

**FORMULATION AND EVALUATION OF POLYHERBAL SHAMPOO
TABLETS WITH *MURRAYA KOENIGII***

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ABSTRACT

In the contemporary era, there is a growing preference for natural and herbal alternatives due to their renewability, minimal adverse effects, and cost-effectiveness. This novel work aims to prepare and evaluate an environmentally conscious herbal shampoo in tablet form. This pioneering endeavor by the formulator seeks to create an essential cosmetic product for hair hygiene and attractiveness using natural ingredients. Nowadays so many marketed preparation shampoo is available with several chemical cure hair problems but may damage of hairs. Shampoo are available in different dosage form like liquid, semisolid, form. This shampoo is in tablet form with so many so many types of herbal ingredients and no any side effects. It helps hair to improve their shine, thickening, growth, and strength of roots. This shampoo tablets clean the hair and prevent hair loss due to natural effective

ingredients as Shikakai - Promotes Growth, Anti Dandruff, Reetha- natural cleanser, Guva, Hibiscuss- reduce hair fall, Amla- delays Greying and Henna provides the conditioning of the hair. This tablet is natural and herbal alternatives due to their renewability, eco-conscious, and user friendly solution to conventional shampoos with no side effects.

KEYWORDS: Shampoo Tables, formulations, testing of tables, hair conditioner.

INTRODUCTION

Hair loss is a prevalent condition worldwide; it can affect both males and females of different age groups. Despite the availability of many conventional treatment but causing different side effects, leading to a growing interest in natural and herbal remedies. In Pharmaceutical industry the shampoo is one of best cosmetic product and the largest unit sale among the hair care products used in daily life. Ayurveda is the ancient Indian system of medicine. It has been nurturing hair naturally for centuries. This ancient Ayurvedic herb is a natural cleanser loved for generations. Some herbal hair product gives strengthen hair, slow hair loss, or promote new growth, but they're not likely to grow a full head of hair while many are safe, some can cause unwanted side effects. It is challenging to create a shampoo with only one natural ingredient that is safer and softer than synthetic shampoo. It should have property as like foaming, detergency, and solid content, same as to synthetic shampoo. Shampoo should be non-toxic and non-irritating to the scalp and hair. It should remove sebum and atmospheric pollutants from the scalp and hair. We prepare considering all criteria and condition, developing a pure natural shampoo tablet for hair loss, cleaning and conditioning hair without side effect by using different tested method.

MATERIALS AND METHODS

COLLECTION OF HERBS: The plants selected for the formulation are collected from local source, shaded-dried, mixed in blender and sieved to produce proper powder.

Bhringraj Amla, Neem, Shikakai, Reetha powders were brought from Packed and Marketed by Global Enterprises, Noida, Delhi. Curry leaves (*Murraya koenigii*), Henna, Hibiscus powders were brought from domestically plants, Acacia, SLS Surfactant., Magnesium stearate (lubricant) purchased from, Research lab fine chem. Lab Mumbai.

In this formulation the ingredients Curry leaves (stops hair loss, delays greying), Guava leaves and Amla, as hair growth, Hibiscus as hair regrowth, Neem as antimicrobial, Shikakai is a cleanser and conditioner, Henna as hair conditioner, Reetha cleanser and anti-dandruff also foaming agent, etc.

Preparation of Polyherbal Powder Shampoo: The herbal shampoo powder was formulated using the many natural herbal ingredients.

All Herbal drugs were shade dried and grinded. Herbal powders for shampoo preparation were done by weighing individually. These powdered materials were mixed thoroughly made homogeneous fine powder and passed through sieve no: 80 and 120 to get the sufficient quantity of fine powder. Powder was compressed by direct compression which tablets are compressed directly from powder blends of active ingredients and excipients.^[18]

Table 1: Formula for herbal shampoo tablet.

Sr.No	Ingredients	Tablet (RF1) (660 mg)	Tablet (RF2) (660 mg)
1	Curry leaves	100 mg	130 mg
2	Henna	50 mg	50 mg
3	Fenugreek	80 mg	90 mg
4	Guava leaves	50 mg	40 mg
5	Amla	50 mg	50 mg
6	Reetha	80 mg	80 mg
7	Shikakai	80 mg	60 mg
8	Hibiscus	70 mg	80 mg
9	Neem	40 mg	20 mg
10	Acacia	55 mg	55 mg
11	SLS	5 mg	5 mg

Tablet composition is presented in Table 1



Fig. 1: Powdered herbal drug.

EVALUATION

The prepared formulations were evaluated by quality control tests including visual assessment and physicochemical tests such as pH and viscosity etc. Also to assure the quality of products, specific tests for shampoo formulations.

▪ PHYSICAL APPEARANCE / VISUAL ASSESSMENT

GENERAL CHARACTERISTICS OF POWDER

Test of particle size: Grittiness and spreading are depending upon the particle size of tablet. Specific size can be achieved by sieving techniques, in this, the powder is passed through sieves of varying mesh sizes to separate particles based on their size.^[1]

Angle of repose by funnel method: This is measured experimentally by allowing the powder to flow freely onto a flat surface until it forms a cone. The angle of tangent formed by the cone and the flat surface shows the angle of repose. The angle of repose found to be 31° .^[2]

Bulk density: Bulk density shows the mass of a powder divided by its bulk volume. It is usually expressed in grams per milliliter (g/mL) or kilograms per cubic meter (kg/m^3). Bulk density can be measured using various methods, such as tapped density, poured density, and bulk density using a graduated cylinder.^[6] Bulk density shows the packing arrangement of particles within the powder. It can influence flow properties, compressibility, and handling characteristics.

Bulk density = Weight of the herbal shampoo powder / Volume of the herbal shampoo powder

Tapped density: It is measured after the powder has been tapped or subjected to vibrations to settle it more densely. This process reduces the void spaces between particles and gives a more accurate measure of the powder's packing efficiency that is important for transport purpose.^[2]

$$\text{Tapped density} = \text{Weight of powder} / \text{Tapped powder volume}$$

Hausner ratio: The Hausner ratio is an indirect bulk parameter of a powder, as well as a measure of particle interaction.^[24] A Hausner ratio close to 1.2 indicates that there is minimal change in volume between the loose and tapped states, suggesting good flowability.^[3]

$$\text{Hausner ratio} = \text{Bulk density} / \text{Tapped density}$$

Carr's compressibility index: It shows the compressibility and flowability of granules. Carr's index of a powder. Lower carr's indicates show better flowability and compressibility of powder or granules.

$$\text{Carr's index} = (\text{Tapped density} - \text{bulk density}) / \text{Tapped density} \times 100^{[4]}$$

- **PHYSICO-CHEMICAL EVALUATION**

Determination of pH: 1g of shampoo tablet in 10 ml distilled water was determined at 25⁰ C by using pH paper. The pH of Shampoo tablet is 8.

Foamability: The shampoo should exhibit ability to produce foam is an important parameter in its evaluation. This indicates that the formulated shampoo exhibited a good foam volume for effective cleansing and coverage of the hair and scalp. For this, Cylinder shake method was used for determining foaming ability.^[6]

50 ml 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 1-minute shaking were recorded. The foam volume was calculated only. The volume of foam at 1 minute intervals for 4 minutes were recorded.^[6]

Moisture content determination: 10 g of prepared herbal powder shampoo was weighed in an evaporating dish and kept in hot air oven (105°C). Drying is carried out until a uniform weight is obtained. The moisture content of each formulation of powder shampoo was calculated.^[7]

Loss on drying: A quantity of 1 g of the herbal shampoo powder was placed in a pre-dried petri dish and the powder was then reweighed to determine its loss on drying.^[8]

Washability: The herbal shampoo powder was applied onto the skin. The sample was manually assessed to determine the ease and extent of washing with water.^[9,10]

Solubility: An accurately measured 1 g portion of the powder was transferred into a beaker with 100 ml of water. The solution was shaken well, gently heated to improve dissolution, cooled, and subsequently filtered. The residue obtained was weighed and noted.^[11]

Dirt dispersion: A test tube with 10 ml of distilled water was added with 2 drops of the 1% shampoo powder solution, followed by 1 drop of India ink. The degree of ink retention in the foam was assessed.^[12,13]

Swelling index: About 1 g of shampoo powder is taken into a glass stopper cylinder containing 25 ml of water. Then, the measuring cylinder is shaken for 1 h with an interval of 10 min. The solution is kept aside for 3 h without shaking. Volume is measured in ml.^[17]

EVALUATION OF POLYHERBAL POWDER SHAMPOO TABLET

Physical evaluation: The organoleptic qualities like colour, odour, shape, and size were performed on shampoo tablet.



Fig. 2: Compressed tablets.

Tablet Hardness: By using a Monsanto hardness tester for determine the hardness of the tablets. The thickness of tablets was tested by Vernier Calipers.^[14]

Weight variation: The weights of ten individual tablets were recorded (between 640-680 mg), followed by determination of their average weight and individual values were assessed relative to this mean (660 mg). The weight variation test determines the drug content uniformity of tablets.

Friability: The friability test was performed using a tablet friability apparatus. 10 tablets were individually weighed, placed in the rotating drum for 100 revolutions, and subsequently reweighed to determine weight loss. The percentage friability was calculated by the following formula.^[14]

$$\text{Percentage friability} = \frac{w_1 - w_2}{w_1} \times 100 \text{ Where, } w_1 = \text{initial weight } w_2 = \text{final weight}$$

Surface tension measurement

The prepared shampoo in distilled water (10% w/v) was evaluated for surface tension using stalagmometer in room temperature.

Wetting Time

Wetting time was also calculated by noting the time which is required by the canvas paper to sink completely. The canvas paper weighing 0.44 g was cut into a disc of diameter measuring

1- inch Over the shampoo (1% v/v) surface, the canvas paper disc was kept and the time is taken for the paper to sink was measured using the stopwatch. The wetting time of this formulated Shampoo was found to be 1 min.

Foam stability test

The stability of the foam is determined. About (1%) solution was taken into the test tube shaken for 10 times vigorously and the foam stability was measured by recording the foam volume of shake test after 1 min and 4 min, respectively and total foam volume was measured after 1 min and shaking the shampoo tablet then compared with standard shampoo.

Particle size: The size of a particle influences properties such as grittiness and spreading. It is determined using sieving techniques, where the powder is passed through sieves of varying mesh sizes to separate particles based on their size.^[15]

Dirt dispersion test

Three drops of shampoo added in the test tube to create a volume up to 10 ml and in that 1 drop of Indian ink is added. The ink serves as a simulated dirt or soil particle. and shake it at least 10 times.

After shaking, observe the foam or lather formed in the test tube. Estimate the amount of ink dispersed in the foam:

None: No ink is visible in the foam.

Light: A small amount of ink is dispersed in the foam, indicating partial cleaning.

Moderate: A moderate amount of ink is dispersed in the foam, suggesting effective cleaning.

Heavy: A significant amount of ink is dispersed in the foam, indicating thorough cleaning. This test provides a qualitative assessment of the shampoo's ability to disperse and remove dirt or soil particles from the hair and scalp.^[12,13]

Wetting time

Wetting time is calculated by noting the time required by the canvas to sink completely the canvas was cut into 1-inch diameter discs having an average weight of 0.44 g. The 1% v/v solution of shampoo is placed on that smooth surface of the disc and in other side stopwatch was started.

The time required for the disc to begin to sink was noted as wetting time finally.^[16]

Skin irritation test

The solution of prepared shampoo tablet applied on skin and kept it for 5 minutes and observed for redness of skin and irritation there, were no any red coloration and the irritation to the skin.

Viscosity: By using the Ostwald viscometer, viscosity was also determined.

Visual assessment: The color, clarity, odor, and froth content of this prepared formulation was assessed.

RESULTS AND DISCUSSION

• EVALUATION OF POLYHERBAL SHAMPOO POWDER

- 1. ORGANOLEPTIC EVALUATION:** The prepared powder formulations [RF1] and [RF2] was evaluated for physical parameters like colour, odour, texture etc. mention in table no. 2

Table 2: Organoleptic Powder Characteristics.

S.N	Evaluation parameter	RF1	RF2
1	Colour	olive green	olive green
2	Odour	characteristic	characteristic
3	Texture	course	course

Table 3: General Powder Characteristics.

S.N	Characteristics	RF1	RF2
1	Particle Size (μm)	334-365	310-385
2	Bulk Density (g/cm^3)	0.71	0.79
3	Tapped Density	0.74	0.85
4	Angle Of Repose ($^\circ$)	30°.9	32°.31
5	Hausner's Ratio	1.055	1.088
6	Compressibility	21.2%	21.94%
7	Flowability	Good	Good
8	Carr's index (%)	6.67	7.51

• PHYSICO CHEMICAL EVALUATION POLYHERBAL SHAMPOO POWDER

All formulations were evaluated for their physicochemical properties:

Table 4: Physicochemical properties of Shampoo Powder.

S.N	Test	RF1	RF2
1	PH	Basic	Basic
2	Washability	Good	Excellent
3	Dirt dispersion	Ink appeared- moderate	Ink appeared - moderate
4	Wetting time (s)	106s	111s
5	Loss on drying	In limit	In limit
6	Foaming Index	Good	Good
7	Moisture content	1.55%	1.67%
8	Conditioning performance	good	good

• EVALUATION OF POLYHERBAL SHAMPOO TABLET

PHYSICAL EVALUATION

The prepared shampoo tablets are evaluated by different tests and results are shown in table 05.

Table 5: Physical Evaluation parameter.

S.N	Evaluation parameter	Observation
1	Colour	olive green
2	Appearance	round
3	Solubility	easily soluble

Table 6: Official/Unofficial (Pharmacopoeial) Tests.

S.N	Parameter	Average
1	Hardness	4.37 mg/cm ²
2	Friability	0.2 %
3	Weight Variation	±5% Within Limits

CONCLUSION

The research is shows that this formulation containing ingredients have wide variety of acceptance in herbal formulation. Formulation and Evaluation of polyherbal Shampoo tablets with *Murraya koenigii* having best result for cleansing, conditioning hair and their growth. The formulated shampoo tablet is not only safer than the chemical but also greatly reduced the hair loss during combining as well as strengthens the hair growth. These are polyherbal product for community. Shampoo tablets boast eco-friendly packaging and a convenient, travel-friendly design. These shampoo is long lasting shelf life and does not having chemical preservatives. The polyherbal shampoo tablet developed can be considered a promising, consumer-friendly, and environmentally sustainable formulation for effective hair and scalp care.

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