INTERNATIONAL JOURNAL OF PHARMACEUTICAL SCIENCES
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: https://www.ijpsjournal.com

OPEN ACCESS

Research Paper

Formulation and Evaluation of Coffee Soap

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ARTICLE INFO

Published: 15 May 2026
Keywords:
Coffee soap, transparent soap base, evaluation test, cleansing, foaming., skin brightening.
DOI:
10.5281/zenodo.20201682

ABSTRACT

Coffee soap was prepared by using coffee powder and transparent soap base and evaluated by using various evaluation parameters such as organoleptic characteristics, pH, foam height retention, skin irritation and high temperature stability. We enlisted type of soap , various methods of soap making and benefits of coffee soap. Prepared coffee soap having good appearance, better cleansing and foaming effect and doesn't have any side effects and have many face skin benefits including Skin Brightening. and Evaluation of transparent skin brightening coffee soap.

INTRODUCTION

Soap is a daily product which have a lot of purposes. More diversity of personal needs and customer preferences, soap products are now very varied, such as opaque soap, liquid soap and transparent soap. Opaque soap is kind of regular soap which is solid and not transparent, liquid soap is soap formed in liquid, while the transparent soap is kind of soap which usually use for face and for showers that can produce a softer foam to the skin and lustrous appearance when compared with other soap. Transparent soap is relatively more expensive compared to other soaps which also usually consumed by the upper middle class .Soaps which have good quality, are affected by the raw material used.

The main raw material for making soap is fat or oils obtained from plant and animal. Oil used in this research was coconut oil. Coconut oil is easily specified. The most predominant fatty acid in coconut oil is lauric acid. Lauric acid is indispensable for making soap caused by saturated fatty acid contained on lauric acid which is capable of providing excellent foaming properties for soap products. Lauric acid as a raw material will produce soaps with high solubility and good foam characteristics. Herbal soap preparation is a medicine or drugs it contain Antibacterial &

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

antifungal agents which mainly uses of part of plants such as leaves, stem, roots and fruits to treatment for a injury disease or to achieve good health. This preparation possess antimicrobial property are administered topically and available to apply in various forms like creams, lotion, gel, soap ,solvent ,extract or ointment.

Now we are discussing about coffee soaps and what goodness it does for the skin. As its name suggests coffee soap is made of coffee. To enhance its benefits producers normally add other natural ingredients such as palm oil, coconut oil or even olive oil.

People have used soap for centuries and it continues to be widely used as a cleansing agent, mild antiseptic and ingestible antidote to some forms of poisoning. Soap can be produced by a simple process called saponification that takes place when a fatty acid comes in contact with an alkali. When fats or oils, which contain fatty acids, are combined with a strong alkali, the alkali first splits the fats or oils into fatty acids and glycerine. After that, the sodium or potassium part of the alkali joins with the fatty acid part of the fat or oils. This mixture is called soap or the potassium or sodium salt of the fatty acid. So, soap is a cleansing agent created by the combination of fats and oils with an alkaline base.

In terms of chemistry, soap is a sodium or potassium salt, which is formed via the chemical reaction between an acid and a base. This reaction is commonly known as neutralization. The oils or fats used in the soap-making process combine with sodium hydroxide, or lye, in a process known as saponification. The fats are hydrolysed by the lye, yielding fatty acids and glycerol.

The fats and oils used to make soap are made up of triglycerides. A triglyceride is a molecule that contains three fatty acid molecules, which are attached to one molecule of glycerine. Theother major component of soap, lye, is an alkali; or a base (the opposite of an acid, on the pH scale).

The variety of creams and soap properties have been used to treat various skin disorders. Mostly skin infection are caused by fungi, staphylococcus aurous and streptococcus species. Ethno medically juice and extract from leaves of the plants are topically applied as antimicrobial and anti-inflammatory agents in treatment of skin disease including ringworm and prorates. The succulent gel form is used to disorder of psoriasis. crude preparation of soap are able to soften the skin epidermis enhance greater penetration and cleaning acne and also promote the healing and resolution in quickly in time. Soap is defined as mixture of chemical compounds resulting from the interaction of fatty acids with a metal radical. Soap may also be described as any water-soluble salt of those fatty acids which contain eight or more carbon atoms. The metals commonly used in soap making are sodium and potassium, which produce water-soluble soaps that are used for laundry and cleaning purposes coffee soap used as a CNS stimulating.

Soap is produced by the saponification of a triglyceride, the triglyceride is reacted with a strong. alkali such as KOH or NaOH to produce glycerol and fatty acid salts. Antiseptic soap is an alteration of an ordinary soap where bioactive ingredients are added into the basic soap medium to produce a variety of biological effects to the product. The Herbal plant aloe Vera of maximum 100 cm in height and mature in 5 to 6 years. Aloe Vera is derived from Arabic words "Aloe means "Shinning bitter substance and 'Vera' means "True'. It is used for host of purposes since the ancient Egyptians called plant of "Immortality". It is also none as 'Ghritkumari' in Hindi. Aloe Vera leafs is use for cure sunburns, burns and skin disease. Aloe Vera and: coffee soap is used to skin care like acne, wound healing and protect sunburn of skin.

Types of Soaps Based on Usage

1. Toilet Soaps
   - Non-Toilet Soaps
   - Glycerine Soaps
2. Transparent Soaps
3. Liquid soaps

Soap production processes :-The Kettle Process

1. Boiling
2. Salting
3. Strong change
4. Pitching

The Continuous Process:-Continuous soap making—the hydrolyser process :-

1. Splitting
2. Mixing
3. Cooling and finishing
4. Milling

Method of soap making :-

1. Melt-and-Pour Soap
2. Cold Process Soap

Benefits of Coffee Soap :

1. Lifts Dead Skin Cells
2. Reduces Dark Spots, Dirt plus Acne Scars
3. Eliminates Body Odour
4. Promotes Healthy, Bright, Moist as well as Soft Skin
5. Helps Reducing Eye Bags
6. Reduces Cellulite and Stretch Marks
7. Shields the Skin from UVA and UVB
8. Brightens skin
9. Cleansing properties
10. Dark circles on the face
11. It is a natural exfoliant
12. Reduces acne and break-outs.
13. Makes skin soft and supple.
14. Improves skin health.

Mechanism of Antimicrobial Action

The antimicrobial activity of coffee-based formulations is attributed to several concurrent mechanisms:

- Disruption of bacterial cell membrane
- Inhibition of DNA/RNA synthesis
- Interference with nutrient uptake
- PH modulation

Anti-inflammatory and Antioxidant Properties

Skin inflammation, often manifesting as acne, redness, or folliculitis, is a common dermatological concern. Studies indicate that coffee extracts significant anti-inflammatory activity by inhibiting pro-inflammatory cytokines. This is largely due to the high concentration of chlorogenic acids.

The antioxidant activity of coffee soap is its most prominent feature. It acts by:

1. Scavenging free radicals
2. Reducing oxidative stress

The combined antimicrobial and antioxidant properties enhance the overall therapeutic potential of the soap, making it effective for both cleansing and skin protection.

Advantages of coffee soap:

1. Cleanstheskin:

Cleaning the skin is the major function of bathing soaps. Soap contains emulsifying agents which help in the removal of dirt and oil from the skin. Every person wants a clean and healthy skin.

2.Washing off corrosive acids:

Corrosive acids are those acids which deteriorate and damage everything with which they come in contact with. High excessive pollution content in the environment leads these corrosive acids to settle on your skin. These acids can damage your skin cells and introduces skin diseases.

3. Removes oil and dirt:

A bathing soap removes the oil on your face and helps to make your skin oil free. Soap contain emulsifying agents that help in removing the oil from your skin. Bathing with a soap will prevent the fear or problem of acne related problems. We go through very rough and tough situations in a whole day. Our skin faces a lot of dirt, oil, chemicals and weather problems. Bathing soap

performs the function of removing the dirt from your skin effectively. Dirt causes a lot of skin problems like pimples, acne etc.

4. Prevent acne and pimples: Bathing soap prevents your skin from acne and pimples by cleaning the dirt and oil from the skin. Soap keeps the skin dry by removing the oil. Use the best quality soap to have more clean and beautiful skin.

5. Removal of impurities: Taking a bath with a good quality soap removes all the impurities from your body. Different chemicals acquire the skin pores and start damaging the skin. Bathing soap helps you to protect yourself these impurities.

Disadvantages of soap

The over use of soap cause following disadvantages,

1. Damages The Skin. Soap is infused with harsh chemicals that can be harmful to the skin. Since the skin on the face is soft and sensitive, there are chances for the skin to get damaged easier. Regular use of soap also rips off the natural oils of the skin thus making it dull and dry.

2.**Leads To Dry Skin**.

Using soap on your face can definitely help in cleaning the skin but also have sideffects. The caustic acid in soap removes the natural oil produced on the skin. It makes your skin look thin and eventually, it begins to peel off. Moreover, regular use can lead to wrinkles on your skin.

Affects The Health Of The Skin. Frequent use of bar soaps will wash off the natural lipids on the skin. These natural lipids protect the skin from infections. Loss of these lipids will invite bacteria and viral infections on the skin. This will affect the immunity of the skin.

3.Disturbs The pH Balance Of The Skin.

Some soaps disturb the pH balance of the surface of the skin, thus making it more alkaline. The pH balance of the skin is very important as it helps in keeping away from bacteria and any kind of infections. It also helps in protecting the skin from becoming dry and flaky. Compared to bar soaps, liquid cleansers are more acidic in nature and are less likely to change the pH balance of the skin.

4.**Destroys Good Microbes.** Bacteria are of two types good and bad. Good bacteria are those present on the surface of the skin that helps to fight various skin infections. The absence of good bacteria can also bring other skin problems like acne and breakouts. If used frequently on the skin, soap will kill all the good bacteria.

PLANT PROFILES

PLANT PROFILE

1. Biological Source

Coffee consists of the dried seeds (beans) obtained from the fruits of the plant coffea arabica linn. And coffeacanephora.

2. Family

- Rubiaceae

3. Synonyms

- Coffee bean
- Arabica coffee
- Robusta coffee
- Café (French/Spanish)

4. Vernacular Names

Language	Name
English	Coffee
Hindi	Coffee / Kapi
Marathi	Coffee
Tamil	Kapi
Telugu	Coffee

5. Geographical Source

Coffee is widely cultivated in:

- India (Karnataka, Kerala, Tamil Nadu)
- Colombia

- Ethiopia
- Vietnam
- Brazil

6. Morphological Characteristics

Leaves

- Shape: Elliptical to oblong
- Color: Dark green
- Surface: Smooth and glossy

Stem

- Woody and erect shrub or small tree
- Highly branched

Flowers

- Small, White and fragrant
- Arranged in clusters

Fruits (coffee cherries)

- Oval-shaped
- Colour: Green (unripe) tuning red/purple when ripe
- Contain two seeds (coffee beans)

7. Chemical Constituents

The coffee beans contain:

- Caffeine
- Chlorogenic acids
- Polyphenols
- Tannins
- Diterpenes (cafestol, kahweol)
- Trigonelline
- Essential oils

8. Pharmacological Activities

- Antimicrobial
- Anti-inflammatory
- Antioxidant
- Exfoliating action
- Skin-stimulating (improves blood circulation)

9. Uses

- Natural exfoliant for removing dead skin cells
- Helps in reducing acne and excess oil
- Improves skin texture and tone
- Reduces puffiness and appearance of cellulite
- Provides refreshing and energizing effect

10. Part Used

- Seeds (coffee beans)
- Coffee powder (ground beans)

11. Collection and Preparation

- Coffee cherries are harvested when ripe
- Beans are extracted, dried, and roasted
- Ground into powder for use in soap formulation
- Can be used as extract or exfoliating particles

12. Storage

- Stored in an airtight container
- Kept in a cool, dry place
- Protected from moisture, heat, and direct sunlight

13. Adulterants

- Chicory may be mixed with coffee powder
- Low-quality or exhausted coffee ground

14. Identification Tests

- Characteristic strong aroma of coffee
- Presence of coffee (chemical test)
- Positive tests for polyphenols and tannins

METHODOLOGY

Formulation table

Sr. No.	Ingredients	Use	Quantity
1	Coffee powder	Active ingredients (exfoliant)	10 g
2	Coconut oil	Base oil (moisturize)	25 ml
3	Olive oil	Conditioning agent	20 ml
4	Castol oil	Lathering agent	10 ml
5	Sodium hydroxide (NaOH)	Saponifying agent	8 g
6	Distilled water	Solvent	20 ml
7	Essential oil (coffee)	Fragrance	2-3 drops
8	Vitamin E oil	Antioxidant	1 ml

Procedure

- Required amount of sodium hydroxide was carefully dissolved in distilled water (Lye solution) and allowed to cool.
- Coconut oil, olive oil, and castrol oil were measured and gently heated until completely melted.
- The cooled lye solution was slowly added to the oil mixture with continuous stirring
- The mixture was blended thoroughly until it reached "trace" (semi-solid consistency)
- Coffee powder was added and mixed uniformly to provide exfoliating properties.
- Essential oil and vitamin E oil were added for fragrance and skin benefits.
- The final mixture was poured into molds and allowed to set for 24-48 hours.
- The soap was removed from molds and cured for 3-4 weeks in a dry place before use.

RESULTS AND DISCUSSION

1. Organoleptic Evaluation

Parameter	Observation
Color	Dark brown
Odor	Pleasant, coffee aroma
Taste	Slightly coarse (exfoliating)
Appearance	Smooth, Solid bar

Discussion

- The prepared coffee soap exhibited a **dark brown colour** due to the presence of coffee powder, indicating successful incorporation.
- The **ordorwas found to be pleasant and refreshing**, mainly due to coffee and added essential oil.
- The **texture was slightly coarse,** providing effective exfoliation of dead skin cells.
- Overall, the organoleptic properties were found to be satisfactory and suitable for skincare use.

2. pH Determination

Sample	pH Value
Coffee soap	8-10

Discussion

- The pH of the soap was within the acceptable range for bathing soaps.
- It ensure proper cleansing without causing significant skin irritating when used appropriately..

3. Foam Test

Parameter	Observation
Foam	Moderate and stable

Discussion

- The presence of castoroil contributed to good foam formation and stability

4. Stability Study

Parameter	Initial	After 30 Days
Color	Dark brown	No Change
Odor	Pleasant coffee	No Change
Texture	Slightly coarse	No Change
Appearance	Smooth	Smooth

Discussion

- Stability studies are essential to determine the **shelf-life and reliability** of the formulation. The coffee soap was stored under normal conditions and evaluated over a period of 30 days.
- The **color, odor, and clarity remained unchanged**, indicating that there was no degradation of active constituents.
- No slight of rancidity or microbial growth were observed. This suggests that the formulation is **physically andchemical stable.**

5. Antimicrobial Activity

Microorganism	Zone of Inhibition (mm)
Escherichia coli	10 mm
Staphylococcus aureus	12 mm

Discussion

- The antimicrobial activity of the coffee soap was evaluated using standard agar diffusion method.
- The formulation showed moderate antibacterial activity against common skin pathogens.
- The presence of caffeine, polyphenols, and antioxidants contributes to antimicrobial effects.
- These compounds act by:
  - Disrupting microbial cell membranes
  - Inhibiting microbial growth
  - Preventing skin infection

The results suggest that coffee soap has**mild antimicrobial properties**, suitable for daily skincare use.

6. Overall Evaluation

Parameter	Result	Evaluation
Organoleptic Properties	Acceptable	Pass
pH	8-10	Suitable
Foam	Moderate	Good
Stability	Stable	Pass
Antimicrobial Activity	Moderate	Effective

Discussion

- The overall evaluation of the coffee soap indicates that it meets the essential criteria for an ideal herbal soap formulation.
- The product is physically stable, chemically safe, and exhibits beneficial skin properties.
- The presence of coffee provides exfoliating, antioxidant, and mild antimicrobial effects.
- The formulation is suitable for regular use and can serve as a natural alternative to commercial soaps.

CONCLUSION

The transparent coffee soap was prepared by using coffee powder and then evaluated by various parameters likes pH ,irritation test, foaming test, etc. And have various skin benefits which is removed dark spots, skin brightening effect, natural exfoliating, remove dark circles, cleaning properties etc. The result of evaluations parameters prove that prepared Soap have good appearance better cleansing and foaming effect and does not have side effects. In this Soap research we study formulation and Evaluation of transparent skin brightening coffee soap. In this study we little bit understand the type of soap. Soap making process and methods, benefits of coffee soap.

FUTURE SCOPE

Although the present study has demonstrated encouraging results, further research can be extended in the following areas:

- **Clinical Evaluation:** Conduct dermatological testing on human subjects to assess safety, skin compatibility, and effectiveness under real-life conditions.
- **Standardization of Extract:** Quantitative analysis of active compounds in coffee (such as caffeine and antioxidants) using advanced techniques to ensure consistency and quality.
- **Formulation Optimization:** Development of improved formulations such as moisturizing variants, sensitive-skin formulas, or soaps

with additional natural ingredients for enhanced benefits.

- **Comparative Studies:**Evaluation of coffee soap against commercially available soaps to analyze its cleansing efficiency, exfoliation properties, and skin benefits.
- **Shelf-life Studies:**Assessments of long-term stability under different environmental conditions including temperature, humidity, and storage methods.
- **Expanded Antimicrobial Studies:**Investigation of additional properties such as anti-aging, anti-inflammatory, and skin-brightening effects.
- **Product Development:** Scaling up the production process for industrial manufacturing and commercialization.
- **Combination Formulations:** Incorporation of other natural ingredients (e.g., honey, aloe vera, coconut oil, or essential oils) to enhance effectiveness and consumer appeal.

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HOW TO CITE: Bittewar Prajwal Pundlik, Mohammad Zishan Ibrahim, Dr. Jameel Ahmed, Mokle Nupur Formulation and Evaluation of Coffee Soap, Int. J. of Pharm. Sci., 2026, Vol 4, Issue 5, 3607-3615, https://doi.org/10.5281/zenodo.20201682