



FORMULATION AND EVALUATION OF HERBAL SOLID SHAMPOO

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Abstract

Hair plays a significant role in how attractive the body appears and serves as a health indicator. One of the most popular hair-cleansing beauty items is shampoo. The basic cleansing of hair is only one function of modern shampoo compositions. Additional advantages are anticipated, such as conditioning, smoothening of the hair's surface, and hair in good health, meaning free of dandruff, grime, grease, and lice. A conventional hair cleaner in a solid form is called a shampoo bar. The primary distinction is that liquid shampoos frequently contain detergents that can occasionally strip hair of its natural oils, while shampoo bars frequently don't. Anti-dandruff ingredients in shampoo composition assist in treating dandruff, which in turn lessens hair loss while fostering growth. The anti-dandruff properties of plants and various herbs can be used in such a circumstance to avoid using highly destructive chemical products. The development of a formulation of herbal solid shampoo (bar) utilizing the inclusion of a plant herb, i.e., *Psidium guajava* [guava leaves], because of its advantageous effects on hair, can meet the needs of consumers today by providing a novel product within the organic cosmetics market. Due to the modifications made to the formulation by employing raw leaf powder instead of an extract, the anti-dandruff test of the developed formulation was conducted against the *Malassezia* species of fungus responsible for dandruff.

Keywords: Herbal Solid shampoo, Guava leaf, Antidandruff

1. INTRODUCTION ^[1,2,3,5,6,7]

In addition to being a health indication, hair has a big impact on how appealing the body looks. Because of this, advancements in hair science and hair care technologies have been published in the literature as innovations and tactics for hair treatments and cosmetics. The care of the scalp and hair required the use of shampoo to clean hair in an efficient but gentle manner. However, as time passed, shampoo came to be seen as more than just a cosmetic product with a purifying purpose. It is also responsible for sustaining the aesthetic and health of hair, adding gloss, and making it easier to manage

A shampoo is a surfactant (surface active substance) preparation in an appropriate form - liquid, solid, or powder - that when applied under the required conditions will remove surface grease, grime, and skin debris from the hair shaft and scalp without harming the user.

A shampoo bar is a solid form of the traditional hair cleanser. The main difference is that shampoo bars often don't contain the same detergents found in many liquid shampoos, which can sometimes strip hair of its natural oils. There are many Benefits of Solid Shampoo Bars over Liquid Shampoo like-They save water, having More potent ingredients, you'll cut down on plastic usage Travel-friendly, Environment-friendly, being gentle, being much more natural, Economical & Easy to use.

The majority of the world's indigenous communities include traditional medicine in their cultures and conceptions of health. In the same way that conventional shampoo preparations are made, herbal shampoo bars are cosmetic products that use plant-based herbs to clean the hair and scalp. It is a natural hair care

treatment used to remove grease, filth, and dandruff as well as to encourage hair growth, strengthen the hair, and make the hair darker. In addition, it gives the hair softness, smoothness, and shine as an alternative to the synthetic shampoo bars that are sold in stores

Cosmetic shampoo bars are made with a variety of medications. These medications have several undesirable side effects, including hair loss, increased scaling, itching, pain, nausea, and headache. So, an effort is made to create a side-effect-free herbal shampoo mix. The best solution for all of these issues is to switch to a herbal shampoo bar, which will restore lost nutrients and undo any harm.

2.0 PLANT PROFILE: [8,9,10]

Table 1: Details of guava leaves used as herbs.

PLANT	Psidium guajava L.
COMMON NAME/S	Guava, Guava Maroon, Guava of Peru.
FAMILY	Myrtaceae
PLANT/PART USED	Leaves
FIGURE	 <p>Figure-1</p>
CHEMICAL CONSTITUENTS	<p><u>Polysaccharides</u>: Uronic acid, sugars (carbohydrate), acarbose.</p> <p><u>Proteins</u>.</p> <p><u>Minerals</u>: Calcium, potassium, sulfur, sodium, iron. etc</p> <p><u>Vitamins</u>: vitamin C and vitamin B.</p> <p><u>Essential oils</u>: Beta caryophyllene, Alpha pinene, 1, 8-cineole.</p> <p><u>Phenolic compounds</u>: 5 quercetin glycosides, guavinosides A, B, C, triterpenoid sesquiterpenoids, gallic acid, guajaverin. [19]</p>
BENEFITS	<p>Good antioxidant activity due to polysaccharides.</p> <p>Major role in growth and maintenance due to proteins (improve collision activity in hair growth).</p> <p>Provides the nutritional foundation for thicker and shinier-looking hair.</p> <p>Makes the roots stronger and hair less prone to breakage.</p> <p>Anti-bacterial and anti-fungal property which helps to keep the scalp safe from dandruff/infections, has radio-protective properties.</p> <p>These leaves can also remove scalp build-up and prevent oiliness so that your hair is smooth and silky. [20, 21, 22]</p>

3. METHODOLOGY: [11,12]

3.1 Materials: -

Raw materials/Ingredients/Lab reagents: Guava leaves powder was used as an anti-dandruff agent. Sodium Cocoyl Isethionate and Cocamidopropyl Betaine were used as surfactants. Hardeners such as stearic acid and cetostearyl alcohol were used to achieve consistency. Other conditioning agents and humectants included glycerol, sorbitol, and polypropylene glycol.

Glass-ware and Laboratory Equipment: Glassware included a simple balance, analytical balance, thermometer, beaker, conical flask, stirrer, sabouraud agar plates, and sieves while lab equipment included pH meter, heating plate, thermostatic bath, and incubator.

3.2 Methods/Preparation of Herbal Solid Shampoo (Bar): -

There are two general approaches to creating a shampoo bar: The cold process (Mould press process) and the Hot process (Melt and pour process)

In our investigation, the hot process was chosen over the cold process. This choice was based on different observational studies that revealed that the final glossy finish required in the bar could only be accomplished by the hot process.

A 50:50 lye solution was prepared by combining NaOH and H₂O in a labelled container. Polypropylene glycol, vegetable glycerine, sorbitol, and surfactant were contained in a beaker and heated to 60°C with continuous stirring. Once this temperature was reached, stearic acid and cetostearyl alcohol was added to it, and was heated to 68°C. After reaching this temperature, the lye solution was slowly added and mixed for 20 mins by pausing and continuing at intervals. The solution was allowed to settle for 1hr at 68°C. After 1hr, powdered active component, in our case guava leaves powder was carefully and slowly added with constant stirring to avoid lumps. This was followed by the addition of triethanolamine and preservatives. The soap solution was allowed to cool to 62-64°C before pouring into the soap mold to cool and harden.

Table 2: Formula for Herbal Solid Shampoo

Ingredients	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
Sodium Lauryl Sulphate	19gm	-	-	-	-	-
Sodium Cocoate	11gm	-	-	-	-	-
Sodium Cocoyl Isethionate	-	20.25gm	20gm	20gm	20gm	20.25gm
Cocamidopropyl Betaine	-	10gm	10gm	10gm	10gm	10gm
Stearic acid	13gm	13gm	13gm	13gm	13gm	14gm
Cetostearyl Alcohol	6.06gm	6.06gm	6.06gm	6.06gm	6.06gm	6.06gm
Beeswax	-	-	-	6gm	6gm	-
Coconut Oil	q.s.	q. s	q.s	q.s	q.s	q.s
Cocoa Butter	3.5gm	-	-	-	-	-
Glycerol	37.15gm	6.28gm	37.15gm	37.15gm	37.15gm	6.28gm
Sorbitol	-	17.11gm	19.53gm	-	19.53gm	17.11gm
Polypropylene glycol	19.53gm	18.8gm	-	19.53gm	-	18.8gm
Lemongrass oil	1.5gm	1.5gm	1.5gm	1.5gm	1.5gm	-
Sodium Benzoate	0.5gm	0.5gm	0.5gm	0.5gm	0.5gm	0.5gm
Triethanolamine (TEA)	2.59gm	2.59gm	2.59gm	2.59gm	2.59gm	2.59gm
Active Ingredient	-	-	9gm	9gm	9gm	9gm
Coloring agent	q.s.	q.s.	-	-	q.s.	q.s.
Appearance						

4. EVALUATION ^[13,14,]

Physical Appearance:

The clarity, color, aroma, cracks, toughness, and roughness of the created formulation were all examined.

Dirt Dispersion:

In a test tube containing 10 ml of distilled water, two drops of shampoo bar solution were added. After adding one drop of India ink, the test tube was covered and shaken ten times. None, Light, Moderate, or Heavy ink was judged to be present in the foam.

Washability/Detergency:

The formulation was applied to the fallen hair strands, and the ease and extent of water washing, as well as the elimination of filth and oil particles, were evaluated using a Projection microscope.

Foaming Ability:

The foaming ability was determined using the cylinder shaking method. 50 ml of the shampoo bar solution was placed in a 250 ml graduated cylinder, covered with hands, and shaken for 10 minutes. After 1 minute of shaking, the total volume of foam content was measured.

Foaming Stability:

The volume of foam was measured at 1-minute intervals for 10 minutes immediately after shaking (using the same solution produced for foaming ability). The foam volume remains constant over a 5-minute period, indicating that the foam formed by the shampoo bar is stable and that the prepared shampoo bar has a higher foam property.

Determination of PH:

A 10% w/v shampoo bar solution was made in distilled water, and the pH was measured using a calibrated pH meter (ph. strips can also be used). A shampoo bar based on surfactants will most likely have a pH between 4.5 and 6.5.

Anti-Dandruff Test:**Isolation of Malassezia species:**

Flakes or scales were removed from the scalp by separating the hair using a sterile comb and scraping an area of about one inch with a sterile blunt scalpel. The specimen was then placed on dark sample paper to avoid exposure to sunlight. To avoid bacterial contamination, the samples were inoculated into Sabouraud Dextrose broth flask media with chloramphenicol. The flask was subsequently incubated at 30 °C for 7 days, which was monitored on a daily basis. The antifungal activity of all formulation batches developed was tested using the agar well diffusion method.

Agar well diffusion method:

The formulated samples were inoculated in the wells formed over the surface of Sabouraud Dextrose Agar (SDA) media. Plates were then incubated at 30°C for 5 days. The zone of inhibition (diameter in mm) developed, if any, was then measured.

Zone of inhibition:

The diameter of the zone of Malassezia growth inhibition around the plates was measured continuously for 5-6 days using a ruler and vernier caliper, and the activity of guava leaves powder against the growth of dandruff-causing species was scored using symbols and expressed as inactive (-), not-detectable (ND), 1-5mm (+), 6-13mm (++), 14-19mm (+++), 20 and above (++++)

Determination Of % Solid Content:

A clean, dry evaporating dish was weighed, and 2 grams of shampoo bar were placed to it. The evaporating dish with a shampoo bar was placed on the hot plate and allowed to evaporate the liquid component. After drying, the weight of the shampoo bar's solid contents was calculated. A decent shampoo bar has 20 to 30% solids.

Conditioning Attributes:

After washing the hair with the shampoo bar, the conditioning impact on the hair was examined. Conditioning characteristics encompass all desirable hair benefits such as increased hair mass, better luster, softness, and silkiness. Conditioning effects were graded on a scale of 1 to 5 (1=very poor, 2=poor, 3=moderate, 4=good, 5=excellent).

Stability Of Shampoo Bar:

Over the course of one month, all of the shampoo bars were taken and stored at ambient temperature (30°C) as well as in the refrigerated (4°C). Physical characteristics were observed to change. (0 means chemically and physically unstable, and 5 means chemically and physically stable).

5. RESULT:

Table 3: Evaluation Parameters Results

Sr.no.	Parameters	Observation	Standard	
1.	Visual characteristics	Color	5	0 [light green] – 5 [dark green]
		Cracks	5	0 [has several cracks] – 5 [does not have cracks]
		Brightness	5	0 [lusterless] -5 [bright]
		Unmolding	5	0[shape does not correspond to the mold] - 5 [The shape corresponds perfectly to the mold.]
	Texture	Toughness	4	0 [soft] - 5 [tough]
		Roughness	4	0 [rough] -5 [smooth]
2.	Dirt dispersion	Moderate	None, light, moderate, Heavy.	
3.	Washability / Detergency	5	0[not washable] – 5 [easily washable]	
4.	Foaming ability	83 ⁺ /3 ml	Between 80-90 ml	
5.	Foaming stability	Stable till 5min	Stable till 5min	
6.	Determination of pH	6	4.5-6.5	
7.	Anti-dandruff test	 Figure-2	++	1-5 mm [+], 6-13mm [++], 14-19mm [+++], 20 and above [++++].
		 Figure-3	+	
		 Figure-4	+++	
8.	Determination of % solid Content	28% ^{w/w}	20-30%	
9.	Conditioning attributes	4	Rated from 1-5.	
10.	Stability of shampoo bar	5	0 [chemically and physically unstable]; 5[chemically and physically stable]	

6. CONCLUSION:

Many people face problems associated with hair and scalp to which shampooing is the best solution. The demand for solid shampoos has been vastly increasing due to its stated benefits.

Efforts have been made to develop a solid shampoo using raw powder of guava leaves due to its beneficial properties on hair and scalp. The formulated product showed considerable results for its properties.

At the end, I would like to conclude by saying that the formulated herbal bar can be used as a promising alternative to commercial chemical-containing bars.

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