber for 3 months with the temperature and humidity maintained at 40 °C  $\pm$  2 °C/75% and RH  $\pm$  5% to satisfy the (WHO) ICH standards for class IV climatic conditions.

## **RESULTS AND DISCUSSION**

### **Particle size distribution**

To determine particle size, the powder was passed through a sieve number 80. The powder's particle size examination revealed that 80% of the particles are fine powder.

## Pre-Formulation

Table 2: Evaluation of pre-formulation studies

Formulation	Bulk density	Tapped density	Hausner's ratio	Compressibility Index (%)	Angle of Repose (degree)	Flow properties
F1	0.5	0.54	1.08	7.4	26	Excellent
F2	0.49	0.54	1.10	9.25	32	Good
F3	0.47	0.55	1.17	14	35	Good
F4	0.48	0.54	1.12	11.11	46	Poor
F5	0.49	0.55	1.12	10.9	39	Fair
F6	0.48	0.55	1.14	12.72	32	Good

Table 3: Comparative evaluation of trial formulations

Formulation	Colour	Hardness Test (Kg/cm <sup>2</sup> )	Thickness (mm)	Friability Test (%)	Weight Variation (mg)	pH	Wash Ability	Irritation Test
F1	Reddish green	2.4	2.5	0.81	490	4.53	Excellent	No Irritation
F2	Reddish green	2.4	2.5	0.85	480	5	Good	No Irritation
F3	Reddish green	2.45	2.5	0.80	490	5.5	Poor	No Irritation
F4	Reddish green	2.4	2.5	0.71	485	5.3	Excellent	No Irritation
F5	Reddish green	2.35	2.5	0.93	495	5.7	poor	No Irritation
F6	Reddish green	2.2	2.5	0.75	490	6	Very poor	No Irritation

Table 4: Foaming properties of formulations

Formulation	Foaming Properties
F1	Excellent foam production
F2	Good foam production
F3	Small amount of foam production
F4	Small amount of foam production
F5	Small amount of foam production
F6	Very Small amount of foam production

Table 5: Comparative analysis of optimized batch (F1) at the start and after 3 months of stability testing

Sr. No.	Parameters	Formulation	
		Initial	After three months
1.	Colour	Reddish green	Reddish green
2.	Thickness	2.5	2.5
3.	Hardness	2.4	2.2
4.	Weight Variation	499	499
5.	Foaming Ability	Excellent	Excellent



Fig 1: Polyherbal Facewash Tablet

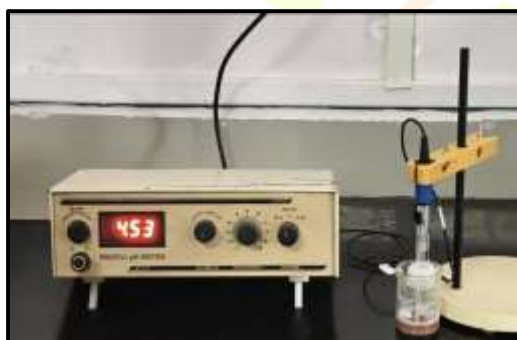


Fig 2: pH test

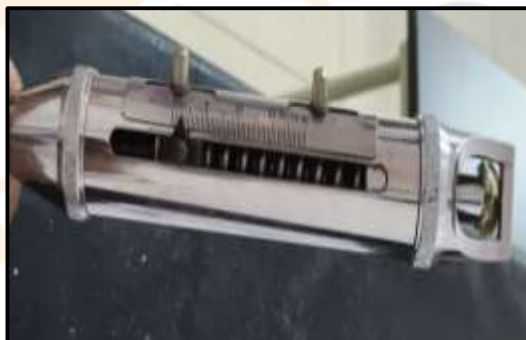


Fig 3: Hardness Test



Fig 4: Friability Test



Fig 5: Washability



Fig 6: Foam Test



Fig 7: Skin Irritation Test

## CONCLUSION

This study aimed to develop and evaluate polyherbal facewash tablets that are convenient, cost-effective, and accessible to the general public. By incorporating tableting technology, we created a product that is travel-friendly, reduces usage time. Our formulation, particularly batch F1, demonstrated excellent foaming properties and produced a high-quality facewash tablet. Through comparative analysis of ingredients and assessments, we identified the optimal formulation that meets our goals of convenience, efficacy, and sustainability.

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