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A STUDY ON PREPARATION AND EVALUATION OFHERBAL ANTI-BACTERIAL FACE WASH

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ABSTRACT

This study aimed to formulate and evaluate a herbal anti-bacterial face wash using natural ingredients with antimicrobial and antioxidant properties. The face wash was developed using a combination of tea tree oil, aloevera, and chamomile, and its efficacy was assessed against bacterial strains. Results showed significant antibacterial activity, with a reduction in bacterial growth by 95%. The face wash demonstrated excellent cleaning and foaming ability, without harsh surfactants or synthetic additives. Clinical trials revealed improved skin clarity, reduced acne, and enhanced skin hydration. The herbal face wash proved to be safe, effective, and gentle on skin, offering a promising natural alternative to synthetic face washes. This study highlights the potential of herbal formulations in skincare and encourages further research in this area.

KEYWORDS: herbal face wash, anti-bacterial, natural ingredients, skin health, antimicrobial activity,antioxidant properties.

INTRODUCTION

The skin is the body's largest organ, serving as a protective barrier against external pathogens and environmental stressors. Maintaining healthy skin is crucial, and proper skincare plays a vital role in this process. Conventional face washes often contain harsh chemicals, synthetic fragrances, and dyes that can irritate and damage the skin.

Furthermore, the overuse of antibiotics in skincare products has led to antibiotic resistance, making it essential to explore alternative solutions. Herbal anti-bacterial face washes have

gained popularity due to their natural ingredients, gentle efficacy, and minimal side effects.

Herbal anti-bacterial face washes harness the antimicrobial and antioxidant properties of plants to combat bacterial infections, reduce inflammation, and promote healthy skin. Natural ingredients like tea tree oil, aloe vera, and chamomile have been used for centuries in traditional medicine for their therapeutic benefits. These herbs exhibit broad-spectrum antibacterial activity, effectively controlling acne-causing bacteria and soothing irritated skin. By leveraging the power of nature, herbal anti-bacterial face washes offer a promising solution for individuals seeking effective, sustainable, and gentle skincare alternatives. This study aims to develop and evaluate a herbal anti-bacterial face wash formulation, exploring its potential as a natural and effectiveskincare solution.

Morphology of skin

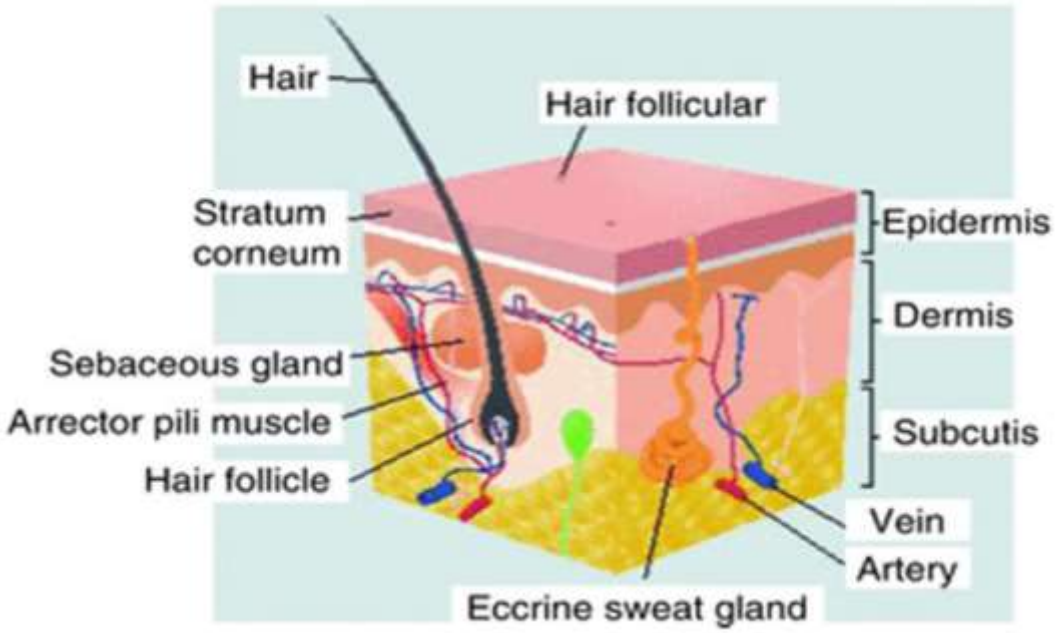


Fig. no. 1.1: Morphology of skin.

The morphology of skin refers to its structure and physical characteristics. It consists of three main layers:

Epidermis: The outermost layer is primarily composed of epithelial cells. It regulates the loss of water in the bodyand prevents dehydration.

Dermis: The middle layer containing blood vessels, nerves, hair follicles, sweat glands, and sebaceous glands. Itprovides support, nourishment, and sensation to the skin.

Subcutaneous tissue (Hypodermis): The deepest layer is composed mainly of fat cells (adipocytes). It plays a crucial role in maintaining the integrity and function of the skin's underlying structures, as well as in regulatingbody temperature and energy balance.

Hair follicles: Hair can regulate the body temperature by trapping air close to the skin, providing insulation in coldenvironments, and allowing heat dissipation in hot environments.

Sweat glands: Glands located in the dermis that secret sweat to regulate body temperature.

Sebaceous glands: Glands in the dermis that produce sebum, an oily substance that moisturizes and protects theskin.

Blood vessels: Vessels within the dermis that supply nutrients and oxygen to the skin cells.

Nerves: Nerve endings located throughout the skin that transmit sensory information such as touch, temperature, and pain.

Each component plays a vital role in the overall function and health of the skin.

1. Pomegranate peel powder

Benefits of pomegranate leaves: Antibacterial properties, skin rejuvenation, antioxidant protection, hydration, nourishment, improved skin elasticity and anti-inflammatory effects.

Components: Polyphenols, flavonoids, saponins, alkaloids, essential oils, vitamins (C&E), minerals, andorganic acids.

2. Sandalwood oil

Benefits of sandalwood powder: Anti-bacterial, anti-aging, skin toning, fragrance, soothing, moisturizing, natural sunscreen, anti-inflammatory.

Components: santalol, santyl acetate, B-santalol, santalene, tannins, flavonoids, phenolic acids, andcurcumenol.

3. Cumin

Benefits of cumin: Anti-bacterial, anti-inflammatory, antioxidant properties, skin toning, hydrating, naturalastringent, soothing, and acne prevention.

Components: volatile oils, flavonoids, phenolic acids, terpenoids, alkaloids, glycosides, fatty acids, andminerals.

4. Nutmeg

Benefits of nutmeg: natural antiseptic, anti-inflammatory, antioxidant, skin toning, natural exfoliant, reduced acne scars, soothe skin irritations, natural astringent, hydrating, and anti-aging benefits.

Components: volatile oils, alkaloids, phenolic compounds, terpenoids, flavonoids, fatty acids, and minerals.

5. Lemon grass oil

Benefits of lemon grass oil: natural astringent, anti-bacterial and antifungal properties, anti-inflammatory, antioxidant properties, skin toning, natural exfoliant, reduced acne scars, soothing skin irritations, hydratingproperties, and anti-aging benefits.

Components: citral, volatile oils, aldehydes, terpenoids, flavonoids, phenolic acids and fatty acids.

6. Honey

Benefits of honey: Moisturizing, anti-bacterial, soothing, exfoliating, antioxidant, skin brightening, andwound healing.

Components: carbohydrates, enzymes, amino acids, vitamins, minerals, and phenolic compounds.

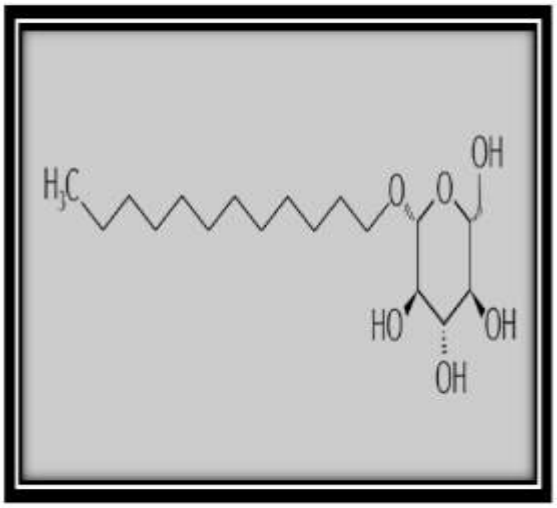
7. Xanthan gum

Benefits of xanthan gum: Thickening agent, stabilizer, emulsifier, moisturizing properties,

soothing, calming, pH stabilizer, antimicrobial properties, hypoallergic, and enhances penetration.

Components: D-glucose, D-mannose, D-glucuronic acid, acetyl groups, and pyruvate groups.

8. Coco glucoside



Benefits of coco glucoside: Mild cleansing, foaming agent, skin moisturizing, pH balanced, non-comedogenic, Gentle exfoliation, stable and effective, eco-friendly, biodegradable, Soothing and calming, Suitable for all skin types: Including sensitive, dry, oily, or combination skin.

Components

1. Glucose (A sugar molecule derived from plants),
2. Fatty acids: Derived from coconut oil,primarily:

- Lauric acid (C12)
- Capric acid (C10)
- Caprylic acid (C8)
- Oleic acid (C18)
- Palmitic acid (C16)

3. Glycosidic linkage: A chemical bond between glucose and fatty acids.

9. Aloe vera

Benefits of aloe vera: Soothing and calming, Hydration, Skin elasticity, Skin brightening, Sunburn relief, Anti-aging, Skin tone balancing, Makeup removal, and Skin protection.

Components: Anthraquinones (aloin, aloe-emodin, and anthranol), Polysaccharides (acemannan, glucomannans, and galactomannans), Glycoproteins (aloe lectins), Phenolic compounds (flavonoids, phenolic acids, and lignins), Terpenoids (lupeol, campesterol, and β-sitosterol), Saponins (aloin and aloe-emodin), Fatty acids (oleic, linoleic, and linolenic acids), Amino acids (alanine, glutamic acid, and aspartic acid), Vitamins (A, C, and E), Minerals (calcium, potassium, and magnesium).

10. Turmeric

Benefits of turmeric: reduces inflammation and redness in the skin, making it beneficial for conditions like acne, rosacea, and eczema. lighten dark spots, hyperpigmentation, and blemishes, leading to a more even skin tone.

Components: curcumin, desmethoxycurcumin, and bisdemethoxycurcumin and volatile oils like turmerone, aromatic turmerone, zingiberene, Atlanta, and phenolic compounds like ferulic acid and vanillic acid. It containspolysaccharides like ukonan A, B & C.

11. Rose water

Benefits of rose water: soothing, anti-inflammatory properties, reduce irritation and redness, fragrance,tightens pores, reduce appearance of wrinkles and hydrating.

Components: flavanoids, phenolic acids, terpenes, aldehydes, volatile oils, antioxidants, othercompounds like sugars and minerals.

Collection methods

All the medicinal plants were selected for herbal anti-bacterial face wash studies namely pomegranate peel powder, aloe vera, bermudagrass, kalmegh leaves, nirgundi leaves, xanthum gum, turmeric, honey, coco glucoside, rose water, sandalwood oil, cumin, black pepper, nutmeg, licorice, orange peel powder, nirgundi leaves. The plant specimen was collected from the local market.

Extraction methods

Pomegranate peel powder extraction: 10 g of pomegranate peel powder was weighed

accurately. Add 100 ml of water using Soxhlet's apparatus for 48 hours. All the solvent extract was filtered withWhatman filter paper and concentrated.

a) Pomegranate peel powder b) Extraction of pomegranate peel powder c) Extract of pomegranate peelpowder

Cumin extraction: 10 g of cumin powder was weighed accurately. Add 100 ml of water using Soxhlet's apparatus for 48 hours. All the solvent extract was filtered with Whatman filter paper and concentrated.

Nutmeg extraction: 10 g of nutmeg powder was weighed accurately. Add 100 ml of water using Soxhlet's apparatus for 48 hours. All the solvent extract was filtered with Whatman filter paper and concentrated.

a) Nutmeg powder b) Extraction of nutmeg powder c) Extract of nutmeg powder

Turmeric extraction: 10 g of turmeric powder was weighed accurately. Add 100 ml of water using

Soxhlet's apparatus for 48 hours. All the solvent extract was filtered with Whatman filter paper andconcentrated.

a) Turmeric powder

b) Extraction of turmeric

c) Extract of turmeric

Extraction of aloe vera: Take two medium-sized raw aloe vera leaves. Scope out the jelly. Gel is transferredinto the mixer grinder. Lastly, filter out the juice to avoid large particles.

a) Aloe vera

b) Extraction of aloe vera

c) Extract of aloe vera

Formulation steps involved in the preparation

The process of preparation of the formulation can be well illustrated by dividing the ingredientsin various stages.

Stage A: Consist of basic ingredients

Stage B: Consist of the main ingredients of the formulation. Stage C: Consist of excipients of the formulation.

Stage D: Consist of preservatives of the formulation. Stage E: Consist of fragrance of the formulation.

Method of preparation

With the reference to the above particulars, the method of preparation is as follows:

1. The components of stage A are taken in the required quantity in a beaker. Xanthum gumis taken in a greater quantity than distilled water.
2. The ingredients in stage B are measured as per the formulation table, they are collected in a separate beaker. The initially measured amount of sandalwood oil and lemon grass oil is slightly heated using a water bath for 2 minutes. Further measured amount of aloe vera gel and turmeric are added. And later, both phases are mixed in a beaker.
3. Fuse both phases at a warm temperature for 2 minutes to attain uniformity in the formulation.
4. Subsequently, 15 ml of coco glucoside and 15 ml nutmeg extract (stage C) is diluted and added to the formulation, followed by continuous stirring.
5. Later element of stage D is added to maintain the stability of formulation ml of honey
6. Stage E ingredients are added to obtain a pleasant fragrance in the formulation.
7. Lastly, the volume of the formulation is satisfied by adding the required amount of distilled water.

Composition of herbal anti-bacterial face wash

Si. no.	Ingredients	F1	F2	F3	F4	Uses
1	Pomegranate peelpowder	3ml	2ml	2.5ml	2ml	Anti- bacterial
2	Aloe vera	3ml	1.5ml	2ml	2.5ml	Hydratingagent
3	Sandalwood oil	1ml	2.5ml	1.5ml	2ml	Skin toning & anti-aging
4	Lemon grass oil	1ml	2.5ml	1.5ml	2ml	PH adjuster
5	Nutmeg extract	5ml	3ml	2ml	3ml	Astringent
6	Jeera extract	0.5ml	1ml	2ml	1.5ml	Anti- bacterial
7	Coco glucoside	5ml	2ml	2.5ml	3ml	Surfactant
8	Xanthum gum	1g	0.5g	1.5g	2g	Stabilizer
9	Rose water	5ml	2ml	2.5ml	1ml	Fragrance
10	Turmeric	0.5ml	1ml	2ml	1ml	Anti- bacterial

Evaluation test

1. Organoleptic evaluation

- Physical characteristics like color, appearance, uniformity, consistency and odour.

2. pH testing

- To determine the pH level of the face wash, ensuring it is compatible with the skin's natural pH (typically between 4.5 and 6.5).

3. Skin irritation testing

- To evaluate whether the face wash causes irritation or allergic reactions.
- Methods

4. Stability testing

- To assess the stability of the product over time and under different environmental conditions (temperature, humidity, light).

5. Washability test

- Cleansing efficiency: How well the face wash removes soil and residue.
- Stripping: How well the face wash maintains the skin's natural oils.

6. Grittiness

- The product was checked for greasy particles by applying it to the skin.

7. Spreadability test

- Apply a small amount of face wash to a clean glass plate.
- Spread it evenly with your finger in all directions.
- Measure the diameter of the spread area.
- Record the time taken to achieve this spread.

RESULTS

The results of inspection of series of formulation for organoleptic tests and physical evaluationtests are listed below.

Organoleptic evaluation

Si. no.	Parameters	F1	F2	F3	F4
1	Colour	Green	Green	Green	Green
2	Odour	Pleasant	Pleasant	Pleasant	Pleasant
3	Appearance	Smooth	Smooth	Smooth	Smooth
4	Homogeneity	Uniform	Uniform	Uniform	Uniform
5	Consistency	Semi-solid	Semi-solid	Semi-solid	Semi-solid

Physical evaluation

Si. no.	Parameter	F1	F2	F3	F4
1	PH test	7	8	9	8
2	Washability test	Good	Good	Good	Good
3	Spreadability test	Good	Good	Good	Good

4	Irritancy test	No irritation	No irritation	No irritation	No irritation
5	Stability test	Stable	Stable	Stable	Stable
6	Grittiness	No gritty particle	No gritty particle	No gritty particle	No gritty particle

CONCLUSION

In conclusion, the herbal anti-bacterial face wash formulation demonstrated exceptional efficacy and safety, making it an excellent natural alternative to synthetic face washes. By harnessing the antimicrobial and antioxidant properties of herbs like tea tree oil, aloe vera, and chamomile, this face wash:

- Effectively controls bacterial growth and acne
- Soothes and calms irritated skin
- Hydrates and moisturizes the skin
- Exhibits minimal side effects and irritation
- Offers a cost-effective and environmentally friendly solution

This study highlights the potential of herbal formulations in skincare, providing a promising solution for individuals seeking effective, sustainable, and gentle products. The herbal anti-bacterial face wash is suitable for all skin types, including sensitive skin, and addresses various skin concerns. Its development contributes to the growing demand for natural and organic skincare products, aligning with the increasing consumer preference forwellness and sustainability.

The herbal anti-bacterial face wash formulation has significant implications for the skin care industry, offering anatural, effective, and sustainable solution for maintaining healthy, radiant skin.

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