



Formulation and Evaluation of Herbal Shampoo by Extract of Some Plants

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Abstract The aim of the present investigation was to formulate and evaluate herbal shampoo containing natural ingredients with an emphasis on safety and efficacy, which will avoid the risk posed by chemical ingredients. The main objective of this study was to eliminate harmful synthetic ingredient from shampoo formulation and substitute them with safe natural ingredients. An attempt has been made to combine modern formulation technology into a formula based on natural ingredients. It clears sebum, dirt, dandruff, promotes hair growth, strengthens, and darkens the hair. Moreover, it also acts as a conditioning agent and performs all these actions without affecting or damaging hair. The shampoo was prepared by taking the extracts of *Aloe vera*, *Hibiscus rosa-sinensis*, *Phyllanthus emblica*, *Acacia concinna*, *Azadirachta indica*, *Sapindus mukorossi*, *Glycyrrhiza glabra* and *Eclipta prostrata*. Evaluation of organoleptic properties, physicochemical and performance test were carried out. The results indicated that this can be used as a potential alternative for cleaning and managing hair in a natural and effective way instead of synthetic source. The findings of this investigation reveal that chemicals have sometimes been the cause of adverse effects among consumers. The present work confirmed the successful preparation of herbal shampoo using natural ingredients. All the ingredients used to formulate shampoo are safer and the physicochemical evaluation showed ideal results.

Keywords Herbal Shampoo, dandruff, *Aloe vera*, *Hibiscus rosa-sinensis*, *Phyllanthus emblica*, *Acacia concinna*, *Azadirachta indica*, *Sapindus mukorossi*, *Glycyrrhiza glabra* and *Eclipta prostrata*

Introduction

Hair is one of the external barometers of internal body conditions. It is an important part of human body [1] derived from ectoderm and is protective appendages on the body [2] associated with sebaceous glands, sweat glands. Hair-care products are the preparation which are meant for cleansing, modifying the texture, changing of the color, providing nourishment to the hair and giving the healthy look to the hair [3]. Shampoo is described as a cosmetic preparation meant for washing hair of accumulated sebum, scalp debris and residue of hair grooming preparations [4, 5]. Herbal shampoo is a cosmetic preparation which uses herbs from plants and it is meant for washing of hair and scalp just like a regular shampoo. It is an alternative to the synthetic shampoo available in market [6, 7]. Synthetic shampoo causes harmful effects on hairs, skin and eyes so community got attracted towards the herbal products, due to negligible side effects and less cost.

The objective of the present research work is to formulate and evaluate an herbal shampoo with various herbs for multipurpose use by eliminating all traditionally incorporated synthetic ingredients. This shampoo clears sebum, dirt, dandruff, promotes hair growth, strengthens, and darkens hair. Moreover, it also acts as a conditioning agent. This herbal shampoo powder performs all these actions without affecting or damaging hair [1].











Materials and Methods

Collection of materials

Different parts of plant were selected to study hair care property. All the required plant parts were purchased from the local Jadav Nursery of Udaipur. These are powdered for further use and passed through sieve No. 100. Details of the plant materials study is given in Table 1.

Table 1: Details of the plant materials study

S. No.	Plant Name	Medicinal use	Figure
1	Neem <i>Azadirachta indica</i>	leaves: Antibacterial, anti-fungal, anti-septic [6]	
2	Hibiscus <i>Rosa-sinensis</i>	Hair conditioner, Hair growth promoter [8]	
3	Shikakae: <i>Acacia concinna</i>	Foaming agent, Anti-dandruff agent	
4	Liquorice: <i>Glycyrrhiza glabra</i>	Nourishes the scalp, Heal damage [6]	
5	Amla: <i>Phyllanthus emblica</i>	For hair loss treatment. To prevent premature graying of hair.	

6	Aloe vera powder: <i>Aloe vera</i>	Moisturising agent, delivers something property to the skin [6]	
7	Soap Nut: <i>Sapindus mukorossi</i>	provides shining and silky hair	
8	Bringraj: <i>Eclipta prostrata</i>	It is believed to maintain and rejuvenate hair [9] and also used in hair darkening and as hair growth promoter	

Extraction

Take all coarsely powdered herbs of *Aloe vera*, *Hibiscus Rosa-sinensis*, *Phyllanthus emblica*, *Acacia concinna*, *Azadirachta indica*, *Sapindus mukorossi*, *Glycyrrhiza glabra* and *Eclipta prostrata* and extracted by cold maceration separately by agitation using 70% methanol for seven days. The marc was squeezed out and filtered off. The combined filtrate was concentrated by allowing it to be evaporated from the petridish below 50°C and volume was made up. The concentrated extracts were stored in air-tight containers in a refrigerator at 4°C until further use [6]. Composition of polyherbal plant extract is given in Table 2.

Table 2: Composition of polyherbal plant extract

S. No.	Drugs Name	Parts	Quantity for 100gm
1	Neem powder	Leaves	9%
2	Hibiscus flower powder	Flower	12%
3	Aloe vera powder	Leaves	7%
4	Shikakae powder	Pods	22%
5	Liquorice powder	Root	5%
6	Amla powder	Fruit	25%
7	Soap Nut	Nut	20%

Formulation

The herbal shampoo was prepared by using primary emulsion method. The plant extracts were mixed in different proportions to obtain an extract whose formula is shown in Table-2. The proportion of oil: water: gum is 4:2:1. The castor oil and the methanolic extract of herbs made oil part. Polyethylene glycol (PEG) 400, glycerine and methyl paraben were the water part. Acacia and tragacanth was used as gum which forms oil in water (o/w) emulsion. The final volume was made to 100 ml with PEG 400 and glycerine. Finally, the pH of the solution was adjusted by adding sufficient quantity of 1% citric acid solution. Few drops of essential oil were also added to impart aroma to the prepared shampoo. The composition formula is given in Table 3.



Table 3: Composition of herbal shampoo

Herb extract	10ml
Castor oil	17ml
Polyethylene glycol (PEG) 400	8ml
Glycerine	2ml
Methyl paraben(0.05%)	1ml
Acacia	3g
Tragacanth	2g
Essential oil	q.s.
Citricacid solution	q.s.

Evaluation of herbal shampoo

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density and viscosity were performed.

1. Physical appearance/visual inspection: The formulation prepared was evaluated for the clarity, color, odor and foam producing ability and fluidity [10].

2. Determination of pH: A 10% v/v shampoo solution was constituted in distilled water and the pH of the solution was measured by using a calibrated pH meter [11, 12].

3. Determine percent of solids contents: A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated, the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated [13].

4. Rheological evaluations: Pseudo plastic behavior which is a desirable attribute in shampoos formulation [9], the viscosity of the shampoos was determined by using Brookfield Viscometer set at different spindle speeds from 0.3 to 10 rpm. The viscosity of the shampoos was measured. The temperature and sample container's size was kept constants during the study [14].

5. Dirt dispersion: Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. A 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 None, Light, Moderate, or Heavy [6, 23].

6. Cleaning action: 5 grams of wool yarn were placed in grease, after that it was placed in 200 ml. of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 35 °C. The flask was shaken for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation [17, 18, 19]:

$$DP=100\left(1-\frac{T}{C}\right)$$

In which, 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.

7. Surface tension measurement: It has been mentioned that a proper shampoo should be able to decrease the surface tension of pure water to about 40 dynes/cm^[20, 21]. Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmo meter using chronic acid and purified water. Because surface tension is highly affected with grease or other lubricants. The data calculated by following equation given bellow:

$$R_2 = \frac{(W_3 - W_1)n_1}{(W_2 - W_1)n_2} \times R_1$$

Where,

W1 is weight of empty beaker.

W2 is weight of beaker with distilled water.



W3 is Weight of beaker with HS solution.

n1 is no. of drops of distilled water.

n2 is no. of drops of HS solution.

R1 is surface tension of distilled water at room temperature.

R2 is surface tension of herbal shampoo solution [17].

8. Foaming ability and foam stability: Cylinder shake method was used for determining foaming ability. 50ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1-minute intervals for 4 minutes were recorded [22].

9. Stability studies: The thermal stability of formulations was studied by placing in glass tubes and they were placed in a humidity chamber at 45°C and 75% relative humidity. Their appearance and physical stability were inspected for a period of 3months at interval of one month [14, 15, 16].

Results and Discussion

1. Physical appearance / Visual inspection: -Our formulated shampoo as shown in Fig.1 was opaque and dark brown in colour. It has a good odour given by the fragrance in the ingredients and also a good foam producing ability.

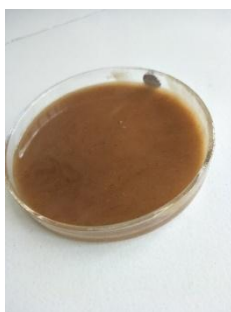


Figure 1: Polyherbal shampoo

3. pH: The pH of our formulated shampoo was 5.8, falling within the ideal pH range for shampoo which is between 5 and 7.8.

3. Percentage of solid contents: If the shampoo has too many solids it will be hard to work into the hair or too hard to wash out. The result of percent of solids contents was found to be 26.4% and it is suggestive that it can be washed out easily.

4. Rheological evaluations: The results of rheological evaluation showed that the viscosity of the samples changes gradually with the increase in rpm, therefore the shampoo formulations were time dependent. Secondly as the data showed the viscosity decreases with increase in rpm, so the shampoo formulations were shear thinning or pseudo plastic in nature. These formulations showed pseudo plastic behavior which is a desirable attribute in shampoos formulation.

5. Dirt Dispersion: Shampoo that because 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. Results indicate that no dirt would stay in the foam; so prepared formulations are satisfactory.

6. Cleaning Action: As cleaning is the primary action of a shampoo powder, cleaning action was tested on wool yarn in grease. The results of detergency studies showed that the final formulation detergency ability was found to be 21%

7. Surface tension measurement: It has been mentioned that a proper shampoo should be able to decrease the surface tension of pure water to about 40 dynes/cm. Surface tension reduction is one of the mechanisms implicated in



detergency. The reduction in surface tension of water from 72.8 dynes/cm to 35.37 dynes/cm by the herbal shampoos is an indication of their good detergent action.

8. Foaming ability and foam stability: Although foam generation has little to do with the cleansing ability of shampoos, it is of importance to the consumer. The final formulation produced stable foams there was little bit change in foam volume.

9. Stability Study: Stability and acceptability of organoleptic properties (odor and color) of formulations during the storage period indicated that they are chemically and physically stable. The formulated polyherbal shampoo is chemically and physically stable at standard room temperature of 25-30°C. The results indicate that it possesses good stability within the 6 weeks of stability study. Results are shown in Table 4.

Table 4: Results

S. No.	Parameters	Observations
1	Colour	Dark Brown
2	pH	5.8
3	Percentage of solid contents	26.4%
4	Percentage cleaning action	21%
5	Surface Tension	35.37
6	Foamability	Foam volume 106 ml at 5 min
7	Dirt Dispersion	moderate

Conclusion

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. The replacement of synthetic ingredients by herbal natural extracts having the same activity to overcome side effects is the need of study. Synthetic hair shampoo is known to damage the hair cuticle and leave brittle, dull and dry hair. The factors like UV radiations, use of harsh chemical products have direct and indirect impact on to the hair.

The evaluation study on our shampoo showed good cleaning action, better foaming capacity, and quick wetting time. The formulated shampoo was not only safer than the chemical conditioning agents, but also greatly reduces the protein loss during combing. The pH of the shampoos was adjusted to 5.5, to retain the acidic mantle of scalp. However, the lather and clarity property, of the prepared shampoo are not that much of good but the shampoo was devoid of any harmful chemicals and can be used as an alternative to its synthetic counterpart. It concludes that the formulated shampoo was safe and effective to use.

In the present scenario, it seems improbable that herbal shampoo, although better in performance and safer than the synthetic ones, will be popular with the consumers. It is essential to have a green revolution which may definitely help our society to survive healthier and long lasting. A more radical approach in popularizing herbal shampoo would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy. Formulators must play an active role in educating the consumers about the potential harmful effects of synthetic detergents and other chemical additives present in Shampoos. There is a strong need to change the consumer perception of a good shampoo and the onus lies with the formulators.

References

- [1]. Akula, NP (2015), "Preparation and evaluation of shampoo powder containing herbal ingredients", Asian journal of pharmaceutical and clinical research, Vol. 8(1), 266-270.
- [2]. Patil, SS; Mane, YJ and Mohite, SK (2015), "Formulation and evaluation of herbal shampoo powder", International Journal of Advanced Research, Vol. 3(3), 939-946.
- [3]. Wani, S; Khot, N and Buchake VV (2014), "Preparation & evaluation of antidandruff polyherbal powder shampoo", Pharmacophore (An International Research Journal) Vol. 5(1), 77-84.
- [4]. Fatima Grace X, Rahul Raj S, Sowmya KV, Reshma I, Shanmuganathan S (2015), "Development and evaluation of a polyherbal shampoo", Adv J Pharm Life Sci Res, Vol. 3(1), 13-16.



- [5]. Maniker, AR and jolly, CI (2001) "Formulation of natural shampoo", *Int J Cosm Sci*, Vol. 23(1), 59-62.
- [6]. Mendhekar, SY; Tajane, AS; Shitole, PB; Jadhav S and Gaikwad DD (2017) "Formulation and evaluation of polyherbal shampoo and compare with marketed shampoos", *World Journal of Pharmacy and Pharmaceutical Sciences*, Vol. 6(12), 1388-1397.
- [7]. Pandey, S; Meshya, N and D. Viral (2010), "Herbs play an important role in the field of cosmetics", *Int J Pharm Tech Res*, Vol. 2(1), 632-639.
- [8]. Sutar, M; Deshmukh, S; Chavan, M and Singh, S (2013) "Preparation and evaluation of polyherbal shampoo powder", *International Journal of Pharmacy and Biological Sciences*, Vol. 3(2), 151-159.
- [9]. Namita and Nimisha, (2013) "Formulation and evaluation of herbal shampoo having antimicrobial potential", *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol. 5, (3), 708-712.
- [10]. Badi, KA and Khan, SA (2014), "Formulation, evaluation and comparison of the herbal shampoo with the commercial shampoos" *beni-suef university journal of basic and applied sciences*3, 301-305.
- [11]. Dash, GK and Noor Husna Nazirah Binti A. Razak, (2017), "Formulation and evaluation of a herbal shampoo" *Indo American Journal of Pharmaceutical Sciences*, Vol.4 (09), 2860-2865.
- [12]. Deeksha; Malviya, R and Sharma PK, (2014) "Advancement in shampoo (a dermal care product): preparation methods, patents and commercial utility", *Recent Pat Inflamm Allergy Drug Discov*, Vol. 8(1), 48-58.
- [13]. Dessai, P and Phatarpekar, S (2016) "Formulation and evaluation of herbal shampoo formulations and to compare formulated shampoo with marketed shampoos", *World Journal of Pharmacy and Pharmaceutical Sciences*, Vol. 5(9), 1467-1477.
- [14]. Sharma, RM; Shah, K and Patel J, (2011), "Evaluation of prepared herbal shampoo formulations and to compare formulated shampoo with marketed shampoos" *International Journal of Pharmacy and Pharmaceutical Sciences*, Vol. 3(4),402-405.
- [15]. Umbach W., (1991) "Cosmetics and Toiletries Development", *Production and Use*, 26.
- [16]. Barel A.O., Paye M. and Maibach H.I., *Handbook of Cosmetic Science and Technology*. (2001) 423, 583-588, 773-775.
- [17]. Utane, R; Deo, S and Itankar, P (2017) "Preparation of herbal shampoo (hs) by green method and their characterization" *International Journal of Researches in Social Sciences and Information Studies*, Vol. 5, 254-258.
- [18]. Sharma, RM; Shah, K and Patel, J (2011) "Evaluation of prepared formulations and to compare formulated shampoo with marketed shampoos" *International Journal of Pharmacy and Pharmaceutical Sciences*. Vol.2 (4) 402-405.
- [19]. Shinde, PR; Tatiya, AU and Surana, SJ (2013) "Formulation Development and Evaluation of Herbal Antidandruff Shampoo" *International Journal of Research in Cosmetic Science*, Vol. 3(2), 25-33.
- [20]. Kumar, A and Mali, RR (2010) "Evaluation of prepared shampoo formulations and to compare formulated shampoo with marketed shampoos" *International Journal of Pharmaceutical Sciences Review and Research* Vol. 3(1), 120-126
- [21]. Ireland, S; Carlino, K; Gould, L; Frazier, F; Haycock, P; Ilton, S; Deptuck, R; Bousfield, B; Verge, D; Antoni, K; MacRae, L; Renshaw, H; Bialachowski, A; Chagnon, C and Reddy, K (2007) *Can. J. Neurosci. Nurs.* Vol. 29(1), 14-9.
- [22]. Sekar, M and Haleeda Aqeela, Merican Noordin, Nazaruddin, "Formulation and evaluation of herbal shampoo containing rambutan leaves extract" *International Journal of Pharma and Bio Sciences*, Vol. 7(4), 146 -151.

