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Formulation and evaluation of polyherbal facewash using betel leaf and Liquorice

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Abstract
The global market for herbal formulations is expanding. Herbal-based face washes are preferred over synthetic alternatives due to their ability to mitigate side effects. Polyherbal facewash formulations, which combine natural ingredients, offer a holistic approach to skincare. These formulations have garnered attention for their synergistic effects, particularly those combining betel leaf, liquorice, and peppermint oil. Betel leaf provides antimicrobial and anti-inflammatory properties, while liquorice offers antioxidants and skin-lightening capabilities. Peppermint oil contributes a cooling sensation and helps control oil secretion. Together, these ingredients in a facewash formulation potentially deliver comprehensive skincare benefits such as cleansing, toning, and refreshing. Research underscores the multifaceted medicinal and cosmetic properties of these herbal components, emphasizing their individual efficacy and potential synergies when combined.

Keywords: Polyherbal, facewash, betel leaf, liquorice, peppermint oil, skincare, synergistic effects

Introduction
Polyherbal formulations have been integral to traditional medicinal systems such as Ayurveda, Siddha, and Unani. These formulations combine various herbs to harness their synergistic effects, enhancing the overall therapeutic benefits. The use of polyherbal facewashes is deeply rooted in these traditions, aiming to promote skin health through natural means." In Ayurveda, skin care is viewed as an essential part of overall health and wellness. Ancient texts like the "Charaka Samhita" and "Sushruta Samhita" elaborate on the use of multiple herbs for maintaining healthy skin, treating skin disorders, and enhancing beauty" [1-2] The development of herbal formulations is primarily focused on the creation of a safe and elegant product that is acceptable to a larger variety of individuals. The body's largest organ is the skin [3-6].

Definition of Facewash
A facewash is a skincare product designed to cleanse the face by removing dirt, oil, makeup, and other impurities from the skin. It typically contains a combination of surfactants, moisturizing agents, and various active ingredients that help to clean, hydrate, and treat the skin. Unlike regular soaps, facewashes are formulated to be gentler on the delicate facial skin and often include additional beneficial ingredients to address specific skin concerns, such as acne, dryness, or sensitivity [7]. Betel leaf (Piper betel) and liquorice (*Glycyrrhiza glabra*) are two herbs with a rich history in traditional medicine systems, particularly Ayurveda and Siddha medicine. Their combination in a polyherbal facewash leverages their respective properties for skin care.

Betel Leaf (Piper betel)
Traditional Uses and Properties
Betel leaf has been extensively used in Ayurveda for its medicinal properties. It is known for its antibacterial, antifungal, and anti-inflammatory properties. These attributes make it effective in treating skin infections and promoting wound healing."

- **Antibacterial:** Effective against a variety of bacterial strains, helping to cleanse and protect the skin.
- **Antifungal:** Assists in treating fungal infections, keeping the skin clear and healthy.

Anti-inflammatory: Reduces inflammation, helping to soothe irritated skin.

Table 1: Taxonomy Classification

Kingdom	Plantae
Division	Magnoliophyte
Class	Magnoliophyte
Order	Piperale
Family	Piperaceae
Genus	Piper
Species	Piper betel

Liquorice (*Glycyrrhiza glabra*)

Traditional Uses and Properties

Liquorice is renowned in both Ayurveda and Unani medicine for its skin-lightening, anti-inflammatory, and antioxidant properties. It is particularly effective in reducing hyperpigmentation and soothing the skin."

- "Skin-lightening: Helps reduce dark spots and pigmentation, promoting an even skin tone.
- Anti-inflammatory: Soothes irritated skin, reducing redness and inflammation.

Antioxidant: Protects the skin from oxidative stress and environmental damage [8-9].

Table 2: Taxonomy Classification

Kingdom	Plantae
Division	Angiospermae
Class	Dicotyledoneae
Order	Rosales
Family	Leguminosae
Genus	Glycyrrhiza
Species	glabra linn

Formulation of the Polyherbal Facewash

Combining betel leaf and liquorice in a facewash formulation can offer a balanced and holistic approach to skin care. The facewash harnesses the antimicrobial and soothing properties of betel leaf and the skin-brightening and protective effects of liquorice.

Preparation

Betel Leaf Extract: Crush fresh betel leaves to extract the juice or create a fine paste. Liquorice Root Powder: Grind dried liquorice roots into a fine powder [10].

Advantages of polyherbal facewash

Polyherbal facewashes offer numerous advantages supported by both traditional wisdom and modern research.

- **Natural Ingredients:** Polyherbal facewashes are often formulated with natural herbs, making them gentle on the skin and reducing the risk of adverse reaction.
- **Synergistic Effects:** Combining multiple herbs in polyherbal facewashes creates synergies, enhancing their overall efficacy and providing comprehensive skincare benefits.
- **Antimicrobial Properties:** Many herbs in polyherbal facewashes possess antimicrobial properties, helping to cleanse the skin and prevent infections.
- **Anti-inflammatory and Soothing:** Certain herbs in polyherbal facewashes have anti-inflammatory properties, soothing irritated skin and reducing redness
- **Skin Brightening and Even Tone:** Herbs like liquorice are known for their skin- brightening effects, reducing hyperpigmentation and promoting an even skin tone.
- **Antioxidant Protection:** Many herbs in polyherbal facewashes contain antioxidants, protecting the skin from oxidative damage and slowing down the aging process. [11-16].

Properties of Face Wash

- Exfoliation animates skin recovery and reestablishment by accelerating blood flow.
- Sebaceous organs emit an excessive amount of sebum, which stops the pores and makes the skin oilier.
- Cleansers with spices and botanicals that unmistakably the pores and diminishing oil collection are fundamental for slick skin. Mitigating and cell reinforcement fixings in these peeling chemicals help to fix and sustain harmed skin.
- The herbal face wash is utilized to fix skin inflammation and pimples because of its remedial characteristics. Homegrown face wash, which contains rich plant-based parts like neem, disposes of an abundance of oil without stripping the skin of its supplements
- It should be both strong and interesting to the eye.
- When applied to the skin, it ought to be mellow.
- It ought to be not difficult to disperse without hauling.
- It ought not to feel slick or oily while being applied
- Rather than ingestion, its actual effect should be that of skin flushing and pore opening.

After application, a meager emollient layer ought to stay on the skin [17].

Materials and Instruments

Table 3: Instruments used for work

Sr. No.	Instruments
1	Electronic analytical weighing balance
2	Electrical water bath
3	pH meter
4	Brookfield Viscometer (LVDV-60)
5	Soxhlet Apparatus
6	Heating mantel

Table 4: Chemicals used for works

Sr. No.	Chemicals
1	Ethanol
2	Peppermint oil
3	Carbopol 934
4	Propylene glycol
5	Methyl paraben
6	Propyl paraben
7	Sodium lauryl sulphate
8	Distilled water

Experimental Design

Formulation of Polyherbal facewash

Selection of plant

Betel leaf, liquorice and piper mint oil from local market Kolhapur. The chemicals were taken from Ashokrao mane institute of pharmacy ambap, Kolhapur

All ingredients and excipients used are given in the table.

Fig 1: Prepration of Extract

Preparation of extract

In maceration (for fluid extract), whole or coarsely powdered plant- drug in contact with the solvent in a stoppered container for a defined period (at least 7 days) with frequent agitation until soluble matter is dissolved. The mixture then is strained; the Marc (the damp solid material) is pressed and the combined liquids are clarified by filtration or decantation after standing. This method is best suitable for use in case of the thermolabile drugs [18].

Fig 2: Filtration Process

Determination of total ash

Useful for detecting low grade products Useful for detecting exhausted products, useful for detecting excess of sandy Useful for detecting earthy matter with drug. Weigh accurately about 2-3 gm. of the powdered drug in a tared silica crucible. Incinerate the powdered drug by gradually increasing the temperature 5500C until free from carbon and cool. Keep it in desiccators. Weigh the ash and calculate the % of the total ash with reference to the air dried sample.

Formula:

$$\% \text{ total ash} = \frac{\text{Ash weight}}{\text{Weight of sample}} \text{ X } 100$$

Water-soluble ash value

To the crucible containing the total ash, add 25 ml of water and boil for 5 minutes. Collect the insoluble matter in a silica crucible or on an ashless filter-paper. Wash with hot water and ignite in acrucible for 15 minutes at a temperature not exceeding 450°C. Subtract the weight of this residue in mg from the weight of total ash. Calculate the content of water-soluble ash in mg per g of air-dried material.

Formula

$$\% \text{ water soluble ash} = \frac{\text{Total ash weight} - \text{Water insoluble residue in total ash}}{\text{Weight of sample}} \text{ X } 100$$

Determination of acid insoluble ash value

Refer to the total ash procedure till ashing. Add 25 ml of dilute hydrochloric acid. Heat on a water bath for 10 minutes. Cool and filter the contents of the dish. Wash the filter paper with water until the washings are free from the acid. After the filter paper is free from the acid. Return the filter paper in a dish. Keep it in an oven at 100 ± 2°C for 25 to 30 minutes. Ignite in amuffle furnace at 550 ± 25°C for one hour. Cool the dish in desiccators and weigh. Repeat this process for two successive weighing. Record the lowest mass. Calculate the result [19].

Formula

$$\% \text{ acid-insoluble ash} = \frac{\text{Acid insoluble ash weight}}{\text{Weight of sample}} \text{ X } 100$$

Solubility Test

As adding solute for solubility analysis in small incremental amount to fixed the volume of solvents such as ethanol, acetone and chloroform. After undissolved particles will be examined [20].

Methods of preparation

Carbopol 940 was dispersed in of distilled water and the beaker was kept aside to swell the carbopol940 to form gel. Take distilled water and required quantity of methyl paraben and propyl paraben were taken and dissolved by heating on water bath solution was cooled and propylene glycol 400and sodium lauryl sulphate were added. Further required quantity of extract was mixed to the above mixture and add this solution into the carbopol940 gel with continuous stirring and triethanolamine was added dropwise to the formulation for adjustment of required skin pH and to obtain the gel at required con [21].

Formulation Table

Table 5: Formulation Table

Sr.no.	Ingredients	Batches			Roles of ingredients
		F1	F2	F3	
1.	Ethanolic extract	1 ml	3 ml	2 ml	Antioxidant,
2.	Piper mint oil	0.1 ml	0.1 ml	0.1 ml	Antibacterial
3.	Carbopol 940	0.5 g	2 g	1.5 g	Gelling agent
4	Methyl paraben	0.3 g	0.6 g	0.1 g	Preservative
5	Propylene paraben	0.1 g	0.3 g	0.1 g	Preservative
6	Sodium lauryl sulphate	1 g	3.5 gm	2.5 g	Foaming agent
7	Propylene glycol	0.1 ml	0.1 ml	0.1 ml	Humectant
8	Rose oil	qs	qs	qs	Flavoring agent
9	Distilled water	qs	qs	qs	Vehicle

Evaluation Parameters

A. Colour
The colour of the face wash gel was checked visually.

B. Odour
The formulation was evaluated for its odour by smelling it.

C. Consistency
It was determined manually by fingers and by applying on to skin

D. Viscosity
Viscosity of the gel was determined using Brookfield viscometer. The values obtained for the sample and for water were noted.

E. Spreadability
The spread ability of the gel was found manually by applying the gel on the skin with gentle rub.

F. Washability
The product was applied on hand and showed under running water.

G. pH
pH of 1% aqueous solution of the formulation was measured by using a calibrated digital pH meter at constant temperature [22].

H. Foamability test
Small amount of face wash will be taken in a beaker containing water. Initial volume will be noted, beaker will be shaken for 10 minutes and the final volume will be noted, foam appears 1.5cm.

Results and Discussion

Table 6: Parameters

Sr. No.	Parameters	1	2	3	Mean
1	Colour	Pale green	Pale green	Pale green	Pale green
2	Odour	Pleasant	Pleasant	Pleasant	Pleasant
3	Consistency	viscous	viscous	viscous	viscous
4	Viscosity	21.32±0.3	24.71±0.3	23.39±0.5	22.34±0.2
5	Spreadability	31.31±0.6	20.28±0.9	21.11±0.7	19.78±0.6
6	Washability	Non-greasy, washable	Non-greasy, washable	Non-greasy, washable	Non-greasy, washable
7	pH	6.11±0.5	6.93±0.4	7.25±0.5	6.76±0.3

Conclusion
Betel leaf, commonly used in traditional medicine, contains compounds like phenols and flavonoids known for their anti-inflammatory and antimicrobial properties. These properties can help soothe and protect the skin from irritation and infections. Additionally, betel leaf has astringent properties, which can help tighten the skin and reduce excess oil production. Licorice, on the other hand, contains glycyrrhizin and glabridin, which have skin-lightening properties. They inhibit the production of melanin, making licorice extract beneficial for reducing hyperpigmentation, dark spots, and uneven skin tone. Licorice also possesses anti-inflammatory properties, making it useful for calming sensitive or inflamed skin. Combining betel leaf and licorice in a polyherbal facewash offers a promising blend of natural ingredients with potential benefits for skincare. Betel leaf is known for its anti-inflammatory and antimicrobial properties, while licorice contains compounds that can help reduce hyperpigmentation and soothe irritated skin. Together, they may provide a gentle yet effective solution for cleansing and revitalizing the skin, promoting a clearer, brighter complexion. However, further research and testing may be needed to fully understand their synergistic effects and optimal formulation for skincare products.

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