



FORMULATION AND EVALUATION OF HERBAL SHAMPOO FROM GREWIA SERRULATA DC. STEM BARK

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ABSTRACT

Shampooing is one of the most common forms of hair treatment, primarily cleansing the hair and scalp. Herbal shampoo is a natural haircare product used to remove grease, dirt and dandruff, promote growth, and strengthen the hair. This study aims to formulate a shampoo containing herbal extract that can be an alternative to chemical-based shampoo and may also show better safety. Aqueous extract of stem bark of *Grewia serrulata* DC. belonging to the family Tiliaceae which is highly mucilaginous in nature was used as the main ingredient in the formulated herbal shampoo. The main objective of the study was to prepare herbal shampoo incorporating the herbal constituent base and evaluate the herbal shampoo for cosmetic purposes.

Keywords: Herbal shampoo, *Grewia serrulata* DC. stem bark, Evaluation methods

INTRODUCTION

Every individual does their best to look and smell good. The beauty industry is one of the most stable and consistently growing industries. Hair is an essential

beautifying part of human beings. Since ancient times, herbal drugs have beautified and cleansed hair. Hair care represents the largest segment in the global beauty

market. Shampoos are one such hair care product used as cosmetics. The skin over the head produces a greasy sebum to protect the hair. This gives the hair a healthy shine. Shampoo is thus needed to protect the hair and scalp. Herbal shampoo is one of the most popular products for daily cleaning of the hair and scalp. It has been used for many years. Herbal shampoos are cosmetic preparations that use herbs as a base for the preparation as an alternative to the synthetic shampoo available in the market. *Grewia serrulata* DC. commonly known as *Kadpedenji* in Tulu language, is a small tree with slender branches. It is widely distributed in and around Moodabidire Taluk, Dakshina Karnataka, Karnataka. Leaves of *Grewia serrulata* DC. are alternate (rarely opposite), simple, entire, with serrations, sparsely stellate pubescent on both sides when young, and glabrous when mature. Flowers are

axillary in umbellate cymes. Fruits are drupe. The fresh stem bark is greyish brown coloured externally and creamish white internally. Dried stem bark powder is light yellowish in colour. Length varies from 30 cm to 1 meter with no characteristic odour and highly mucilaginous in nature. The mucilaginous water of stem bark is advised for hair wash in dandruff condition among folklore practitioners in and around Moodabidire taluk, Dakshin Kannada, Karnataka.

MATERIALS AND METHODS

The stem bark of *Grewia serrulata* DC. was collected from the village in and around Moodabidire taluk. Other ingredients for the shampoo were gathered from the local market, Moodabidire, Karnataka. The plant extracts were mixed in different proportions to obtain a shampoo whose formula is shown in Table no.1.

Table No.1 Formulation of herbal shampoo

Sl.No.	Ingredients	Quantity	Uses
1	<i>Grewia serrulata</i> DC. aqueous extract	89ml	Cleanses, conditions hair, prevent dandruff
2	SLS	0.8gm	Act as foaming agent
3	Glycerin	8ml	Moistens the scalp
4	Triethanolamine	2ml	Act as thickening agent
5	Tea tree oil	0.6ml	Prevent dandruff, act as preservative
6	Lavender oil	0.2ml	Act as aromatic agent
7	Rosewater	0.2ml	Act as aromatic agent
8	Coloring agent	Qs.	Imparts color

Preparation of plant extract

The required quantity of stem bark of *Grewia serrulata* DC. was collected freshly, washed under running water to remove the foreign particles and used to prepare the cold infusion. The infusion was filtered and taken for further shampoo preparation.

Formulation of herbal shampoo:

Grewia serrulata DC. stem bark aqueous extract was initially taken, added with Sodium Lauryl Sulphate, and homogeneously mixed. Glycerin and Triethanolamine were added to adjust the thickness of the shampoo. Tea tree oil was added to the above mixture. Lavender oil and rosewater were added to impart aroma to the prepared shampoo, followed by a colouring agent to impart colour.

EVALUATION OF HERBAL SHAMPOO

The prepared formulation was evaluated for product performance, including organoleptic characters, physico-chemical characterization, and solid content determination. To guarantee the nature of the item, particular tests were performed for foam volume, foam stability, and wetting time using a standard protocol.

1. Visual assessment: The prepared formulation was assessed for colour, clarity, odour, and froth content¹.

2. Testing of wetting: Wetting time was calculated by noting the time required by the canvas paper to sink completely². A canvas paper weighing 0.44 g was cut into a disc with a diameter measuring 1 inch. The canvas paper disc was placed over the shampoo (1% v/v)

surface. Time taken for the paper to sink was measured using the stopwatch.

3. Foam stability test: The stability of the foam was determined using the cylinder shake method. About 50 ml of formulated shampoo (1%) solution was taken in a graduated cylinder of 250 ml capacity and shaken 10 times vigorously. Foam stability was measured by recording the foam volume of the shake test after 1 min and 4 min, respectively.

4. Dirt dispersion test: To 10 ml of refined water, two drops of cleanser were included and taken in a wide-mouthed test tube. To the formulated shampoo, add one drop of Indian ink and shake for 10 min after closing the test tube with a stopper. The ink volume in the froth was measured, and the result was graded in terms of none, slight, medium, or heavy.⁴

5. Conditioning performance evaluation: A hair tress of an Asian woman collected from a local saloon was cut into four swatches of the tresses with approximately 10 cm length. One of the swatches without washing served as the control. The other three tresses were identically washed with the shampoo. For each cycle, each tress was shaken with the shampoo identically. For each cycle, each tress was shaken with the mixture of 10 g of a sample and 10 g of water in a conical flask for 2 minutes and then rinsed with water. Each tress was left for air drying at room temperature. The braids were washed for a maximum of 5 cycles. The conditioning performance of the shampoo, such as the smoothness and softness of the braids, was evaluated by ten volunteers through a blind touch test. The volunteers were blindfolded and asked to touch the tresses labelled with random codes. One of the braids was the control, and the other three tresses were treated with the sample. Volunteers were asked to rank the

conditioning performance of the braids after touch, using the score from 1 to 4, where 1 is poor, 2 is satisfactory, 3 is good, and four is excellent^{5,6}

6. Skin irritation test: 1% v/v shampoo solution was constituted in distilled water and applied over the skin. The applicant was allowed to remain in contact for two hours.

7. Determination of percentage of solid contents: The percentage of solid contents in the shampoo was measured by taking 4 g of shampoo in a pre-weighed porcelain dish. The liquid portion was evaporated entirely, and the solid left after evaporation were weighed. The results were expressed as the percentage weight of solid contents in the shampoo⁷.

Observation & calculation:

1. Weight of empty petri plate (A)= 67.598 gm
2. Weight of plate after evaporation (B)=67.970 gm
3. Weight of sample = (B) – (A) = 67.970 – 67.598 = 0.372 gm
4. Total solid content =0.372 gm
5. Therefore, percentage of solid content = (B – A)/ 4 x 100 = 0.372 gm / 4 x 100 = 9.3%

8. Foaming Index: The cylinder shake method determined foaming ability. 5 ml of shampoo was taken into a measuring cylinder, and the volume was made up to 25 ml and shaken properly ten times. Further, 5 test tubes were taken and the stock solution was measured as given in table no. 2. Each test tube was adjusted for volume up to 10 ml by adding water. Foam in each test tube was measured in cm, and the foaming index was calculated⁸.

Table no.2: Foaming index calculation

Test tube containing ml of stock solution	Height of foam in cm
1ml	0.9
2ml	1.2
3ml	1.9
4ml	2.5
5ml	2.6

Calculation:

Foaming Index = 1000 /A

Where A = volume of decoction having exact 1cm height

Therefore, foaming index = 1000 / 2 =500

RESULT AND DISCUSSION

Evaluation of formulated shampoo

Table no.3 Results of evaluation of formulated herbal shampoo.

Sl. No	Evaluation Test	Observation
1	Physical appearance	Greenish
2	Clarity	Translucent
3	Odor	Pleasant
4	Wetting time	90s
5	Foaming ability	Good
6	Foam stability	Foam left as such after 15 min
7	Dirt dispersion test	No dirt
8	Conditioning performance	Good
9	Skin sensitization test	Negative
10	Percentage of solid content	9.3%
11	Foaming index	500
12	Nature of hair after washes	Soft and smooth

- 1. Physical appearance:** The prepared shampoo showed good characteristics- Greenish and translucent on visual inspection of the formulation and characterized with pleasant smell.
- 2. Wetting time:** To test the efficacy of the shampoo, the wetting ability of a surfactant needs to be calculated depending on the concentration of surfactant. For the evaluation of wetting ability of the shampoo, canvas disc method was used which is an efficient, quick, easy, and reliable method. The prepared shampoo showed the wetting time of 90s.
- 3. Foaming ability and foaming stability:** From the consumer point of view, foam stability is one of the important need of a shampoo. An important parameter that was considered in the shampoo evaluation was determination of foaming stability. Ideally, a good shampoo produces sufficient foam when shaken. The formulated shampoo produced enough foam when shaken with sufficient water in a test tube The foam was left as such for 15 minutes.
- 4. Dirt dispersion test:** In the dirt dispersion test using Indian ink, the volume of ink in the froth was measured and the result was graded as slight.
- 5. Conditioning performance:** Conditioning performance of the formulated shampoo was based on the mean scores of the volunteers. Majority of the volunteers rated the score of 4 (excellent) for the tress that were washed 3 times by the shampoo. The results of the study clearly indicated that the formulated shampoo has good conditioning performance level.
- 6. Skin irritation test:** 1% v/v solution of the formulated shampoo in water was applied to the skin and kept in contact for 2 h. There were no symptoms of irritation, redness, itchiness or inflammation in the applied area, explaining that the herbal shampoo was safe to be used.
- 7. Determination of percentage of solid contents:** A shampoo is considered good if the percentage of solid contents are sufficient enough thereby it can be easily applied and rinsed out from the hair. Lack of enough solids results in quick wash away

of the shampoo from the hair. On the other hand, presence of too many solids in the shampoo will be hard to work into the hair or too hard to wash out. The percentage of solids in the formulated shampoo was found to be 9.3%.

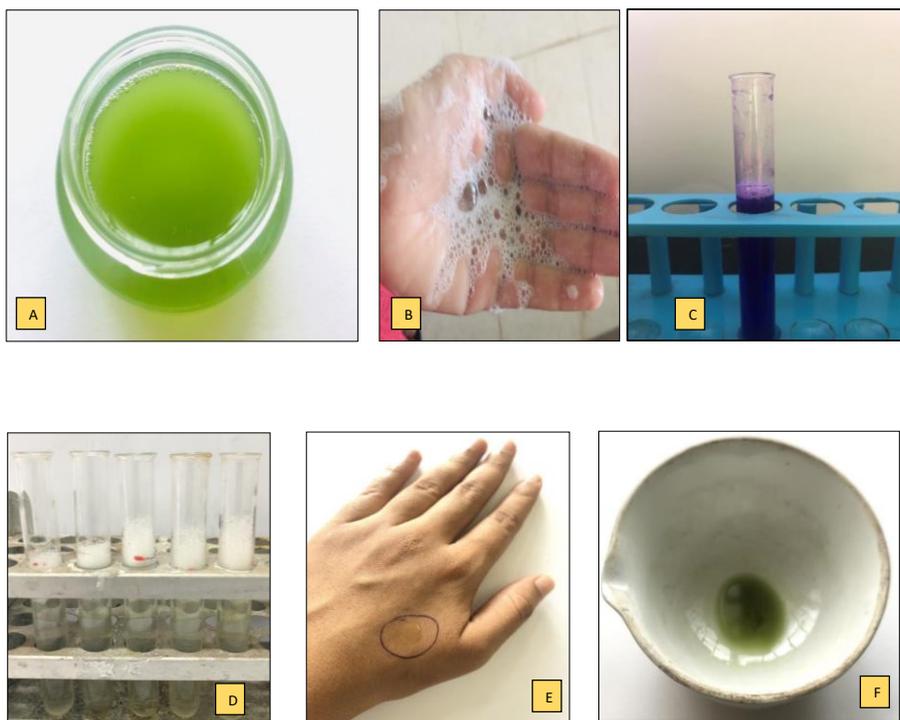
8. Foaming Index: The foaming index of formulated herbal shampoo was 500.

Merits of herbal shampoo:

Herbal shampoos are used to promote hair growth by naturally stimulating the hair follicles. They are environment friendly as they contain biodegradable materials rather than harsh chemicals. Herbal shampoos are considered safe as they contain all natural ingredients; it is a non-allergic product, which makes them suitable for all the skin types, including sensitive & allergy-prone skin⁹. Pooja et al. opine that the plant products in herbal shampoo may be used in their powdered form, crude form, purified extracts, or derivative form¹⁰. The aqueous extract of stem bark of *Grewia serrulata* DC. was utilized as a base for the prepared shampoo in this study. Shinde et al. opines that herbal formulations are considered as an alternative to synthetic shampoo but formulating cosmetics using

completely natural raw material is a difficult task¹¹. It is challenging to prepare an herbal shampoo using a single natural material that would be milder and safer than the synthetic shampoo and at the same time, would compete favorably with its foaming, detergency and solid content. We, therefore, considered formulating an herbal shampoo using traditionally and commonly used plant material as the main ingredient. Synthetic surfactant Sodium Lauryl Sulphate in a minimal amount of 0.8gm in 100ml solution was added to the prepared shampoo and triethanolamine was added to maintain the minimal thickness of the shampoo. In the present formulated shampoo, though named herbal shampoo, there are few inevitable sources utilized to maintain the shelf life of the formulation. Further changes can be made in the formulation in order to avoid the chemical reagents for a better outcome.

Figure No. 1: Evaluation of herbal shampoo
A. Physical appearance of herbal shampoo, B. Foaming ability, C. Dirt dispersion test, D. Foaming index, E. Skin irritation test, F. Solid determination test



CONCLUSION

The present study was carried out to prepare an herbal shampoo that reduces hair loss and dandruff, is safer than chemical conditioning agents, and strengthens hair growth. Herbal shampoo was formulated with the aqueous extract of the stem bark of *Grewia serrulata* DC., traditionally used for cleansing hair among the folklores in and around Moodabidire taluk, Karnataka. The primary purpose behind this investigation was to develop a stable and functionally effective shampoo. Various tests were performed to evaluate the prepared shampoo's excellent product performance. The evaluation study of the formulated herbal shampoo revealed a comparable result for the quality control test, but further scientific validation is needed for its overall quality.

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