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Formulation and Evaluation of Anti-Dandruff Powder Shampoo with Guava Leaves and Nutgrass for Enhanced Conditioning

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ABSTRACT: Dandruff is a scalp condition marked by fast and abnormal changes in the outer layer of the scalp. The fungus Malassezia causes dandruff. Herbal treatments' antifungal qualities and efficacy have been examined. This review highlights the research results aimed at assessing the antidandruff potential of medicinal herbs. Cyperusrotundus, Psidiumguajava, Lawsoniainermis, Aloe barbadensis, and Prunusdulcis. The review discusses Cyperusrotundus and Psidiumguajava's antifungal and antidandruff properties. The current study looked at stability studies, physicochemical characteristics, and antifungal effects against Candida albicans.

KEYWORDS: Anti-dandruff, Anti-fungal, Powder shampoo, Nutgrass, Herbal cosmetics, Conditioner

I. INTRODUCTION

Cosmetics are derived from the Greek word 'cosmetics,' which means to adorn (make more beautiful or attractive). They may be defined as substances that come in contact with various body parts, such as skin, hair, nails, lips, teeth, and mucous membranes [10]. Herbal cosmetics referred to as products, formulated, using various permissible cosmetic ingredients to form the base in which one or more herbal ingredients are used to provide defined cosmetic benefit only, shall be called Herbal Cosmetics [12].

The essential component of human beauty is hair, keratin, the main component of finger and toenails, is a protein filament that makes up hair, a basic structure[2]. Foreign particles are repelled by hair. It shapes gender identity and is a significant aspect of appearance. Typically, “hair” refers to two different structures: either the hair follicle, which is located beneath the skin, or the bulb or root, which is removed from the skin. Typically, “hair” refers to two different structures: either the hair follicle, which is located beneath the skin, or the bulb or root, which is removed from the skin.

Shampoos are a kind of formulation that is used for hair and body washing or therapeutic purposes. Shampoos are expected to be much more than mere cleansing agents. Shampoos have many properties in addition to their detergency, such as conditioning and hair shining. They are expected to be non - irritating to skin and mucus membranes. There are many different varieties of ingredients for making a proper shampoo. Each of these ingredients has a special role in shampoo's formulation. The major ingredients used in making a shampoo are detergents (surfactants), conditioning and active ingredients for hair manageability, and additives that modify the surfactant effect, stabilize the product (preservatives and antioxidants) and increase its appeal. Conditioning agents are examples of these additives. Surfactants are specific conditioners but there are many other materials used as conditioners [5].When opposed to conventional shampoos, solid shampoos offer a few more benefits. Because they have greater microbiological stability than liquid formulations, they are especially portable and have a longer shelf life.

Dandruff is a very common non-contagious hair problem, nearly affecting people irrespective of age. Medically it is defined as pityriasis simplex capitis –shedding dead cells from the scalp. It may be dry or grease [1,13]. Dry dandruff appears silvery and white while greasy flakes appear pale yellowish and may have an unpleasant smell. Dandruff is a major cosmetic problem and a great public concern both in developed and developing countries.Oily dandruff is also called pityriasissteatoides. It arrives on the scalp with sebum production. It is mostly found in young men following puberty. Inflammation of varied intensity developed on the scalp along with oily scales of dirty yellow colour. Dandruff is a

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chronic scalp condition leading to scaling, itching, and redness of the scalp by shedding epidermal cells [3].

A unique hair care called an anti-dandruff powder shampoo is made to assist manage dandruff and preserve the health of the scalp. , which is a multipurpose powder for hair treatment. Usually, it is available as a powder that may be applied to dump hair combined with water. This kind of shampoo frequently has no harmful preservatives.Unlike chemical-based products, herbs are completely safe, extremely effective, and have almost no side effects due to their compatibility with the human body.

II.MATERIALS AND METHODS

INGREDIENTS	PART	IMAGE	USE
Nutgrass	Root and Rhizome		Anti-dandruff, Improves hair growth, Improves hair texture, Improves hair loss, Anti-lice.
Guava	Leaf		Covers grey hair naturally, Triggers hair growth, Prevents split ends, and Conditions hair.
Aloe vera	Leaf		Moisturizes and conditions hair, Soothes scalp irritation, Promotes hair growth and Reduces dandruff.
Almond	Seed		Conditions hair, Moisturizes, and nourishes hair, and Improves hair shine and luster.

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Henna	Leaf		Maintains scalp health, Promotes hair growth, Anti-dandruff, strengthens and repairs hair follicles

Table 1: Significance of Ingredients

SI No	INGREDIENTS	ACTIVITY
1	Nutgrass	Anti-fungal
2	Guava leaves	Hair smoothening
3	Almond	Conditioning
4	Aloe vera	Moisturizing
5	Henna	Hair strengthening
6	Sodium lauryl sulfate	Cleansing effect
7	Sodium citrate	Buffering agent
8	Citric acid	Maintains pH
9	Sodium benzoate	Preservation agent

III.FORMULATION

SI No	INGREDIENTS	QUANTITY
1	Nutgrass	5 g
2	Guava leaves	5 g
3	Almond	3 g
4	Aloevera	2 g
5	Henna	2 g
6	Sodium lauryl sulfate	2 g
7	Sodium citrate	2 g
8	Citric acid	2 g
9	Sodium benzoate	2 g

IV.MATERIAL COLLECTION

The different parts of plants which having antidandruff or hair care property was selected. The parts of plants were selected according to the above table like leaves, roots, seeds and rhizomes of herbal plants.

PREPARATION

1. .Collection and preparation of dried nutgrass and guava leaves
2. Collection of other excipients
3. Extraction of collected plant materials by soxhlet apparatus
4. Sieving and weighing of powdered drug
5. Formulation of anti-dandruff powder shampoo
6. Mixing of ingredients
7. Packing and storage.

V. EVALUATION

The prepared Anti-dandruff powder shampoo was evaluated by following the parameters.

Organoleptic Evaluation	General powder Characteristics	Physiological Evaluation	In-vitro Evaluation
Colour	Particle size	Ash value	Anti-fungal test
Odor	Angle of repose	Moisture content	
Taste	Bulk density	Foaming index	

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Appearance	Tapped density	P H determination	
	Hausner's ratio	Wash ability	
	Carr's index	Stability test	

➢ **Organoleptic Evaluation**

By utilizing sensory organs like eyes or nose, the examination of the formulation is performed under this evaluation, and it includes macroscopic characteristics of the drug or product, such as colour, odour, texture, and appearance.

➢ **General powder characteristics**

Testing of parameters that may impact exterior elements (such as flow structures, appearance, packing technique, etc.) of the configuration is a common powdered feature. Symbols studied under this category include particle size, resting angle, bulk density tapped density, etc.

a) Particle size

Particle size is a parameter that influences stiffness, dispersion, and other aspects. The analytical sieving method was used to determine the particle size distribution of the powdered drug. It applies to powdered material having a particle size not more than about 75µm.

b) Angle of repose

It is determined as the maximum angle possible between the surface of the pile of powder to the horizontal flow. 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 are noted and recorded. For the above method, the angle of repose (Θ) can be calculated by using the formula.

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

Where, Θ - Angle of repose,
h - Height of the heap,
r - Radius of the base

c) Bulk Density

Bulk density is the ratio between the given mass of a powder and its bulk volume. The required amount of the powder will be dried and filled in a 50ml measuring cylinder of up to 50ml. The cylinder is then tossed into a solid wooden surface from a height of 1 inch per 2-second intervals. Powder volume is measured. The powder is then weighed. This is repeated to get average values. Bulk density is calculated using the formula.

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

d) Tapped Density

Tapped density is the increased density of the bulk detected after tapping a container containing a powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for one minute, and volume or weight readings are taken until little further volume or mass change is observed. It was revealed per cubic centimetre (g/cm3)

Tapped Density = Weight of powder/Tapped volume of powder

e)Hausner's Ratio

Hausner's Ratio = Tapped density/ Bulk density

➢ **Physicochemical evaluation**

- **Moisture content determination**

10g of herbal powder was weighed in a petri dish and stored in a warm place in a hot air oven at 105°C. Repeat drying until continuous weight loss is seen after expiration 30min intervals. Hence moisture content is calculated.

- **Foaming Index**

1g of powder is accurately weighed and transferred to 250 ml of conical flask containing 100ml boiling water. Then gently warm for 30 minutes, cool again filtered, and set the volume to 100ml in a standard volume flask. This release was taken in 10 test tubes in a series of 1,2,3...10ml series and the remaining volume was made of water up to 10ml. The test tubes are then shaken with a long motion of 15 time seconds at a speed of 2 frequencies/second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured.

- **pH**

The p H of 10% shampoo solution in distilled water was determined at room temperature 25°C. The p H was measured by using a digital p H meter.

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➢ **In-vitro testing**

Antifungal test

It was conducted by using the agar well diffusion method. The procedure is as follows.

- Inoculum preparation: Transfer a loopful of fungal and bacterial culture from working stock slants to 5 ml of broth and incubate at 37 ºC till getting visible turbidity equivalent to 0.5 MacFarland unit.
- 25 of respect agar media were added to sterile petriplates and allowed to dry for 5 minutes.
- Then the cultures were inoculated on plates by swabbing on the surface of the media.
- Using sterile Cork Borer of 8mm diameter prepare wells on the swabbed agar plates.
- A 100 µl sample was added to the well using a micropipette.
- Kept the plates in the biosafety cabinet till the diffusion of the sample occurs and after that incubate the plates.
- After incubation, using a ruler measure the diameter (mm) of the zone of inhibition.
- Record the results.

VI. OBSERVATION

Sl No	Parameters	Observations
1	Colour	Light brown
2	Odor	Characteristic
3	Appearance	Fine and smooth
4	Angle of repose	25.61º
5	Bulk density	0.51g/ml
6	Tapped density	0.58g/ml
7	Hausner's ratio	1.13
8	Carr's index	12%
9	Ash content	3.67% w/w
10	Moisture content	1.89%
11	Foaming index	110.2%
12	P H	5.6

Anti-fungal test

VII. CONCLUSION

Throughout the research study period, the powder shampoo's good anti-dandruff properties, conditioning impact, p H, and homogeneity were noted. The combination of natural components, which are well known for their ability to nourish and strengthen hair, demonstrated the ability to lessen dandruff and enhance the general health of hair. The current study concludes that the powder shampoo formulation is safe and suitable for usage as a cosmeceutical because it was created using herbal extracts.

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