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Development and Evaluation of Polyherbal Shampoo



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ABSTRACT

The goal of the study was to create a pure herbal shampoo and assess and contrast its physicochemical characteristics with those of commercially available synthetic and herbal shampoos. To create and assess the physicochemical properties of the herbal shampoo used in this study, appropriate ingredients including hibiscus rosa-sinensis, Emblica officinalis, Acacia concinna, apindus indicia, Eclipta prostrata, Aloe barbadensis, and cassia auriculata were added in varying amounts. This study's goal is to create and assess a poly-herbal shampoo with herbal ingredients for cosmetic use. The following powders and gels were purchased from the local market: hibiscus powder, neem powder, henna powder, amla powder, shikakai powder, ritha powder, and aloe vera powder. Homemade methods are used to prepare the soy milk and banyan root powder. These ingredients are then combined and their organoleptic and physico-chemical properties are assessed. In addition to cleaning hair, herbal shampoo also conditions and smoothes the hair's surface, promoting healthy hair that is free of dirt, grease, dandruff, and lice. Most importantly, its safety benefits are anticipated. Herbal cosmetics have the advantage of being non-toxic, reducing allergic reactions, and having many ingredients that are useful over time. As a result, in the current work, we have discovered that herbal shampoo has good qualities and have further optimized its benefits for use as a cosmetic by humans. Two herbal shampoo powder preparations were created using some common traditional medications that Indian folk and traditional people use to take care of their hair.



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INTRODUCTION:

Without hair, a person lacks complete beauty. Herbs have been used for hair care and cleaning since ancient times. Hair shampoo is used to give hair more shine in addition to cleaning it. Shampoos infused with natural ingredient extracts are known as herbal shampoos. Herbal shampoos are cosmetic preparations that are used for cleansing purposes using traditional Ayurvedic herbs. Herbal products hurt fever and are less expensive. Herbal shampoo can be either basic or uncomplicated. They include protein, hydrolasate, vitamins, and amino acids. Many individuals, both males and females, wash their hair with shampoo. Shampoo's main purpose is to clean the hair scalp of debris. Nowadays the use of herbal shampoo is increased, and there is high demand for herbal cosmetics. The poly herbal shampoo was created with natural ingredient such as eclipta prosrtata, sapindus mukorossi, aloe barbadensia, glycyrrhiza glabra, aemblica officialis, azadirachta indica, Hibiscus, Roseainesis.¹

In essence, a shampoo is a detergent solution with appropriate additives for additional benefits like lubrication, medication, and improved hair conditioning. Synthetic surfactants are added to synthetic shampoos primarily for their cleansing and foaming properties. However, frequent use of these surfactants can have serious side effects, including dryness, irritation of the scalp and eyes, and hair loss. We can use natural herbal shampoos as an alternative to synthetic ones. Shampoos contain synthetic surfactants mainly for foaming and cleaning purposes; however, frequent use of these surfactants can cause hair loss, irritation to the scalp, and dry eyes. Herbal formulations are seen as a synthetic shampoo substitute, but creating cosmetics with only natural raw materials is challenging. Shampoos are formulated with synthetic surfactants primarily as a foaming and cleansing agent. Numerous medicinal plants are widely used in shampoo formulation because of their purportedly positive effects on hair. Hair problem such as hair loss, white hair and a dandruff and split ends tension, Scalp infection, hormone disruption, low vitamin and food intake and excessive chemical shampoo use these all cause of human problems. The herbal shampoo powder was are formed with natural in gradients such as them Neem, Shikakai, Aloe vera, Methi, Amla, Bhringraj , Soup nut, Hibiscus powder, Liquorice, etc.

➤ **The function of shampoo:**

- Lubricant
- Conditioning
- Hair growth
- Maintain hair colour
- Medication

➤ **Advantages**

- Pure and organic ingredient
- Free from side effect
- No surfactant
- No animal testing
- Low level of irritation

Despite its seemingly simple appearance, a hair strand is one of the body's most intricate structures. Hair consists of two distinct structural components. The area beneath your skin is called the hair follicle, and the area visible above it is called the hair shaft. 95% of hair is made of keratin. Ectoderm from the skin gives rise to vital body parts like hair, nails, and the sebaceous and sweat glands. Hair also serves as a protective covering for the body. Because they are derived from the epidermis during embryological development, they are also known as epidermal derivatives. (6) Your hair grows and is held in place in the hair follicle. At the bottom of the follicle, a piece of tissue called the papilla contains tiny blood vessels.

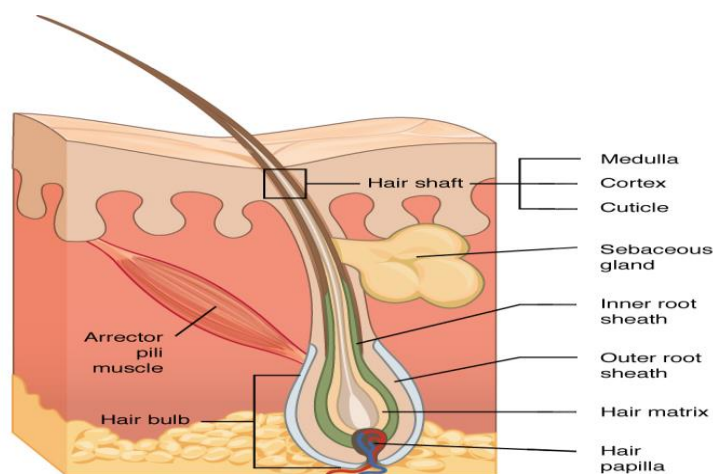


Fig.1. Hair structure

❖ **HAIR STRUCTURE:**

➤ **Hair Shaft:**

The hair shaft is the part of the hair that we can see. The shaft is the visible part of the hair that sticks out of the skin. The hair root is in the skin and extends down to the deeper layers of the skin. Each hair shaft is made up of two or three layers: the cuticle, the cortex, and sometimes the medulla. the layer of hair shaft:

- **The Inner Layer:** This is called the medulla. Depending on the type of hair, the medulla isn't always present.
- **The Middle Layer:** This is called the cortex, which makes up most of the hair shaft. The medulla and the cortex contain pigmenting cells responsible for giving hair color.
- **The Outer Layer:** This is called the cuticle, which is formed by tightly packed scales in an overlapping structure that resembles roof shingles. Many hair conditioning products are formulated to clean the cuticle by smoothing its structure. ⁽⁶⁾

➤ **HAIR CARE:**

Hair care is an important thing for men and women. Hair product increase the shine of hair, strength of hair, increase volume of hair, reduce freeze, and stimulate the new hair growth.

The basic feature of hair care cosmetics:

- Should be simple to use.
- Should have a local impact.
- Not harmful for hair and skin.
- Should not be toxic for human body.
- Nanotechnology has been used to enhance hair care product such as shampoo, and dye etc.

❖ **HAIR PROBLEM:**

Hair problem can affect thru hair and scalp includes hair loss, infection, and disorder like itching.

➤ **Hair loss:** Hair loss is very common problem that found in both men and women. The cause of hair loss is major surgery, major illness, and sudden blood loss. The natural ingredient used in the natural shampoo has antibacterial properties that support healthy scalp maintenance. People typically lose 50-100 hairs every day.

Hair loss is related to the following factors:

- Family history
- Hormonal changes
- Medical condition
- Hairstyles and treatment

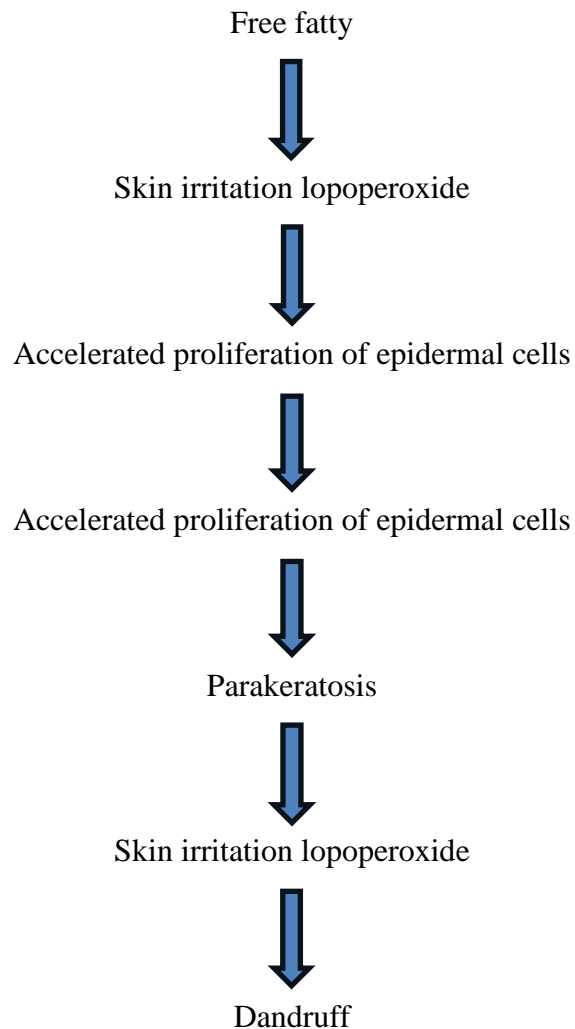
➤ **Hair Dandruff:**

Dandruff is common dermatological condition where the scalp symptoms such as flaking, crusting, itching, and hair breakage. It affects both men and women. But it is more problematic in female due to their long hair.

➤ **Dandruff causes:**

- Oily skin
- Dry skin
- Eczema
- Dirty scalp
- Over washing
- Unbalance diet
- Hair care ingredient

Sebum Production



➤ Grey Hair:

White hairs are more noticeable in people with people in dark hair. It is normal for hair color to change as people age but grey hair can appear at almost any time in life. The hair follicle generates the hair color or pigment cell that contains melanin.

The following are causes of grey hair:

- Deficiencies of vitamin b12, vitamin d3, and calcium.
- Hormones
- Genetics
- medical condition
- chemical hair dyes
- lifestyle factor

- stress
- high blood pressure
- smoking can cause premature greying



Fig.2. Grey hair

➤ **TYPES OF SHAMPOO:**

There are various types of shampoo used for hair cleansing. These shampoos are available as liquid cream, gels, and foam aerosol or in powdered form.

➤ The main types are as follows:

1. ordinary shampoo
2. conditioning shampoo
3. special care shampoo
4. frequently used shampoo
5. baby shampoo
6. Volumizing shampoo

Table.1. Types of shampoo

Hair condition	Natural ingredient used in treatment
All types	Marigold, aloe vera
Dry hair	Sandal wood, rosemary
Oily hair	Lavender, lemon, mint
Hair growth	Henna, hibiscus
Premature greying	amla
Maintenance of hair colour	Hibiscus, amla
dandruff	Tulsi, neem

❖ **INGREDIENT:**

They are primarily composed of saponins which are found in variety of vegetables spices, namely soap bark, soapwort, sarsaparilla, all are herbs. A sugar is hydrophilic component. Which compare with them to non ionic but an acidic or basic group is frequently found in the form of quiliaia acid.⁽⁸⁾

1. Foam stabiliser:

Softeners, or both Customers value foam. It is psychologically associated with the detergent effect, but it is also an indication that the cleaning job has been completed. The upstart of foam its volume, softness, texture, stability and removal by rinsing are all components of foaming qualities. These properties are primarily enhanced by addition of fatty acid alkanol amides, which impart a creamy feel as well as softer and more stable foam.

2. Thickeners:

Consistency and richness are provide by natural gums (Karaya, tragacanth), cellulose hydrocolloids, acrylic polymers (carbomer) or salt such sodium.

3. Conditioner:

They are intended to bring softness and gloss to reduce flyaway and to enhance disentangling. Their role in a shampoo is not effective as conditioner because of multiple function. They are useful in shampoo for dry and damage hair. A great number of compound

are added according to type of formulation, the purpose, care and beautifying aims they are mostly fatty ingredients, protein and cationic polymers.

4. Preservatives: Life of herbal product.

5. Fragrances and Colorant: Fragrance and colorants are intended to individualise shampoo perception.

❖ **NEED:**

Herbal shampoos are regarded as the greatest hair care products because natural ingredients have been utilized by humans for eons. Shampoos enriched with natural ingredient extracts are known as herbal shampoos. The best and most durable results are produced by these shampoos, which is their greatest quality. These shampoos don't harm hair and don't contain any harsh chemicals. Some of the advantages of herbal shampoos for hair growth will be discussed in this blog.

The goal of mixing two or more different herbs is to provide the hair with a variety of benefits. The addition of various hair product ingredients allows this shampoo to serve multiple purposes.

This shampoo clear dirt, nourish the hair remove the lice give cooling effect after shampooing, remove the dandruff, increase the hair volume and hair strength and it is natural conditioner for hair.

❖ **OBJECTIVE:**

- To formulate the herbal shampoo.
- To evaluate the herbal shampoo.
- The part used for formulation is leaves, fruits and roots.
- To reduce side effects of chemical formulation.
- To improve hair texture.
- To darkening the hair colour.
- To imparting gloss to hair and to maintain their manageability and oiliness for hairs.

❖ **MATERIALS AND METHODS**

➤ **List of Material**

The herbs and powders used in the present formulation work have been procured from authenticated supplier and are research-grade. Some material obtained from pharmacognosy lab and some are obtained from marketed as mentioned below in tab.

Table.2. List of material

Sr no.	Material
1	Née powder
2	Hibiscus powder
5	liquorice
6	Amla
7	Soap nut
8	Bringraj

List of equipment-

Table.3. list of equipment





Sr no.	Instrument	Model
1	Digital Weighing balance	DWB 1000
2	Digital pH meter	EQ-610
3	Stalagmometer	
4	Hot air oven	
5	Hot plate disc	
6	Viscometer	Brookfield viscometer





➤ **List of glassware-**

Table.4. list of glassware

Sr no.	Glassware
1	Beaker
2	Glass rod
3	Measuring cylinder
4	spatula
5	funnel
6	Conical flask
7	Mortar and pestle

Table.5. constituent and and its use

Sr no	Constitution	Figure	Biological source/Family	Uses
1	Amla powder		Dried ripe fruit of Embelica officinalis (Euphorbiaceae)	Darkening of hair and hair growth promoter. Moisturising agent.
2	Neem powder		Dried leaves of Azadirachta indica (miliaceae)	Antibacterial anti-fungal, antiseptic, prevent dryness of hairs and flaking of hairs
3	Hibiscus powder		Dried leaves of Hibiscus rosea (malvaceae)	Hair conditioner, hair growth
4	Aloe vera		Dried leaves of Aloe barbadensis miller (Asphodelaceae)	Anti dandruff agent, conditioner, moisturizing agent

5	Shikakai powder		Dried pods of Acacia concinna (Mimosaceae)	Nourish the scalp, heal damage, detergent
6	Liquorice powder		Peeled and unpeeled roots, stolons, stem of Glycyrrhiza glabra linn.	For hair loss treatment and prevention of premature greying of hair
7	Soup nut (Reetha fruit)		Dried fruit of Sapindus mukorossi (Sapindaceae)	Provides shining and silky hair, detergent
8	Bhringraj		Extract from the root of the plant Eclipta prostrata Family: Asteraceae	To maintain and rejuvenate hair, hair darkening, hair growth promote

❖ **METHODS:**

- Material collection
- Different plant parts with hair care properties were chosen for the study.
- Amla fruits are plant (*embelica officinalis*)
- Neem leaf, hibiscus leaf (*hibiscus rosea*)
- Shikakai fruit (*acacia*)
- Aloe leaf (*aloe barbadensis*)
- Amla powder, shikakai powder and neem powder collected from collage's cognosy laboratory. Hibiscus leaf powder, reetha fruit, liquorice powder, aloe vera leaf are collected as raw material from the market. All collected materials are given in table.

❖ **EXTRACTION METHOD:**

➤ **Soupnut Extraction:**

The outer pericarp of Ritha was separated from the seeds. The separated Ritha pericarp was washed with water and sun dried indoors at room temperature (20 ± 82) °c. and crushed with mortar and pestle. The samples were macerated for 24 hours in Millipore water at room temperature and filtered. The filtrate was evaporated on water bath at 40-50°C. Ritha gave a brownish paste. The extract was weighed and dissolved in Millipore water. All measurements were performed at least thrice. ⁽⁸⁾

➤ **Amla Extract:**

Amla fruit was made seedless and chopped and kept in drier at 40°C until properly dried and to be crushed, and 10g crushed amla powder was then mixed with 50ml of 95% ethanol (aml powder:ethanol=1:5, w/v)and stirred continuously to obtain the maximum solvent dissolved constituents. Filtrate was thereafter concentrated by using rotary evaporator for 20 min at 40°C under reduced pressure followed by two times re-extraction. Concentrated amla extract, was further subjected to a hot air oven for proper drying at 45°C for 12 hours, and thereafter stored at 4°C in the dark in an airtight glass container, until further use.⁽⁹⁾

➤ **Neem extract:**

The neem leaves were washed using distilled water. During the drying process, the leaves were left under sunlight for three days. Then, the leaves were ground to powder form, two methods were implemented to extract the neem leaves.

1. In the first method, 26.0g neem leaves powder was extracted with 300ml methanol solvent by using a Soxhlet extractor in 2 hrs. After the extraction, it was filtered and the methanol solvent was evaporated completely by using rotary vacuum evaporator, brand BUCHI R-215 manufactured by Buchi, German. The same steps were repeated by using other solvents; ethanol, ethyl acetate, and hexane.⁽¹⁰⁾

2. In the second method which was immersion extraction, the neem leaves powder was weight around 26.0g and were put in a polytetrafluoroethylene(PTFE) bottle, followed by the insertion of 300ml methanol solvent. The bottle was tightly closed and was placed in an oven at a temperature of 100°C for 2hrs. Furthermore, the solution was filtered and evaporated by using a rotary vacuum evaporator. All extraction methods were repeated by using ethanol, ethyl acetate, and hexane solvents. Distilled water (DW) was used as an extraction solvent at room temperature(25°C), 50°C, 70°C and 90°C for 2 hrs in the immersion method. This purposely compares whether the distilled water has the potential to be used as a medium in extraction since it has low cost compares with other solvents.⁽¹⁹⁾

Table 6. Formulation of shampoo

Sr. no	Compound	LF(%W/V)
1	Neem powder	8
2	Hibiscus powder	11
3	Aloe vera	6
4	Shikakai	21
5	Liquorice	5
6	Amla powder	24
7	Soup powder	20
8	Bhringraj	5
9	Lemon	1ml
10	Water	Q.S

➤ **METHODS OF PREPARATION OF SHAMPOO:**

1. Weigh the all powders as per requirements given in table by weighing balance.

2. Aloe vera gel preparation: wash the aloe vera leaf with clean water then cut the leaf and collect the transparent white part into water in beaker. Remove it from water weigh it then use it for preparation of shampoo.
3. Weighted soapnut, shikakai and amla boiled separately in 40 ml on water bath for 5 min to get liquid extract of this powders, after boiling filter it.
4. filter it separately.
5. Mix the amla extract and shikakai extract in mortar pestle.
6. Add other weighed powders in it triturate it properly.
7. Add weigh aloe vera and triturate it in mortar pestle for proper mixing.
8. Add the reetha extract in the above mixture.
9. Measure the quantity and make up volume 100ml by adding water as per q.s.
10. Evaporate the prepared shampoo and take reading and compare with other marketed shampoo.

❖ **INGREDIENT OF SHAMPOO**

➤ **Aloe vera -**



Fig.3. Aloe vera

Aloevera: It is a succulent plant of the genus aloe, it is widely distributed, and is considered an invasive species in many world regions. An evergreen perennial, it originates from the Arabian Peninsula, but grows wild in tropical, semi tropical and climates around the world.

Terms:

Aloe vera is derived from the Arabic word, Alloeh meaning a 'shining bitter substance' and Vera came from the latin word, 'vera meaning a true'.

Benefits-

- It calms an itchy scalp.
- Deep cleanses the oily hair.
- Strengthens and repairs hair strands.
- May promote hair growth.

Active constituents of aloevera

Aloe vera 75 potentially active constituents, including vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids, and amino acids,4-6.

Vitamins: It contains antioxidant vitamins A(beta-carotene), C, and E. It also includes B12, folic acid, and choline. Free radicals are neutralized by antioxidants.⁽¹¹⁾

Enzymes: There are eight enzymes in it: aliiase, alkalinephosphatase, amylase, bradykinase, carboxypeptidase, catalase,cellulose,lipase, and peroxidase.When applied topically to the skin, Brady kinase helps to reduce excessive inflammation.

Minerals: Calcium, chromium, copper, selenium, magnesium, manganese,potassium,sodium, and zinc are all present.It also contain sugars, polysaccharides, anthraquinones and plant steroids.

Hormones: It include auxins and gibberellins, which aid in wound healing and anti-inflammatory properties.

Medicinal Uses:

- In treatment of constipation relief.

- Aloe vera has two parts that's commonly used. Bitter part widely used as a bittering agent in alcoholic beverages and as laxative.
- It also used in pharmacological and toxicological research.
- Inner gel, also known as "pure gel", is the more well-known part of aloe vera plant.

➤ **Bhringraj-**

Bhringraj(*Eclipta alba*) -It belongs to family Asteraceae

Synonyms-False daisy, Karisalankanni, Maka

Chemical constituents- Bhringa Raj contains alkaloid ecliptine and flavonoids wedelolactone. It consists apignin, wedelic acid, glycosides, resin.

Parts used-leaves, roots

Reason- Bhringa Raj oil alleviates inflammation when massaged into the scalp. It increases the thickness and luster of hair. It is a potent hair vitalizer that has a host of bioactive constituents like flavonoids. Bhringa Raj plays vital role in treating and preventing baldness. It treats the dandruff due to its powerful anti-microbial and anti-bacterial properties.(12)

Formulations-Shampoo, Hair oil



Fig.4.Bhringraj

➤ **Neem-**

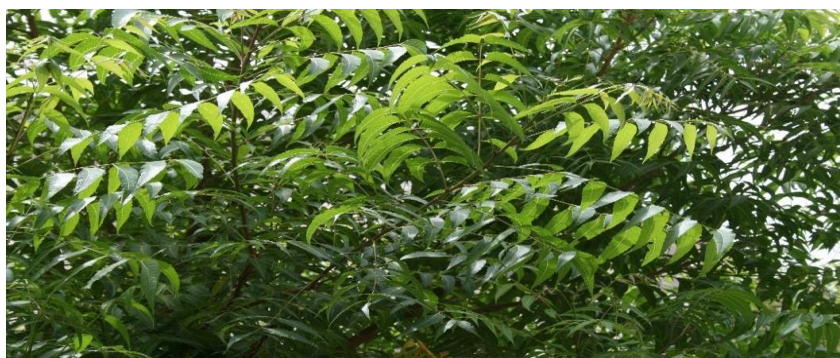


Fig.5.Neem

Neem (Azadirachta indica)-It belongs to the family Meliaceae

Synonyms - Margosa

Chemical constituents- Neem contains fatty acids like oleic and stearic acid. Neem also consists glycerides of saturated and unsaturated fatty acids.

Parts used- leaves, barks

Reasons- The anti fungal properties of neem help to treat dandruff. The effective use of Neem to hair can relieve the itchiness, inflammation and irritation. The regenerative properties of Neem help in reducing hair fall. Neem consists of fatty acids, it helps the scalp to nourish and keeping the hair smooth. ⁽¹³⁾

Formulations- Shampoo, hair mask

➤ **Shikakai -**



Fig.6.Shikakai

Shikakai-

Botanical name- Acacia concinna

Common name- shikakai

Plants parts used -Bark, Leaves, Pods

Benefits-

- makes hair soft and shiny.
- Prevents itchy scalp.
- Eliminates lice.
- Boosts hair growth. (14)

➤ **Amla**



Fig.7. Amla

Botanical name - Embelica officinalis

Common name- Amla

Plant part used- Fruit, seed

Benefits- Darkening of hair and hair growth promoter, Moisturizing agent(15).

➤ **Soup nut**



Fig.8. Soapnut

Soupnut –(Reetha fruit)-

Botanical name- Sapindus mukorossi (Sapindaceae)

Common name- Soupnut

Plant part used- Fruit

Benefits- Provide shining and silky hair, detergent. (16).

➤ **Hibiscus-**



Fig.9.Hibiscus

Botanical name- Rosa sinensis

Common name- Hibiscus

Plant part used- Flower

Benefits- Conditioning agent. (17).

➤ **Cassia :**



Fig.10. cassia

Botanical name- Cassia auriculata

Common name- Cassia

Plant part used- Leaves

Benefits - Anti-dandruff agent

❖ **EVALUATION OF HERBAL SHAMPOO:**

To evaluate the prepared formulations, quality control test including visual assessment and physicochemical control such as PH, density, surface tension, foam stability and wetting time was performed using standard protocols.

1. Physical appearance \ visual inspection:

The formulation prepared was evaluated for the clarity, colour, odour and foam producing ability and fluidity.

2. Determination of Ph:

A 10% v/v shampoo solution was constituted in distilled water and ph of solution was measured by using a calibrated pH meter.

3. Determination of solid content percentage:

A clean dry evaporating disk was weighted and 4gm of shampoo was added to evaporating disc. The evaporating disc with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of solid content present in shampoo was calculated after drying.

4. Wetting time :

Wetting time was calculated by noting the time required by the canvas paper to sink completely. A canvas paper weighing 0.42gm was cut into a disk of diameter measuring 1 inch.

5. Cleansing agent :

The cleansing property of the herbal shampoo was evaluated by the application of shampoo on hair that has not been washed for 7 days. The shampoo was used to wash the hair of human subject that had applies oil 4-5 hr before washing. The performance of the shampoo was assessed on its ability to remove oily dirt from scalp.

6. Foming ability:

Cylinder shake method was used for determining foaming ability. 50 ml of the 1% herbal shampoo solution was put into a 250 ml graduated cylinder was covered with hand and shaken with the volume 10 minutes. The total volume of foam content after 1 min shaking was recorded. Immediately after shaking the volume of foam at 1 min interval for 10 min for recorded. The foam volume remains same throughout the period about 5 min howing that the generated the foam by the shampoo exhibits higher foam property which may be due to presence of soapnut. 1ml shampoo is dissolved with 2ml water and shaken vigorously for 10 min produced 0.4ml foam.

7. Stability study:

Prepared herbal shampoo was applied on skin for a period of 4 weeks by keeping at temperature of 25°-30°c.

8. Skin irritation test:

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

9. Conditioning:

The conditioning effect of the shampoo on hair was evaluated after the hair had been washed with it.

10. Viscosity:

Viscosity of shampoo on hair was determined by using Ostwald's viscometer. The viscosity of herbal shampoo was measured by counting drop of herbal shampoo from the mark to bottom.

11. Density: First take empty bottle weight of pycnometer, then fill it till neck with shampoo and then weight it along with shampoo. Again fill pycnometer with water and weight it. ⁽¹⁸⁾.

❖ RESULT:

Herbal shampoo was formulated by admixing the equal amount of the ingredients with soapnut. The above plant extract contains phytoconstituent like saponine which is a natural surfactant having detergent property and foaming property. An ideal shampoo must have adequate viscosity and many natural substances possess good viscosity.

❖ HERBAL SHAMPOO FORMULATION:

An equal amount of each ingredient's aqueous extract was combined with soapnut to create the shampoo (Table 8.1). The plant extract mentioned above includes phytoconstituents such as saponins, a naturally occurring surfactant with foaming and detergent qualities. A good viscosity is necessary for an ideal shampoo, and many natural substances have a good viscosity. One milliliter of lemon juice, added to the shampoo, acts as a chelating agent, natural antioxidant, and anti-dandruff agent while keeping the formulation's acidic pH.

Evaluation of formulated shampoo- The comparative effectiveness of the formulated herbal and commercial shampoo were evaluated by performing some simple physicochemical tests, results of which are discussed below.

➤ **Physical appearance** - The prepared shampoo showed good characteristics in terms of foaming effect and appearance on the visual inspection of the formulation.

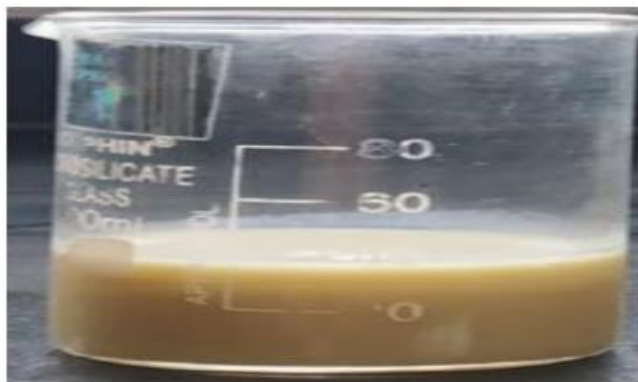


Fig.11.formulated shampoo Solubility

Shampoo sample is soluble in water small heat makes it soluble. it is important to make the ingredient soluble in water for its better action. 2min heat makes it completely soluble. (18).

➤ **pH**

Assessed at 25°C, the pH of the shampoo solution made with 10% distilled water was measured. The pH of the shampoo is crucial for boosting and improving the quality of the hair, as well as for stabilizing the scalp and reducing eye irritation [5]. Creating shampoos with a lower pH value is one of the current trends for minimizing the damage that shampoo causes to hair. Reduced pH (light acidity) encourages scaling tightening and reduces swelling, resulting in observed. The results are presented in Table.



Fig.12.Ph meter

➤ **Solid content**

High-solid content shampoo is very difficult to rinse and works very hard on the hair. There are 23.25% solid ingredients in the prepared shampoo. As a result, they believed that when shampoos were prepared with less solid content, they were easier to wash out.

➤ **Foaming ability and foaming stability**

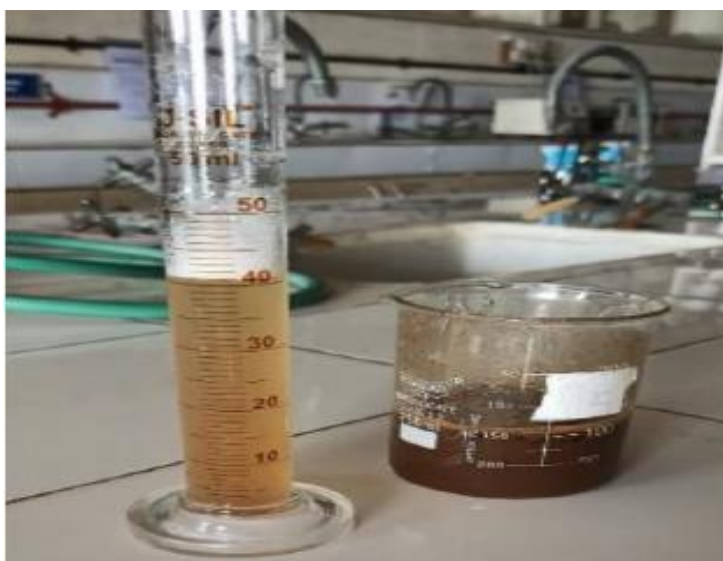


Fig.13. foaming ability test

One of shampoo's most crucial requirements, as seen by the consumer, is foam stability. The assessment of foaming stability was a crucial factor considered in the shampoo evaluation. The formulated shampoo produces more than 50 milliliters of foam. The prepared shampoo produces a dense, compact, small-sized, consistent, and stable foam. The prepared shampoo has a higher foam property, which may be because it contains both soapnut and shikakai, and the foam volume stays constant for approximately five minutes, indicating that the foam generated by the shampoo has good stability.

Table.7. foaming ability test

the foaming ability of shampoo Time in minutes	Formulated shampoo	Marked shampoo
1	130	143
2	127	140
3	124	134
4	121	132
5	119	129

➤ **Viscosity:**

Viscosity of the shampoo measured by a viscometer. Viscosity of shampoo is important for its better action and storage purpose and viscosity of shampoo mentioned in table.

➤ **Dirt dispersion test:**

In the dirt dispersion test using Indian ink, and volume of ink in the forth was measured and the result was graded as none light moderate or heavy.

➤ **Skin sensitivity:**

Our shampoo does not show any sensitivity reaction after applying to the skin. It is not harmful. Dose not shows any reaction after applying.

➤ **Wetting time:**

To test the efficacy of the shampoo, wetting ability of surfactant need to be calculating which depend on the concentration of Surfactant (2). The prepared shampoo shows the 120s wetting time.

Table .8. Physico- chemical study of Herbal Shampoo

Colour	Dark brown	Gray
Transparency	Not Transparent	Transparent
Odour	Good	Good
Ph of 10%olution	4.2	5.4
Solid content (%)	25.67	25.00
Foam volume(ml)	143	150
Foam type	Dense large	Dense small
Surface tension Dynes/cm	26.32	24.75
Wetting time (min)	120	120
Cleansing action (%)	33.34	32.17
Viscosity	142	148

➤ **Net content:**

Before starting the experiment, the outside of the bottle was marketed at the surface level of liquid, and then at the end of the experiment, the volume of water required to fill it up to mark was noted.

❖ CONCLUSION:

The purpose of this study was to create a shampoo that is entirely herbal and comparable to the synthetic shampoos that are sold today. We created an herbal shampoo by utilizing plant extracts, which are widely used in traditional Asian medicine and highly regarded for their ability to cleanse hair. All the components that go into making shampoo are safer than synthetic conditioning agents like silicones and polyquaterniums, and they can also significantly lessen the loss of hair or protein during mixing. To achieve the conditioning effect, we have used plant extracts such as sheekakai and amla in place of cationic conditioners.

Several experiments were conducted to assess and contrast the physicochemical characteristics of shampoos that were prepared and marketed.

Our prepared shampoo showed comparable result with that of marketed shampoo for quality control tests further research and development is required to improve its overall quality.

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