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Design and evaluation of skin friendly facewash tablet

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Abstract

The study aims to formulate and evaluate a skin-friendly herbal facewash tablet using *Rubia cordifolia* and *Moringa oleifera.* These plants are selected because they contain important phytoconstituents such as flavonoids, tannins, saponins, and phenolic compounds, which are confirmed through phytochemical screening. The skin brightening, anti-aging and antimicrobial properties *of Rubia cordifolia* root powder could be used for the treatment of various skin-related problems such as acne and hyperpigmentation. The vitamins present in the Moringa eaves, namely vitamins A, C and E, possess antioxidant and anti-inflammatory properties and are used for skin care. The face wash tablets that are formulated are analyzed for their quality and effectiveness through various tests. The parameters like weight variation, hardness, and friability are within the range, proving the quality of the face wash tablets. The antioxidant activity was also confirmed through the DPPH and FRAP tests. The antimicrobial activity was found to be good and thus the herbal face wash tablets are beneficial for skin care.

Keywords: Facewash Tablet; *Rubia cordifolia; Moringa oliefera*; pH; Hardness test; Antioxidant

1. Introduction

Herbal and natural cosmetics are widely used, especially in India. In traditional medicine, they are recommended for health and beauty. In recent times, there is a trend towards using herbal cosmetic products. They are safer and more compatible for use on the skin. There are fewer chances of side effects. The increasing demand for herbal cosmetic products has led to the development of effective, eco-friendly and sustainable skincare products.

Skin is the largest organ in the human body. It acts as a protective shield against environmental factors such as dust, microorganisms, chemicals and ultraviolet light. It is involved in temperature regulation, prevention of water loss and sensation. The skin is composed of three layers. It is divided into three layers of tissue: epidermis, dermis and subcutaneous tissue. Cleansing is very important for a healthy skin. The accumulation of dirt, oil and dead cells can cause problems such as acne, irritation and inflammation.

Face wash products are generally used for gentle and effective cleansing of the skin. Unlike soap, face wash products are mild and gentle on the skin and are used for regular cleansing without causing dryness. Face wash helps in cleansing the skin while keeping it moisturized. In addition, exfoliation is another significant aspect in skincare that helps in removing dead cells from the skin, thus providing better results in terms of healthy and glowing skin.

Recently, face wash tablets have been developed as a new and sustainable face wash product in the market. Face wash tablets are more stable, portable and environmentally friendly and they do not require preservatives, thus providing better results in terms of healthy and glowing skin. The addition of herbal ingredients and microparticles also helps in providing better results in terms of healthy and glowing skin. Hence, in this study, face wash tablets are formulated and evaluated for providing better results in terms of healthy and glowing skin. [1,2,3,4]

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2. Face wash tablet

Face wash tablet is a solid, water-free form of cosmetics. It is intended for cleaning the facial skin. It contains a mixture of surfactants, disintegrants, binder and active ingredients, which may be of herbal or synthetic origin. On contact with water, the tablet loses its shape and produces suds, which help to remove dirt, oil and other impurities from the skin. The face wash tablet is an eco-friendly product instead of the conventional liquid face wash.

2.1. Ideal Properties of a Face Wash Tablet

- The face wash tablet must disintegrate quickly on contact with water.
- The formulation must be mild and non-irritating to the skin.
- The formulation must be able to maintain a pH range of 5.5 to 7 on the skin.
- The face wash tablet must be of uniform weight and adequate hardness.
- The face wash tablet must be non-drying and non-irritating to the skin.

2.2. Advantages of a Face wash tablet

- Eco-friendly and water-free product.
- It helps in reducing plastic usage.
- Travel-friendly and convenient.
- Longer shelf life than face wash.
- It helps in the easy incorporation of herbal ingredients.
- Cost-effective and lightweight.

2.3. Disadvantages of a Face wash tablet

- Takes time to dissolve in water.
- Improper formulation may result in dry skin.
- It is not suitable for sensitive skin.
- Prone to breakage if not packed properly.
- Limited awareness among users. [5,6]

3. Drug used in the formulation

3.1. Moringa leaves *(Moringa oleifera*)

Figure 1 Moringa leaves

3.1.1. Active ingredients

It contains vital minerals that support cellular and skin health, such as calcium, iron, and potassium. It contains phenolic acids, which have protective and anti-aging qualities. Tannins have a mildly astringent effect that helps tighten skin. Rich in vitamins such as vitamin E that protects the skin from oxidation, vitamin C that is helpful in the synthesis of collagen and vitamin A that is helpful in skin renewal. Presence of high levels of flavonoids that have strong antioxidant properties such as kaempferol and quercetin. Antimicrobial and cleansing properties because of the presence of saponins and alkaloids.

3.1.2. Properties

It has high antioxidant properties that help to counteract free radicals and prevent premature aging, anti-inflammatory properties that help to reduce skin irritation and redness. It helps to nourish and moisturize the skin, thus improving its texture and softness. It acts as an astringent that helps to control oil and minimize skin pores. It has antibacterial properties that help to prevent skin infections such as acne. It helps to achieve clear and glowing skin if used regularly.[7]

3.2. *Rubia cordifolia* root

Figure 2 *Rubia cordifolia*

3.2.1. Active Ingredients

Anthraquinones such as rubiadin, purpurin, and munjistin present in it have strong biological activities. High content of glycosides such as ruberythric acid contributes to its therapeutic activities. Tannins present in it impart astringent properties. Flavonoids increase its antioxidant potential. These phytochemicals work synergistically to impart its medicinal and cosmetic properties.

3.2.2. Properties

Antioxidant properties protect the skin from the damaging effects of free radicals and premature aging. Its anti-inflammatory properties help to reduce inflammation and alleviate skin problems. Antimicrobial properties help to prevent and control the growth of bacteria that cause acne. Astringent properties help to tighten the skin and improve its texture. Blood purifier that aids in the removal of toxins and toxins to achieve clear skin. It helps to reduce acne and achieve a better complexion.[8]

3.3. Excipients used in a face wash tablet

Excipients are inactive substances added to a face wash tablet to aid in formulation, stability, cleansing and performance. The commonly used excipients and their functions are listed below:

3.3.1. Binders

The binders play a significant role in the tablet formulation. They help in binding the powder particles. They give strength to the tablets. In the case of face wash tablets, the binders used are maize starch, Carbopol and microcrystalline cellulose. These compounds help in the formation of perfect granules during the wet granulation process, thus enhancing the quality of the tablets. The tablets, therefore, become strong and stable, thus able to withstand all the forces without breaking.

The disintegrants aid in the rapid disintegration of the tablets upon contact with water, owing to their water absorption and swelling capabilities. Sodium starch glycolate and crospovidone can be used as effective face wash formulation disintegrants. The fast disintegration ensures the formation of a rich lather.

3.3.2. Surfactants

Surfactants play a role in reducing the surface tension of the oil-water interface, thus aiding the efficient removal of dirt and sebum. Sodium lauryl sulfate, abbreviated as SLS, is the surfactant used in face wash tablets. It generates foam when mixed with water, thus enhancing the efficiency of the face wash.

3.3.3. Lubricants

Lubricants are excipients used to enhance the process of making face wash tablets. They play a role in reducing the friction between the powder particles and the surface of the tablet machine. Talc, together with magnesium stearate,

are used as lubricants as well as glidants. They play a role in the efficient movement of the powder during the compression of face wash tablets. They also play a role in the movement of the compressed face wash tablets from the die.

3.3.4. Diluents

Diluents are excipients used to add bulk to the face wash tablets. They are used when the amount of the active ingredients used is small. Lactose, as well as kaolin clay, are used as excipients. They play a role in the efficient mixing of all the ingredients. They also play a role in the texture, stability, as well as the absorption of face wash tablets.

3.3.5. pH Modifiers

pH modifiers are incorporated into face wash tablets to ensure that an optimal level of pH is maintained in the product. The level of pH has to be optimal to ensure that the product remains mild and safe for use on the skin. Citric acid is one of the common pH modifying agents used in cosmetic formulations. This agent ensures that the level of pH in the product remains within the range of 5 to 6, which is close to the natural level of skin pH.

3.3.6. Moisturizers

Moisturizers are additives in face wash tablets that play an important role in ensuring that the skin remains naturally moist and hydrated. When washing one's face, one may lose some level of natural oils in addition to dirt and grime, which can be washed away by the face wash product. The moisturizers in face wash tablets play an important role in ensuring that dryness and irritation do not occur after washing one's face with the product. The common moisturizers used in face wash tablets include glycerin, aloe vera, hyaluronic acid and oils. [6,8,9]

4. Methodology

4.1. Formulation of skin friendly Facewash Tablet

4.1.1. Collection of Rubia Herbal ingredients

The *Rubia cordifolia* roots have been collected from a commercial market, and it has been properly identified. Microscopic examination was done to ensure the internal structure of the plant and purity of the material, ruling out any chances of adulteration. [10,11] The *Moringa oliefera* leaves were collected, the collected plant material was authenticated to ensured accuracy and purity in the plant material collected.

4.1.2. Preparation of Herbal powder

The roots of *Rubia cordifolia* were initially washed with water to remove dirt, dust, and other impurities from the roots. The impurities were removed to ensure that the powder obtained from the roots was pure and ready for use. The roots were then dried in the sun in a clean environment for two days to remove moisture from the roots. The roots were crushed into a powder form using a grinder to increase the surface area of the roots. The increase in the surface area of the roots is necessary in the extraction of active ingredients from the roots in the formation of tablets. The powder was then sieved through sieve no 80. *Moringa oliefera* leaves are dried under shade for 14 days. Then leaves were crushed into a grinder to obtain fine powder and sieved through sieve no 80.

The prepared powder was subjected to evaluation for its preliminary as well as physicochemical properties, such as moisture content, pH, ash values and extractive values, to check the quality, purity and suitability of the powder for the preparation of tablets. The powder was stored in an airtight amber-colored glass bottle to prevent the powder from light, humidity, as well as contamination, to ensure the stability of the powder until its utilization for blending with face wash tablets. [10,11,12,13,14]

Figure 3 *Rubia cordifolia* Powder

Figure 4 *Moringa oleifera* powder

5. Preparation of powder blend

The process of preparing a herbal tablet blend starts with accurately measuring the herbal ingredients, i.e., *Rubia cordifolia root powder and Moringa oleifera l*eaf powder. In addition to these herbal powders, the excipients, such as Sodium Lauryl Sulfate (SLS), starch, Microcrystalline Cellulose (MCC), Sodium starch glycolate, Magnesium stearate and citric acid, are also accurately measured. The herbal powders and excipients are mixed together in a mortar and pestle to form a uniform mixture. To retain moisture in the mixture to prevent drying out, glycerin is added as a humectant to the mixture. The mixture is then triturated to form a uniform mixture. The uniform mixture of herbal powders and excipients was mixed. It was ready for pre-formulation evaluation and tablet compression. [15,16]

5.1. Tablet compression

The process of preparation of an herbal tablet blend begins with the precise measurement of the herbal ingredients, that is *Rubia cordifolia* root powder and *Moringa oleifera* leaf powder. Besides the precise measurement of the herbal ingredients, the excipients like Sodium Lauryl Sulfate (SLS), starch, Microcrystalline Cellulose (MCC), Sodium starch glycolate, Magnesium stearate and citric acid are also measured. The measured herbal ingredients and excipients are mixed together with the help of a mortar and pestle. For the retention of moisture in the mixture to prevent it from drying out, glycerin is added to the mixture. The mixture is then triturated to form a uniform mixture. The uniform mixture of the herbal ingredients and excipients was mixed. It was ready for pre-formulation evaluation. [17,18]

5.2. Formulation design of Facewash Tablet

The formulation is designed to produce 200 mg tablets. Different formulations were prepared and the formulation design was shown below.

Table 1 Formulation Chart

Sl. No	Ingredients	F1	F2	F3	F4
1	*Rubia cordifolia* (mg)	30 mg	28 mg	26 mg	24 mg
2	*Moringa oleifera* (mg)	24 mg	26 mg	28 mg	30 mg
3	Starch (mg)	20 mg	18 mg	16 mg	14 mg
4	Microcrystalline cellulose (mg)	100 mg	100 mg	100 mg	100 mg

5	Sodium starch glycolate (mg)	12 mg	12 mg	12 mg	12 mg
6	Sodium lauryl sulphate (mg)	2 mg	3 mg	4 mg	5 mg
7	Magnesium stearate (mg)	2 mg	2 mg	2 mg	2 mg
8	Citric acid (mg)	10 mg	10 mg	10 mg	10 mg
9	Glycerin (mL)	0.02 mL	0.02 mL	0.02 mL	0.02 mL

6. Evaluation tests

Preliminary tests of herbal ingredients [10,11,19]

6.1. Test for Carbohydrate

- Molisch's Test: Dissolved the extract in 5 mL of distilled water, filtered and treated the filtrate with 2 drops of alcoholic α-naphthol solution. Carefully added 2 mL of concentrated sulfuric acid along the sides of the test tube The formation of a violet ring at the junction indicated the presence of carbohydrates.
- Benedict's Test: Treated the filtrate with Benedict's reagent and heated in a water bath for 5 minutes.
- Fehling's Test: Hydrolyzed the filtrated with dilute hydrochloric acid, neutralized with alkali and then heated with Fehling's A and B solutions.

6.2. Test for Alkaloids

- Mayer's reagent: It is Potassium Mercury iodide solution & gives a white or pale-yellow precipitate, except with Alkaloids of the Purine groups and few others.
- Dragon Droff's reagent: It is solution of Potassium Iodide and Bismuth sub nitrate. They form orange color precipitate
- Wagner's test: Alkaloids give a reddish-brown precipitate with Wagner's reagent [Solution of iodine in potassium iodide]
- Hager's test: Alkaloids give yellow color precipitate with Hager's reagent (saturated solution of Picric acid)

6.3. Test for Proteins

- Ninhydrin Test: To an Aqueous Solution of Protein, Alcoholic solution of Ninhydrin is added and then heated. Formation of Red/Blue to Violet color suggests presence of Proteins.
- Millon's test: Any compound containing a phenolic hydroxyl group gives Millon's test positive. The Millon's reagent is a solution of mercuric and mercurous ions in nitric and nitrous acids. Taken 1 ml of protein solution in a test tube and added few drops of Millon's reagent. White precipitate is produced, which turns red after heating for 5 minutes on waterbath.
- Xanthoprotic Reaction: Protein usually forms yellow color solution. when warmed with conc. HNO3. This color becomes orange, when the solution made alkaline.

6.4. Test for Glycosides

- Hydrolysis; The extract is hydrolyzed with dilute hydrochloric acid to prepare for glycoside tests.
- Modified Borntrager's Test; Treated the extract with ferric chloride solution, heated in a boiling water bath for 5 minutes, cool, and shaken with an equal volume of benzene. Separated the benzene layer and added half its volume of ammonia solution. The formation of rose pink or cherry red color in the ammoniac layer indicates the presence of anthraquinone glycosides.
- Baljet's Test; Treat the extract with sodium picrate. The formation of a yellowish-orange color confirms the presence of cardiac glycosides.
- Keller-Killiani Test; Procedure Treat the extract with glacial acetic acid, 5% ferric chloride, and concentrated sulfuric acid. The formation of a reddish-brown color at the junction of two liquid layers, with the upper layer appearing bluish-green indicates the presence of cardiac glycosides Test of Saponins
- Foam Test (Froth's Test); Dilute the extract with distilled water in a graduated cylinder. Shaken the mixture vigorously for about 15 minutes. The formation of a stable layer of foam indicates the presence of saponins.

6.5. Test of Phenolic Compounds and Tannins

- Ferric Chloride Test; Added a few drops of neutral ferric chloride solution (5%) to the extract. The formation of a bluish-black color indicates the presence of phenolic compounds
- Gelatin Test; Added 1% gelatin solution containing sodium chloride to the extract. The formation of a white precipitate indicates the presence of tannins Test of flavonoids
- Lead Acetate test; Treated the extract with a few drops of 10% lead acetate solution. The formation of a white precipitate confirms the presence of flavonoids.
- Shinoda test; Add a few fragments of magnesium metal to the extract followed by a dropwise addition of concentrated hydrochloric acid. The formation of a magenta color indicates the presence of flavonoids.

6.6. Physicochemical analysis of Herbal ingredients [10,11,19]

6.6.1. Determination of total ash

Silica Crucibles were cleaned, dried well and then weighed to constant weight and labelling was made. Drug sample were then weighed accurately and placed in the Silica Crucibles respectively. These crucibles were placed in a muffle furnace at a temperature of 450˚C ±5˚C till were become totally free from Carbon. The time taken for this process was about 6 hrs. The crucibles containing the ash were allowed to be cooled in desiccators and subsequently weighed to constant weight

6.6.2. Determination of water-soluble ash

Water soluble ash value was determined as per Indian Pharmacopoeia 1996. Boiled the total ash for 5 minutes with 25 ml of water; collected the insoluble matter in a Gooch 's Crucible or on an ash less filter paper, washed with hot water and ignite for 15 minutes at a temperature not exceeding 450˚ C. Subtracted the weight of the insoluble matter from the weight of the ash; the difference in weight represents the water-soluble ash. Calculated the percentage of water-soluble ash with reference to the air-dried drug.

6.6.3. Determination of acid insoluble Ash

Acid insoluble Ash value was determined as per Indian Pharmacopoeia, 1996. Boil the total ash with 25 ml of 2M Hydrochloric acid for 5 minutes. Collected the insoluble matter in a Gooch crucible or on an ash less filter paper, wash with hot water, ignite, cooled in a desiccator and weighed. Calculated the percentage of acid insoluble ash with reference to the air-dried drug.

6.7. Determination of extractive values

6.7.1. Alcohol soluble extractive value:

Macerated about 5g accurately weighed coarsely powder air dried crude drug with 100ml of 90% alcohol in stoppered flask, for 24 hours. It was shaken frequently for 6 hours and stand for 18 hours. Then extract was rapidly filtered through filter paper. Evaporated 25ml of filtrate, day at 100˚C. kept in desiccator and weighed. Calculated % w/w of alcohol soluble extract with reference to air dried drug.

6.7.2. Water soluble extractive value:

Macerate about 5g weighed coarsely powdered air-dried crude drug with 100ml of chloroform water in a stoppered flask for 24 hours. It was shaken frequently for 6 hours and allowed to stand for 18 hours. The extract was filtered rapidly through filter paper. Evaporated 25ml of filtrate is dried in a shallow dish. Dry % w/w of water-soluble extract with reference to air dried drug.

6.7.3. Determination of moisture content

To determine the foaming index, 1 g of the sample is dissolved in 100 mL of distilled water to make a uniform solution. 10 mL of this solution is placed in a graduated test tube and shaken vigorously 10 times. The height of the foam formed is measured immediately and again after 5 minutes. The foaming index is defined as the highest dilution of the sample that produces a foam of at least 1 cm height which remains stable for 5 minutes, indicating the foaming capacity of the formulation.

7. Pre-formulation studies of formulated powder [15,16,20,21]

Pre formulation studies are essential to assess the suitability of the powder blend for tablet compression.

7.1. Angle of repose

A Pile of Powder's angle of repose is the greatest angle that Can exist between its surface and the horizontal plane. It determines the interparticle force or friction force in a powdered bulk

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

Where h = Height, r =radius, θ=Angle of repose

7.2. Bulk density and tapped density

Bulk density is the ratio of the mass of the powder to the bulk volume. The bulk density of a sample is equal to its weight in grams divided by its volume.

Tapped density is the amount of vacant space in a powder after the bulk quantity has been tapped.

Tapped Density is calculated by the weight of the powder divided by the calculated density.

7.3. Carr 's index

The powder's cohesiveness, particle size distribution, and flow rate are all correlated with Carr's index. To determine Carr 's Index;

Bulk Density- tapped density/ Tapped density x 100

7.4. Hausner 's ratio

Hausner 's Ratio is the ratio of tapped density to bulk density.

Evaluation tests for Tablet [15,18,22,21]

7.5. Hardness tests

The ability of a tablet to withstand mechanical shocks is known as hardness. Monsanto hardness tester is the instrument which is used to determine the hardness of tablet. It is expressed in kg/cm2. Taken three tablets from each batch and hardness should be determined and the selection of tabled should be done randomly. Then the mean and standard deviation values should be determined.

7.6. Friability tests

Roche friabilator is the equipment which is used for the determination of friability. It is expressed in percentage. Note down the initial weight of the tablets individually (W initial). Tablets were placed in a plastic chamber which revolves at 25 rpm and they are subjected to fall from a height of 6 inches in the friabilator for about 100 revolutions. Then measured the weight of the tablet (W final) and observed any weight difference before tablet and after the friabilator processing. Limits: loss in weight less than 0.5 to 1% of the initial weight of the tablet should be considered as acceptable limits. Percentage of friability is calculated;

(Initial weight- Final weight)/Initial weight×100

7.7. Weight variation tests

20 tablets of each formulation were taken for the weight variation test. Each of the tablet are weighed individually using the electronic balance and average weight was calculated and the deviation was recorded by comparing with the average value. According to US Pharmacopeia small variations in the weight is negligible and can be accepted the weight variation limit should not exceed+/-7.50

7.8. Thickness

The Thickness of the tablets should be measured with the help of Vernier calliper. Thickness of the tablet should be in limit of ±5. It is expressed as Kg/cm2.

7.9. Evaluation Tests for Facewash tablet

7.9.1. Washability:

The washability of the face wash tablet can be determined by applying the formulation on the skin and washed with water and checked manually.

7.9.2. Spreadability

The spreadability of the herbal face wash tablet was checked manually by applying the tablet on the skin with a gentle rub.

7.9.3. Foaming ability

By cylinder shake method. Taken 50ml of water in a 250ml cylinder and dropped the tablet in the cylinder and covered the cylinder with hand and shaken it vigorously for few minutes. Measure the volume of the foam produced.

7.9.4. pH

To determine the pH of a facewash tablet using a pH meter, first weighed and dissolve the tablet in a suitable volume of distilled water, ensuring complete dissolution to form a uniform solution. Calibrated the pH meter using standard buffer solutions at pH 4.0, 7.0, and 9.0 before measurement. Rinsed the electrode with distilled water, gently blot dry and immersed it into the prepared facewash solution. Allowed the reading to stabilize, then record the pH value. Repeated the measurement in triplicate to ensure accuracy and calculated the average pH of the facewash tablet solution.

7.10. Bioactive Test

In vitro Antioxidant Study [23,24,25]

7.10.1. DPPH Assay

Determination of 1, 1-Diphenyl-2-Picrylhydrazyl (DPPH) Free Radical Scavenging

This method is based on the reduction of DPPH in methanol/ethanol solution in the presence of a hydrogen-donating antioxidant due to the formation of the non-radical form DPPH-H. This transformation results in a color change from purple to yellow, which is measured spectrophotometrically at 517 nm.

7.10.2. Sample Preparation

Weighed about 200mg of formulations and dissolved in ethanol. Prepared sample solution was filtered by the Whatman filter paper, and the volume was made up to 10 ml in a volumetric flask.

7.10.3. Preparation of Standard

Weighed about 10 mg of ascorbic acid and dissolved it in 10 ml of ethanol. From this solution, take 2.5 ml and volume makeup to 25 ml with ethanol to prepare the stock solution. This stock solution was serially diluted separately to obtain different concentrations of the standard.

Procedure

Taken 3ml of 0.004% ethanolic solution of DPPH and added 0.5ml of sample solution. The solution was incubated for 30 minutes in the dark. At 517nm, DPPH shows its absorbance, and a comparison was made between the absorbance of the sample and the absorbance of the standard. Blank used is ethanol and the control is DPPH solution. The percentage inhibition was calculated by the equation as follows),

DPPH radical scavenging activity [%] = [(A control-A test)/A control] x100

A control- absorbance of the control solution

A test- absorbance of the test solution.

Ferric reducing antioxidant power (FRAP) assay

This assay is based on the antioxidant's capacity to convert ferric ions into ferrous ions. Once the reduction of ferric iron occurs, a blue color is developed.

7.10.4. Preparation of Phosphate Buffer (pH 6.6, 0.2 M):

Dissolve 27.60 g of sodium dihydrogen phosphate monohydrate in 900 mL of water. Adjusted to pH 6.6 with 10 M sodium hydroxide and dilute with water to produce 1000 ml.

Procedure:

Stock solutions of formulations were prepared, and this stock solution was serially diluted separately to obtain different concentrations.

To the 1 ml of the sample solution, added 2.5 ml phosphate buffer (6.6 pH, 0.2 M), mixed well, then add 2.5 ml of 1% ferrocyanide solution. Covered with aluminium foil and incubate at 50°C for 20 minutes in a water bath. Shake the reaction mixture and add 2. ml of 10 % trichloroacetic acid. After thorough mixing, taken 2.5 ml from the reaction mixture and add 2.5 ml of distilled water, followed by adding 0.5 ml of 0.1 % ferric chloride. A bluish color is developed and absorbance was measured at 700 nm. Ascorbic acid was used as a standard and distilled water as a blank.

7.11. Determination of Anti-microbial activity

7.11.1. Cup-plate Method [26]

The inoculum *Staphylococcus aureus* culture is prepared in nutrient agar broth medium. Placed a sterile disc saturated with the formulated facewash and a marketed one aseptically by using forceps in the Petri dish. The disc was allowed to diffuse and after sometime, the plates were incubated at 37˚C for 24 hours. After 24 hours the Petri dish were observed for ZOl and the diameter of zone of inhibition is measured in millimeters.

8. Result and discussion

Four Formulation of Facewash Tablet F1, F2, F3, F4 were Prepared.

Figure 5 Final Facewash tablet of each formulation

All the prepared formulations were subjected for the following evaluation parameters.

8.1. Organoleptic evaluation

The results of organoleptic evaluations shown in tablet:

Table 2 Organoleptic evaluation

Formulations	Colour	Odour	Consistency
F1	Light Pink	Characteristic	Solid
F2	Light Pink	Characteristic	Solid
F3	Light Pink	Characteristic	Solid
F4	Light Pink	Characteristic	Solid

8.2. Preliminary screening of Powdered herbal ingredients

Table 3 Preliminary screening of Powdered herbal ingredients

Test	*Rubia cordifolia*	*Moringa oliefera*
Carbohydrate	Positive	Positive
Protein and Amino acid	Negative	Positive
Alkaloids	Positive	Positive
Tannins	Positive	Positive
Flavonoids	Positive	Positive
Anthraquinone Glycoside	Positive	Negative
Cardiac Glycoside	Positive	Negative
Saponin Glycoside	Positive	Positive

8.3. Physicochemical Screening of Herbal ingredients

Table 4 Physicochemical Screening of Herbal ingredients

Test	*Rubia cordifolia*	*Moringa oliefera*
Total ash value (%)	6.5	4.3
Water soluble Ash value (%)	21.66	2.6
Alcohol insoluble Ash value (%)	4.16	4.2
Moisture content (%)	8	8
Water soluble extractive value (%w/w)	10.70	23
Alcohol soluble extractive value(%w/w)	14.7	10.9
Foaming Index	Excellent Foaming capacity	Medium Foaming capacity

8.4. Pre-formulation studies of tablet blend

Table 5 Pre-formulation studies of tablet blend

Formulation	Angle of Repose	Bulk Density(g/ml)	Tapped Density(g/ml)	Hausner's Ratio	Carr's Index (%)
F1	38	0.50	0.62	1.24	19.35
F2	34	0.53	0.67	1.26	20.89
F3	36	0.56	0.71	1.27	21.13
F4	33	0.59	0.77	1.31	21.13

8.5. Evaluation test for tablet

Table 6 Evaluation test for tablet

Formulation	Hardness test(kg/cm²)	Friability test (%)	Weight variation(mg)	Thickness(mm²)
F1	4	0.49	210	4
F2	3.6	1.78	207	4
F3	3.6	1.27	206	4
F4	4	0.33	206	4

8.6. Evaluation test for facewash tablet

Table 7 Evaluation test for Facewash tablet

Formulation	Washability	Spreadability	Foamability	pH
F1	Excellent	Excellent	65ml after 1minutes and 56ml after 10minutes	5.2
F2	Excellent	Excellent	66ml after 1minutes and 53ml after 10minutes	5.4
F3	Excellent	Excellent	65ml after 1minutes and 55ml after 10minutes	5.1
F4	Excellent	Excellent	64ml after 1minutes and 55ml after 10minutes	5

8.7. Bioactivity test

8.7.1. Invitro Antioxidant Activity

DPPH Assay

Table 8 DPPH Scavenging activity of standard

Standard Concentration(µg/ml)	Absorbance	Percentage inhibition (%)
10	0.211	89.179
20	0.075	96.15
30	0.050	97.43
40	0.047	97.58
50	0.024	98.76

Table 9 DPPH Scavenging activity of formulation

Formulation Concentration(µg/ml)	Absorbance	Percentage inhibition (%)
F1	0.220	88.71
F2	0.362	76
F3	0.156	80.2
F4	0.240	87.69

Antioxidant assay by DPPH radical scavenging activity was carried out for standard (ascorbic acid) and all 4 formulations. Percentage inhibition was calculated and result indicates F1 have highest antioxidant activity among all the formulations. F1 has antioxidant activity nearer to the standard. Hence F1 shows antioxidant property.

8.7.2. Ferric reducing antioxidant power-frap assay

Table 10 FRAP Assay of standard

Standard Concentration(µg/ml)	Percentage inhibition (%)
20	65.15
40	73.25
60	78.72
80	83.02
100	97.26

Table 11 FRAP Assay of formulation

Formulation Concentration(50µg/ml)	Percentage inhibition (%)
F1	89.01
F2	72
F3	74.23
F4	83.01

Table 12 FRAP Assay of formulation

Formulation Concentration(100µg/ml)	Percentage inhibition (%)
F1	98.98
F2	83.01
F3	85.57
F4	90.57

FRAP assay was carried out for all the formulations, standard and the percentage inhibition was calculated. From the result the F1 formulation have greater percentage inhibition. Hence shows significant antioxidant activity.

8.8. Antimicrobial activity

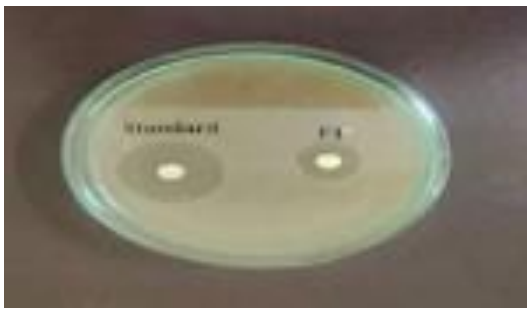

Figure 6 Zone of Inhibition

Optimized formulation F1 was selected and subjected to microbial study by using cup plate method and zone of inhibition was determined.

Table 13 Zone of inhibition

Formulation	Zone of Inhibition(mm)
F1	12
Standard	16

The antimicrobial test demonstrated significant activity against acne causing bacteria *(Staphylococcus aureus*) and found that the zone of inhibition for the formulation F4 is close to that of marketed formulation.

Among all the formulations, F1 was found to be the optimized formulation on the basis of better performance in evaluation parameters.

9. Conclusion

The study was able to develop a skin-friendly herbal face wash tablet using *Rubia cordifolia* and *Moringa oleifera* by using a direct compression method, wherein it was found that all formulations (F1-F4) showed acceptable organoleptic characteristics, such as uniform color, odor and solid characteristics. Pre-formulation evaluation revealed that all formulations showed acceptable flow properties, as indicated by an angle of repose of 33-38 degrees, Carr's index of 19-21%, and Hausner's ratio of 1.24-1.31. Evaluation of the formulations showed acceptable hardness of 3.6-4 kg/cm2, acceptable thickness of 4 mm, and acceptable friability, especially for F1 and F4 formulations (0.49 and 0.33%, respectively) and within acceptable limits for weight variation. All the formulations have shown excellent washability, spreadability, good foamability (64-66 ml at the initial stage) and pH suitable for the skin (5.0-5.4). Among the formulations prepared, F1 has shown better results than the others regarding antioxidant activity of DPPH (88.71%), FRAP (98.98% at 100 µg/ml), antimicrobial activity against *Staphylococcus aureus* (zone of inhibition 12 mm), and hence F1 formulation may be used as an eco-friendly alternative for the conventional face wash products.

Compliance with ethical standards

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Disclosure of conflict of interest

There is no conflict of interest to be disclosed.

References

[1] Sneh G, Ram K R.et.al. Formulation, development, and evaluation of herbal face cleanser. International Journal of Pharmaceutical Research and Development. 2025;7(1):137–139.

[2] Chandra P M, Chanchal S.et.al. Development and evaluation of polyherbal facewash for skin care. International Journal of Pharmacy and Pharmaceutical Science. 2025;7(2):198–200.

[3] Panaskar A N, Panaskar B A.et al. Formulation & evaluation of poly-herbal face scrub for skin exfoliation. International Journal of Innovative Science and Research Technology. 2023;8(7):2450–2456.

[4] Mahajan S, Gayakwad D.et.al. Formulation and evaluation of herbo-mineral facial scrub. Journal of Drug Delivery & Therapeutics. 2020;10(3):195–197.

[5] Miran I, More S, et al. To review on the face wash tablet. International Journal of Pharmaceutical Research and Application. 2024;9(6):1351–1358.

[6] Tanvi B, Mohin J, et al. Review on: Facewash tablet. International Journal of Pharmaceutical Sciences. 2024;2(11):1516–1525.

[7] Pankaj H S, Mukund G T, et al. A pharmacognosy, ethanobotany and phytopharmacology of Moringa oleifera Lam. International Journal of PharmTech Research. 2022;15(2):73–82.

[8] Rutuja N P. Fizz and fresh: Development of a water-soluble herbal face-wash tablet. International Journal of Pharmaceutical Research and Development. 2025;10(4):2456–4184.

[9] Vishwajit V P, Gauri B S, et al. Formulation of liquorice and charcoal facewash tablet incorporating inorganic salt. European Journal of Pharmaceutical and Medical Research. 2025;12(5):626–633.

[10] Harinarayanan C M, Nair P P. *Quality Analysis of Manjishta (Rubia cordifolia L.) with respect to pharmacognostical and high-performance thin-layer chromatography profile of the genuine sample: A cross-sectional market sample study*. Pharmacognosy Magazine. 2021;17(5):45–53.

[11] Priya DM, Siril EA. Pharmacognostic studies on Indian madder (Rubia cordifolia L.). Journal of Pharmacognosy and Phytochemistry. 2013;1(5):112-119.

[12] Ramya P, Diya A.et.al Formulation and evaluation of herbal face wash tablet. International Journal of Pharmaceutical Sciences and Research. 2022;13(6):1162-1167.

[13] Mahour P, Kumar P.et.al. Preparation and optimization of moringa leaf powder for edible purpose. Journal of the Indian Chemical Society. 2022;99(3):100377.

[14] Avhad V, Pathan N.et.al. Formulation and physicochemical evaluation of Moringa oleifera as an effervescent tablet. International Journal of Novel Research and Development. 2024;9(7):225–232.

[15] Gadge A G, Doke G.et.al.Formulation and evaluation of polyherbal facewash tablet. International Journal of Pharmacy and Pharmaceutical Science. 2025;7(1):284-288.

[16] Devaraj S, Radhakrishnan A.et al. Formulation and evaluation of consumer friendly facewash tablet. Research Journal of Pharmacy and Technology. 2021;14(2):838-842.

[17] Khare DD, Maru AD.et.al. Formulation and evaluation of polyherbal facewash tablets. European Journal of Biomedical and Pharmaceutical Sciences. 2023;10(5):225-229.

[18] Pawar RM, Limaye RP.et.a. Formulation and evaluation of herbal facewash tablets by using Rosa gallica and multani mitti. International Journal of Innovative Research in Technology. 2024;10(12):225-230.

[19] Kamble SC, Humbare RB.et.al. Assessment of phytochemicals and antioxidant properties of root extracts of Rubia cordifolia L. in different solvent systems. Biology and Life Sciences Forum. 2021;4(1):100.

[20] Khare DD, Maru AD.et.al. Formulation and evaluation of polyherbal facewash tablets. European Journal of Biomedical and Pharmaceutical Sciences. 2023;10(5):225-229.

[21] Amitha S, Roy AM, et.al. Formulation and evaluation of herbal facewash tablet. Journal of Emerging Technologies and Innovative Research. 2025;12(7):251–255.

[22] Misar K, Gajbhiye R.et.al. Formulation and evaluation of herbal facewash tablet using Rosa gallica, dead sea mud and multani mitti. International Journal of Research in Biosciences, Agriculture and Technology. 2023;11(2):164-168.

[23] S Chanda, R Dave, in vitro model for antioxidant activity evaluation and some medicinal plants possessing antioxidant properties: An overview, African Journal of microbiology Research, 2009; 3(13): 981-996.

[24] Indian pharmacopeia, volume 1, Ghaziabad: The Indian pharmacopeia commission,2018, phosphate buffer: 888.

[25] Madhuranga HD, Samarakoon DN. Advancing Invitro Antioxidant Activity Assessment: A Comprehensive Methodological Review and Improved Approaches for DPPH, FRAP, and H2O2 Assays. Journal of Natural and Ayurvedic Medicine. 2023, 7(4): 000431

[26] Rasheed A, Reddy GA.et.al. Formulation and comparative evaluation of polyherbal anti-acne face wash gels. Pharmaceutical Biology. 2011;49(8):771–774.