



Formulation and Evaluation of Polyherbal Shampoo Bar

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ABSTRACT

Shampoos are primarily been products aimed at cleansing the hair and scalp. In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy. The present study was aimed to formulate an herbal shampoo bar containing polyherbal extract and to evaluate its physicochemical properties and to reduce the usage of plastic. The herbal shampoo bar was formulated by incorporating the extracts of herbs such as Spinach, Aloe vera, Hibiscus flower, Shikakai, Retha, Tulsi leaves. Several tests such as visual inspection, pH, foam ability and stability studies were performed to determine the physicochemical properties of the formulated herbal shampoo bar. The conditioning performance and Dirt dispersion were evaluated. The results clearly indicates that the formulated shampoo bar is having a satisfactory conditioning performance. All the ingredients used to formulate shampoo bar are safer and the physicochemical evaluation showed ideal results, but further research is required to improve its quality and safety with improved cleansing and conditioning property.

Keywords: Shampoo bar, safe and efficacy, conditioner, poly herbs, foam ability and foam stability.

INTRODUCTION

The cosmetics industry is a multibillion-dollar global business. Cosmetics Europe According to the Personal Care Association, 450 million Europeans use soap, shampoo, hair conditioner, toothpaste, deodorant, shaving cream, skincare, perfume, and make-up on a regular basis. Innovation is one of the most fundamental concepts in this field. The cosmetic industry has seen tremendous growth in the last 20 years, resulting in a vast choice of products to preserve and hydrate skin, as well as counteract inflammation and age signs. In addition, customers are becoming increasingly concerned about their looks as they attempt to adapt to new societal paradigms. Natural cosmetics, on the other hand, are in higher demand than ever, and are now largely seen as a serious threat to the global cosmetics industry¹. These new ideas enhanced the use of natural substances as effective cosmetic ingredients, allowing for the reusing of old-style natural-source active chemicals as well as the development of new green compounds based on sustainable principles. Polyphenols, the oldest of these big categories of active substances, can be found in a variety of places, including plants and sometimes even food by-products².

Herbal hair care products

Using both natural and organic ingredients are becoming more and more popular every day in the beauty industry. There are good reasons why too. Plenty of people are making the switch, and a lot of different companies are rebranding their image to include using natural products, whether it's makeup, skin care lotions, or

hair products. This change is great because natural products are better for the environment and they're better for you. After all, things found in nature are much stronger than anything that's been made by man. Make the switch to natural hair products today³.

Our hair is organic in nature and needs nourishment the same way that our bodies need food in order to stay vibrant and vitalized. Hair products go directly on the scalp and then into the hair shaft. The main purposes are to strengthen hair and promote growth. For those who are unfortunate to be already losing their hair, it will reduce the rate at which strands begin falling off. There are many other reasons to make the switch⁴.

If you're worried about the use of chemicals as you learn more about them, you're not alone, and your worries are valid. A lot of hair cosmetics consist of chemicals that will have negative side effects on your body. Some can trigger allergies, cause the skin to change colour, and even cause your hair to start falling out! Many of these problems can be prevented if you decide to switch to shampoo and conditioner that's made from all-natural ingredients. There are great products that are available for use, made from ingredients like fruits and juice extracts¹.

Natural hair care products can contain antioxidants. These will help your body to get rid of free radicals. There are a lot of chemicals that are constantly being released into your hair. These can have negative effects on skin and hair alike; they destroy a cell and then move onto the next one. Antioxidants that are in natural hair products can include Vitamin E, which is very powerful. The following reasons



are some examples of why you might choose natural hair products⁴.

MATERIALS AND METHODS

Collection of Plant Material

The spinach leaves, dried reetha fruits, dried shikakay and flax seeds are collected from local market. The remaining herbs such as Tulasi leaves, hibiscuss flowers and aloe vera

are gathered from our college medicinal garden. All these are shade dried stored in an air tight container.

Processing of plant material

The collected spinach leaves, Tulasi leaves and hibiscus flowers were cleaned and shade dried and powdered and sieving was done to get homogenous spinach powder. The collected flax seeds, reetha and shikakay were powdered and sieved to get uniform powder.

Table 1: Representing Materials & Its Description

Material	Description
Spinach	<p>Kingdom - Plantae</p> <p>Order - Caryophyllales</p> <p>Family - Amaranthaceae</p> <p>Genus - Spinacia</p> <p>Species - <i>S. oleracea</i></p> <p>Botanical Name - <i>Spinacia oleracea</i></p> <p>Uses - The antioxidants present in spinach help in preventing hair loss. It also helps ensure the scalp is clean and healthy. Spinach is rich in vitamins K, A, C, B2, B6, B1, E, manganese, zinc, and iron. These nutrients help nourish your scalp and hair, ensuring healthy hair growth. The rich iron content helps increase the supply of oxygen to the hair follicles, ensuring that they stay in top health. Spinach has anti-inflammatory properties. This helps soothe an aggravated scalp⁵.</p>
Reetha	<p>Kingdom - Plantae</p> <p>Order - Sapindales</p> <p>Family - Sapindaceae</p> <p>Genus - Sapindus</p> <p>Species - <i>S. mukorossi</i></p> <p>Binomial name - <i>Sapindus mukorossi</i> Gaertn</p> <p>Uses - Reetha is a natural conditioner that is known to soothe the scalp and make the hair shiny. It gives a natural lustre and shine to the hair which can otherwise get damaged by pollution and lifestyle. Reetha is antibacterial and antifungal in nature. Thus, any scalp infection such as dandruff is taken care of, with regular usage⁵.</p>
Flax seeds	<p>Kingdom - Plantae</p> <p>Family - Linaceae</p> <p>Genus - Linum</p> <p>Species - <i>L. usitatissimum</i></p> <p>Binomial name - <i>Linum usitatissimum</i></p> <p>Uses - Flaxseeds contain omega-3 fatty acids, which give vital proteins and nutrients to hair follicles, boost circulation in the scalp, and inhibit hair follicle inflammation that induces hair fall. Flaxseeds contain vitamin B and are rich in biotin, riboflavin, niacin, pyridoxine, pantothenic acid, and folic acid, which are responsible for increasing hair growth making hair stronger⁵.</p>
Tulasi	<p>Kingdom - Plantae</p> <p>Order - Lamiales</p> <p>Family - Lamiaceae</p> <p>Genus - Ocimum</p> <p>Species - <i>O. tenuiflorum</i></p> <p>Binomial name - <i>Ocimum tenuiflorum</i></p> <p>Uses - Tulsi helps in prevention of hair loss, strengthens hair shafts, treats dandruff and dry scalp, it helps to reduce stress and promotes hair growth⁵.</p>

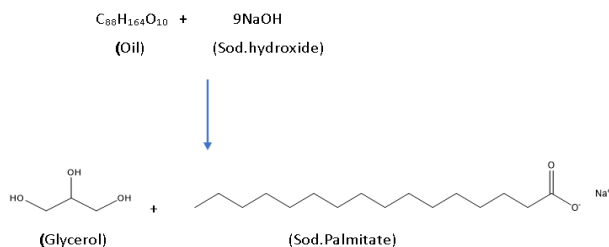
Shikakai	<p>Kingdom - Plantae Order - Fabales Family - Fabaceae Sub family - Caesalpinioideae Genus - Senegalia Species - <i>S. rugata</i> Binomial name - <i>Senegalia rugata</i></p> <p>Uses - Shikakai promotes hair development, reduces hair loss and breakage, and adds bounce and luster to the hair. Shikakai's robust antifungal and anti-microbial properties, much to our relief, play an important part in eradicating dandruff from the scalp and hair, respectively⁵.</p>
Lavender	<p>Kingdom - Plantae Order - Lamiales Family - Lamiaceae Sub family - Nepetoideae Tribe - Ocimeae Genus - Lavandula L.</p> <p>Lavandula species- <i>L. angustifolia</i>, <i>L. latifolia</i>.</p> <p>Uses- Lavender oil has analgesic and anti-inflammatory properties that can soothe any irritated skin. Both Linalyl and Linalool, compounds present in Lavender, are known to ease pain and help inflammation.</p> <p>The oil is beneficial for hair thickening, developing new hair, and hair loss prevention. It also helps in conditioning the hair, controlling frizz & boosting shine. Lavender oil even helps with problems such as alopecia or pattern baldness.</p> <p>Lavender oil has antimicrobial properties that are known to prevent fungi & bacteria from growing. It can treat many scalp conditions, including dandruff, dry and itchy scalp, etc.</p> <p>Head lice are an undesirable and uncomfortable occurrence. Lavender oil can reduce the risk of having lice⁶.</p>
Hibiscus	<p>Kingdom - Plantae Scientific Name - <i>Hibiscus rosa-sinensis</i> Order - Malvales Family - Malvaceae Sub family - Malvoideae Tribe - Hibisceae Genus - <i>Hibiscus</i> L.</p> <p>Uses - Stimulates hair growth, lost hair volume and luster over the years? The naturally occurring amino acids in hibiscus flowers provide the hair with the nutrients help in promoting hair growth. These amino acids produce a special kind of structural protein called keratin, which is the building block of hair⁶.</p> <ol style="list-style-type: none"> 2. Conditions hair 3. Prevents baldness 4. Treats dandruff and itchy scalp
Aloe	<p>Kingdom - Plantae Order - Asparagales Family - Asphodelaceae Sub family - Asphodeloideae Genus - <i>Aloe</i> L. Type species - <i>Aloe perfoliata</i></p> <p>Uses - Controls greasy hair, helps an itchy scalp, protection from UV damage, hair growth⁶.</p>

Formulation of Herbal Shampoo bar

1. Saponification process for preparation of soap base

Saponification: Saponification is a process that involves the conversion of fat, oil, or lipid, into soap and alcohol by the action of aqueous alkali (e.g. NaOH). Soaps are salts of fatty acids, which in turn are carboxylic acids with long carbon chains⁸.

The general equation for this reaction is:



Procedure

10 ml coconut oil was poured into beaker and 50ml of 9M Sodium hydroxide solution was added to it. This mixture was boiled for 5 minutes and 50 ml of distilled water was added and 1.5g of Sodium chloride was added. This mixture was allowed to boil for 10 minutes, then Soap is filtered out and washed with distilled water. A small amount of soap

and water was added into a test tube and it was kept for solidification⁸.

2. Incorporation of dried plant constituents into soap base:

To formulate herbal shampoo bar 75g of prepared soap base was taken in to a beaker and heated to get liquefied and then 2g of spinach powder, 15ml of Reeta extract, 1g of Shikakai, 1g of Tulasi powder, 1g of Flax seed powder, 2ml of lavender oil into a motor triturated for 5mins in the motor using pestle The triturated powder was added to the soap base and stirred continuously with glass rod. Then the mixture was poured into the moulds and kept aside for drying⁹.



Figure 1: Formulated Herbal shampoo bar

Table 2: Contents of Formulation

S.No.	Name of the ingredients	Quantity required	Uses
1.	Soap base	75g	Base
2.	Spinach Powder	2g	Hair growth, reduce hair loss
3.	Reeta Extract	15ml	Cleansing agent, control hair fall
4.	Shikakai Powder	2g	Prevents dandruff
5.	Tulasi Powder	2g	Strengthens hair follicles
6.	Flax seeds	1g	Conditioner
7.	Lavender Oil	3ml	Anti-microbial and Fragrance

EVALUATION OF HERBAL SHAMPOO BAR

The following physico chemical parameters were assessed for determining the quality of the formulated herbal shampoo bar.

Physical Parameters:

The colour, texture and clarity of the formulated shampoo bar was identified with naked eye against a white background. The odour of the shampoo bar was smelled for its fragrance⁹.

pH:

The P^H of the formulated herbal shampoo bar was determined by using digital P^H meter. The formulated herbal shampoo bar was dissolved in 100 ml of distilled water and kept aside for 2 hrs. The P^H was checked using previously calibrated digital P^H meter⁹.

% Free alkali content:

10 g of shampoo bar placed in beaker which contains 150 ml of distilled water to dissolve the shampoo bar and heated for 40 minutes at reflux on a water bath and after reflux the solution was cooled and transferred with the washings to the 250 ml conical flask and the capacity was filled with distilled water and two drops of phenolphthalein indicator was added and titrated against 0.1 M hydrochloric acid solution until its colourless¹⁰.

Foam ability and Foam stability:

Cylinder Shaker method was most widely used for determining foaming ability. 50ml of 1% shampoo solution was put into a 250ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of foam contents after 1min shaken were recorded. The foam volume was calculated. Immediately

after shaking the volume of foam at 1min intervals for 4min were recorded¹¹.

Percentage of Solid Contents:

The percentage ranges of solid contents of well-prepared shampoos are between 20 to 30%. Basically, low amount of solid will result in watery formulation that is capable of being washed away too quickly. However, if too many solids are present, it will be hard to wash out. The formulated herbal shampoo using polyherbal extract was found to be having solids contents of 26.42% and it is suggestive that it can be washed out easily^{10,11}.

Dirt Dispersion Test:

0.1gm of shampoo bar was taken into 50ml beaker and dissolved in 10ml of distilled water. This was transferred into a large test tube. To this solution 1 drop of India Ink was added and the test tube was stoppered and shaken 10 times. The amount ink in the foam was indicated by the rubric such as none, light, moderate or heavy¹².

1. Physico chemical parameters

Table 4: Physicochemical parameters of Herbal Shampoo bar.

Parameter	F1	F2	F3	F4	F5	F6	F7
Colour	Light green	Light green	Light green	Light green	Dark green	Dark green	Dark green
Odour	Lavender like	Lavender like	Lavender like	Lavender like	Lavender like	Lavender like	Lavender like
Clarity	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid	Turbid

2. pH

Table 5: P^H of Herbal Shampoo bar

S.NO	Parameter	F1	F2	F3	F4	F5	F6	F7
1.	p ^H	4.2	5.8	4.5	6.1	5.2	6.8	4.9

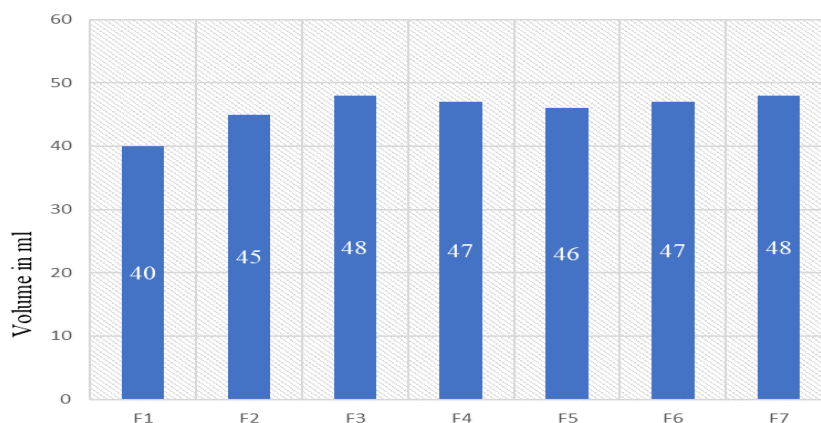
2. % Free alkali content:

Table 6: % free alkali content of Herbal Shampoo bar

S.No	Parameter	F1	F2	F3	F4	F5	F6	F7
1.	%Free alkali	0.22	0.25	0.15	0.29	0.31	0.28	0.30

3. Foam ability:

Table 7: Foam Ability of herbal shampoo bar



RESULTS

The evaluation results of formulated herbal shampoo bar were summarized in below tables.

Table 3: Evaluation parameters of Poly herbal Shampoo bar

S.No	Formulation	Volume of the shampoo
1	F1	40ml
2	F2	45ml
3	F3	48ml
4	F4	47ml
5	F5	46ml
6	F6	47ml
7	F7	48ml

5. Foam stability:

Table 8: Foam Stability of herbal shampoo bar

F1		F2		F3		F4		F5		F6		F7	
Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol	Time	Vol
0min	50ml	0min	50ml	0min	50ml	0min	50ml	0min	50ml	0min	50ml	0min	50ml
1min	50ml	1min	45ml	1min	45ml	1min	35ml	1min	45ml	1min	45ml	1min	45ml
-	-	2min	48ml	2min	48ml	2min	45ml	2min	47ml	2min	46ml	2min	47ml
-	-	3min	50ml	3min	50ml	3min	47ml	3min	48ml	3min	49ml	3min	50ml
-	-	4min	50ml	4min	50ml	4min	50ml	4min	50ml	4min	50ml	4min	50ml



Figure 2: Foam Stability

6. Percentage of Solid Contents:

Table 9: % of Solid contents of herbal shampoo bar

S.No	Formulation	% of Solid Contents
1	F1	25.88%
2	F2	23.36%
3	F3	20.87%
4	F4	19.49%
5	F5	19.98%
6	F6	21.02%
7	F7	22.11%

7. Dirt Dispersion Test:

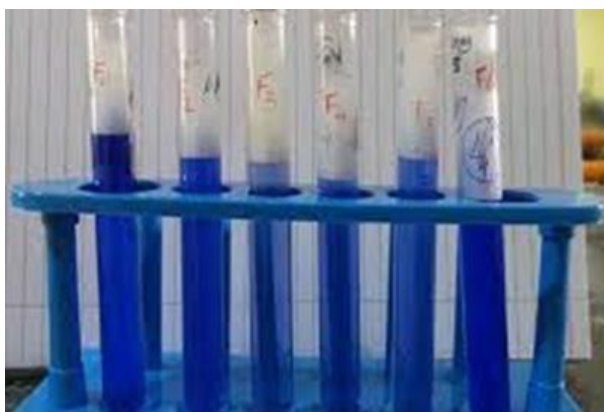


Figure 3: Dirt dispersion

DISCUSSION AND CONCLUSION

The present work is concerned with the formulation of shampoo bar using Spinach powder, Reeta extract, Shikakai powder, Flax seed powder, tulsi powder and essential oil. The formulated Polyherbal shampoo bar was evaluated for their physic chemical characteristics. The formulated shampoo bar was good in appearance with pleasant odour and colour. The formulated shampoo bar was a dry, stable solid showing no colour change and good appearance and it is foamy in nature without any added surfactants. We have formulated 7 shampoo bars of different formula out of all formulations F7 have optimum pH, foam ability and stability, dirt dispersion and percentage of solid contents. Hence it can be concluded that the formulated shampoo bar must be standardized and can be used as a promising alternative to commercial chemical containing shampoos^{13,14}.

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