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Formulation and Evaluation of Herbal Powder Shampoo

Corresponding Author*
Utkarsh Kasar*, Nikhil Kause*, Pratiksha Kaware*
Student, Dr. N J Paulbudhe College of Pharmacy,
Shaneshwar Nagar, Vasant Tekadi, Savedi, Ahmednagar, Maharashtra, India

Co-Corresponding Author**
Ghugarkar Prasad**
Assistant Professor, Department of Pharmaceutics, Dr. N J Paulbudhe College of Pharmacy
Shaneshwar Nagar, Vasant Tekadi, Savedi, Ahmednagar, Maharashtra, India

ABSTRACT
The study aimed to formulate an herbal powder shampoo and evaluate its physicochemical properties. The herbal liquid shampoo was formulated by adding the fine powder of Shikakai, Methi, Hibiscus, Neem, Ashwagandha, Reetha, Amla, Cinnamon, Kalonji and Rose. Several tests such as Organoleptic character (Odor, Color and Texture), Bulk density, tapped density, Moisture content, Dirt dispersion, pH, Water solubility and Foaming index were performed to determine the physicochemical properties. All the evaluation parameters give the satisfactory results.

Keywords: *Herbal shampoo, herbal cosmetic, Hibiscus rosa-sinensis, Emblica officinalis, Azadirachta indica, Rosa Centifolia, Acacia concinna, Sapindus indica, Trigonella foenum- graecum Linn, Withania somnifera, Cinnamomum verum, Nigella sativa Linn, formulation and evaluation*

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Introduction:
Herbal formulation has growing demand in the world market. The natural remedies are more acceptable in market because it's safe and fewer side effect antidandruff shampoo and nutritional shampoo containing vitamin, amino acids proteins hydrolysate. Currently available treatment of dandruff include therapeutic use of zinc pyrithione, salicylic acid, imidazole derivatives, glycolic acid, steroids, and sulphur and coal tar derivatives. However, these agents show certain limitations, either due to poor clinical efficacy or due to the. Furthermore, compliance issues, these drugs are unable to prevent recurrence. The synthetic shampoo contains cationic, anionic and non-anionic surfactant mix in this surfactant having good foaming character but its toxic and caused irritation of eye. Hard water the surfactants leave a deposit of sodium, calcium and magnesium salts on the hair shaft. So, these synthetic shampoos are found to have side effects like drying effect on the hair. These shampoos leave the hair too dry to handle (or) comb, to avoid these problems, herbal shampoos will be useful. [1-3]

Materials and methods:
Fresh parts of *Hibiscus rosa-sinensis* (Hibiscus flower), *Emblica officinalis* (Amla fruit) and Azadirachta indica (Neem leaves) and *Rosa Centifolia* (Rose petals) were collected from botanical garden and washed under running water to remove contaminants. While *Acacia concinna* (shikakai Pods) and *Sapindus indica* (Reetha fruit), *Trigonella foenum- graecum Linn* (Methi seeds), *Withania somnifera* (Ashwagandha root), *Cinnamomum verum* (Cinnamon bark) and *Nigella sativa Linn* (Kalonji) were collected in dried form from market.

Table 1 List of ingredients used in herbal shampoo powder

Sr. no.	Common name	Picture	Botanical name	Part used	Category/ Use
1	Shikakai		*Acacia concinna*	Powder	Detergent
2	Methi		*Trigonella foenum-graecum Linn*	Seeds	Cleansing agent/Softeningagent
3	Hibiscus		*Hibiscus rosa-sinensis*	Flower	Conditioninzagent
4	Neem		*Azadirachta indica*	Leaves	Antiseptic, Antibacterial
5	Ashwagandha		*Withania somnifera*	Root	Improves circulation
6	Reetha		*Sapindus indica*	Fruit	Detergent
7	Amla		*Emblica officinalis*	Fruit	Anti-dandruffagent
8	Cinnamon		*Cinnamomum verum*	Bark	Antifungal
9	Kalonji		*Nigella sativa Linn*	Seeds	Improves scalphealth
10	Rose		*Rosa Centifolia*	Petals	Flavoring agent

❖ **Formulation table:**

A. **Table 2 Formulation of herbal shampoo powder**

Ingredient	Batches		
	F1	**F2**	**F3**
Shikakai	35	35	35
Methi	7	2	5
Hibiscus	20	15	15
Neem	20	25	20
Ashwagandha	7	5	3
Reetha	15	35	35
Amla	20	10	15
Cinnamon	3	5	4
Kalonji	20	15	15
Rose	3	3	3
Total	**150 (Gram)**	**150 (Gram)**	**150 (Gram)**

- **Procedure of Formulation of Herbal Shampoo Powder:** [4-6]
  - Formulation of herbal shampoo powder
  - Drying: All the powder are in dry form and grinded.
  - Weighing: All the required herbal powders for shampoo preparation were weighed individually
  - Size reduction: The crude ingredients were collected and these ingredients were size reduced using hand driven mixer individually
  - Mixing: All these fine ingredients were mixed thoroughly by mixer to form a homogenous fine powder
  - Sieving: Then this fine powder was passed through sieve no: 80, to get the sufficient quantity of fine powder
  - Packing and labeling: Then it was packed and labeled suitably. Preparation Quantity taken for 100g of Herbal Powder Shampoo

Evaluation of Prepared Herbal Liquid Shampoo: [6-15]

To evaluate the prepared formulations, physicochemical tests viz., Organoleptic character (Odor, Color and Texture), Bulk density, Tapped density, Moisture content, Dirt dispersion, pH, Water solubility and Foaming index were carried out.

Organoleptic character:
Organoleptic evaluation studies were performed by taking the samples randomly for the parameters like color, Odour and texture.

Bulk density:
The bulk density of a powder is the ratio of the mass of an untapped powder sample and its volume, including the contribution of inter particulate void volume. Hence, the bulk density depends on both the density of powder particles and the spatial arrangement of particles in the powdered. The bulk density is expressed in g/cm3A volume of 50 ml graduated cylinder was taken and required amount of herbal shampoo.

Powder was added to the graduated cylinder. This was transferred to bulk density apparatus and bulk density was calculated. It is an important property for packaging and uniformity in the bulk of the product.

$$Bulk\ density = \frac{Mass\ of\ powder(M)}{Bulk\ volume\ of\ the\ powder\ (Vb)}$$

Tapped density:
The tapped density is an increased bulk density attained after mechanically tapping container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 mined volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimetre (g/cm3).

$$Tapped\ density = \frac{Mass\ of\ powder(M)}{Tapped\ volume\ of\ the\ powder\ (Vt}$$

Moisture content:
Moisture content in the formulation is very important as it contains herbs which are liable to be attacked by weather. 2gm of powder was taken and kept in an oven and dried up to two constant reading and %moisture content was calculates as w/w.

Dirt dispersion:
Two drops of herbal shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shakes it ten times. The amount of ink in the foam was estimated as Light. A volume of 50 ml graduated cylinder was taken and required amount of herbal shampoo powder was added to the graduated cylinder. This was transferred to bulk density apparatus and bulk density was calculated. It is an important property for packaging and uniformity in the bulk of the product.

pH:
The pH of 10% shampoo solution in distilled water was determined at room temperature 25o C. the pH was measured by using digital pH meter.

Water Solubility:
Solubility is defined as the ability of the substance to soluble in a solvent. One gram of the powder is weighed accurately and transferred into a beaker containing 100 ml of water. This was shaken well and warmed to increase the solubility. Then cooled and filter it, the residue obtained is weighed and noted.

Foaming Index:
One gram of the powder was weighed accurately and transferred into 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 minutes, cooled and filtered and make up the volume to 100 ml in standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portion of 1, 2, 3....10 ml and remaining volume is made up with water to10 ml. Then the test tubes were shaken in longwise motion for 15 seconds at speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.

$$Foaming\ Index = \sqrt{\frac{1000}{A}}$$

Where, A is the volume in ml of the decoction used for preparing the dilution in the tube where foaming to a height of 1 cm is observed.

Result and discussion:
Organoleptic character: Color of prepared herbal shampoo powder was found to be light brown and light green. Odour is good and better. Texture is fine smooth.

Bulk density: Bulk density of prepared formulation batches of herbal shampoo powder was found to be in the range of 0.4265(gm/ml) to 0.4984 (gm/ml).

Tapped density: Tapped density of prepared formulation batches of herbal shampoo powder was found to be in the range of 0.4528(gm/ml) to 0.5561 (gm/ml).

Moisture content: Moisture content of prepared formulation batches of herbal shampoo powder was found to be in the range of 1.86 % to 2%.

Dirt dispersion:
Shampoo that causes the ink to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair. These results indicate that no dirt would stays in the foam; so prepared formulation shows light dirt dispersion is satisfactory.

pH:
The pH of shampoos has been shown to be important for improving and enhancing the qualities of hair, minimizing irritation to the eyes and stabilizing the ecological balance of the scalp. The current trend to promote shampoos follower pH is one of the ways to minimize damage to the hair. Mild acidity prevents swelling and promotes tightening of the scales, there by inducing shine. The pH of prepared shampoo was observed as 6 to 7, which is near to the skin pH.

Water Solubility: Water solubility of prepared formulation batches of herbal shampoo powder was found to be miscible soluble in the water.

Foaming Index:
Although foam generation has little to do with the cleansing ability of shampoos, it is of importance to the consumer. The foaming index of formulated shampoo was found to be in the range of 92 ml to 112 ml.

Table No 3: Observation Table of Herbal Shampoo Powder

Parameter	Batch		
	F1	F2	F3
Color	Light brown	Light green	Light brown
Odor	Good	Good	Better
Texture	Fine smooth	Fine smooth	Fine smooth
Bulk density	0.4551 (gm/ml)	0.4265 (gm/ml)	0.4984 (gm/ml)
Tapped density	0.4528(gm/ml)	0.4826(gm/ml)	0.5561 (gm/ml)
Moisture content	1.86 %w/w	2.00% w/w	2.00%w/w
Dirt dispersion	Light	Light	Light
pH	6	7	7
Water solubility	Miscible soluble	Miscible soluble	Miscible soluble
Foaming index (ml)	92	105	112

Amongst all 3 formulation batches, **F3 batch** shows better result. Color of prepared herbal shampoo powder was found to be **light brown**. Odour is **better**. Texture is **fine smooth**, Bulk density was found to be 0.4984 (gm/ml). Tapped density of herbal shampoo powder found to be 0.5561 (gm/ml). moisture content was found to be 2% and dirt dispersion is 2g. pH is measure by pH scale and was found to be neutral pH that is **7**. Herbal shampoo powder is **miscible soluble** in the water. And gives **good foaming index**.

Summary and conclusion:

Herbal powder shampoo using Shikakai, Methi, Hibiscus, Neem, Ashwagandha, Reetha, Amla, Cinnamon, Kalonji and Rose were prepared and evaluations were carried out for those following parameters viz., Organoleptic character (Odor, Color and Texture), Bulk density, Tapped density, Moisture content, Dirt dispersion, pH, Water solubility and Foaming index. The evaluation parameters data were shown in acceptable range. Further studies are appreciated for comparing this preparation with marketed one and establishing some effective results for hair cleansing action and conditioning effect as well.

The herbal powder shampoo was formulated based upon traditional knowledge and emphasis was to formulate a stable and functionally effective. The formulated shampoos were not only safer than the chemical conditioning agents, but also greatly reduce the hair loss during combing as well as strengthen the hair growth.

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