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Preparation and Evaluation of Semi-Synthetic Shampoo Tablet

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ABSTRACT:
The present study focuses on the formulation and evaluation of semi-synthetic shampoo tablets as an alternative to conventional liquid shampoos. The main aim was to develop a solid dosage form that is easy to handle, eco-friendly, and suitable for travel, while maintaining effective cleansing properties. Shampoo tablets were prepared using selected semi-synthetic polymers and evaluated for physical parameters such as weight variation, friability, hardness, and foamability. The results showed that the tablets had uniform weight, acceptable friability (0%), and good mechanical strength. Foam quality and cleansing ability were found to be satisfactory, indicating the potential of shampoo tablets as a promising alternative in personal care products. This study supports the development of sustainable and user-friendly hair care formulations.

Keywords: Hair, Semi-Synthetic Tablet Shampoo, Cosmatic, Hibiscus, Shikakai

I. INTRODUTION:

Cosmetics are products made to be applied to the body in order to alter or beautify appearance, accentuate attractive features, and cleanse the body. Designed to be administered by rubbing, sprinkling, or other means, these items have a modest effect on the human body and are meant to clean, beautify, and boost attractiveness, change the appearance, Alternatively maintain healthy skin or hair.(1) Human beauty is inextricably linked to hair. Using traditional ayurvedic herbs, herbal shampoos are cosmetic preparations that have been used since ancient times to cleanse the hair and scalp, as well as to manage and beautify hair. Uses for herbal shampoos include to keep hair manageable and oily, as well as to give it a glossy finish and for cleaning purposes.(2)

1.1 Structure of the Scalp:

SCALP [1] is a mnemonic that helps you recall the five different layers that make up the scalp: Hair follicles, sebaceous glands, and a dense innervation of blood vessels and sensory receptors such as Pacinian corpuscles are all found in the skin.Connective tissue, which includes blood vessels and nerve endings, is a fibrofatty layer that runs from the epidermis to the epicranial aponeurosis.The thin, strong layer of fibrous tendinous tissue where the occipitofrontalis muscle inserts is called the epicranial aponeurosis (Galea aponeurotica).The loose link between the pericranium and the epicranial aponeurosis that permits the other layers to glide over it is known as "loose areolar tissue."The thin layer of dense, uneven connective tissue that covers the outside of the skull is called the periosteum, or pericranium.

1.2 Hair Structure:

In the scalp's dermis, hair follicles are tubular structures made of several layers of epithelial cells. Important elements consist of :The hair bulb, which is the base of the follicle with blood vessels and nerve projections, is invaginated by the dermal papilla. The three deepest layers of epithelial cells keratinize to form the hair shaft. The mass of cells that make up the hair shaft is known as the "hair matrix." Smooth muscles called arrector pili are connected to hair follicles and, when contracted, cause a hair erection. Melanocytes: These cells give hair its color by integrating melanin into the hair shaft.(3)

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Semi-synthetic herbal tablet shampoos are the result of revolutionary shampoo formulations spurred by the growing demand for eco-friendly, high-performing, and consumer-friendly hair care products. Modern pharmaceutical technologies and the therapeutic advantages of traditional herbal medicine are combined in these innovative formulations to create a solid dosage form with enhanced stability, mobility, and less packaging waste. Tablet forms assist the global trend toward environmentally friendly cosmetics, minimize the usage of preservatives, and lower the risk of microbiological contamination (Bisht et al., 2020). Herbal tablet shampoos are a promising new direction in the creation of eco-friendly, useful cosmetics because of these qualities.(4)

1.3 Skin care preparation for hair:Hair shampoo,Hair cream,Hair sprays,Hair conditioner,Hair lotion,Hair fixer,Hair gel,Hair oil etc.(5)

II. TYPES OF SHAMPOO:

- Powder Shampoo
- Liquid Shampoo
- Lotion Shampoo
- Cream Shampoo
- Jelly Shampoo
- Aerosol Shampoo
- Specialized Shampoo
- Conditioning Shampoo
- Anti_ dandruff Shampoo
- Traditional shampoo
- Herbal shampoo
- Solid shampoo (6)

2.1 SHAMPOO: shampoos are used for cosmetic purposes. In our daily lives, we utilize this hair care product to clean our hair and scalp. Shampoos are sticky detergent solutions with the right chemicals, preservatives, and active ingredients that are most commonly used as beautifying agents. It's typically smeared into damp hair, massaged in, and rinsed out with water. Herbal shampoo is intended to remove makeup and debris from hair without removing a significant amount of sebum.(7)

III. MATERIAL:

A) Shikakai:
Family- Leguminosae
Botanical Name- Acacia concinna Linn
Plant Part- Flower

Use-Nourish follicles,cleansing property etc.

Recall the times when our mother used to wash our hair with shikakai. Because shikakai is an excellent herb for healthy hair, we are grateful to our mother. Shikakai, also known as Acacia concinna, is an ayurvedic herb that naturally cleanses and soothes the scalp. It is high in phytochemicals and vitamin C, which aid to lessen dryness, irritation, and dandruff on the scalp. Shikakai is wealthy in antioxidants that support and encourage the natural growth of hair.

B) Hibiscus:
Family- Malvaceae
Botanical Name- Hibiscus-sinensis L.
Use- Anti-bacterial, silky hair etc.

Promotes hair growth and reduces gray hair. Dandruff and hair loss can be treated with the help of the mucilage and plant proteins found in the flowers and leaves. Hibiscus infusions are fantastic as a last rinse because they provide warm red tones, offer superior glide and assist in untangling naturally curly hair.(8,9,10)

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3.1 METHOD:

Collection of herbal ingredients –

1. Shikakai -shikakai pod collected from market.
2. Hibiscus - hibiscus flower collected from plant.

Herbal ingredient were shade-dried and subsequently powdered for further use.

Sr.no.	Powder
1.	Shikakai powder
2.	Hibiscus powder

3.2 CHEMICALS USED:

Sr.no.	Chemicals
1.	Sodium Starch Glycolate
2.	Magnesium stearate
3.	HPMC
4.	Talc

3.3 INSTRUMENTS REQUIRED:

Sr.no.	Instruments
1.	Tablet Punching Machine
2.	Weighing Balance
3.	Sieve
4.	All Glasswares

IV. ROLE OF INGREDIENTS :

Sr.no.	Ingredient	Role
1.	Shikakai Powder	Cleansing Agent
2.	Hibiscus Powder	Conditioning Agent
3.	Sodium Starch Glycolate	Foamimng Agent
4.	Corn Starch	Binder
5.	Magnesium Sterate	Glidant
6.	Sodium Lauryl Sulfate	Foaming Agent
7.	Talc	Dispersing Agent

V. FORMULATION TABLE:

Sr.no.	Ingredients	A	B	C	D
1.	Hibiscus Powder	150mg	150mg	150mg	150mg
2.	Shikakai Powder	150mg	150mg	150mg	150mg
3.	Sodium Starch Glycolate	600mg	700mg	800mg	900mg
4.	Corn Starch	400mg	300mg	200mg	100mg
5.	Magnesium Sterate	50mg	50mg	50mg	50mg
6.	Sodium Lauryl Sulfate	100mg	100mg	100mg	100mg
7.	Talc	50mg	50mg	50mg	50mg

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5.1 Procedure:

Experimental Procedure

1. Collection of Ingredients:Shikakai was procured from the local market, while Hibiscus was freshly collected from a plant source.
2. Drying:Both herbal ingredients were subjected to shade drying to preserve their active constituents.
3. Powdering:After complete drying, the plant materials were grind into fine powders using a mechanical grinder.
4. Trituration and Sieving:The powdered herbs were triturated thoroughly to achieve uniform mixing and then passed through a suitable mesh sieve to obtain a fine and consistent powder.
5. Weighing and Excipient Addition:The required quantities of herbal powders were accurately weighed. Appropriate pharmaceutical excipients were added to the formulation.
6. Final Trituration:The mixture of herbal powders and excipients was triturated again to ensure even distribution of all ingredients.
7. Tablet Formation:The final mixture was subjected to tablet compression using a tablet punching machine to obtain uniform herbal tablets.

TABLET PUNCHING MACHINE CADMACH CMD3

VI. PREFORMULATION STUDIES & BULK CHARACTERIZATIONS:(11)

Powder Form

1. **Bulk Density:**It is the apparent density of the powder. It is the untapped powder volume. The weight of powder is taken and poured Into a graduated cylinder via a large funnel. The volume is called the bulk volume. It is expressed as g/cm³. The bulk Density is determined by,

$$Bulk\ Density = \frac{Weight\ of\ the\ powder}{Bulk\ volume}$$

2. **Tapped density**:It is the volume of the powder obtained after mechanical tapping. It is also expressed as g/cm³, obtained after Mechanical tapping. It is also expressed as g/cm³. The tapped density is determined by,

$$Tapped\ Density = \frac{weight\ of\ the\ powder}{Tapped\ volume}$$

3. **Carr's index:**Is a test to evaluate the flowability of powder by comparing the bulk density and tapped density of the powder and the rate at which it packs down. Carr's index (%) can be determined by the formula

$$Carr's\ Index = \frac{(Tapped\ density - Bulk\ density)}{Tapped\ density} \times 100$$

4. **Hausner's Ratio:**Hausner's ratio is also correlated with the density ratio of powder and its flow property.

Hausner's ratio is calculated by,

$$Hausner's\ Ratio = \frac{Tapped\ density}{Bulk\ density}$$

5. **Angle of repos**e:The angle of repose is the maximum angle possible between the surface of the pile of powder and the horizontal plane.

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It can be easily determined by allowing powder to flow through a funnel and fall freely onto a surface, it is calculated By the equation,

Where,H is the height of a powder cone, r is the radius of powder cone

$$\emptyset = \tan^{-1} h/r$$

VII. EVALUATION PARAMETERS:

a) **Physical evaluation(12):** Physical characteristics of Shampoo tablet like color, state, odour, Were visually tested.

b) **PH determination(13):** One tablet was taken and converted into powder form. Pour 10 mL of water over this Powder. pH was determined using pH paper.

c) **Foamability(14):** Take 5 ml. of water in measuring cylinder, add the tablet powder to it. Shake the solution of 5 to 10 min and measure the foam produced.

d) **Washability(15):** The product is applied on hand and observed under running water to check its washability.

e) **Grittiness(16):** Tablets with the help of water were rubbed between fingers, against the palm and grittiness Was determined.

f) **Weight Variation(17):** Take the weight of 20 tablets individually. Determine the average weight, then Compare that with the weight of each tablet. The tablet passes the IP test if.

g) **Friability Test(18):**This Test was done by using ROCHE FRIABILITY TESTER. 4 tablets were placed In a plastic chambered friabilator attached to a motor revolving at a speed of 25 rpm For 4 minutes. Friability was measured by using following formula:

$$\%\text{Friability} = \frac{\text{Initial weight} - \text{final weight}}{\text{Initial Weight}} \times 100$$

VIII. RESULT AND CONCLUSION:

Batch D was found to be optimum batch amongst all.

- **Preformulation studies:**

Weight of powder – 10gm
Bulk volume –33
Bulk volume after tapping –23
Diameter – 7cm
Radius – 3.5
Height of pile – 5.5cm

Sr.no.	Test	Result	Type of flow
1.	Bulk Density	0.3030	---
2.	Tapped Density	0.4347	---
3.	Hausner's Ratio	1.4346	Average
4.	Carr's Index	30.29%	Poor
5.	Angle of Repose	38.41	Average

- **Physical Characteristic:**

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Prepared Tablets

Sr.no.	Parameters	Results
1.	Brown	Brown
2.	State	Hard
3.	Odour	Odorless

- **Evaluation parameters**

Sr.no.	Parameters	Results
1.	pH	5
2.	Foamability	25ml
3.	Washability	Easily washable
4.	Grittiness	No gritty particle

Fomability

Tablet After use

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Tablet Before Use

Weight Variation Result:
Average Weight of Tablet
Permitted Variation

≥ 250 mg	±5%
130 mg to 249 mg	±7.5%
< 130 mg	±10%

For your 1.50 g (1500 mg) shampoo tablet, the limit is:
> ±5% of 1500 mg = ±75 mg

Sr.no.	Individual Weight (mg)	Average Weight (mg)	Standard Deviation	Lower Limit	Upper Limit	**Result**
1	1440mg	1470mg	0.215%	1430mg	1480mg	**Pass**
2	1430mg	1470mg	0.215%	1430mg	1480mg	**Pass**
3	1435mg	1470mg	0.215%	1430mg	1480mg	**Pass**
4	1450mg	1470mg	0.215%	1430mg	1480mg	Pass
5	1460mg	1470mg	0.215%	1430mg	1480mg	Pass
6	1470mg	1470mg	0.215%	1430mg	1480mg	Pass
7	1470mg	1470mg	0.215%	1430mg	1480mg	**Pass**
8	1480mg	1470mg	0.215%	1430mg	1480mg	**Pass**
9	1470mg	1470mg	0.215%	1430mg	1480mg	**Pass**
10	1475mg	1470mg	0.215%	1430mg	1480mg	**Pass**
11	1478mg	1470mg	0.215%	1430mg	1480mg	**Pass**
12	1470mg	1470mg	0.215%	1430mg	1480mg	**Pass**
13	1475mg	1470mg	0.215%	1430mg	1480mg	**Pass**
14	1476mg	1470mg	0.215%	1430mg	1480mg	**Pass**
15	1467mg	1470mg	0.215%	1430mg	1480mg	**Pass**
16	1478mg	1470mg	0.215%	1430mg	1480mg	**Pass**
17	1470mg	1470mg	0.215%	1430mg	1480mg	**Pass**
18	1472mg	1470mg	0.215%	1430mg	1480mg	**Pass**
19	1477mg	1470mg	0.215%	1430mg	1480mg	**Pass**
20	1473mg	1470mg	0.215%	1430mg	1480mg	**Pass**

Friability Test Result:
Formula
Initial Weight=
Final Weight=
% Friability = Initial Weight – Final weight / Initial Weight *100

$$= \frac{1500mg - 1470mg}{1500mg} \times 100$$

= 2%

REFERENCE:

[1]. Sapna,Bhaedwaj SK,Sharma A,Sharma A,Dr.Gupta R.Herbal Shampoo: A Review Volume 8 INTERNATIONAL JOURNAL OF NOVEL RESEARCH AND DEVELOPMENT 3 March 2023 ISSN: 2456-4184 .

[2]. P Naga Haritha*, Pabba Supraja, Shaista Samreen, Hrudayanjali, A Review on Polyherbal Shampoo Powder international journal of pharmacy and pharmaceutical research May 2021 Vol.:21, Issue:2

[3]. Standring, S. (Ed.). (2020). Gray's Anatomy: The Anatomical Basis of Clinical Practice (42nd ed.). Elsevier.

[4]. Swarbrick, J. (2013). Encyclopedia of Pharmaceutical Technology (Vol. 1–3). Informa Healt.

[5]. Janrao kaveri, Gaikwad Vishal Shivaji.A REVIEW ON HERBAL

SHAMPOO.Volume 10. INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS. 10 October 2022 | ISSN: 2320-2882.

[6]. Janrao kaveri, Gaikwad Vishal Shivaji.A REVIEW ON HERBAL SHAMPOO.Volume 10. INTERNATIONAL JOURNAL OF CREATIVE RESEARCH THOUGHTS. 10 October 2022 | ISSN: 2320-2882.

[7]. Barel, A. O., Paye, M., & Maibach, H. I. (2014). Handbook of Cosmetic Science and Technology (4th ed.). CRC Press.

[8]. P Naga Haritha, Pabba Supraja, Shaista Samreen, Hrudayanjali, A Review on Polyherbal Shampoo Powder international journal of pharmacy and pharmaceutical research May 2021 Vol.:21, Issue:2

[9]. https://images.app.goo.gl/BNvYBh8FcfUoqzHe6

[10]. https://images.app.goo.gl/XymE6cmxWSW14PNH8

[11]. Mr. Sumedh. Paralkar, Dr. Yogesh. Thorat, Dr. Balkrishna. Tiwari, Ms. Aditi. Kasture , Ms. Pooja. Kare. Formulation and Evaluation of Herbal Facewash Tablets,Volume - 10,INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD,Issue - X, XXX - 2024.

[12]. Mr. Sumedh. Paralkar, Dr. Yogesh. Thorat, Dr. Balkrishna. Tiwari, Ms. Aditi. Kasture , Ms. Pooja. Kare. Formulation and Evaluation of Herbal Facewash Tablets,Volume - 10,INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD,Issue - X, XXX - 2024.

[13]. Quddus M A. The cropland agroforestry experiences of the village and farm forestry project in Northwest Bangladesh.. National Workshop, September 16- 17, Gazipur, Bangladesh, 2001, 229-239.

[14]. Gibson, H., Taylor, J. H., Hall, K. E., & Holah, J. T. (1999). Effectiveness of cleaning techniques used in the food industry in terms of the removal of bacterial biofilms. Journal of Applied Microbiology.

[15]. C.K. Kokate a.p.purohit ,s.b.gokhle pharmacogonosy niraliprakashan 43edition 10-12.

[16]. Harshran pal singh et al., Antiacne synergistic herbal face wash gel formulation, evaluation and stability studies 1261-1273, volume 4, 015, World journal of pharmaceutical research.

[17]. Lachman L, Lieberman A, Kinig JL. 4th ed. Bombay: Varghese Publishing House; 1991. The Theory and Practice of Industrial Pharmacy; pp. 67–8. [Google Scholar]

[18]. Mr. Sumedh. Paralkar, Dr. Yogesh. Thorat, Dr. Balkrishna. Tiwari, Ms. Aditi. Kasture , Ms. Pooja. Kare. Formulation and Evaluation of Herbal Facewash Tablets,Volume - 10,INTERNATIONAL JOURNAL FOR INNOVATIVE RESEARCH IN MULTIDISCIPLINARY FIELD,Issue - X, XXX - 2024.