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Development and Evaluation of Herbal Shampoo

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Abstract: *The main objective of this study is to evaluate and development of herbal shampoo. Shampoo are one of the cosmetic products used in daily life. Synthetic preservatives and detergents have sometimes been the cause of adverse effects among consumers Shampoos are cosmetic preparations that are used to wash hair and scalp, packed in a convenient way for usage. The primary function of the shampoo is to clean the hair, accumulated sebum, scalp debris and residue of hair. A shampoo formulation must be safe and efficient for a long-time use. The use of polyherbal cosmetics is raising as they have few side effects. The ingredients used in formulation of Herbal Shampoo are Ficus Religiosa leaves (Powder), Hibiscus Leaves (Powder), Reetha (Powder), Shikakai (Powder), Aloe vera, then prepared by mixing with each other and evaluated for its organoleptic and physio-chemical characteristics and performance tests in terms of wetting time test, pH, solid contents, surface tension, dirt dispersion, foam Stability, and Viscosity was performed. The combination of several such ingredient of herbal origin has made it possible to secure highly effective dry powder shampoo. The formulation at laboratory scale was done and evaluated for number of parameters to ensure its safety and efficacy*

Keywords: Aloe Vera, Ficus Religiosa, Herbal Extracts, Herbal Shampoo, Natural Cosmetics

I. INTRODUCTION

Cosmetics are not only used to modify appearance of an individual, but are also used for care of skin and body, there are Various types of cosmetics available with specific and significant purpose. Many distinct races and cultures employ Cosmetics in the day-to-day life. The main significance of cosmetics is to provide a new Decent look to the person after application. Even though there is a booming success in cosmetic industry but the actual Meaning of cosmetics is misunderstood in many Western countries for makeup products but US FDA clearly explained That cosmetics are products, which are generally intended for Application in the human body for altering the Appearance, promoting attractiveness, cleansing or beautifying without affecting the body's structure or functions". As Per this definition, any product which matches the above statement becomes cosmetic product, but US FDA clearly Rejects pure soap as a cosmetic. The creative self-expression and self-identity aspect are considered to be the key factors Which contribute to the fame of cosmetics in current scenario In Indian cosmetic market which traditionally a stronghold of a few major Brands like Lakme and ponds has seen a lot.[1] foreign entrance to the market within the last decade

1.1 Herbal shampoo

Herbal formulations are considered as alternative to synthetic shampoo but formulating cosmetics using completely Natural raw material is a difficult task. There are large numbers of medicinal plants which are reported to have beneficial Effects on hair and are commonly used in formulation of shampoo. These plant products may be used in their powdered Form, crude form, purified extracts or derivative form. Synthetic shampoo contains surfactants and long-term use of these surfactants Can lead to serious effects like scalp irritation, loss of hair, drying of hair, greying of hair, split ends and skin irritation. Due to these reasons public is getting attracted towards herbal cosmetics due to its insignificant side effects and Inexpensive nature. Herbal shampoos are prepared from natural ingredients and are meant for cleansing hair and scalp just like regular Shampoo. These shampoos are free from side effects since no surfactants are involved it has good stability and are less Harmful compared to synthetic sham [2]

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1.2 Vedic history

(Ficus religiosa) commonly known as Peepal is the most popular member of the genus Ficus and it is known by more than 150 names. Ficus religiosa has got mythological, religious and medicinal importance in Indian culture.[3]

1.3 Taxonomy / botanical classification

Table 1 Classification of Ficus Religious

Domine	Eukaryota
Kingdom	Plantae
Phylum	Tracheophyta
Class:	MagnoliopsidaBrongniart
Family	Moraceae
Division	Magnoliophyta
Tribe	Ficeae
Genus	Ficus (FY-kus) Linnaeus

1.4 Nomenclature

'Ficus' is the Latin word for 'Figure', the fruit of the tree. 'Religiosa' refers to 'religion' because the tree is sacred in both Hinduism and Buddhism and is very frequently planted in temples and shrines of both faiths. 'Bodhi' or its short form 'Bo' means 'supreme knowledge' or 'awakening' in the old Indian languages. 'Pipal' relates (I believe) to the same ancient roots which give rise to English words like 'Pip' and 'Apple' and therefore mean something like 'fruit-bearing tree'. 'Ashwattha' and 'Ashvattha' come from an ancient.[4]

Figure 1 Ficus Religiosa Tree (Ficus Religiosa Tree)

Figure 2 Ficus Religiosa Leaves

II. SHAMPOO

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and a viscous solution of detergents containing suitable additives preservatives and active ingredients.

It is usually applied on wet hair, massaging into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt that is build up on the hair. Many synthetic shampoos are present in the current market both medicated and non medicated however, herbal shampoo popularized due to natural origin which is safer and free from side effects which is increasing consumer demand. In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as skin irritation, scalp irritation, loss of hair and dryness of hairs.[5]

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2.1 TYPES OF SHAMPOO

Powder shampoo : It is available in the form of Dry powder, initially it was prepared from dry Soaps, but nowadays dry synthetic detergents are Used for their preparation. Powder shampoo is Prepared where addition of water or other solvent Reduces the activity of the components, especially In case of medicated shampoo. Nowadays, these Shampoos are not used due to the difficulty Experienced in their application.

Liquid shampoo : These are clear liquid Preparations that are most widely used. They are
Usually made by using detergent of low cloud Point. Some of these shampoos may be transparent.

Cream shampoo :These are called as lotion Shampoos which are modification of clear liquid Cream shampoos. Solubilising agents such as Magnesium stearate is also used to dissolve the Added opacifier.[6]

Jelly shampoo : These are transparent and thick Usually made by incorporating a gelling agent,
(e.g., cellulose).There is great use in hair salons And beauty parlors. The principle ingredient is Detergent which can be used either alone or in Combination with soap. By altering the proportion Of detergent, gel of required consistency can be Obtained. Addition of methyl cellulose to clear Liquid shampoo and its subsequent thickening also Gives rise to gel shampoo.

Aerosol shampoo : They are called aerosol Shampoos because they are packed in aerosol Containers. Their formulation, preparation and Packing is complicated as an additional propellant Is included. The propellant added must be Compatible and should not reduce the activity of Shampooing ingredients. The container opening is Provided with a valve. Shampoo comes out as foam When the valve is pressed. Hence also called as Foam type shampoo.

Keratin shampoo : When your shampoo(or any Hair care product) is infused with keratin oil, you Reap benefits that nourish and condition the hair. This helps it look shiny and smooth. It also helps to Fight frizz, tame fly always, and protect against Damage caused by styling tools like a straightening Iron or blow dryer.

Volumizing shampoo : Volumizing or volume Shampoos make hair appear fuller, bouncier and More full of body. It's more about the texture of the Hair than the thickness of the hair strands. … Instead, volumizing shampoos should be Lightweight enough to not weigh down your hair, Thus creating more body in the end.

Specialised shampoo : Speciality shampoos are Marketed to people with dandruff, colour- treated Hair, gluten or wheat allergies, an interest in using An organic product, infants and young children ("baby shampoo" is less irritating).[7]

- Conditioner
- Anti dandruff
- Baby
- Two layer
- Anti hair fall

2.2 HERBAL SHAMPOO

They are the cosmetic preparations that with the Use of traditional ayurvedic herbs
are meant for Cleansing the hair and scalp just like the regular Shampoo. They are used for removal of oils, dandruff, dirt, Environmental pollution, etcc.[8]

2.3 ADVANTAGES OF HERBAL SHAMPOO

➤ Herbal shampoo are made out of pure and Organic ingredients and there are no synthetic Additives or surfactants are free of any side effects.

➤ Are bio-degradable and earth friendly.

➤ It doesn't cause irritation to the eyes.

➤ It is cost friendly, not much expensive

➤ Regular usage of herbal shampoo can do Wonders for your hair.

➤ By using herbal shampoo, you can get the Perfect oil balance.

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➤ They are made out of national essential Antiseptic properties that prevent our hair and scalp From the harsh u.v rays of the sun thus preventing Skin infections[9]

III. FUNCTION OF HERBAL SHAMPOO

- Lubrication
- Conditioning
- Hair growth
- Maintenance of hair colour
- Medication [10]

IV. ANATOMY OF HAIR

The hair is made up of 95% keratin a fibrous, helicoidal protein (shaped like a helix) that forms part of the skin and all its attachments (body hair, nails etc.). The hair structure consists of 3 different parts:
Medulla: It is the innermost layer of the hair shaft, made up of an amorphous, soft, oily substances.
Cuticle: Thin protective outer layer that contains nutrients beneficial for hair growth. It is highly keratinized with cells shaped like scales that are layered one over the other, measuring about 60 micro-meters long and about 6 micro-meters wide.
Cortex: It is the main constituent of the hair, containing long keratin chains which gives elasticity, suppleness and resistance to the hair. The cells of the cortex are joined together by an intercellular cement rich in lipids and proteins.[11]

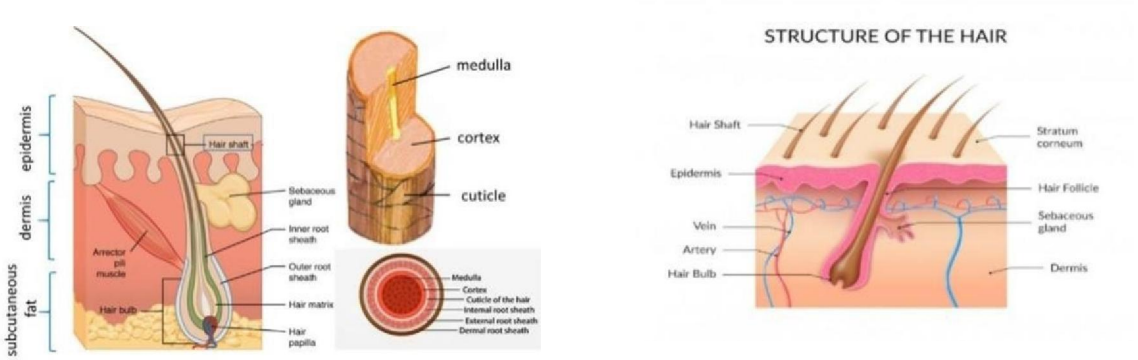

Figure 3 Anatomy of Hair

V. HAIR PROBLEM

Split ends-: When the oil from the scalp doesn't reach the ends of the hair, it tends to dry and split over time and another reason is heat worse the ends. Applying a dash of oil on the ends can avoid split ends.

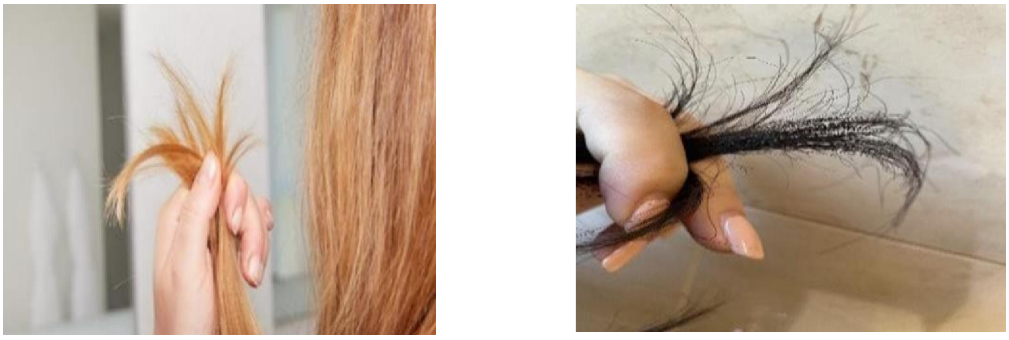

Figure 4 Split ends of Hair

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5.1 Hair loss

Hair loss occurs due to several factors such as stress, hormonal imbalance, and using the wrong products. Prevention is possible by using protein-rich food, switching to mild shampoos, massage with hot oil, staying hydrated, And exercise regularly [12]

Figure 5 Hair Loss Problem

5.2Dandruff

The scaly particles that cling to the root of the hair is dandruff which is caused by poor diet, dry scalp, Infection, excess sebum, and sensitivity to certain products. It is a harmless, non-inflammatory skin condition that Affects the scalp and can lead to hair loss. [13]

Figure 6 Dandruff Problem in Hair

VI. FORMULATION OF HERBAL SHAMPOO

Formulation of the herbal shampoo was done as per the formula given in Table 1. To increase the thickness of formulation, SLS (7.5%) solution was prepared using 0.1 M NaCl. Twenty ml of the herbal extract was added to 20 ml SLS solution with 20 ml NaCl solution and mixed by shaking gently. The final volume was made to 100 ml by adding 10 ml acacia gum extract, 2 ml of glycerine and 25 ml of water. To improve aroma in the formulation, sufficient quantity (q.s.) of essential oil (castor oil) was added. The shampoo also included one capsule of Vitamin E for conditioning, activated charcoal for colour and 2 ml of lemon juice as preservative.[14]

TABLE 1: COMPOSITION OF HERBAL SHAMPOO

INGREDIENTS	QUANTITY
Herbal extract	20 ml
Sls	20 ml
0.1 M Nacl	20 ml

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Acacia (gum)	10 ml
Glycerine	2 ml
Vitamin E capsules	2
Lemon juice	2 ml
Essential oil (castor oil)	q.s
Water	250 ml

6.1 Materials and methods Collection of plants

The parts of plants like orange (peel), Reetha (fruit), Ginger (root) and Guar gum were collected from the local market. Curry Patta (leaves) and Aloe vera (leaves) were obtained from nursery locally. These were washed under running water to remove contaminants. They are dried in sunlight , converted into coarse powders and sieved using 60meshes. The extracts were prepared by decoction method and the prepared extracts were stored in well-closed containers.[15]

6.2 Preparation of herbal extract

5g of Curry Patta powder, 5g of Ginger water, 10g of Aloe vera gel, 20g of Reetha and 5g of orange peel powder (Table 2) were mixed with 100 ml water in a stainless steel vessel. The mixture was kept for boiling until the water reduced to one quarter. It was then filtered. The clear extract obtained was used as herbal extract

TABLE 2: INGREDIENTS OF HERBAL EXTRACT:

Plant	Part	Quantity For 100 MG
Curry Patha	Leaves	5%(5GM)
Ginger	Root	5%(5GM)
Orange peel powder	Peel	20%(20GM)
Retha	Fruit	10%(10GM)
Hibiscus	Leaves	5%(5GM)
Aloe vera	Leaves	10%(10GM)

VII. EVALUATION OF HERBAL SHAMPOO

To evaluate the prepared formulations, quality control tests including visual assessment and physicochemical controls such as pH, density, viscosity, surface tension, foam volume, foam stability and wetting time were performed using standard protocols.[16]

Physical appearance/visual inspection:

- The formulation prepared was evaluated for the clarity, colour, Odor and foam producing ability and fluidity.
- Determination of pH:
- A 10% v/v shampoo solution was constituted in distilled water and the pH of the solution was measured by using a calibrated pH meter

Determination of solid content percentage:

A clean dry evaporating dish was weighed and 4 grams of shampoo was added to the evaporating dish. The evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the solid contents present in the shampoo was calculated after drying.[17]

Wetting time was calculated by noting the time required by the canvas paper to sink completely [16]. A 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 taken for the paper to sink was measured using the stopwatch.

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7.1 Rheological evaluation

The viscosity of herbal shampoo was determined by using Ostwald's viscometer. The viscosity bottom.

- nw: viscosity of water
- ny: viscosity of tested liquid
- dw: density of water
- dy: density of tested liquid
- tw: timing of runoff of water
- ty: timing of runoff of tested liquid

Dirt dispersion

Two drops of herbal shampoo were added In a wide mouthed falcon tube containing 10ml of Distilled water. 1 drop of India ink was added, the Falcon tube was covered and shaken for ten times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy.

Cleansing action

The cleansing property of the herbal Shampoo was evaluated by the application of the
Shampoo on hair that has not been washed for Seven days. The shampoo was used to wash the Hair of human subject that had applied oil 4-5 hours Before washing. The performance of the shampoo Was assessed on its ability to remove oily dirt from Scalp.

Surface tension measurement

Measurement was carried out with herbal Shampoo through stalagmometer. The principle is to Measure the weight of the drops of herbal shampoo Falling from a capillary glass tube, and Thereby [18]
calculate the surface tension of the fluid. We can determine the weight of the falling drops by counting them. From it we can determine the surface tension as shown below.

- nl: cm no. of drops of liquid
- nw: no. of drops of water
- dl: density of liquid
- dw: density of water
- tw: 71.2 dyne/

Foaming ability & foam stability

Cylinder shake method was used for determining foaming ability. 50ml of the 1% herbal shampoo solution was put into a 250ml graduated cylinder & the cylinder was covered with hands and shaken for 10 minutes. The total volume of the foam content after 1 minute shaking was recorded. Immediately after shaking the volume of foam at 1-minute intervals for 10 minutes were recorded. The foam volume remains same throughout the period of about 5 min showing that the generated foam by the shampoo has good stability and the prepared shampoo exhibits higher foam property which may be due to the presence of soapsuds.[19]

Stability Study

The stability of the formulation was studied for a period of four weeks by keeping at temperature of 25-30°C.

Skin Irritation Test

Prepared herbal shampoo was applied on skin for 5 minutes after that was washed and tested for irritation or inflammation to the skin.

Conditioning attributes

The conditioning effect of the shampoo on the hair was evaluated after the hair had been
washed with it. Conditioning properties include all desirable benefits imparted to the hair such as increased mass to the hair, improved lustre, softness and silkiness

Microbial examination

100 microlitre of shampoo was mixed with melted Mueller Hinton agar and poured to
sterile Petri dishes under ascetic conditions. The plates were rotated to mix thoroughly and then allowed to set. The plates were incubated at 37°C for 24 hours and observed for microbial growth. This test was carried out to determine

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the susceptibility or resistance of organisms to formulation ingredients according to the method described by Cheesbrough. The Gram positive (Bacillus) and Gram negative (E. coli) test organisms were subculture on nutrient broth and incubated at 37°C till desired turbidity. The developed culture was streaked on the surface of Mueller Hinton agar on which four wells were punched with sterile corn borer. 25, 50, 100 and 150 ul shampoo were filled in these wells in increasing order. The plates were incubated at 37 °C for 24 hrs. and zone of inhibition around the wells were measured using a ruler.[20]

VIII. CONCLUSION

The formulated shampoo is not only safer than the chemical conditioning agents but also greatly reduce the hair loss as well as strengthen the hair growth. The pH of the shampoos was adjusted to 6.2 to retain the acidic nature of scalp. Synthetic preservatives have sometimes been the cause of adverse effects among consumers The objective of the study was to develop a stable and functionally effective herbal shampoo by excluding synthetic chemicals, which are normally incorporated in such formulations to larger extent. Synthetic hair shampoo is known to damage the hair cuticle leaving it brittle, dull and dry. Although the formulated shampoo contains synthetic chemical as SLS (7.5%) but its percentage is too small as compared to synthetic shampoo (10-40%) available in the market. The evaluation study on our shampoo showed good cleaning action, better foaming capacity, and quick wetting time. We have used Aloe-vera gel to provide the conditioning effects.

IX. NOMENCLATURE

FDA – Food and Drug Administration
GM – Gram
Ml – Millilitre
NaCl – Sodium Chloride

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