



**INTERNATIONAL JOURNAL OF
PHARMACEUTICAL SCIENCES**
[ISSN: 0975-4725; CODEN(USA): IJPS00]
Journal Homepage: <https://www.ijpsjournal.com>



Research Paper

Formulation And Evaluation of Shampoo, Conditioner & Serum Trio-Pack

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ARTICLE INFO

Published: 28 Apr 2026

Keywords:

Poly-herbal shampoo, anti-dandruff, TLC, Salvia hispanica

DOI:

10.5281/zenodo.19846616

ABSTRACT

Polyherbal shampoos(trio pack), formulated with a blend of diverse botanical extracts, have gained prominence in the realm of hair care. Shampoos are mostly used as cosmetic products; they are hair care products that are used for cleaning, beautifying, and managing hair in our daily lives. There are many plants or herbal ingredients utilized for shampoo, like Neem leaves, ritha, shikakai, amla, lauryl glucoside, aloe vera, lemon juice, rice water and gelatin etc. Shampoos are classified according to their activities, such as based on appearance, which includes powder shampoo, liquid shampoo, etc., and based on function, which includes conditioning shampoo, anti-dandruff shampoo, etc. Shampoos are viscous solutions of detergents containing suitable additives, preservatives, and active ingredients. Some plants show their activities, such as Salvia hispanica, which is used to reduce hair fall and enhance new hair growth; Prunus dulcis, which provides strength to hair and stimulates follicles; and Centella Asiatica L., which boosts hair growth. The purpose of this study is to formulate and evaluate a trio pack of shampoo which consist shampoo, conditioner and serum because this kind of formulation is currently not present in market which should maintain and growth the hair and scalp. The benefits of herbal cosmetics, which have negligible side effects, reduce allergic reactions, and have no more chemicals added..

INTRODUCTION

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp

and hair in our daily life. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives, preservatives and active ingredients. It

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Relevant conflicts of interest/financial disclosures: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.



is usually applied on wet hair, massaging into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt that is build up on the hair without stripping out much of the sebum. Many synthetic shampoos are present in the current market both medicated and non-medicated, however, herbal shampoo popularized due to natural origin which is safer, increases consumer demand and free from side effects.

In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as eye irritation, scalp irritation, loss of hair, and dryness of hairs. Alternative to synthetic shampoo we can use shampoos containing natural herbals. However, formulating cosmetic products containing only natural substances are very difficult. There are a number of medicinal plants with potential effects on hair used traditionally over years around the world and are incorporated in shampoo formulation. These medicinal plants may be used in extracts form, their powdered form, crude form, or their derivatives. To develop a shampoo containing an only one natural substance which would be safer with milder effect, then the synthetic shampoo is difficult and also it should possess good foaming, detergency, and solid content as such synthetic shampoo. Hence, we considered in detailing an unadulterated natural cleanser utilizing conventional technique using regularly utilized plant material for hair washing. The foaming and cleansing action but their regular use leads to dryness of hairs, In essence, a shampoo is a detergent solution with appropriate chemicals for additional benefits including lubrication, medicine, and improved hair conditioning. There are a lot of synthetic, herbal, medicated, and non-medicated shampoos on the market these days, but customers are becoming more interested in herbal shampoos since they think these natural products are safe and have no

negative side effects. The main reasons synthetic surfactants are added to shampoo are hair loss, scalp irritation, and eye irritation. While herbal formulations are thought to be an alternative to synthetic shampoo, it can be challenging to create cosmetics utilizing just natural ingredients. Numerous medicinal plants are frequently included in shampoo formulations and are said to have positive effects on hair. These plant-based compounds can be utilized as derivatives, crude, powdered, or refined extracts. It is very challenging to make a herbal shampoo with a single natural ingredient that would be safer and gentler than synthetic ones while yet competing well in terms of foaming, detergency, and solid content. Therefore, we thought about creating a pure herbal shampoo using plant elements that are typically used for hair cleaning in India and the Gulf region in particular. The word "cosmetic" comes from the Greek word "cosmesis," which means "beautifying substance." Cosmetics are chemicals that are applied to the human body to enhance its appearance. Cosmetics, such as skin-care creams, lotions, powders, perfumes, lipsticks, fingernail and toe nail polish, eye and facial makeup, permanent waves, colored contact lenses, hair colors, hair sprays and gels, deodorants, baby products, bath oils, bubble baths, bath salts, and various types of butter, are in high demand in both developed and developing countries. Herbal cosmetics are a precious gift from nature, and their market is growing worldwide. A range of herbal cosmetics are available to complete your beauty routine, and applying herbal cosmetics is quite safe for your skin and hair. Nonetheless, the use of herbs as medications and cosmetics is on the rise. The current study's goal is to create and assess a multipurpose herbal shampoo by removing all conventionally added synthetic components and using a variety of herbs. This shampoo strengthens, darkens, and encourages hair growth while getting rid of dandruff, sebum, and



impurities. Additionally, it serves as a conditioning agent. All of these functions are carried out by this herbal shampoo powder without harming or compromising hair. Herbal shampoos meet the consistency requirements and can be classified as nourishing, antimicrobial, or plain shampoo based on the makeup of the components. Including hydrolyzed proteins, vitamins, and amino acids. The potential of an ingredient to cleanse, nourish, and protect the skin while preventing damage to it is taken into consideration when choosing active ingredients for hair care powders. To improve the stability and safety of a shampoo's composition, some of these compounds must be added.

CONDITIONER:

Hair conditioner is often a viscous liquid that is applied and massaged into the hair. Conditioner contain a variety of conditioning and moisturizing ingredients that are left behind on the hair after rinsing and affect the hair characteristics. The primary conditioning agents include quaternized surfactants (quats), cationic polymers, silicones, emollients, and humectants. Hair conditioners may contain moisturizers, oils and sunscreen, among other ingredients. Conditioners are frequently acidic, as low pH protonates the keratins amino acids. The hydrogen ions give the hair a positive charge and creates more hydrogen bonds among the keratin scales, giving the hair more compact structure. Organic acids such as citric acid are usually used to maintain acidity. They will act basically on shaft of the hair. The conditioner gives hair luster, manageability, and antistatic qualities.

CLASSES OF CONDITIONER:

- Regular rinse off conditioner
- Intensive treatment conditioner
- Leave-in products
- Ordinary conditioner
- Hold conditioners

BENEFITS OF HAIR CONDITIONER:

- Lessen the forces used in hair brushing.
- Offers advantages for color-treated hair in terms of color retention.
- The decrease or avoidance of flyaway hair.
- Making brushing easier.
- Hair repair.
- Hair strengthening
- Split end repair.
- A rise in the luster of hair

SERUM:

Serum is one of the cosmetic products with very high concentration of active ingredient in their formula for providing intensive nutrition to the deeper skin layer and non-greasy finish product which suitable for skin. Hair serum is the styling product that coats the surface of the hair known as hair serum. It is basically a hair care product in liquid form, its consistency thicker than water. Hair serum is not just meant for hair styling. They are also for treating multiple hair concerns like dry hair, dull hair, and unmanageable hair. Different kinds of hair serums are available for various hair objectives. A hair serum may straighten hair, add gloss, or lessen frizz, depending on the product's recipe. This is silicone based styling product that is designed to coat the surface of hair to help impart added shine, smoothness hydration, humidity and pollution protection.

MATERIALS AND METHODS



Table 1: Ingredient Table

SR.NO	INGRIDENT	QUANTITY	PROPERTIES
1	Reetha	5gm	Foaming agent
2	Neem	5gm	Anti Bacterial
3	Aloevera	5 ml	Conditioning agent
4	Aamla	5gm	Nourishment
5	Lemon Juice	2ml	Preservative
6	Shikakai	5gm	Clean the scalp
7	Gelatin	5ml	Smooth & Shine the hair
8	Fenugreek	5ml	Nourish hair
9	Vitamin E	Q.S.	For Hair growth
10	Distilled Water	Q.S.	Vehicle
11	Hibiscus	5ml	Natural Conditioner



Figure 1: Ingredient and API's

PROCEDURE:

Preparation of Shampoo-

First collect all the herbs and excipients which should used to prepare the formulation



Then wash the herbs and dry it for the extraction of herbs



The triturate the dry herbs and extract it with the help of soxhlet assembly



Figure 2: Extraction of Crude Drug

Then start the further procedure to make the shampoo



Mix amla, shikakai and reetha powder in required water



Then boil it for 15-20 minutes



After properly boiling cool it and filter it



Figure 3: Preparation of Shampoo

The add aloe vera juice, neem extract, glycerin and lemon juice in filtrate



Mix it properly and add perfume in it

Preparation of Conditioner:

Mix aloe vera juice, coconut oil and hibiscus extract



Then add honey, glycerin and lemon juice in it



Then add rose water slowly while stirring till smooth lotion forms



Then transfer it into a clean conditioner bottle

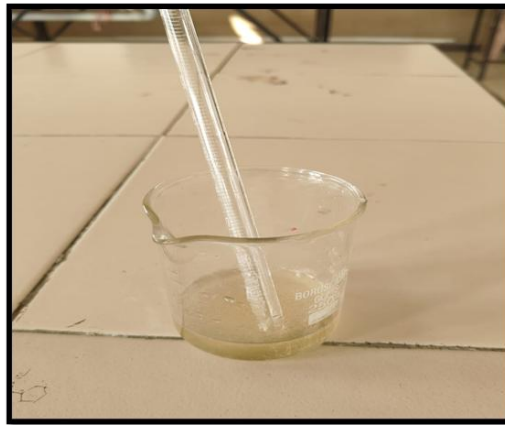


Figure 4: Preparation of Conditioner

Preparation of Serum:

Take argan oil in a small beaker



Add aloe vera extract and stir it well



Then add vitamin E in it and mix it well



Add rose water dropwise with stirring until smooth serum like texture forms



Store in a small pump bottle

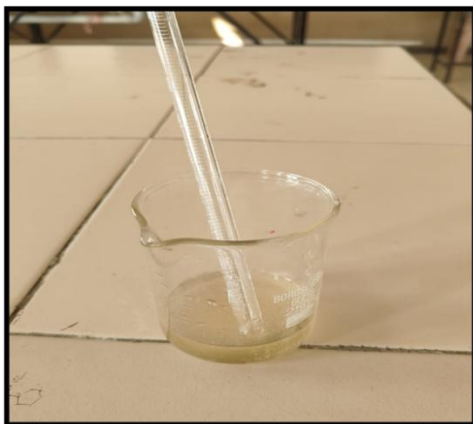


Figure 5: Preparation of Serum

EVALUATION OF FORMULATION

1) Determination of pH: - At 27 degree temperature combine 01g of shampoo with 9 ml of water, then use a ph meter to measure the ph. It evaluated by means of ph analyzer at room temperature.

2) Physical appearance: The prepared formulations were assessed for fluidity, clarity, and capacity to produce foam.

3) Determination Percentage of solid content: Weighing an evaporating dish that was dry and clean, we put 4g of shampoo to it. The dish and shampoo were weighed. After the exact weight of the shampoo was established, the evaporating dish containing the shampoo was placed on a hot plate to allow the liquid part to evaporate. The weight of the shampoo alone was measured after drying.

4) Rheological Evaluation: A Brookfield viscometer was used to measure the shampoos viscosity. After dipping a spindle for approximately five minutes in a beaker containing ten millimeters of shampoo, readings are taken.

5) Dirt Dispersion: Two drops of shampoo were introduced to a big test tube containing ten milliliters of pure water. The test tube was stopped and shaken ten times after one drop of India ink was added. The estimated levels of ink in the foam were none, light, moderate, or substantial.

6) Cleansing action: Crease was applied to 5gm of albino mouse, which was then submerged in 200

millimeters of water in a flask containing 1 gram of soap. The water's temperature was kept at 350 degree. For four minutes, the flask was shaken fifty times per minute. After removing the solution, the sample was removed, dried and weighed. The following formula was used to determine the amount of grease removed DP is equal to $100(1/T/C)$. Where, T is the weight of sebum in the test sample, is the weight of sebum in the control sample, and DP is the percentage of detergency power.

7) Surface tension measurement: A stalagmometer was used at room temperature to measure the surface tension of the shampoo that had been prepared in 10% w/v distilled water.

8) Foaming ability and stability: Foaming capacity was evaluated using the cylinder shake method. 50 ml of the 1% shampoo solution was added to a 250 ml graduated cylinder, which was then covered with a hand and shook ten times. The total quantities of the foam contents were recorded after a minute of shaking. The foam volume was the only thing calculated. After four minutes of shaking the foam volume, each minute was recorded.

9) Stability studies: To determine the foam's stability, the cylinder shaking method was applied. About 50 milliliters of the 1% shampoo solution were added to a graduated 250 milliliter cylinder, which was then forcefully shaken ten times. Foam stability was assessed by measuring the shake

test's foam volume after one and four minutes, respectively. After shaking for a minute, the total volume of foam was measured.

10) Wetting time: The wetting time was calculated by timing how long it took the canvas paper to completely submerge. 0.42 g of canvas paper was cut into an inch-diameter disk. The timer was used to measure how long it took the canvas paper disc to sink when it was placed over the shampoo surface.

11) Skin irritation test: Arranged natural cleanser was applied on skin for 5 minutes after that was washed and tried for bothering or aggravation to the skin.

12) Conditioning performance: An artificial hair tress of Indian women was received from a salon and divided into two swatches of length 10cm approximately, weighing 5g. The control swatch was the one without washing and the test swatch using the formulated shampoo was washed with. Each tress was added for 2 min to the combination of shampoo in water in the proportion 10:15 taken in a conical flask and washed using 50 ml of distilled water. Each tress was air dried at room temperature and the procedure was repeated for maximum of 10 times. The conditioning effected of the prepared shampoo in terms of softness and smoothness as determined using a blind touch test using volunteers of student 20 numbers selected randomly. All the students were blind folded and asked to touch and rate the four tresses for conditioning performance from score 1 to 4.

13) Detergency ability: The samples' detergency ability was assessed using the Thompson method. In short, a 5% laurel glucoside solution was used to wash a scrunch of hair, which was subsequently dried and separated into 3g weight groups. The

samples were suspended in a hexane solution with 10% synthetic sebum, and the combination was agitated at room temperature for fifteen minutes. Samples were then taken out, the solvent was allowed to evaporate at room temperature, and their sebum content was ascertained. Lastly, the formula $DP=100 (1T/C)$, where DP is the percentage of detergency power, C is the weight of sebum in the control sample, and T is the weight of sebum in the test sample, was used to determine the percentage of detergency power.

14) Anti-Microbial Assay: Values are mean for four imitates Microbiological appraisal of Cleanser Assessment of the nature of the cleanser at microbiological level was finished to affirm the sufficiency of the non-expansion of additive to the cleanser to decide how long the cleanser tests would be really great for use according to a microbiological perspective, Francis and Boniface, (2017). Toward the finish of every week after week time span accomplished for quite some time, there was no proof of microorganisms or parasites development on the way of life packs from the two examples. It very well may be inferred that the cleanser isn't auspicious to the development of growths and microorganisms.

RESULT & DISCUSSION:

The current research aims to effectively create an trio pack of hair shampoo using traditional herbal extracts known for their hair cleansing properties in India. All the components utilized in crafting this herbal shampoo are deemed safer in comparison to commercially available products. (1) Hair conditioner is one of the cosmetics which is widely used in daily life.



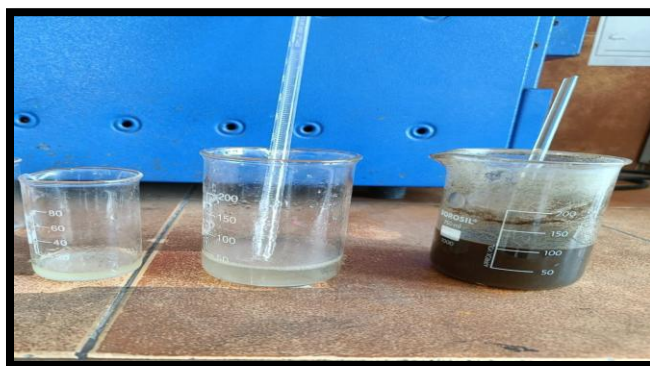


Figure 6: Prepared Shampoo, Conditioner & Serum

They will act basically on shaft of the hair. The conditioner gives hair luster, manageability, and antistatic qualities. Additionally, conditioners try to restore hair that has been harmed by typical sources of trauma, such as chemical or mechanical damage. (2) The herbal hair serum was stored for three months at two different temperatures of $4 \pm 2^\circ\text{C}$ and $30 \pm 2^\circ\text{C}$ with 65% relative humidity. This included heavy brushing and hot blowing. After

three months, the pH and viscosity of the herbal hair serum were measured and compared to their initial values. Several experiments were carried out to evaluate the produced shampoo's efficacy. In terms of quality control assessment, the results of the evaluation of the recently developed shampoo showed similarities. However, additional scientific confirmation is required to verify its overall quality.

Table 2: Evaluation test result

S. No.	Name of Test	Result
1	pH test	5.92
2	Consistency	Good
3	Viscosity	6350
4	Dirt dispersion	Good
5	Spreadability	4.3
6	Washability	Easily washable in water
7	Foam stability	23%
8	Skin irritation	Non irritant

Table 3: Organoleptic test

S. No.	Organoleptic Test	Result
1	Colour	Brownish black
2	Odour	Rosy
3	Taste	Aromatic and bitter
4	Texture	Smooth



Figure 7: pH test



Figure 8: Consistency test



Figure 9: Viscosity test



Figure 10: TLC test



Figure 11: Spreadability test



Figure 12: Washability test



Figure 13: Foamability test



Figure 14: Skin irritancy test

CONCLUSION

Preparation and evaluation of trio pack of hair shampoo is a complex process that requires careful consideration of various factors, such as the selection of plant or herbal ingredients required for formulation, their extraction method, and the evaluation of the end or final product for its safety and efficacy. The use of herbal ingredients or plants in shampoo formulation offers potential benefits such as improved hair health, reduced environmental impact, inhibited hair fall, and a boost to new hair growth. However, it is important to conduct testing and evaluation to ensure the safety and effectiveness of the product. Overall, the estimation and assessment of herbal shampoo is an important area for research that has the potential to offer consumers a more natural and sustainable hair care option.

The aim of the current study was to develop a trio pack of hair shampoo contain shampoo, conditioner and serum that improves the growth of hair while minimizing hair loss and combing it is safer than chemical conditioning agents. In addition to being safer than chemical conditioning agents, the shampoo formulation also significantly reduced hair loss during combing and strengthened hair growth. The pH of the shampoo was adjusted to maintained the acidic mental of the scalp, and a physiochemical approach was used for formulation preservation to avoid the risk posed by chemical preservatives.

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HOW TO CITE: Sagar Verma, Devid Patel, Dushyant Patel, Nisha Neval, P Yamini, Rajat Rathore, Shweta Ram, Dr. Gyanesh Kumar Sahu, Suchita Wamankar, Dr. Chanchal Deep Kaur, Formulation And Evaluation of Shampoo, Conditioner & Serum Trio-Pack, *Int. J. of Pharm. Sci.*, 2026, Vol 4, Issue 4, 4633-4645, <https://doi.org/10.5281/zenodo.19846616>

