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Formulation and Evaluation of Poly Herbal Shampoo Powder

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ABSTRACT

Shampoo is a hair care product packed conveniently for use function of shampoo is to clean the hair, and remove oils, dirt, scalp debris, and accumulated sebum. The formulation of shampoo must be safe and efficient for long use. The major objective of the present study was to formulate the herbal shampoo powder by using ingredients like hibiscus, Bhringraj, Curry leaves, Neem, Tulasi, shikkakai, amla, and Rita in an appropriate ratio. Moreover, it also acts as a conditioning agent and performs all these actions without affecting or damaging hair. The herbs have been selected to formulate the herbal shampoo powder based on the traditional system and scientific justification with modern uses. Herbal shampoo powders were accurately weighed, passed through sieve no.100, prepared by mixing in their ascending order of quantities with continuous trituration, stored in air-tight containers, and used for further studies. All the six formulations (F1-F6) were subjected to organoleptic studies, general powder characteristics, physicochemical evaluation, ash and alcohol soluble extractives, moisture content determination, pH determination, cleaning action, foaming capacities, and dirt dispersion, wetting time, and studies on nature of hair after wash.

I INTRODUCTION

The term Cosmetic is derived from the Greek word Kosmetics which means cosmesis or beautifying substance. Cosmetics are substances used to enhance the appearance of the human body. Cosmetics include 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, kinds of butter and many other types of products are in great demand in both developing and developed countries[1].

Herbal cosmetics have a growing demand in the world market and are an invaluable gift of nature. There is a wide range of herbal cosmetics products to satisfy your beauty regime, adding herbal cosmetics is very safe for skin and hair. Human beings have been using herbs for different purposes like food, medicine, and beatifying with the advancement of science & technology use of natural things including plants has been reduced except for food, vegetarian takes plant& plant only. However, there is a resurgence of the use of herbs both as drugs and cosmetics[2].

Hair is one of the external barometers of internal body conditions. It is an important part of the human body. Various synthetic compounds, chemicals, dyes, and their derivatives have been proved to cause harmful effects. Nowadays, people are having an awareness of their effects on hair skin, and eyes. Due to these reasons, the community is getting attracted to herbal products due to their inexpensive nature and negligible side effects. As time has passed synthetic agents have taken a large share but today people are getting aware of their harmful effects on hairs, skin, and eyes. These regions are attracted to the community by the herbal products, which are less expensive and have negligible side effects. The selection of active ingredients for hair care powders is based on the ability of the ingredient to prevent skin damage as well as to improve the quality of skin by cleansing, nourishing and protecting the skin. In this study, formulation and evaluation of herbal shampoo powders are reported. The objective of the present research work is to develop an herbal shampoo powder that clears sebum, dirt, and 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[4].

Herbal shampoos are concerned with stability criteria, depending upon the nature of the ingredients, they may be simple or plain shampoo, antiseptic or antidandruff shampoo, and

nutritional shampoo containing vitamins, amino acids, proteins hydrolysate3. The active ingredients for hair care powders are based on the ability of the ingredient to prevent skin damage as well as to improve the quality of the skin by cleansing, nourishing, and protecting the skin. As far as herbal shampoos are concerned instability criteria. The major ingredients used in making a shampoo are detergents (surfactants), conditioning and active ingredients for hair growth, additives that modify the surfactant effect (viscosity control agents, foam stabilizers, and viscosity modifiers), preserve the product (preservatives), and increase its appearance (fragrances, essence). Some of these additives have to be added to a shampoo formulation to increase its selection of stability and safety[5].

Need of Shampoo

The skin on our heads produces a greasy fluid called sebum. It is produced to protect the hair by coating itself all over the head. This gives the hair.

The ideal characteristic of herbal shampoo

a healthy shine but when in large amounts it makes the hair look dirty. Should effectively and completely remove the dust, and excessive sebum.

- Should effectively wash hair.
- Should produce a good amount of foam
- The shampoo should be easily removed by rinsing with water.
- Should leave the hair non-dry, soft, and lustrous with good, manageability.
- Should impart a pleasant fragrance to the hair.
- Should not make the hand rough and chapped.
- Should not have any side effects or irritate skin or eye[6].

Types of Shampoo

Shampoos are of the following types

- Powder Shampoo
- Liquid Shampoo

- Lotion Shampoo
- Cream Shampoo
- Jelly Shampoo
- Aerosol Shampoo
- Specialized Shampoo
- Conditioning Shampoo
- Anti-dandruff Shampoo
- Baby Shampoo
- Two Layer Shampoo

Composition of shampoo

- Surfactant
- Antidandruff agents
- Conditioning agents
- Pearlescent agents
- Sequestrants
- Thickening agents
- Colours, perfumes and preservatives[7].

The pericarp of Spindus mukorossi, commonly known as Soapnut or reetha, fruits of Phyllanthus emblica commonly known as Amla, and dried pods of Acacia concinna (Shikakai) have traditionally been used in Indian folklore system for centuries for washing hair. Reetha and Shikakai produce rich lather when shaken with water due to their high content of saponins. They are also known to produce beneficial effects on skin and other organ systems. Amla fruit is rich in vitamin C and is employed in hair preparations as antidandruff agent, hair growth promoter and to strengthen hairs[8].SIn today fast life peoples don't have time to look on there physique also. The problems of hair; hair falling, dandruff,

white hair and splitend hair etc. The reasons of hair problem are tension, scalp infection, hormone disturbances, lower vitamin, food, minerals, and large chemical shampoo use. To overcome all these problems was the main intension of our project. So we prepared poly herbal antidandruff powder, which is an multi-purpose powder for hair treatment. Cleanliness of hair and scalp are among the most important personal life considerations today[9].

PLANT PROFILE:

REETHA:

An attractive medium-sized deciduous tree, Reetha (Sapindus mukorossi), stands up to 20 m in height, with gray smooth bark and pinnate leaves. The tree bears leaves in 5-10 pairs, with large drupes. The trunk of the tree is straight and cylindrical, going 13-16 ft in height and has an umbrella-like hemisphere measuring about 16 ft in diameter. The tree is ever-growing and in 70 years of existence, it can attain a height of up to 82 ft and a girth of up to 9-16 ft. The size of the leaflets tapers towar ds the tip of the rachis.

Figure No. 1: Reetha

SHIKAKAI:

Occurrence (Special Areas): Ayurvedic Udyan.

Acacia concinna is a thorny spreading shrub or tree that can either be scandent or climb into other plants. Bark is light grey. Leaves are oblong 4-10mm long forming 7-11 pairs of branches each with 17-37 pairs of leaflets. ... Fruit are on trees from February to March.

Senegalia rugata has been used traditionally for hair care in the Indian Subcontinent since ancient times. It is one of the Ayurvedic medicinal plants.

Figure No. 2: Shikakai

AMLA:

Amla is a medium-size deciduous plant. It grows to the height of 8 -18 meters.

It has a crooked trunk and spreading branches. The fruit is nearly spherical, light greenish-yellow, quite smooth and hard on appearance, with six vertical stripes or furrows. Ripening in autumn, the berries are harvested by hand after climbing to the upper branches bearing the fruits. The taste of Indian gooseberry is sour, bitter, and astringent, and it is quite fibrous. In India, it is common to eat gooseberries steeped in salt water and turmeric to make the sour fruits palatable.

Figure No. 3: Amla

BHRINGRAJ:

Eclipta alba (L.) commonly known as false daisy, bhringraj, karisilakanni, etc. is an annual herbaceous plant belonging to the family Asteraceae. The herb is widely distributed throughout India, China, Thailand, and Brazil. Bhringraj is said to be the best drug for the treatment of liver ailments such as cirrhosis and infective hepatitis and other conditions involving hepatic enlargement. In the pharmaceutical industry, it is the most widely used plant in hepatoprotective formulations.

Figure No. 4: Bhringraj

TULASI:

Tulsi consists of the fresh or dried leaves of Ocimum species like *Ocimum sanctum* L. and *Ocimum basilicum* L.Tulsi consist of the fresh or dried leaves of Ocimum species like *Ocimum sanctum* L. and Ocimum basilicum Tulsi is considered to be a major ingredient in **herbal hair loss treatments**. **Tulsi benefits** hair by rejuvenating the hair follicles and strengthening the roots, which in turn curbs hair loss.

Figure No. 5: Tulasi

NEEM:

Neem consists of the fresh or dried leaves and seed oil of Azadirachta indica j. juss (melia indica or M. azadirachta Linn.). Neem is very popular as a medicinal plant. Neem leaves and their extracts are commonly used for their antiseptic, anti-inflammatory, antioxidant, and healing properties. This excellent herb is a great source of fatty acids, vitamins, and minerals that are needed for healthy skin and hair. It contains active constituents like nimbidin, nimbolide and azadirachtin that have some amazing medicinal properties that can help you get rid of every skin and hair problem.

Figure No. 6: Neem

HIBISCUS:

The leaves are alternate, ovate to lanceolate, often with a toothed or lobed margin (dentate). The flowers are large, conspicuous, trumpet-shaped, with five or more petals, colour from white to pink, red, blue, orange, peach,[7] yellow or purple,[8] and from 4–18 cm broad.

Figure No. 7: Hibiscus

CURRY LEAF:

Murraya koenigii (L.) Spreng or its common name curry leaf tree is a small strong-smelling perennial shrub commonly found in forests as undergrowth. It was originally cultivated in India for its aromatic leaves and ornament and is normally used for natural flavoring in curries and sauces.

Figure No. 8: Curry leaf

II MATERIALS AND METHODS:

COLLECTION OF PLANT MATERIALS:

The Materials used in the present study in Leaves of Hibiscus rosasinensis (hibiscus), Eclipte (bhringraj), Ocimum tenifloram (tulsi), Azadirachta Indica(neem), Murrayakoenigii (curry leaves), Sapindus Mukorossi (reetha), Acacia concinna (shikakkai), Emblica Officinalis (amla) were Collected from Nearby Areas and dried in shade in shade for 5 days and powered for Further use. The herbal shampoo powder was formulated using the following natural ingredients[10]. were collected from the college medicinal garden.

Formulation of herbal shampoo powder/ mixing the ingredients

All the size-reduced plant materials were sieved using sieve number 100 so that the fine powder was produced. Then all the required ingredients were formulated as per the formulation[13].

Table No. 1: Composition of Shampoo

S.no	Ingredients	Category	F1	F2	F3	F4	F5	F6
1.	AMLA	Promote hair growth, prevent premature gray ing and control dandruff	2	2	2	2	2	2
2.	REETHA	Detergent, foaming property	4	4	4	4	4	4
3.	SHIKAKAI	Natural cleansing agent, detergent,	2	2	2	2	2	2
4.	NEEM(F1)	Antimicrobial agent	2	-		-	-	-
5.	HIBISCUS LEAVES (F2)	Improves hair growth, prevent premature grayness	-	2	-	-	-	-
6.	BHRINGRAJ(F3)	Improves hair growth, prevent premature grayness	-	-	2	-	-	-
7.	HIBISCUS FLOWERS(F4)	Improves hair growth, prevent premature grayness	-	-	-	2	-	-
8.	CURRY LEAVES (F5)	Improves hair growth, prevent premature grayness	-	-	-	-	2	-
9.	TULASI(F6)	Antimicrobial agent	-	-	-	-	-	2

Evaluation of herbal shampoo powder:

Organoleptic evaluation:

Organoleptic evaluation on the parameters like colour, odour taste, and texture was carried out. Colour and texture were evaluated by vision and touch sensation respectively. For taste and odour evaluation a team of five taste and odour sensitive persons was formed and random sampling was performed[34].

General powder characteristics:

General powder characteristics include evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.) of the preparation, Characteristics evaluated under this section are powder form, particle size angle of repose and bulk density. Samples for all these evaluations were taken at three different levels i.e. from top, middle and lower level[35].

Particle size:

Particle size is a parameter, which 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:

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow[36].

Funnel method:

Required quality of dried powder is taken in a funnel placed at a height of 6cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder were noted and recorded the angle of repose (θ) can be calculated by using the formula.

Open-ended cylinder method:

The 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 formula[37].

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

Where, θ – Angle of repose,

h – Height of the heap,

r – Radius of the base.

Bulk density:

Bulk Density is the ratio between the given mass of a powder and its bulk volume. The required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hardwood surface from a height of 1 inch at 2-second intervals. The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the below-given formula.

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

Tapped density:

The 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)[38].

Physicochemical evaluation:

pH:

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C. The pH was measured by using digital pH Meter.

Washability:

Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

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.

Loss on drying:

Loss on drying is the loss of mass expressed in percent m/m. Two gram of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish is placed in a desiccator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying[39].

Extractive values:

Determination of alcohol soluble extractive:

5 g of each air-dried herbal shampoo powder was weighed and macerated with 100 ml of Alcohol of the specified strength in a closed flask for twenty-four hours, shaked frequently for six hours and allowed to stand for eighteen hours. Filtered, by taking precautions against loss of solvent, 25 ml of the filtrate was evaporated to dryness in a tare flat bottomed shallow dish, and dry at 105 $^{\circ}$C, to constant weight and weighed. The percentage of alcohol-soluble extractive in the air-dried drug was calculated.

Determination of water soluble extractive:

Proceeded as directed for the determination of alcohol-soluble extractive using chloroform water instead of ethanol. The percentage of water-soluble extractive was calculated for each sample[40].

Dirt dispersion:

Two drops of 1% each shampoo powders 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 shaken for 10 times. The amount of ink in the foam of was estimated as None, Light, Moderate, or Heavy[41].

Moisture content determination:

10 g of each herbal shampoo powder was weighed in a tare evaporating dish and kept in hot air oven at 1050C. Repeated the drying until the constant weight loss was observed after the interval of 30 minutes. The moisture content was calculated for each sample[42].

Wetting time:

The canvas was cut into 1-inch diameter discs having an average weight of 0.44 g. The disc was floated on the surface of shampoo solution of 1% w/v and the stopwatch started. The time required for the disc to begin to sink was measured acutely and noted as the wetting time[43].

Stability Study:

The stability and acceptability of organoleptic properties (odor and color) of formulations during the storage period indicated that they are chemically and physically stable.

Nature of hair after washes:

Nature of hair after wash can be done by collecting the responses of volunteers.

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 the standard volumetric flask. This extract is taken in 10 test tubes in a series of the successive portion of 1, 2, 3….10 ml and the remaining volume is made up of water to 10 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[44].

The height of the foam was measured.

Foaming index = 1000/a **Swelling index:**

The swelling index is the volume in milliliters occupied by one gram of a drug, including any adhering mucilage after it has swollen in an aqueous liquid for 4 hour. Accurately weighed 1 g of the powder and transferred it into glass stopper measuring cylinder containing 25 ml of water. Then it is shaken thoroughly at every 10 minutes for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml[45].

Skin /eye irritation test:

The eye and skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on the skin and eye. This is due to the absence of synthetic surfactants. Most synthetic surfactants produce inflammation of the eyelid and corneal irritation. But in this formulation of herbal shampoo powder, the uses of all ingredients are obtained naturally. So it does not produce any harmful effect on the skin and eye[46,47].

III. RESULTS AND DISCUSSION

Formulation of herbal shampoo powder/ Mixing the ingredients: All the size reduced plant materials were sieved using sieve number 100 so that the fine powder was produced. Then all the required ingredients were formulated.

Figure No. 9: F1-Neem

Herbal shampoo powder

Figure No. 10: F2- Hibiscus leaves

herbal shampoo powder

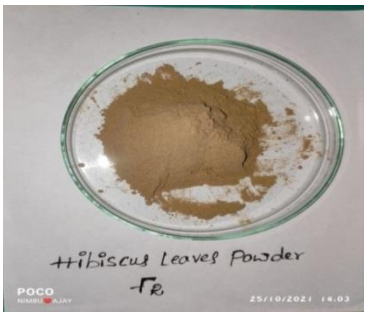


Figure No. 11: F3- Bhringraj herbal shampoo powder

Figure No. 12: F4 –Hibiscus flower shampoo powder

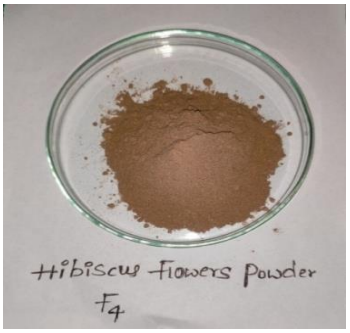
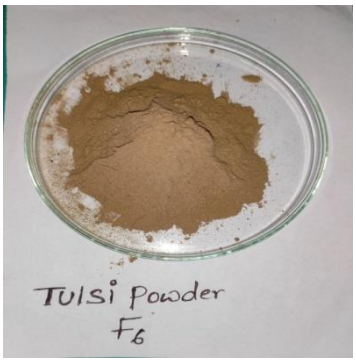


Figure No. 13: F6-Tulsi herbal shampoo powder



Evaluation of herbal shampoo powder:

Table No. 2: Organoleptic evaluation of F1-F6

S.NO	Organoleptic characters	F1	F2	F3	F4	F5	F6
1	**Colour**	Gingerbread	Peanut in brown	Tortilla in brown	Peanut in brown	Peanut in brown	Peanut in brown
2	**Odour**	Aroma	unpleasant	Sweet pungent aroma	Strong aroma	pungent	pungent
3	**Taste**	pungent	Bitter	Bitter	Bitter	Bitter	Bitter
4	**Texture**	Fine & smooth	Fine& smooth	Fine & smooth	Fine & smooth	Fine & smooth	Fine & smooth

Table No. 3: Angle of repose of F1-F6

Formulation No.	Method	Height of cone(cm)	Radius of cone(cm)	TanΘ=h/r	Θ=tan-1(h/r)	Flow property
F1	Funnel	3	3.5	0.857	40	Fair
F2	Funnel	2	3.4	0.571	29	Excellent
F3	Funnel	3	3.5	0.857	40	Fair
F4	Funnel	2.5	3.5	0.714	35	Good
F5	Funnel	4	3	1.33	53	Poor
F6	Funnel	4	3	1.33	53	Poor

Table No. 4: Bulk density of F1-F6:

Formulation No.	**Bulk volume(ml)**	**Mass of the powder (gm)**	**Bulk density(g/ml)**
F1	23	10	0.43
F2	30	10	0.33
F3	29	10	0.34
F4	29	10	0.34
F5	30	10	0.33
F6	24	10	0.33

Table No 5: Tapped density of F1-F6:

Formulation No.	**Tapped volume**	**Mass of the powder**	**Tapped density(g/ml)**
F1	30	10	28.7
F2	30	10	29
F3	30	10	28.4
F4	30	10	28.9
F5	30	10	28.3
F6	30	10	29

Table No 6: Physicochemical evaluation of F1-F6:

Formulation No.	pH	Washability	Loss on drying (final wt)	Dirt dispersion	Nature of hair after washes
F1	5.5	Easy	1.88g	Moderate	Soft manageable
F2	5.7	Easy	1.86g	Moderate	Soft manageable
F3	5.7	Easy	1.89g	Moderate	Soft manageable
F4	5.9	Easy	1.92g	Moderate	Soft manageable
F5	5.5	Easy	1.97g	Moderate	Soft manageable
F6	5.7	Easy	1.90g	Moderate	Soft manageable

Table No. 7: Extractive values of F1-F6:

Formulation No.	Alocohol soluble extract	Water soluble extract
F1	0.62	0.69
F2	0.81	0.87
F3	0.62	0.69
F4	0.61	0.95
F5	0.40	0.87
F6	0.64	0.89

Table No. 8: Moisture content of F1-F6:

Formulation No.	Initial weight	After 30 min	After 60 min
F1	10g	9.92g	9.92g
F2	10g	9.36g	9.36g
F3	10g	9.84g	9.84g
F4	10g	9.86g	9.86g
F5	10g	9.91g	9.91g
F6	10g	9.87g	9.87g

Table No. 9: Swelling index of F1-F6:

Formulation No.	Initial volume (ml)	Final volume after 3 hours (ml)
F1	27	29
F2	27	31
F3	27	28
F4	27	29
F5	27	29
F6	27	30

Table No. 10: Foaming capacity

Formulation No.	Wetting time	Stability	Foaming capacity	Skin/ eye irritation
F1	4 seconds	Stable	Good foaming	No irritation
F2	3 seconds	Stable	Good foaming	No irritation
F3	2 seconds	Stable	Good foaming	No irritation
F4	3 seconds	Stable	Good foaming	No irritation
F5	2 seconds	Stable	Good foaming	No irritation
F6	2 seconds	Stable	Good foaming	No irritation

IV.SUMMARY AND CONCLUSION

➢ The present work was formulation and evaluation of herbal shampoo powder using different kinds of plant herbs like Amla, Shikakai, Reetha, Bhringraj, Tulasi, Neem, Hibiscus, and Curry leaves.

➢ All the plant materials were collected from the college medicinal garden fresh. Then air dried the collected materials then milled, and sieved.

➢ Further, the powders were used as per the formulation table and formulated as herbal shampoo powder.

➢ Total 6 formulations were prepared and evaluated for different tests to know the efficacy and stability of the formulations.

➢ All 6 formulations were shown better results during the evaluation studies and the results were found satisfactory.

➢ The work concluded that the formulation and evaluation of herbal shampoo powder with different herbs shown good results on the hair. That is the hair became smoother and covering grey hair.

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