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## Formulation Development And Characterization Of Polyherbal Shampoo Containing Flax Seeds Powder

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### ABSTRACT:

The current study's objective is to create and assess a polyherbal shampoo using natural components that is safe and effective. It cleans out debris and dandruff, encourages hair development and shine, and fortifies and darkens hair.

The polyherbal extract from flax seeds, hibiscus flowers, pomegranate peels, neem leaves, curry leaves, shikakai, and amla fruit is combined in varying amounts to make the shampoo. A number of physicochemical experiments were carried out to evaluate the material visually as well as to test for viscosity, pH, wetting time, surface tension, dirt dispersion, conditioning performance, and foam stability.

The brown-colored, well-formulated polyherbal shampoo has excellent cleansing power, foam stability, low surface tension, an ideal pH, and conditioning action. The polyherbal shampoo's dirt dispersion has a light color and a 25-ml foam height. These are all the perfect qualities of a high-quality polyherbal shampoo that may be used on a daily basis. Nonetheless, additional scientific research is necessary to validate its overall excellence.

**KEYWORDS**—Polyherbalshampoo,naturalingredients,hairevaluation ofshampoo.

### INTRODUCTION:

Similar to conventional shampoo, polyherbal shampoo is a cosmetic preparation made from herbs derived from plants and is intended to be used for shampooing the hair and scalp. 1,2 Formulations made using polyherbs are thought to provide an alternative to synthetic shampoo. The polyherbal shampoo is crucial since, in order to improve their health, many now prefer using polyherbal products over chemical ones. The growing belief that herbal cosmetics are safe and free of adverse effects is the main reason for the increased demand and awareness of these products. The potential of an ingredient to both prevent hair damage and enhance hair quality by washing, nourishing, and protecting the hair is taken into consideration when choosing active ingredients for hair care products. 3 In order to provide excellent hair care, we thus tried to

create a fundamental technique for the formulation of polyherbal shampoo. Flax seeds (*Linum usitatissimum*), hibiscus flowers (*Hibiscus rosa-sinensis*), pomegranate peel (*Punicagranatum*), neem leaves (*Azadirachta indica*), curry leaves (*Murraya koenigii*), shikakai fruit (*Acacia concinna*), amla fruit (*Emblica officinalis*), etc. were among the ingredients used in the formulation of the polyherbal shampoo, which was then assessed for its physicochemical properties.

### Advantages of polyherbal shampoo:

- 1) Natural oils, minerals, polyherbal-derived compounds, and natural ayurvedic substances are the main constituents of polyherbal shampoos for hair fall. By hydrating your hair's roots and follicles, these substances help to increase the moisture content of your hair. Thus, there is a decreased likelihood of hair loss and of dry, damaged, and loose hair.
- 2) There are no negative, poisonous, or adverse effects from using polyherbal shampoo.
- 3) The purpose of polyherbal shampoos for hair growth is to fortify hair follicles by providing vital oils and sustenance throughout the follicles and root. Consequently, this encourages the development of new, healthy hair roots and increases hair growth.
- 4) Using polyherbal shampoos on a regular basis will greatly improve your hair. For our scalps to produce vibrant, robust hair, the ideal ratio of oil to pH levels must be maintained. Shampoos with polyherbal ingredients can help you achieve the ideal oil balance.
- 5) Natural and necessary antiseptic ingredients found in polyherbal shampoos shield our hair and scalp from the sun's harmful UV rays, avoiding skin infections.
- 6) Natural components are used to create polyherbal shampoos, which are appropriate for all skin types. These never irritate the skin and are safe for it. Therefore, using polyherbal shampoos does not increase the risk of skin allergies.

### MATERIALS AND METHOD:

#### Materials:






#### Selection of ingredients in polyherbal shampoo:



The physicochemical properties of a polyherbal shampoo were assessed in this study after it was formulated with appropriate ingredients in varying proportions, including flax seeds (*Linum usitatissimum*), hibiscus flowers (*Hibiscus rosa-sinensis*), pomegranate peel (*Punicagranatum*), neem leaves (*Azadirachta indica*), curry leaves (*Murraya koenigii*), shikakai fruit (*Acacia concinna*), amla fruit (*Emblica officinalis*), etc. Because these active components feed the hair from the roots, remove the fatty layer above the follicles that limits hair development, totally eradicate irritation, and prevent skin alopecia, this polyherbal shampoo composition is unique. 4 Its inherent quality keeps hair from aging and leaves it silky and glossy. 5.

Table 1: Materials collected for formulation

Sr.No	Material	Collected From
1	Flax seeds	LocalMarket
2	HibiscusFlower	Garden
3	PomegranatePeel	LocalMarket
4	NeemLeaves	Residentialarea
5	CurryLeaves	Residentialarea
6	ShikakaiFruit	LocalMarket
7	AmlaFruit	LocalMarket
8	Vitamin.E	LocalMarket
9	LemonJuice	PatanjaliStore
10	Honey	PatanjaliStore
11	Gaugum	FromLaboratory
12	RoseOil	FromLaboratory

Table 2: Description of ingredients of polyherbal shampoo

Sr. No	Common	Picture	Botanical Name	Family	Parts used	Category
1	Flax seeds		Linum usitatissimum	Linaceae	seeds	strengthen the hair and prevent breakage
2	Hibiscus		Hibiscus rosasinesis	Malvaceae	Flowers	Moisturizer, Promotes hair growth, Anti-hair fall, Anti-dandruff, Conditioning agent. <sup>6</sup>
3	Pomegranate		Punica granatum	Punicaceae	Peels	Anti-hair fall agent <sup>7</sup> , hairs strengthen.
4	Neem		Azadirachta indica	Meliaceae	Leaves	Anti-bacterial agent
5	Curry		Murraya koenigii	Rutaceae	Leaves	Hair follicles strengthening agent, prevents greying of hair, gives shine.

6	Shikakai		Acacia concinna	Leguminosae	Fruits	Detergent/Foaming agent
7	Amla		Embllica officinalis	Euphorbiaceae	Fruits	Anti-dandruff agent, Provides hair nourishment.

**Authentication of herbs** – The authentication of required natural collected herbs were done from Department of Botany, Walchand College of Arts and Science, Solapur.

## METHODS:

### Preparation of polyherbal extract:

The extraction process was done using the decoction method. In this method, all the ingredients are weighed, and decoction<sup>8</sup> of flax seed powder, hibiscus powder, amla powder, neem leaves, curry leaves, pomegranate powder, and shikakai powder is done separately in water. Filter it by using a muslin cloth, and the filtrate is collected.



Figure 2: Extraction of each herb's ingredient

### Formula used for preparation of polyherbal extract:

Table 3: Quantity taken of each herbal ingredient in formulation

Sr.No.	Ingredients	Quantity(100ml)			
		F1	F2	F3	F4
1	Flax seed powder	3g	4.5g	4.7g	5g
2	Hibiscus Powder	3.5g	4.0g	5.1g	2.1g
3	Pomegranate Peel Powder	3.5g	4.3g	3.0g	3.2g
4	Neem Leaves Powder	3.5g	4.5g	3.2g	3.2g
5	Curry Leaves Powder	3.5g	4.2g	4.2g	4.5g

6	Shikakai Powder	3.5g	5.0g	6.0g	3.0g
7	Amla Powder	3.5g	3.0g	1.0g	5.0g

### Formulation of polyherbal shampoo:

The formula listed below was used to formulate the polyherbal shampoo. Glycerin and guar gum are added to the formulation in order to thicken it up. While continuously stirring, honey and two to three milliliters of lemon juice were also added. For conditioning purposes, vitamin E was also added to the shampoo. Rose oil, an essential oil, was added in sufficient quantity to enhance the formulation's perfume. A suitable amount of water was added to get the final volume to 100 milliliters.



Figure 3: Formulated shampoo

### Composition of polyherbal shampoo:

Table 4: Formulation table

Sr. No.	Ingredients	Quantity (100 ml)			
		F1	F2	F3	F4
1	Polyherbal extract	25.0 ml	25.0 ml	25.0 ml	25.0 ml
2	Gaur gum	20.0 ml	20.0 ml	5.0 ml	10.0 ml
3	Glycerin	15.0 ml	10.0 ml	10.0 ml	15.0 ml
4	Honey	5.0 ml	10.0 ml	5.0 ml	10.0 ml
5	Vitamin E	10.0 ml	10.0 ml	10.0 ml	10.0 ml
6	Lemon juice	-	3.0 ml	3.0 ml	-
7	Rose water	2-5 drops	2-5 drops	2-5 drops	2-5 drops
8	Distilled water	q.s 100	q.s 100	q.s 100	q.s 100

### EVALUATION OF POLYHERBAL SHAMPOO

Using conventional protocols, quality control tests were conducted on the manufactured formulations to assess their quality. These tests included visual assessment and physicochemical controls such as pH, viscosity, surface tension, foam volume, foam stability, and wetting time.

- 1) Outward appearance/visual inspection: The created formulation was assessed for its fluidity, clarity, color, and capacity to produce foam. 8
- 2) pH determination: A calibrated pH meter was used to measure the pH of a 10% v/v shampoo solution that was formed in distilled water. 9.
- 3) To calculate the proportion of solid content, 4 grams of shampoo were placed in a dry, clean evaporating dish, which was then weighed. A shampoo-filled evaporating dish was set over a hot plate until the liquid part solidified. After drying, the weight of the solid ingredients in the shampoo was determined. 7.

- 4) Wetting time: The amount of time needed for the canvas paper to fully sink was noted in order to compute the wetting time. One inch in diameter was cut from a 0.44-gram piece of canvas paper. The canvas paper disc was placed over the shampoo (1% v/v) surface, and the timer was used to time how long it took for the paper to sink.
- 5) Viscosity test: Using an LV-62 spindle, the viscosity was measured with a Brookfield viscometer. The spindle was submerged in the shampoo immediately after the rotation rate was set to 10 rpm, and the viscometer reading in cps was recorded.
- 6) Dirt dispersion: In a test tube with 10 ml of distilled water, two drops of polyherbal shampoo were introduced. After adding one drop of ink, the test tube was covered and given ten shakes. It was judged that there was either light, moderate, heavy, or no ink in the foam.<sup>10</sup>
- 7) Surface tension measurement: A stalagometer was used to assess the surface tension using polyherbal shampoo. The idea is to weigh the drops of herbal shampoo that fall from a glass capillary tube in order to determine the fluid's surface tension. By counting the falling drips, we can calculate their weight. We may calculate the surface tension from it, as indicated below:

$$\gamma_2 = \frac{n_1 \times \rho_2}{n_2 \times \rho_1} \times \gamma_1$$

Where,

$\gamma_1$ =Surface tension of water

$\gamma_2$ =Surface tension of sample

$n_1$ =No. of drops of water

$n_2$ =No. of drops of sample

$\rho_1$ =Density of water

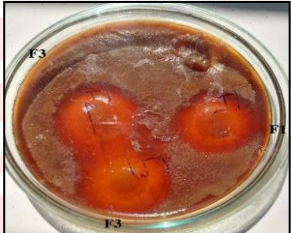
$\rho_2$ =Density of sample

- 8) Foaming ability and foam stability: The foaming ability was assessed using the cylinder shake method. A 250-ml graduated cylinder was filled with 50 ml of the 1% polyherbal shampoo solution, covered with hands, and shaken for ten minutes. Following a minute of shaking, the total amount of foam content was noted. The volume of foam was immediately measured and recorded every minute for ten minutes.<sup>12</sup> Over the course of around five minutes, the volume of foam produced by the shampoo does not change, indicating that it has good stability. The prepared shampoo also has higher foam properties, which may be related to the addition of Shikakai, or flax seed powder.
- 9) Stability Study: The formulation's stability was monitored for four weeks at a temperature between 25 and 30 degrees Celsius.
- 10) Skin Irritation Test: The skin was prepped with a polyherbal shampoo, applied for five minutes, then washed and examined for signs of skin irritation or inflammation.
- 11) Anti-microbial activity: Using the procedure outlined by Cheesbrough, this test was conducted to ascertain if organisms were susceptible to or resistant to formulation constituents. The test organisms, which were Gram negative (E. coli), were cultivated in nutritional broth and allowed to reach the appropriate turbidity at 37°C. Mueller Hinton agar was streaked with the developing culture after four wells were pierced with a sterile cork borer. These wells were then filled with the samples. A ruler was used to measure the zone of inhibition surrounding the wells after the plates were incubated for 24 hours at 37 °C.<sup>11</sup>

## RESULTS AND DISCUSSION

### Results:

**Table 5: Evaluation test result of formulated shampoo**

Sr.No.	Evaluation Test	Formulated shampoo (F2)
1	Colour	Brown
2	Transparency	Clear
3	Odour	Good
4	pH of 10% solution	6.70
5	Solid contents (%)	3.2
6	Wetting time (sec.)	8
7	Viscosity	% torque
		Cp value
		Spindle no.
8	Dirt dispersion	Light
9	Surface tension (dynes/cm)	57.30
10	Foam volume (per 100ml)	27ml after 1min & 20ml after 10min
11	Foam type	Dense & Small
12	Stability	Stable
13	Skin irritation	Nil
14	Anti-microbial activity	11 mm
	 <p>[Zone of inhibition against Gram-negative bacteria (mm)]</p>	

## DISCUSSION

The compositions are brown in color and have a wonderful smell on their own. It was discovered that the mixture had a pH of 6.70, which is ideal for hair. The ideal viscosity of 1873 Cp was determined to exist. Test results for formulations such as anti-microbial, filth dispersion, and skin irritation were 11 mm, light in color, and irritant-free, respectively. It has 57.30 dynes/cm of surface tension. Every formulation has an excellent foam volume, kind, and wetting duration of eight seconds. Out of the four formulations (F1, F2, F3, and F4), the F2 formulation was deemed most suitable and yielded better results than the others. It also had the best stability. As a result, it was chosen as the final formulation.

## CONCLUSIONS

Traditional knowledge was used in the formulation of the herbal shampoo preparation, with a focus on creating a stable and functionally useful product. Factors such as UV radiation and the use of harsh chemical products can affect hair both directly and indirectly. The current study has made the greatest effort to address these issues by creating a herbal shampoo that would protect hair while also providing conditioning, luster, and manageability. The potential of plant extracts for cosmetic applications is the main focus of the current study. Herbs that are particularly effective for hair, including flax seeds, hibiscus, curry,

pomegranate, neem, shikakai, amla, and honey, are used in the study. The least expensive phytoconstituents, or herbs, are struggling to fulfill their potential in polyherbal formulations in order to have synergistic role. Because it's widely held that herbal cosmetics are risk-free and have no negative side effects, interest in and demand for these products are growing. The chemical-free shampoo formula lessens hair loss, boosts hair development, lessens gray hair, and leaves hair looking shiny, silky, and full of bounce. The mixture is affordable and safe.

### CONFLICT OF INTEREST

The authors have no conflicts of interest regarding this investigation.

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