

# Herbal Shampoo Bar as a Sustainable Alternative to Synthetic Hair Cleanser: A Review

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## ABSTRACT

Growing awareness of the adverse effects of synthetic ingredients in cosmetics had led to increased interest in herbal soaps and shampoo bars. Herbal soaps, produced from natural plant materials, were recognized for their antibacterial, antioxidant, and antifungal actions, which made them suitable to treat conditions such as acne, eczema, and psoriasis. Herbal shampoo bars had gained recognition as eco-friendly alternatives to liquid shampoos. By avoiding strong detergents, they maintained natural scalp oils while still cleansing effectively. Herbal ingredients including basil, Aloe vera, Brahmi, guava leaves, curry leaves, flaxseed, and reetha provided antimicrobial, anti-dandruff, and conditioning properties. These components collectively helped reduce scalp irritation, encouraged hair growth, and improved hair texture and shine. In addition, naturally derived shampoo bars offered sustainability advantages by reducing plastic usage and excluding sulfates, parabens, and synthetic surfactants. Altogether, herbal soaps and shampoo bars represented effective and sustainable options for skin and hair care. Their natural origin and therapeutic potential made them promising alternatives to conventional products.

**KEY WORDS:** Herbal soap, Herbal shampoo bar, Herbal ingredients

## INTRODUCTION SHAMPOO ORIGIN

In the Indian subcontinent, a variety of herbs and their extracts have been used as shampoos from ancient days. To make a potent shampoo, dried Indian gooseberry (amla) and several other herbs were boiled with sapindus using the filtered extract. The tropical sapindus tree, also known as soapberries or soapnuts, is found all over India [1]. During their daily wash, early colonial traders in India cleansed their bodies and hair. They transported the newly acquired habits back to Europe, including the hair treatment they called shampoo. [2]

## GOING BACK TO HISTORY

Sake Dean Mahomed, the maestro of soaps and potions, created shampoo. At the time, he was also well-known as the "shampoo surgeon." Dry shampoo is a product to absorb the dirt, oil and grease of your scalp without washing it. [3] Many people use it to freshen their hair after working out, a humid commute. Though many powders were used over the years to absorb excess oil in the hair, the first commercially available powder "dry shampoo" was Minipoo, which was made with fuller's earth, a clay-like ingredient. Dry shampoo has a lengthy history and when we go back in time, the most well-known hair-cleaning products were dry shampoos and hair pastes. [4] A chemist from Berlin Hans Schwarzkopf invented a violet-scented

powder called 'Schaumpon' that became available in German drugstores. When the popularity of the product grew in the next 25 years, he introduced Europe to the world's

first bottle of liquid shampoo. Shampooing hair became a cultural phenomenon with hair care and hygiene. [5]



## REPLACEMENT OF CHAMPU TO SHAMPOO

The word shampoo comes from the Indian Hindu word Champu which is derived from the Sanskrit root Chapati which means to knead, press and soothe. Shampoo cleanses and removes debris, oil, and styling products from the scalp and hair. To use, apply the liquid to damp hair, lather it, then rinse with water. Shampoos can contain surfactants, conditioning agents, fragrances, and preservatives, and are tailored to specific hair types (dry, oily, or color treated).

The usage of conventional shampoos that contain certain synthetic compounds including phthalates, parabens, and sulfates has been linked to possible health hazards, according to several research. These substances have been connected to harmful health outcomes such as cancer, allergic responses, and skin irritation. [6] Many customers are switching to natural and organic shampoos that use plant-based components instead of synthetic ones in response to these worries.

Although conventional shampoos have been in use for many years, natural and organic shampoos are becoming more and more popular. This trend is ascribed to growing consumer awareness of the possible health hazards linked to specific synthetic

chemicals included in personal care products, as well as worries about the effects these goods' manufacture and disposal may have on the environment. [7]

### Types of Shampoo

Shampoos can be categorized according to their consistency and texture, which can impact how well they work and how the user feels. The following list of popular shampoo varieties is based on consistency and texture:

- 1. Liquid Shampoo:** This is the most popular kind of shampoo since it is easy to apply to hair and has a liquid consistency. Usually, it consists of water, surfactants, and other hair-cleaning and conditioning chemicals.
- 2. Cream Shampoo:** - Cream shampoo is perfect for persons with dry or damaged hair because of its thick, creamy texture. Usually, it has hydrating and nourishing components for the hair, such as oils, proteins, or vitamins. [8]
- 3. Gel Shampoo:** Gel shampoo is not as creamy as cream shampoo, but it is thicker than liquid shampoo. Because it can aid in the removal of excess oil and pollutants, it is perfect for oily hair. Commonly used conditioning agents and surfactants include silicones and polymers.
- 4. Powder Shampoo:** - Powder shampoo is a powder that is activated by placing water over it to make a lather. Because it typically

comes in a recyclable container, it is perfect for folks who travel frequently or who seek an environmentally friendly solution. Usually, it includes substances like henna powder, borax, sodium carbonate, potassium carbonate, soap powder, perfume.

**5.Foam Shampoo:** This more recent variety of shampoo is available in a foam dispenser. It creates a lush, decadent, and rich lather. Usually, it includes a mix of foaming agents and surfactants, such as cocamidopropyl betaine or sodium lauryl sulfate.<sup>[9,10]</sup>

**6.Dry Shampoo:** To remove extra oil and pollutants from hair, dry shampoo is sprayed directly onto the hair as an aerosol or powder. For those who like to prolong the interval between washes and have thin or fine hair, it is perfect. It often contains substances like kaolin clay or rice starch that remove grease and debris from the hair.

**7.Shampoo bar:** A shampoo bar is a solid, concentrated form of shampoo, typically shaped like a bar of soap, designed to cleanse hair and scalp

**8.Herbal Shampoo:** This type of hair wash is created with natural elements including herbs, essential oils, and plant extracts. Because of its alleged advantages for hair and scalp, it is frequently marketed as a healthier substitute for conventional shampoo.<sup>[11]</sup>

### TRENDING HERBAL SHAMPOO BAR SOAP

Herbal shampoo bars are a solid form of shampoo that use plant-based ingredients, such as botanical extracts, herbs, essential oils, and natural oils, instead of synthetic chemicals to effectively cleanse the hair and scalp. Similar to liquid shampoo, they are lathered with water and massaged into the scalp and hair.<sup>[12]</sup> These solid bars are easy to use, gentle, affordable, eco-friendly, and highly portable, making them an excellent choice for travelers as they save space, prevent leaks, and reduce liquid consumption.<sup>[13]</sup>



### IDEAL CHARACTERISTIC OF HERBAL SHAMPOO BAR

1. Cleansing
2. Moisturizing
3. Promotes hair growth
4. Reduces dandruff and itchiness
5. Provides soothing relief
6. Antifungal and antibacterial properties.
7. Promotes scalp health
8. Ideal for dry or damaged hair.<sup>[14]</sup>

### Advantages of Herbal Shampoo bar

1. Travel-friendly: Due to their compact size and portability, herbal shampoo bars are excellent for trips.
2. Gentle on hair: Since herbal shampoo bars are made from natural ingredients, they are gentle on the scalp and hair and don't include harsh chemicals like parabens or sulfates.
3. Eco-friendly: Because herbal shampoo bars are made of natural ingredients and don't need plastic packaging, they are less harmful to the environment and generate less waste.

4. Longer shelf life: Compared to liquid shampoos, herbal shampoo bars have a longer shelf life and are less likely to develop bacteria because they don't contain water.<sup>[15]</sup>

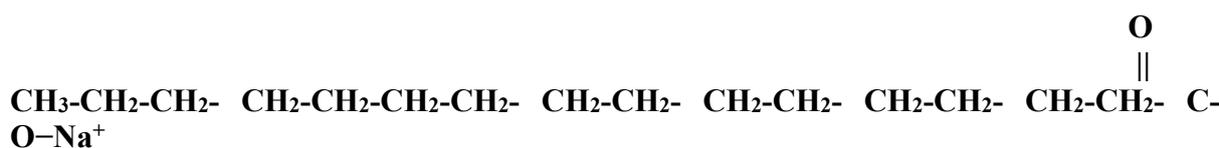
### Disadvantages of Herbal Shampoo bar

1. Residue accumulation: If solid shampoo bars are not thoroughly rinsed, they may leave residue on the hair and scalp, giving it an oily look.
2. Hard water incompatibility: When dealing with hard water, solid shampoo bars could not lather as well, which makes it challenging to apply the product evenly throughout the hair.
3. Lengthier adjustment period: If your hair has been accustomed to liquid shampoos, it may take some time to become using solid shampoo bars.

4. Travel challenges: Packing and transporting solid shampoo bars can be problematic, especially if not stored properly.
5. Limited variety: Solid shampoo bars may not offer as many formulations and fragrances as liquid shampoos.<sup>[16]</sup>

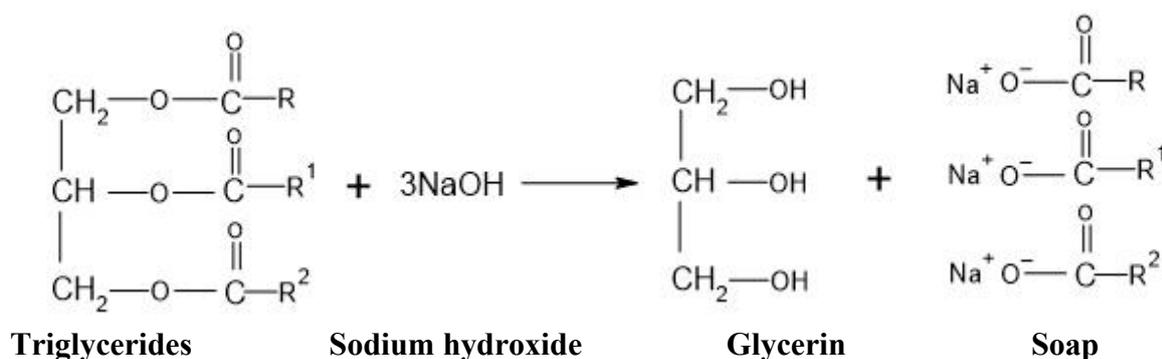
### Mechanism of formation of soap

A soap is a salt of a molecule called fatty acid. A soap molecule is made up of a long hydrocarbon chain (carbons and hydrogens) with a carboxylic acid group at one end that is ionically bound to a metal ion, commonly sodium or potassium. The hydrocarbon end is nonpolar and thus soluble in nonpolar substances (such as fats and oils), but the ionic end (a carboxylic acid salt) is soluble in water. The structure of a soap molecule is represented below:



Non-polar hydrocarbon chain ionic end (soluble in nonpolar substances) (soluble in water)<sup>[17]</sup>

**Chemical reaction of saponification:** Soaps are prepared by the alkaline hydrolysis of fats and oils. This process is known as saponification.<sup>[18]</sup>



- i. A triglyceride is formed when three fatty acid chains join a glycerol molecule with the configuration R-COO.
- ii. Triglycerides' ester bonds (-COO-) react with hydroxide ions (OH<sup>-</sup>) produced by sodium or potassium hydroxide. These ions operate as nucleophiles, removing electrons from nuclei.

- iii. Hydrolysis, which breaks the ester bonds and yields three molecules of soap and glycerol, commonly known as glycerin.
- iv. Soap is generally made up of fatty acid salts (RCOONa or K), which are soluble in water and surface-active compounds.

### The Role of Alkali in Saponification

Alkali in saponification must be taken into consideration in order to comprehend the

chemical process of using fats or oils to generate glycerol and soap.

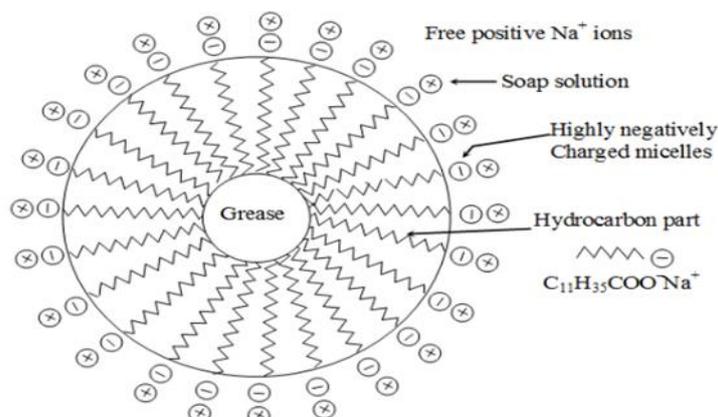
- i. **Catalytic Action:** Alkalis like potassium hydroxide (KOH) and sodium hydroxide (NaOH) are used in the saponification process. These release hydroxide ions ( $\text{OH}^-$ ), which hasten and catalyze the breaking of the ester bonds in triglyceride molecules.
- ii. **Triglyceride Hydrolysis:** The ester linkages ( $-\text{COO}-$ ) that bind the fatty acids to the glycerol in the triglycerides are saponified by the hydroxide ions from the alkali. Fatty acids separate from glycerol (glycerin) during this hydrolysis process, forming the soap molecules as potassium or sodium salts.
- iii. **Types of Soap Produced:** The qualities of the soap to be made will depend on the alkali used (KOH or NaOH). Sodium hydroxide (NaOH) is the raw material for hard soap, which is ideal for bar soap and a strong wash. KOH produces a milder,

more soluble soap that is appropriate for producing liquid soap with comparatively little cleaning power.

- iv. **pH Adjustment:** It also regulates the pH of the soap that is generated, depending on the alkali concentration used<sup>[19]</sup>.

### Mechanism of cleansing action of soap

Soaps clean by emulsifying or dispersing water-insoluble elements (dirt, oil, grease, etc.) and suspending them in water. This ability is derived from soaps' molecular structure. When soap is applied to water containing oil or other water-insoluble substances, the soap molecules encircle the oil droplets.<sup>[20]</sup> The oil or grease is "dissolved" in the alkyl groups of the soap molecules, whereas the ionic end permits the micelle to dissolve in water. As a result, the oil droplets distribute throughout the water (a process known as emulsification) and can be washed away.<sup>[21]</sup>



### Ingredients used in herbal shampoo bar Base Oils & Butters (for cleansing and nourishment)

- Coconut oil (for cleansing and lather)
- Olive oil (moisturizing, mild)
- Castor oil (boosts lather, conditions scalp)
- Shea butter / Cocoa butter (adds hardness, nourishment)
- Almond oil / Jojoba oil (light conditioning)

### Herbal Extracts & Powders (active benefits)

- **Amla (Indian gooseberry):** strengthens hair, prevents premature greying
- **Bhringraj:** promotes hair growth, reduces hair fall
- **Shikakai:** natural cleanser, adds shine
- **Reetha (Soapnut):** natural foaming agent
- **Neem:** antifungal, good for dandruff
- **Hibiscus:** softens hair, prevents split ends
- **Fenugreek (Methi):** conditions and reduces dandruff

### Essential Oils (fragrance + scalp therapy)

- Tea tree oil (antibacterial, dandruff control)
- Rosemary oil (stimulates growth)
- Lavender oil (soothing, calming fragrance)
- Peppermint oil (refreshing, improves blood circulation)

### Moisturizing & Conditioning Agents

- Aloe vera gel/powder (hydration, soothing scalp)
- Honey or Glycerin (natural humectant, locks in moisture)
- Hydrolyzed proteins (silk, keratin, wheat protein)

### Natural Additives & Colorants

- Bentonite clay / Multani mitti (deep cleansing, oil absorption)
- Henna / Indigo (natural color + conditioning)
- Turmeric / Sandalwood powder (scalp health, fragrance)

### Other Supporting Ingredients

- **Lye (Sodium Hydroxide)** – used only in *soap-based bars* (saponification process; not present in final cured bar)
- **Natural preservatives** (Vitamin E, sodium benzoate, potassium sorbate) – to prevent spoilage.<sup>[22]</sup>

## CONCLUSION

Herbal shampoo bars represent a significant advancement in sustainable hair care, offering a natural and eco-friendly alternative to conventional liquid shampoos. Unlike synthetic formulations that rely on sulfates, parabens, and harsh detergents, herbal shampoo bars are enriched with plant-based oils, extracts, and essential herbs that provide cleansing, conditioning, and therapeutic benefits. Their compact solid form eliminates the need for plastic packaging, aligning with zero-waste principles and consumer demand for environmentally responsible products.

Key herbal ingredients such as Aloe vera, neem, hibiscus, fenugreek, reetha, and Brahmi not only cleanse but also strengthen hair, reduce dandruff, and support scalp health. However, despite their advantages, certain limitations remain, including pH imbalance, storage concerns, and reduced lathering compared to liquid shampoos. These challenges highlight the need for further formulation improvements and clinical validation to ensure consistent safety, stability, and efficacy.

Overall, herbal shampoo bars bridge the gap between effective hair care and environmental sustainability, making them a promising choice for future cosmetic innovations. Continued research into novel herbal combinations, standardization techniques, and consumer acceptability will enhance their global adoption as a mainstream alternative to conventional shampoos.

### Declaration by Authors

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