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Formulation and evaluation of herbal shampoo

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Abstract
The increasing demand for natural and sustainable personal care products has led to growing interest in herbal formulations for hair care. This study focuses on the development and evaluation of an herbal shampoo incorporating *Emblica officinalis* (amla) and *Eclipta alba* (bhringraj), two botanicals renowned in traditional Ayurvedic medicine for their potent hair-nourishing properties. Amla is rich in vitamin C, antioxidants, and essential fatty acids that strengthen hair follicles, promote hair growth, and prevent premature greying. Bhringraj, often termed the "king of hair," is known for its revitalizing effects, including enhancement of hair luster, reduction of hair fall, and stimulation of scalp microcirculation. The formulated shampoo was assessed for physicochemical parameters such as pH, viscosity, foamability, and conditioning effects, and demonstrated excellent cleansing efficacy along with improved hair texture and manageability. The combination of Amla and Bhringraj offers a synergistic effect, making the formulation a promising, chemical-free alternative for holistic hair care.

Keywords: Herbal shampoo, Amla, Bhrigraj, Antidandruff, moisturizing effect

Introduction
The main object of this present study is to prepare and evaluate an herbal shampoo and determine physiochemical function that emphasizes on safety, efficacy and quality of the product Herbal Shampoo is the natural haircare product which is use to remove grease, dirt, dandruff and promote hair growth, strengthens and darkness of the hair. It is also providing softness, smoothness, and shines for the hair. Various drugs are used for the preparation of cosmetics shampoo. Such drugs show various side effects such as hair loss, increased scaling, scratching, discomfort, nausea and headache. Therefore, an attempt is made to formulate herbal shampoo that is free from side effects. [1]

Herbal Shampoo
Shampoos are probably the most widely used cosmetic products for cleansing hairs and scalp in our daily life. Herbal shampoos are the cosmetic preparations that with the use of traditional ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo. They are used for removal of oils, dandruff, dirt, environmental pollutions etc. Herbal shampoo is a type of cosmetic preparation that uses herbs from plants as an alternative to the synthetic shampoo available in the market. The herbal shampoo is important, as people nowadays prefer herbal products than chemical ones for they proved to enhance health. The awareness and need for cosmetics with herbs are on the rise, primarily because it is believed that these products are safe and free from side effects [2].

Objectives
The objective of this study is to formulate and evaluate poly-herbal shampoo for cosmetic purpose from herbal ingredients.

Need of Shampoo
The skin on our head produce a greasy fluid called sebum. It is produced to protect the hair by coating itself all over the head. This give the hair a healthy shine but when secretes in large amount it makes the hair look dirty.

History
Indian Subcontinent
In the Indian subcontinent, a variety of herbs and their extracts have been used as shampoos since ancient times. A very effective early shampoo was made by boiling Sapindus with dried Indian gooseberry (amla) and a selection of other herbs, using the strained extract. Sapindus,

also known as soapberries or soapnuts, a tropical tree widespread in India, is called ksuna. In ancient Indian texts and its fruit pulp contains saponins which are a natural surfactant. The extract of soapberries creates a lather which Indian texts called phenaka. It leaves the hair soft, shiny and manageable. Other products used for hair cleansing were shikakai (Acacia concinna), hibiscus flowers, ritha (Sapindus mukorossi) and arappu (Albizzia amara). Guru Nanak, the founder and the first Guru of Sikhism, made references to soapberry tree and soap in the 16th century. [3]

Cleansing with hair and body massage (champu) during one's daily bath was an indulgence of early colonial traders in India. When they returned to Europe, they introduced the newly learned habits, including the hair treatment they called shampoo.

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 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.

Functions of Herbal Shampoo

- Lubrication
- Conditioning
- Hair Growth
- Maintenance of Hair Colour
- Medication

Desired Properties of Hearbal Shampoo

- Ease of Application
- Removal of More Debris
- Easy Wet Combing
- Fragrance
- Low Level of irritation
- Well Preserved
- Good Stability

Ingredients Used

- oap nut extract (Sapindus)
- Amla extract
- Shikakai extract
- Bhringraj extract
- Hibiscus
- Aloe vera
- Lemon juice
- Gaur Gum

Soap Nut

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Sapindales
Family	Sapindaceae
Subfamily	Sapindoideae
Genus	Sapindus L.

Fig 1: Dried fruit and powder of Soap Nut

Amla (Phyllanthus emblica)

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malpighiales
Family	Phyllanthaceae
Subfamily	Phyllanthus
Genus	P. emblica

Fig 2: Fruit and powder of Amla

Shikakai (Acacia concinna)

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Fabales
Family	Fabaceae
Subfamily	Caesalpinioideae
Genus	Senegalia

Fig 3: Fruit and Powder of Shikakai

Bhringraj (Eclipta prostrata)

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Order	Asterales
Family	Asteraceae
Genus	Eclipta

Fig 4: Bhringraj Powder

Hibiscus

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malvales
Family	Malvaceae
Subfamily	Malvoideae
Genus	Hibiscus

Fig 5: Hibiscus Flower

Aloe Vera (Aloe barbadensis)

Scientific Classification	
Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Monocots
Order	Asparagales
Family	Asphodelaceae
Subfamily	Asphodeloideae
Genus	Aloe

Fig 6: Aloe Vera

Importance of this formulation

- The selection of active ingredients for hair care shampoo is often based on the ability of the ingredient to prevent damage to skin as well as to improve the quality of the skin by way of cleansing, nourishing, and protecting the skin.
- It has not make the hand rough and chapped.
- It's not give any side effects or causes irritation to the eye.
- It produces a good amount of foam to satisfy the psychological requirements.

No.	Constituent	Biological Source	Family	Uses
1.	Soap Nut	Dried fruits of Sapindusmukorossi	Sapindaceae	Detergent and antidandruff.
2.	Amla fruit	Dried ripe fruits of Embelicaofficinalis	Euphorbiaceae	Darkening of hairs and hair growth promoter.
3.	Shikakai fruit	Dried pods of Acacia concinna	Mimosaceae	Foam base and anti-dandruff.
4.	Hibiscus	Dried flower of Hibiscus rosea	Malvaceae	Prevents hair loss and hair growth
5.	Alovera	Gel of leaves of Aloe barbadensis miller	Liliaceae	Conditioner and moisturizing effect.

Materials and Methods

- **Plants:** The herbal plant extract materials required for the present study were obtained from the surrounding areas of the college as well as our home. Under the required conditions.
- **Preparation of Extract:** About 100 g of each powdered plant extract materials, namely H. rosa- sinensis, E. officinalis, A. concinna, S. indica, E. prostrate, A. Barbadensis, and C. auriculata, were homogenized. The powdered herbal plant extract material was extracted with distilled water by boiling for 4 hours. The extract of each powder plant material was separated and evaporated. As shown in table below.

Table 2: Extraction of Herbal Drug

No.	Drug Name	Parts	Quantity for 100g
1.	Neem powder	Leaves	09%
2.	Hibiscus flower powder	Flower	12%
3.	Aloe Vera powder	Leaves	07%
4.	Shikakae powder	Pods	22%
5.	Amla powder	Fruit	25%
6.	Soap Nut	Nut	20%

Formulation of Herbal Shampoo

Formulation of the herbal shampoo was done as per the formula given in Table. To the Gaur gum solution (10%), added the herbal plant extract and mixed by shaking continuously at the time interval of 20 min. 1 ml of lemon juice was also added with constant stirring. To improve aroma in the formulation, sufficient quantity of rose water was added and made up the volume to 100 ml with Gaur gum. [5]

Table 3: Formulation of Herbal Shampoo

No	Material Required	Quantity	Medicinal Use
1.	Neem	0.5 g	Antibacterial agent
2.	Soap Nut extract	0.5 g	Foaming agent
3.	Amla Extract	0.5 g	Antidandruff agent
4.	Shikakai Extract	0.5 g	Detergent
5.	Hibiscus	0.5 g	Conditioning agent
6.	Bhringraj Extract	0.5 g	Hair growth
7.	Aloe vera	01 g	Moisturizing agent
8.	Lemon juice	q.s	Antimicrobial agent
9.	Gaur Gum	q.s.	Binding agent
10.	Rose water	q.s	Fragrance

Fig 7: Formulation of Herbal Shampoo

Evaluation of Herbal Shampoo

The prepared formulation was evaluated for product performance which includes organoleptic characters, pH, physicochemical characterization, and for solid content. To guarantee the nature of the items, particular tests were performed for surface tension, foam volume, foam stability, and wetting time using standard protocol.

- **Visual Assessment:** The prepared formulation was assessed for color, clarity, odor, and froth content.
- **pH determination:** The pH of the prepared herbal shampoo in distilled water (10% v/v) was evaluated by means of pH paper at room temperature.
- **Determination of solid content-** The percentage of solid substance was determined by weighing about 4gm of shampoo in a dry, clean, and evaporating dish. To confirm the items, particular tests were performed for foam volume, foam stability, and wetting time by using standard protocol.
- **Testing of wetting-** Wetting time was calculated by noting the time required by the butter paper to sink

completely. A butter paper weighing 0.44gm was cut into disc of diameter measuring 1-inch. Over the shampoo (1%v/v) surface, the butter paper disc was kept and the time taken for the paper to sink was measured using stopwatch.

- **Foam stability test-** The stability of the foam was determined using cylinder shake method. About 10 ml of formulated shampoo solution was taken in a graduated cylinder of 250 ml capacity and shaken for 10 times vigorously. Foam stability was measured by recording the foam volume of shake test after 1 min and 4 min, respectively. The total foam volume was measured after 1 min of shaking.
- **Dirt dispersion test-** To 10 ml of distilled water two drops of cleanser were included and taken in a wide mouthed test tube. To the formulated shampoo, added on drop of Indian ink and shaken for 10 min after closing the test tube with a stopper. The volume of ink in the fourth was measured and the result graded in terms of none, slight, medium, or heavy.
- **Skin sensitization test-** This test is performed on skin of human volunteers and checks whether it irritation on skin or not.
- **Stability test-** Stability and acceptability of organoleptic properties (odour and colour) of formulations during the storage period of 10 days indicated that they are chemically and physically stable. [6]

Result

The shampoo was formulated by admixing the equal amount of the aqueous extracts of all the ingredients with soap-nut. The above herbal plant extract contains phyto-constituents like saponins which is a natural surfactant having detergent property and foaming property. An ideal shampoo must have adequate viscosity and many natural substances possess good viscosity. The Gaur gum solution (10%) behaves as a pseudo-plastic forming clear solutions. Lemon juice (1 ml) added to the shampoo serves as anti-dandruff agent, natural antioxidant, and chelating agent and maintains the acidic pH in the formulation.

Conclusion

It is concluding that our formulation having all the herbal ingredients. Which is not having any toxic or harmful effect on human hairs. Our formulation having Anti-dandruff, Conditioning, Moisturizing, Hair growth properties. Safe to use.

The main purpose behind this investigation was to develop a stable and functionally effective shampoo by excluding all types of synthetic additives, which are normally incorporated in such formulations. To evaluate for good product performance of the prepared shampoo, many tests were performed. The results of the evaluation study of the developed shampoo revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality.

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