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Research Article

Formulation, evaluation & comparison of traditional poly herbal shampoo powders with marketed formulation

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ABSTRACT

The aim of present work is to formulate poly herbal powder by using different natural herbs like Aswagandha, Tulsi, Ginger, Hibiscus, Aloe vera, Amla and Soap nut to have safety and effectiveness which can avoid toxic effects by chemical ingredients and prepared formulations were compared with marketed poly herbal shampoo. Prepared formulation strengths hair growth, prevents hair fall, dandruff and also acts as antibacterial conditioner and foaming agent without affecting or damaging hair. All the herbs have been selected to formulate poly herbal traditional shampoo powder on the basis of traditional system with scientific modern uses of poly herbs. In this present work herbs like *Aswagandha, Tulsi, Ginger, Hibiscus, Aloe vera, Amla* and *Soap nut* were collected, dried, powdered and sieved by passing through sieve no.60, stored in an air tight container and used for further formulation. Then the powders were formulated into four different formulations namely F1, F2, F3, F4 and evaluated for their organoleptic properties like color, odor and texture etc., General powder characteristics like angle of repose, bulk density and true density etc. and physicochemical properties like pH, moisture content, total ash contents, acid insoluble ash, other parameters evaluated were dirt dispersion and foaming capacity. All the four formulations offered good results in all the evaluation tests. The organoleptic characteristics were found to be good, general powder characteristics results were in specified limits and physicochemical evaluation like pH, foaming action, Dirt dispersion were found to yield good satisfactory results. So, the present work successfully formulated poly herbal traditional shampoo powder which meets the modern uses of hair without causing any damage to both skin and hair. Further the Scope of work need to be extended to carry out the stability studies.

Keywords: Poly herbal, Traditional

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INTRODUCTION

Herbs have always been the principal form of medicine in India. Medicinal plants have curative properties due to the presence of various complexes. Chemical substances of different composition, which are found as secondary plant metabolites in one or more parts of these plants. Herbs and herbal drugs have created interest among the people by its clinically proven effects like hair loss. Also the overuse of synthetic drugs, which results in higher incidence of adverse drug reactions, has motivated humans to return nature of safe remedies. The origins, according to many, can be sourced to the World health Organization's Canberre Conference in 1976, which promoted the concept of 'Traditional' medicines for the developing countries¹.

Herbs are widely used as remedial agents because such drugs are easily available at low cost and comparatively safe and the people have good faith in such remedies. In India, Ayurvedic system evolved over 5,000 years ago and is still in practice. The Rig-Veda and Atharvanaveda have included more than 700 medicinal prescriptions. There are also wide range of herbal ingredients like pepper extract, basil extract, Neem extract, rosemary oil, basil oil, clove oil, coleus oil, tea

tree oil which have been documented to have good anti pityrosporum or antidandruff activity. Herbal formulations have growing demand in the world market. This is a multipurpose powder for hair care treatment².

Functions of herbal powder shampoo

- Conditioning
- Hair growth
- Maintenance of hair color
- Medication

Advantages of herbal powder shampoo

- Shampoo powder cleanses your hair and avoids oily locks in between shampooing.
- By washing your hair less often, you also reduce the use of heating implements (e.g. hair dryer, curling or straightening iron) that can damage your hair.
- Shampoo powder makes hair look thicker, which is great for those with fine hair.
- Shampoo powder minimizes hair damage.
- Shampoo powder free from synthetic additives and they are free from side effects.

- Shampoo powders are free from petroleum based products³.

MATERIALS AND METHODS

Collection of Plant Material

All the plant materials like Aswagandha, Amla, Hibiscus, Tulsi, Aloe, Ginger, Soap nut were collected from the Medicinal Herbal Garden of Oil technological and Pharmaceutical research institute (JNTUA-OTPRI), A.P, India and few herbs from the local Ananthapuramu market. These plant materials were shade dried, powdered and stored in air tight containers until it was used for further studies.

Formulation of Powder Shampoo

The formulated shampoo powder is not only safer than the synthetic agent containing shampoos, but it also reduces dandruff, hair fall and makes hair stronger. Herbs along with their part used in shampoo and quantity taken are tabulated in Table 2. Four batches of herbal shampoo formulation were prepared labeled and kept in closed container for further studies. All the ingredients mentioned in Table 2 were weighed accurately, passed through sieve no 70, then mixed geometrically and stored in a well closed container for further evaluation⁴.

Table 1: Formulation Table of Herbal Shampoo Powder

S.N.	Ingredients (gm)	F1	F2	F3	F4
	Aswagandha	25	25	25	25
	Amla	20	15	10	5
	Hibiscus	10	10	10	10
	Tulsi	10	10	10	10
	Aloe	10	10	10	10
	Ginger	10	10	10	10
	Soap nut	15	20	25	30

Table 2: Lists of Plant Parts Used

Ingredients	Plant Part Used	Category
Aswagandha	Dried roots	Strengthen hair root
Amla	Dried ripe fruits	Darkening of hair
Hibiscus	Dried leaves	Promotes hair growth
Tulsi	Dried leaves	Anti-bacterial
Aloe	Dried leaves	Conditioning
Ginger	Dried rhizomes	Anti-dandruff
Soap nut	Dried fruits	Foaming agent

Preparation procedure for herbal powder shampoo^{5, 6, 7}

Drying of Ingredients: All the collected herbal ingredients were sun dried for two days and grinded to make fine powder by using size reduction mill.

Weighing: All the required herbal powders for shampoo preparation were weighed individually by using digital balance.

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.60 to get the sufficient quantity of fine powder.

Collection and storage: The powder mixture was collected and stored in well closed plastic container and further these are used for Evaluation Studies.

Evaluation of Shampoo Powder: Prepared formulations of shampoos were subjected to following evaluation Studies.

Organoleptic evaluation⁸: All the prepared formulations and marketed formulation were subjected to Evaluation of Organoleptic properties like color, odor, and texture. Color and texture was evaluated by vision and touch sensation respectively.

General powder characteristic: All the prepared formulations and marketed formulation were subjected to General powder characteristics like particle size and flow properties etc.

Particle size⁹: Particle size is a parameter, which could affect various properties like spreadability, grittiness etc., particle size was determined by sieving method by using I.P. Standard sieves by mechanical shaking for 10 Min.

Angle of Repose^{10,11}: The flow property of the powder was determined by funnel method; a distance of 2cm was maintained between the graph sheet and the bottom of the funnel, flowing was continued till the top of the heap touches the bottom of the funnel tip. For the above two method, the angle of repose (θ) can be calculated by using the formula¹¹.

Open - ended cylinder method: Required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded. For the above two methods, the angle of repose (θ) can be calculated by using the formula¹¹.

$$\theta = \tan^{-1}(h / r)$$

Where,

θ – Angle of repose,

h – Height of the heap,

r – Radius of the base

Bulk density: It is an important property for the packaging and uniformity in the bulk of product. Bulk density depends on particle size, particle size distribution and cohesiveness of particle. For measuring bulk density a weighted amount of powder was introduced in 100ml graduated cylinder. The cylinder is fixed on bulk density apparatus and bulk density was calculated. It is expressed in grams per cubic centimeter (g/cm^3).

$$\text{Bulk Density} = \frac{\text{Mass of the herbal powder}}{\text{Volume of herbal powder shampoo}}$$

Tapped density: Tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimeter (g/cm^3).

Physicochemical evaluation

pH: A pH meter is an electronic device used for measuring the pH of a liquid. A typical pH meter consists of a special measuring probe connected to an electronic meter that measures and displays the pH reading [11]. About 1 g each of herbal shampoo powder formulations was taken and dissolved in 10 ml of water. Their pH was checked with the help of pH meter¹³.

Ash value

Total ash content¹³: Determination of total ash: A flat, thin, porcelain dish or a tarred silica crucible was weighed and ignited. About 2 g of herbal shampoo powder formulation were weighed and taken into a dish. Support the dish on a pipe-clay triangle placed on a ring of retort stand. Heat the dish about 7 cm above the flame, with the help of a burner,

using a flame of about 2 cm high, heat till vapors almost cease to be evolved, then lower the dish and heat more strongly until all the carbon is burnt off. Cool in a desiccator. Weigh the ash and calculate the percentage of total ash with reference to the air dried shampoo powders.

$$\text{Total ash (\%)} = [(z-x)/y] \times 100$$

Where z-x is the residue in g and y is the total wt. in g.

Acid insoluble ash²: Acid insoluble ash was calculated by boiling above obtained ash with 25 ml dil. Hcl for 5min, insoluble matter was collected in gooch crucible, washed with hot water, ignited and weighed.

Dirt dispersion¹⁴: Put two drops of shampoo formulation in a large test tube. Add 10ml of distilled water and 1 drop of Indian ink. Stopper the test tube and shake it for ten times. Estimate the amount of ink in the foam as None, Light, Moderate, or Heavy and record. Shampoos that cause the ink to concentrate in the foam are considered as poor quality. The dirt should stay in the water portion. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair.

Moisture content determination¹⁵: 10 g of each herbal shampoo powder was weighed in a tare evaporating dish and kept in hot air oven at 105°C. Repeated the drying until the constant weight loss was observed after the interval of 30 minutes. The moisture content was calculated for each sample.

Foaming Capacity⁴: All the prepared poly herbal shampoo powders and marketed product were evaluated for their foam stability or foam capacity by addition of 2 grams of powder with 50 ml water in a graduated cylinder for different time intervals like 0, 10, 20, 30 min respectively and foam observed and foaming capacity is calculated.

RESULTS



Figure 1: Powdered Herbs

Table 3: Organoleptic Properties

F. Code	Color	Odor	Texture
F1	Light green	Pungent	Smooth
F2	Light green	Pungent	Smooth
F3	Light green	Pungent	Smooth
F4	Light green	Pungent	Smooth
M.F	Light green	pungent	smooth

Table 4: General Powder Characteristics

F. Code	Angle of Repose(°)		Bulk Density (gm/cc)	Tapped density (gm/cc)	Particle size (µm)
	Funnel method	Open ended cylinder method			
F1	33.36	32.23	0.470	0.588	20-25
F2	34.23	33.12	0.480	0.590	20-25
F3	34.13	32.21	0.490	0.610	20-25
F4	34.15	32.15	0.501	0.618	20-25
M.F	32.12	31.14	0.515	0.627	20-25

Table 5: Physico-Chemical Parameters

F. Code	pH	Total ash (%)	Acid insoluble ash (%)	Moisture Content (%)
F1	6.0	4w/w	1.77w/w	3.44
F2	6.5	4w/w	1.70w/w	3.40
F3	6.8	4w/w	1.72w/w	3.30
F4	6.6	4w/w	1.71w/w	3.42
M.F.	7.0	4w/w	1.70w/w	3.43

Dirt Dispersion

Table 6: Dirt Dispersion

F. Code	Observation
F1	Light
F2	Light
F3	Moderate
F4	Heavy
M.F	Moderate

Foaming Capacity

Table 7: Foaming Capacity of F1 and F2

Time interval (min)	F1			F2		
	Liquid (ml)	Foam (ml)	%Foaming capacity	Liquid (ml)	Foam (ml)	% Foaming capacity
0	46.5	75	150	47.5	80	160
10	47.9	70	140	48	74	148
20	48.8	67	134	48.8	68	136
30	49.5	60	120	50	64	128
Avg foaming % capacity		136			143	

Table 8: Foaming Capacity of F3 and F4

Time interval (min)	F3			F4		
	Liquid(ml)	Foam(ml)	% Foaming capacity	Liquid(ml)	Foam(ml)	% Foaming capacity
0	48.5	85	170	46.5	90	180
10	49	75	150	48.5	80	160
20	49.5	68	136	49	70	140
30	50	66	132	50	68	136
Avg. foaming % capacity	147			154		

Table 9: Foaming Capacity of M.F

Time interval (min)	MF		
	Liquid(ml)	Foam(ml)	% Foaming capacity
0	47	91	182
10	48	84	168
20	49	75	150
30	50	68	136
Avg foaming % capacity	159		

DISCUSSION

All the prepared poly herbal shampoos were evaluated for their organoleptic characteristics, General powder characteristics and physicochemical parameters. All the prepared poly herbal shampoos were formulated and were evaluated for their organoleptic characteristics, General powder characteristics and physicochemical parameters.

Organoleptic Properties: In organoleptic characteristic studies, color of all the four formulations and Marketed formulation were found to be light green, odor of all the four formulations and Marketed formulation were found to be pungent and the texture study were found to be smooth. So all the prepared formulations were shown good in appearance when compared with marketed formulation.

General Powder Characteristics: All the prepared formulations and marketed formulation was also subjected to general powder characteristics like angle of repose, bulk density and true density. Angle of repose of F1, F2, F3, F4 and marketed formulation determined by funnel method were found to be 33.36, 34.23, 34.13, 34.15 and 32.12 respectively and by open ended cylinder method was found to be 32.23, 33.12, 32.21, 32.15 and 31.14 respectively. The bulk density of F1, F2, F3, F4 and marketed formulation were found to be 0.470, 0.480, 0.490, 0.501 and 0.515. The true density of F1, F2, F3, F4 and marketed formulation was found to be 0.588, 0.590, 0.610, 0.618, and 0.627. The particle size of all the prepared formulations and marketed formulation was found to be 20-25 μ

Physico Chemical Parameters: All the prepared formulations and marketed formulation were also subjected to evaluation of physicochemical parameters like pH, total ash, acid insoluble ash and moisture content. The pH of F1, F2, F3, F4 and M.F was found to be 6.0, 6.5, 6.8, 6.6 and 7.0 respectively. The total ash of all the four formulations and marketed formulation were found to be 4%. Acid insoluble ash of F1, F2, F3, F4 and marketed formulation were found to be 1.77, 1.70, and 1.72. 1.71 And 1.70% respectively. Moisture content of F1, F2, F3, F4 and marketed formulation were found to be 3.44, 3.40, 3.30, 3.42 and 3.43 respectively.

Dirt Dispersion: All the prepared and marketed formulation were subjected to dirt dispersion study and F1, F2 were shown light, F3 and marketed formulation were shown moderate, F4 shown heavy.

Foaming Capacity: Foaming capacity of all the formulations and marketed formulation were evaluated and F1, F2, F3, F4 were found to have 136, 143, 147, 154 and 159 respectively.

CONCLUSION

From this study all the results obtained shown best results in all the evaluation parameters when compared with marketed

formulation. So we conclude that prepared traditional poly herbal shampoo is one of the best cosmetic which overcomes the hair problems without causing any damage to the hair. It is the best approach to prevent or to overcome harmful side effects or any other complication by using synthetic shampoo as they are prepared with so many chemical substances. So further scope of the work is recommended to conduct stability studies and *In-vivo* studies

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