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Review Article

Review on: Formulation and Evaluation of Herbal Facewash by Ajwain

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ABSTRACT

The present study focuses on the formulation and evaluation of a natural polyherbal face wash containing Ajwain (*Trachyspermum ammi*), Bael (*Aegle marmelos*), Aloe vera (*Aloe barbadensis*), and Turmeric (*Curcuma longa*). The increasing demand for herbal cosmetics has encouraged the development of safe and effective skincare products free from harsh synthetic chemicals. Each selected ingredient possesses significant dermatological benefits: Ajwain exhibits strong antimicrobial activity, Bael provides anti-inflammatory and skin-protective properties, Aloe vera offers soothing and moisturizing effects, and Turmeric acts as a potent antioxidant and antibacterial agent. The formulation was prepared using natural extracts incorporated into a suitable gel base to ensure smooth texture and ease of application. The prepared face wash was evaluated for various physicochemical parameters including pH, viscosity, foamability, spreadability, homogeneity, and stability. The pH was found to be compatible with skin, while viscosity and spreadability ensured good application properties. Stability studies indicated no phase separation or degradation under different storage conditions. The results demonstrated effective cleansing, oil control, hydration, and minimal skin irritation, suggesting that the developed polyherbal face wash can serve as a safe, economical, and eco-friendly alternative to conventional synthetic formulations.

INTRODUCTION

The biggest organ in the body, the skin makes up around 15% of an adult's total body weight. It carries out numerous essential tasks, including as preventing excessive water loss from the body, protecting against external physical, chemical, and biological threats, and aiding in thermoregulation.

The mucous membranes that line the body's surface are part of the continuous skin. [1]

At some point in their lives, almost everyone will suffer from acne, a follicular unit skin condition. Many men and women between the ages of 20 and 30 suffer with acne, despite the fact that its prevalence rises during adolescence. Acne comes

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in five varieties: nodular, cystic, pustular, and comedogenic. Blackheads and whiteheads are two types of non-inflammatory comedonal acne. Whiteheads appear as cool or white lumps, but blackheads are open pores with dark skin roughness composed of melanin, sebum, and hair follicle cells. Papules appear as red, solid, raised lesions and are frequently less than 5 mm in diameter. Pustules are localized skin elevations that contain purulent material.^[2]

Theories that aim to improve pathogenesis include differences in target cell sensitivity, biomarkers, neuroendocrine, genetic, and environmental factors. Vulgaris, which includes both synthetic and herbal ingredients, has a remarkable ability to heal a range of pimples.^[3]

SKIN ANATOMY ^[4,5]

The skin is the largest organ in the body in terms of weight and surface area. It has a surface area of about 16,000 cm². Eight percent of an adult's weight is made up of skin. It is the outermost layer or tissue of the living body.

The skin serves as a barrier against the external environment. Skin can produce vitamin D, a useful chemical substance, when exposed to sunlight. In addition to being a sensory organ, the skin helps regulate body temperature. The biological components of skin include erythrocytes, melanocytes, and keratinocytes. It displays multilayered formations because to its numerous constituents, including cells and fibers. The skin is made up of layers.

A. The Epidermis

The outermost layer of the skin is called the epidermis, and it is around 0.2 mm thick. There are no capillaries or veins in this layer. The thickness of the epidermis depends on the body's

posture. The majority of the cells in the epidermis are dendritic and keratinocytes. There are also Langerhans cells, melanocytes, and other cell types. The metabolically active tissue is another name for the layer of the epidermis.

1) The stratum corneum is the first of five sublayers that make up the outermost layer.

2) Lucidium stratum

3) Granulosum stratum

4) The stratum spinosum

5) The basal stratum

1) Stratum Corneum: This is the outermost sublayer of the epidermis. It is also known as the "horny cell layer," and its thickness ranges from 8 to 15 micrometers. The layer helps shield skin from extreme dryness and has a hexagonal shape. "Ceramide," its main component, plays a big part in water retention.

2) Stratum Lucidum: This thin, transparent layer of dead skin cells makes up the stratum lucidum. Only thick skin patches on the palms of the hands and soles of the feet contain it.

3) Stratum Granulosum: Also referred to as a granular cell layer, this layer is 3 meters thick. Granular cells are found in two to four layers. The cells take on a flatter structure when more keratin strands are incorporated into them.

4) Stratum Spinosum: Also known as the prickle cell layer, it is between 50 and 150 μm thick. It is made up of many cells that might vary in structure and form.

5) Stratum Basal: The deepest and sublayer of the epidermis, stratum basal is made up of a single layer. Keratinocytes are formed in the stratum

basal and travel upward to the surface. The term "turnover" refers to the mobility of keratinocytes. It takes days for this process to complete one cycle, and keratinocytes also undergo structural and functional modifications. This layer, also known as the basal cell layer, contains 8% of the water in the epidermis.

B. The Dermis

Collagen, elastin, and fibroblasts make up the majority of the dermis.

This layer serves a number of purposes.

1) Blood and lymphatic vessels, which remove waste materials and poisons from the skin, are found in the dermis.

2) The dermis contains sweat glands. Through your pores, they produce perspiration, which cools your body and eliminates contaminants.

3) The dermis also contains the hair follicles, which are where your hair attaches, and the sebaceous glands, which provide the oils that give your skin its softness and smoothness—sometimes too much, leading to rashes and oily skin.

C. The Subcutaneous Layer ^[4,5,6]

1) The layer of fat connecting your bones to your muscles and bones is the deepest layer of skin. It penetrates deeply, beyond the reach of your skincare products' active ingredients.

2) The layer beneath the skin functions similarly to a thermostat. In an emergency, it can be used as a source of energy in addition to protecting the body.

3) Additionally, fat serves as a filter, preventing harm to your organs, muscles, and bones.

4) Lastly, the deepest oil-producing sebaceous glands, hair follicular roots, nerve endings, and extra blood arteries are found in the subcutaneous layer.[4,5]

Acne vulgaris is characterized by noninflammatory comedones and nodules, as well as inflammatory pustules and papules. Acne vulgaris typically affects the skin on the face, upper chest, and back—areas with the highest number of sebaceous follicles. In the affected area, acne vulgaris may result in erythema, discomfort, or tenderness. Usually, acne vulgaris appears without any systemic signs.^[6]

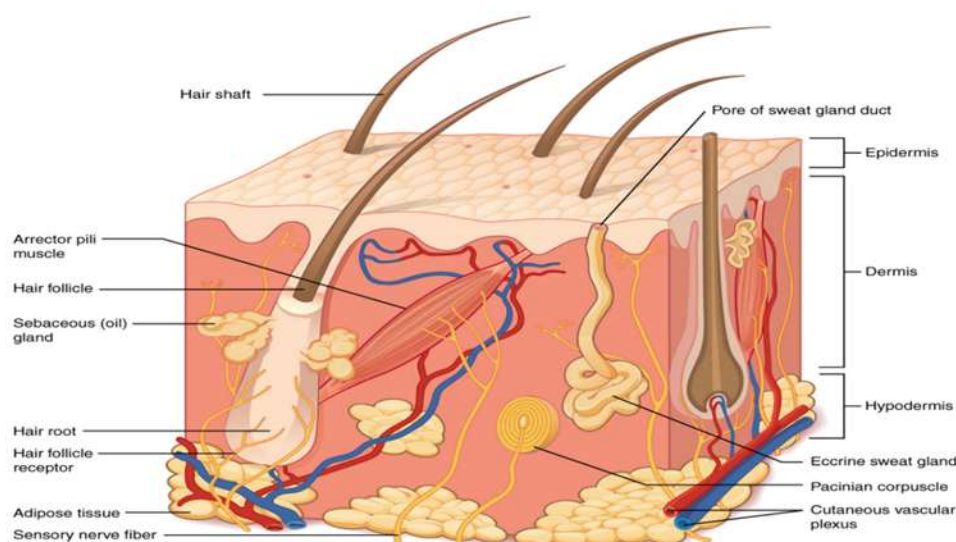


Figure 1: Skin Anatomy

FACE WASH

Definition: A face wash is a type of skincare product used to remove pollutants, oil, and debris from the face. It comes in a variety of forms, such as gels, foams, or creams, and frequently contains substances to target certain skin issues.

Benefits Of Facial Wash ⁷:

- By aiding in the elimination of dead skin cells, it maintains skin looking young and healthy.
- eliminates pollutants, oil, and debris that build up on the skin throughout the day.
- removes extra oil and unclogs pores to help stop outbreaks.
- A lot of face cleansers are made with components that support the preservation of the skin's natural moisture equilibrium.⁶
- 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.
- You may experience an instant sense of renewal and refreshment after washing your face.^[7]

Properties Of Face Wash ^[8,9]

- Cleansers that contain botanicals and spices that clearly open pores and reduce oil buildup are essential for smooth skin. These peeling chemicals' mitigating and cell-reinforcing ingredients aid in repairing and maintaining damaged skin.
- Due to its healing properties, the herbal face wash is used to treat pimples and skin inflammation. Rich plant-based ingredients like neem in this homemade face wash help to remove a lot of oil without depriving the skin of its natural nutrients.
- It should be gentle when applied to the skin.
- Dispersing without hauling should not be difficult.
- It shouldn't feel slippery or greasy when applied.
- Its true effect should be pore opening and skin flushing rather than swallowing.
- After application, a meager emollient layer ought to stay on the skin. [8]

Cleaning

Efficiently gets rid of pollutants, oil, makeup, and grime.

Drinking water

Preserves or improves the natural moisture balance of the skin.

Scrubbing

Includes components that, in some formulations, aid in the removal of dead skin cells.

Balanced pH



Made to ensure that it doesn't damage the skin barrier by matching the pH of the skin naturally.

Antimicrobial

Antibacterial ingredients are included in some formulations to assist in fighting bacteria that cause acne.

Fit for Different Skin Types

Formulations for several skin types (oily, dry, sensitive, and combination) are available. [9]

Uses:

1. Every day, get rid of all makeup residue.
2. For skin cleansing and anti-aging purposes.
3. For cleansing the skin.
4. It helps other products to penetrate properly into the skin.

Agents Used In Face Wash ^[10]

Gelling Agent: Ingredients known as gelling agents will change your water or oil phase into a thicker but not rigid gel. Gelling agents increase the mobility and fluidity of emulsions compared to rigid ones. Certain gels are thixotropic, meaning they thin when force is applied and regain their viscosity when the force is released. For simpler bottling or spraying, these gels enable the creation of thick goods that may be shaken or swirled under high shear. For instance, carbopol 940 and carbopol 934. [10]

Surfactants: For efficient cleaning, use cocamidopropyl betaine, sodium lauryl sulphate (SLS), and sodium laureth sulphate (SLES).

Antioxidants: Take vitamin C, vitamin E, and green tea extract to protect against free radicals.

Natural or artificial compounds known as antioxidants have the ability to stop or postpone certain forms of cell damage. Fruits and vegetables are among the many foods that contain antioxidants. They can be purchased as dietary supplements as well. Lycopene, vitamin A, vitamin C, and vitamin E are a few examples.^[11]

Antimicrobial Agents: Antimicrobial In its broadest definition, an anti-toxin is a chemical that prevents the growth and reproduction of microorganisms. Anti-infection agents and antimicrobials are both objective microorganisms, however, the names have come to connote two unmistakable things over the long run. Antimicrobials are presently most frequently characterized as substances that are utilized to sanitize surfaces and kill microbes that may be perilous.^[12,13]

Preservatives: Preservatives are substances Used to prevent the growth of Microorganisms in various products, such as food, cosmetics, and pharmaceuticals. Methyl Paraben and propyl paraben are among the Preservatives that can be associated with This potential

Gelling Agents: Ingredients known as gelling agents will change your water or oil phase into a thicker but not rigid gel. Instead of being stiff, emulsions thickened with gelling agents will be more fluid and mobile. When force is applied, some of these gels will thin (thixotropic) and regain their viscosity when the force is removed. For easier bottling or spraying, these gels enable the creation of thick products that may be shaken or swirled under high shear. For instance, carbopol940 and carbopol934.^[14]

Humectants: The antithesis of a desiccant, humectants are hygroscopic substances used to keep things moist. It is frequently a molecule containing many hydrophilic groups, most

commonly hydroxyl groups, although it can also contain amines, carboxyl groups, and occasionally esterified groups (its ability to make hydrogen bonds with water molecules is the key characteristic). They are found in a wide range of goods, including as food, cosmetics, medications, and insecticides. Through absorption, a humectant draws water vapour into and/or beneath the surface of an organism or item, attracting and holding onto the moisture in the surrounding air. Butylene, hexylene, and propylene glycol are a few examples.^[15]

Anti-inflametry: Oedema or irritation can be reduced with a drug or therapy. Typically, 50% of analgesics are calming drugs that reduce irritation instead of narcotics, which act on the focused sensory system to prevent mental symptoms of pain.^[16]

HERBS USED IN FACE WASH

1] AJWAIN



Figure no 2 : Ajwain

Synonym :- carom seeds, ajowan ^[19]

Biological source :- Trachyspermum ammi

Family :- Apiaceae

Chemical constituents :- thymol, alpha and beta pinene

Uses :- anti-fungal ^[20], anti-inflammetry ^[21], anti-hypertensive, anti-oxidant ^[22]

2] Bel Patra^[23]



Figure no: 3 bel patra

Synonym :- Native Indian tree, Bel

Biological sources :- Aegle marmelos

Family :- Rutaceae

Uses :-

- Bel patra can aid digestion, alleviate constipation, and treat diarrhea and dysentery.
- The leaves help regulate blood sugar levels.
- They are used to reduce inflammation and treat ulcers.
- It is useful in treating respiratory conditions like asthma and bronchitis.
- Bael is extremely efficient against skin infections, treats various skin conditions, and promotes skin health because it has anti-bacterial characteristics.
- It contains a variety of antioxidants, which play a crucial role in skin health by fighting free radicals and reducing oxidative stress.

- Bael contains chemicals called tannins, flavonoids, and coumarins. These chemicals help to reduce swelling

Characteristics

Appearance :- Each bel patra is made up of three pointed leaflets, which are glossy, green, and have a slightly leathery texture.

Aroma :- The leaves have a mild, pleasant aroma.

Tree :- The Bel tree itself is a medium-sized, deciduous tree with thorny branches and a hard, woody trunk. It can grow up to 15-20 meters tall.

3) Aloevera^[24,25]



Figure no:4 Aloevera

Synonym: Aloe , musabbar

Biological source: Aloe barbadensis miller (or Curacao Aloe)

Family: Liliaceae

Chemical constituent: Aloe-emodin, Aloin, barbaloin, Beta barboloin

Chemical nature: the principal active composition of aloe is aloin, it having various chemical barbaloin chrysophanic acid choline the major source

USES :-

- It is used as purgative
- It is used as carminative
- It is used as anti-inflamentry
- It is used as anti acne and help to smooth skin

1) Scientific name: Aloe vera.

2) Order: Asparagus.

3) Family: Asphodelaceae

4) Subfamily: Asphodeloideae.

5) Kingdom: Plantae

6) Family: Vincaceae

7) Botanical name: Aloe barbadensis miller

The use of aloe vera on the face is beneficial because of its:

- Anti-inflammatory properties that help in relieve pain, swelling and pain in wounds and promote formation and release of collagen.
- It reduces the time needed to recover from first- and second-degree burns.
- It is a reliable source for the treatment of bacterial and fungal diseases.
- The creamy residue should not thicken after evaporation of the water.
- Its physical effects must not be absorption, but rinsing of the skin and opening the pores.
- It has an antioxidant property that can aid in the repair of UV damage and slow down the aging process of the skin.
- It protects the skin from the harmful effects of radiotherapy.

- It contains 98% water, which hydrates, soothes, and hydrates the skin.
- It makes the skin more supple instead of stiff and hard.
- It soothes rashes and sunburns by cooling.
- i. treatment Itching Skin cosmetics
- Turmeric helps brighten skin and the appearance of uneven tone, leaving you with clearer skin.

4) TURMERIC^[26]



Figure no:5 Turmeric

Synonym: Haldi, Indian saffron

Biological Source: Curcuma longa Linn.

Family: Zingiberaceae

Chemical Constituent: Curcumin Zingiberene
Borneol Caprylic acid Curcumanoids

Use:

- a. Antiseptic
- b. Expectorant
- c. Anti-inflammatory
- d. Spice
- e. Carmitaive
- f. Antimicrobial
- g. Antioxidant
- h. Burns and wounds

- It is applied to treat rosacea and psoriasis.

Condition:

1. Reduces acne
2. Natural glow
3. Reduces dark circles
4. Moisturizes dry skin.

Physical properties:

- Colour: yellow orange solid/ bright yellow colour
- Molecular weight:368 g/mol
- Melting point:180°C
- pH: 5.9
- Odour: aromatic order
- Taste: slightly bitter taste

EVALUATION TESTS

Characterization of Gel/Face Wash formulations: ^[27,28]

While foaming is a crucial component of face wash formulas, the gel base was optimized for viscosity and spreadability. In order to achieve good foaming, the surfactant concentration was optimized. In accordance with the documented protocols, the face wash formulations, gel base, and gel base containing natural surfactants were characterized for the various parameters.

1) Physical Appearance : The polyherbal gels' (PHG) physical attributes were examined for

color, homogeneity (the absence of lumps), and smell.

2) Measurement of PH : After dissolving the PHG formulations (0.1g) in 10mL of water, they were left to stand for two hours. A digital pH meter was then used to record the pH of these solutions.

3) Viscosity:

Using spindle number 64, the viscosity of PHG, GB, and SGB was determined at 20 rpm using a Brookfield viscometer. The viscosity of the formulation was determined by recording the measurement on the display following two minutes of shear.

4) Spreadability:

The Arvouet-Grand Method was used to assess the spreadability of PHG, GB, and SGB. A weight of 125g was placed on the upper plate of two 20 x 20 cm glass plates, and 1g of the formulation was sandwiched between them. The diameter of the formulation was measured as a measure of spreadability.

5) Foamability:

A tiny quantity of gel (0.5g) was placed in a measuring cylinder with 1mL of water, and the gel's initial volume was noted. To get foaming, the cylinder was shook ten times, and the volume was once more noted.

6) Washing Off Ability:

In the absence of soap, a tiny quantity of PHG was applied to the skin and then removed with warm water.

7) Grittiness:

The PHG formulations were applied to a glass slide, and any uneven particles were examined under a light microscope.

8) Spreadability, Foamability, Ph, And Viscosity:

As was discovered with GB and SGB, all of the PHGs had optimal viscosity. Every formulation's pH fell between 4.5 and 5.5, which is the range of the skin's pH (table 5). Every PHG had a significant capacity for foaming and was semi-fluid.

CONCLUSION [28]

Herbal face washes are used to improve blood flow, remove stubborn dirt, maintain skin suppleness, and revitalize muscles. One benefit of cosmetics made from herbs is that they are harmless. It nourishes the face's skin. The face wash provides the skin with the nourishment it needs. It helps get rid of pimples, blemishes, and scars. Face washes have cooling, calming, and relaxing effects on the skin in addition to exfoliating it. They complete this task as quickly as feasible. help restore the skin's inherent glow. Using natural face wash on a regular basis improves the skin's texture and look. Regular use of face wash can lessen the negative effects of pollution and harsh environments on the skin."

They help maintain the elasticity of skin cells and slow down the rate of skin aging. It is possible to effectively manage wrinkles, fine lines, and skin loosening with a natural face. In our study, we found some exceptional properties in the face wash, but further investigation is needed to fully understand its potential as a cosmetic.

Since natural medications are safer and less likely to cause side effects than goods with a chemical

base, they are now widely accepted. The growing worldwide market requires a wide variety of herbal formulations to satisfy its expectations. This attempt to make a herbal face wash using a range of plants with therapeutic benefits has been successful.

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