

## Formulation and Evaluation of Polyherbal Shampoo

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### ABSTRACT

Shampoo is a hair care product. Shampoos are used not only for control hair fall but also dandruff, frizz or to prevent damage to excessive oily or dry scalp, etc. It contains various ingredients which helpful for cleansing agent, preservative, foaming agent & also acts as antifungal or antibacterial agent. Generally, most shampoos show many side effects like irritation on the scalp, loss of hair, itching, increased scaling, Nausea & headache. So, here it is necessary to formulate the Shampoo with minimal side effects. Therefore, the present study is aimed at formulating the shampoo which is chemical free and also it must contain herbal extracts which is best alternative against chemical-based shampoos then it shows better safety and efficacy of shampoo. So In the formulated shampoo it contains herbal extracts of Azadirachta indica (Neem), zingiber officinale(ginger), Red Sandal wood, citrus limon (lemon), emblica officinalis (Amla), Ocimum sanctum (Tulasi) & other ingredients required for shampoo base. Before dispensing shampoo it should be evaluated by several tests like visual inspection, PH, percentage of solid content, dirt dispersion, Viscosity, foaming ability, Foam stability, surface tension, etc.

### THE MICROSCOPE

A Microscope is an instrument used to enlarge tiny object to examine that are not visible to the naked eyes. Micro means small. scope means to look at →It magnifies tiny objects so that they can be seen easily. Microscopes are essential in various scientific fields, including biology, medicine chemistry, physics and material sciences. It was first invented by two Dutch spectacle makers and father and son team "Hans and Zacharias Janssen". They were looking through two lenses. Gradually more and more powerful microscopes were made like Simple microscope, compound microscope, electron microscope, scanning probe microscope, acoustic microscope. simple microscope: A simple microscope also known as magnifying glass. They're useful for small prints (or) examining small objects clearly. A simple microscope consists of convex lens. compound microscope:In compound microscope we can use two convex lenses. One is objective and second is

eye piece.It is used to see the plant cell and animal cell.In this magnification power is more.

### Electron microscope:

In Electron microscope use a beam of electrons to create magnified images. It is suitable for viewing small structures such as cells, viruses and nanoparticles.

### Scanning probe microscope:

This Type of microscope operates by scanning a probe over the surface of a sample to create an image.

### Acoustic microscope:

Acoustic microscope use sound waves instead of light (or) electrons to produce images. It is suitable for viewing the internal structure of Solid objects.Microscopes are crucial tools in various fields for magnifying objects beyond the limits of human vision overall microscopes are indispensable tools for advancing scientific knowledge improving health care.

### THE CELL:

The cell is the basic structural, functional, and biological unit of all Living organisms. "Robert Hook" first discovered the cell in 1665 by using a self-designed microscope. It is referred to as the "Building block of life" because it performs all the functions which is necessary for life. Cells vary in size, shape and function they share common features.

### CELL MEMBRANE:

It is also known as plasma membrane. The cell maintaining an internal environment to cellular functions. **CYTOPLASM:**

It is gel-like substance that fills the cell and contains various organelles. It also provides the Structural support.

### NUCLEUS:

It is referred to as the "control centre" of the cell. It is also containing the genetic material DNA (deoxyribonucleic acid). It regulates the gene expressions and control cellular activities such as growth,metabolism and reproduction.

### ORGANELLES:

Specialized structures of the cell perform specific functions. Example: Mitochondria (energy production), endoplasmic reticulum (protein synthesis), Golgi apparatus (protein modification), and chloroplasts (photosynthesis in plant cells). Cells are carrying essential functions such as metabolism, growth reproduction, responses to stimuli. Cells also maintaining the "Homeostasis". They interact with their environment to form tissues, organs and organisms. The study of cells known as "cell biology" (or) "cytology" is fundamental to understanding life Processes and the health and disease.

### COMPOSITION OF CELL WALL

The composition of cell wall depending on the type of organism, whether it is a plant cell, fungal cell bacterial cell (or) Archaeal cell. The Primary component of the cell wall is "cellulose". Cellulose is a polysaccharide made up of long chain of glucose molecules. It provides the structural support to the plant cell. "Hemicellulose" is another polysaccharide which contributes the flexibility of cell wall. "Pectin" is a complex polysaccharide that acts as a glue like substance. It helps for the binding plant cell. "Glycoproteins" that are covalently linked to carbohydrates. It gives signals of plant tissues. "lignin's" is a secondary cell wall in plant cell. It provides additional strength.

"Chitin" is a fungal cell wall. These are similar in structure to cellulose but composed of N-acetyl-glucosamine monomers. "Peptidoglycon" which is mostly found in bacteria. It is a polymer composed of alternating sugars (N -acetyl-glucosamine and N-acetyl-nuramic acid). It maintains the cell shape. "Pseudopeptidoglycon" composed of archaeal cell wall. other archaeal cell walls may contain proteins, glycoproteins, polysaccharides depending on the specific organisms. Composition of cell wall is a crucial for provide structural support, protection and regulation of various cellular process in different types of organisms.

### MICROSCOPIC STUDY

Microscopic study refers to the examination of specimens (or) samples by using a microscope to observe and analyse their features. This method allows scientists, researchers and students to explore the details of objects.

#### Sample preparation:

Before microscopic examination. Samples must be appropriately prepared to clarity and

visibility under the microscope this may involve fixing, staining, sectioning, mounting. The sample on a side, depending on the type of specimen. Researchers can adjust the magnification, focus and lighting to optimize the visibility of Specific features with in the Sample. Microscopic study allows for the structures, tissue morphology, molecular interactions, crystallographic patterns, and surface topography. Microscopic study is fundamental to investigating disease pathology, studying microorganisms and diagnosing medical conditions. Microscopic study provides valuable insights into the microscopic world. By using the microscopic study, the scientists to explore and understand the intricacies of nature.

### SECTION CUTTING:

Section cutting also known as Tissue sectioning (or) histological sectioning is technique which is used in biological research to prepare thin sections of specimens. These specimens may include tissues, organs, cells (or) their biological materials. Section cutting is essential for the morphology and cellular composition of sample.

#### Section cutting process:

##### Tissue fixation:

Before sectioning specimens are typically fixed to preserve their structure. Common fixatives include formaldehyde, paraformaldehyde and glutaraldehyde solutions. Fixation helps to maintain the integrity of cellular structures.

##### Tissue processing:

Fixed specimen undergoes processing to dehydrate in filtrate and embed in a solid medium embedding medium such as paraffin wax (or) resin.

##### Block preparation:

After embedded medium get solidifies, the specimens' forms blocks that can be easily handled and sectioned.

##### Sectioning:

The prepared blocks are mounted in a microtome, which is a precision cutting instrument used to produce thin sections of the specimen. section mounting. once mounted, the sections are dried and heated to adhere to the slide surface. staining and cover dipping:

The sections may undergo various staining techniques to visualize the specific components. Section cutting is a crucial step in histology, pathology and other fields of biological research.

### SHAMPOO

Shampoo is a hair care product used for cleaning and nourishing the hair and scalp. It is typically coming in liquid (or) gel form and is applied to wet hair, lathered and then rinsed thoroughly shampooing helps to remove dirt, oil, Sweat and product from the hair and scalp leaving the hair clean.

#### Features of shampoo:

##### Surfactants:

Surfactants are the primary cleaning agents in shampoo common surfactants used in shampoo include sodium lauryl sulphate (SLS).

##### Conditioning Agents:

Many shampoos contain conditioning agents that help to reduce frizz, and also helps to soften and smooth the hair. These conditioning agents include natural oils and proteins.

##### Moisturizers:




Some shampoo includes moisturising ingredients to help hydrate and nourish the hair and scalp.

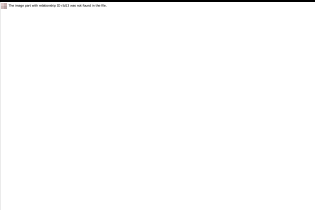
##### PH Balance:

Shampoos are formulated to have a certain pH level. The pH ranging from 4.5 to 6.5. The pH Balance helps to maintain the natural acidity which is important for healthy hair. Shampoo's for adding volume to fine hair, colour-safe shampoos for preserving hair colour and medicated shampoos fortreating dandruff and other scalp conditions.

#### PHYTOCHEMICAL ANALYSIS

Phytochemical analysis refers to the process of identifying, isolating and quantifying the chemical compounds which are present in plants. In plants found in various parts including Leaves, stems, roots, fruits, seeds and flowers. Phytochemicals which are responsible for plants colour, flavour, aroma and other characteristics. Phytochemical analysis plays a crucial role in plant-based research, drug discovery, and natural product development phytochemicals have potential health which are benefits for the humans.

Components	Botanicalname	Family	Uses	Image
<b>Tulsi</b>	OCIMUMTENUIFLORUM	LAMIACEAE	Cure fever,treat to heartdisease,respiratoryproblemsand skinproblems.	
<b>Aloevera</b>	ALOE BARBADENSIS	LILIACEAE	Smoothingagentand conditioningagents	
<b>Amla</b>	EMBLICA OFFICINALIS	EUPHORBIACEAE	Stimulate hairgrowth anddevelopsimmunity	

<b>Neem</b>	AZADIRACHTAINDICA	MALIACEAE	Removedandruff, hairfall,strengthen,purify bloodandimprove immunity.	
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## AIM AND OBJECTIVE

### AIM

The aim of the current study is to give a strategic explanation on **FORMULATED AND EVALUATION OF A**

### POLY HERBAL SHAMPOO.

#### OBJECTIVE

The major objects are:

To remove dirt, oil, sweat from the surface of the hair and scalp. It also helps for the cleaning and nourishing the hair and scalp. It can stimulate the regrowth of new hair. It can improve the hair quality and reduce the hair loss. To reduce dandruff, which can cause the hair follicles. Mainly medicated shampoos are helps to reduce the dandruff.

#### METHODOLOGY

##### Preparation of extract: Decoction method

About 5gm of each powdered plant material like neem, amla etc Vetiver was extracted

using 500ml of distilled water by boiling for 4hrs. Then cooling the extract and filtered.

##### Extraction process:

- Firstly, collect the fresh leaves, fruits & barks.
- Wash the wash the leaves, fruits & barks to remove the dirt.
- Now after wash the leaves, fruits & barks to dry it under shade drying.
- After shade drying of the leaves, fruits & barks then are drying under sunlight.
- Proper drying of leaves, fruits & barks then are pulverized.
- The pulverized dried powder suggested for sieving.
- After sieving the powder is stored in tight closed container.
- The powder drug is extracted using soxhlation, the drug is used further phytochemical analysis.

#### FORMULA

S.no	Name of the ingredients	Purpose	Required quantity for 100ml
1	NEEM	Anti-fungal agent	12.5ml
2	TULASI	Anti-biotic agent	17.5ml
3	AMLA	Anti-dandruff agent	12.5ml
4	GINGER	Flavouring agent	12.5ml
5	RED SANDLE	Shining agent	2.5ml
6	LEMON	Anti-dandruff	7.5ml
7	SLS	Foaming agent	15gr
8	Sodium sulphate	Viscosity	15gr
9	Tween 80	Emulsifying agent	3ml
10	Span 80	Emulsifying agent	3ml

11	Distilled water	Quantity improver	2.7ml
12	NaCl	Preservative	1.25ml

### Organoleptic evaluation

The prepared shampoo was evaluated in terms of their clarity, colour and odour. In watchglass was taken 5ml of final herbal shampoo preparation and then it placed against white background white tubelight. It was detected for its color by naked eyes.

### Determination of pH

PH of your 10% shampoo solution. Dip one strip of pH paper in the solution and compare the color of the strip to key. pH meter can also be used after calibration. Most shampoos are neutral or slightly acidic. Acidic solutions cause the cuticle (outer layer) of the hair to shrink and lay flatter on the shaft of the hair. Basic solutions cause the cuticle to swell and open up. Acidic solutions make the hair seem smoother. Basic solutions make hair seem frizzier. Neutral pH = 7 Acidic pH < 7 Basic pH > 7

### Determination of percentage solid content

A clean dry evaporating dish was weighed and added 4 grams of shampoo to the evaporating dish. The dish and shampoo was weighed. The exact weight of the shampoo was calculated and put the evaporating dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight of the shampoo only (solids) after drying was calculated. If a shampoo has too many solids it will be hard to work into the hair or too hard to wash out. If it doesn't have enough it will be too watery and wash away quickly. A good shampoo will be between 20%–30% solids.

### Surface tension measurement

Measurements were carried out with a 10% shampoo dilution in distilled water at room temperature. Thoroughly clean the stalagmo meter using chronic acid and purified water.

Because surface tension is highly affected by grease or other lubricants. The data calculated by the follow the equation given below

### 2.3.1. Foaming ability and foam stability

Cylinder shake method was most widely used for determining foaming ability. 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. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

### 2.3.2. Wetting time

The canvas was cut into 1 inch diameter discs having an average weight of 0.44 g. The disc was floated on the surface of shampoo solution of 1% w/v and the stop watch started. The time required for the disc to begin to sink was measured acutely and noted as the wetting time.

### 2.3.3. Dirt dispersion

Two drops of shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India ink was added; the test tube was stoppered and shaken 10 times. The amount of ink in the foam was estimated as None, Light, Moderate, or Heavy. Shampoos that cause the ink to concentrate in the foam are considered poor quality. The dirt should stay in the water portion. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair.

### 2.3.4. Conditioning performance evaluation

Artificial hair strands are collected from salon and are divided into two batch (control and test) length 10 cm approximately. The test hair sample is washed with formulated shampoo and control is the one without washing. The test sample has to be washed with shampoo at least for 10 times and air dried. Blind touch test method is used for determining the conditioning effect of shampoo. About 20 student volunteers are selected and are made to touch the hair samples. The conditioning performance of the shampoo is rated in terms of score 1-4 (4-excellent, 3-good, 2-satisfactory and 1-poor).

### 2.3.5. Cleaning action

5 grams of wool yarn were placed in grease, after that it was placed in 200ml of water containing 1 gram of shampoo in a flask. Temperature of water was maintained at 35°C.

The flask was shaken for 4 minutes at the rate of 50 times a minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation:

$$DP = 100(1 - T/C)$$

In which, DP is the percentage of detergency power, C is the weight of sebum in the control sample and T is the weight of sebum in the test sample.

### 2.3.6. Eye irritation test

Animals (albino rabbits) were collected from an animal house. About 1% shampoo solution was dripped into the eyes of six albino rabbits with their eyes held open with clips at the lid. The progressive damage to the rabbit's eyes was recorded at specific intervals over an average period of 4 seconds. Reactions to the irritants can include swelling of the eyelid, inflammation of the eye, ulceration, hemorrhaging (bleeding) and blindness.

### ALL RESULTS (after 6 months)

S.no	Parameter	Values obtained
1	Color	Brown, shiny
2	PH	7.4 ± 0.03
3	Percentage of solid contents	17.97 ± 0.03
4	Wetting time	17.8 ± 0.03
5	Percentage of cleaning	27.3 ± 0.3
6	Percentage of detergency	67.2 ± 0.3
7	Foam volume	45ml ± 1 ml
8	Surface tension (dynes/cm)	33.4 ± 0.3

### FUTURE SCOPE

The global hair shampoo market is anticipated to rise the product during the period between 2023 and 2030. The shampoo could include advancements in formulation, such as more sustainable ingredients and packaging, customization based on individual needs (or) hair types. And innovations in delivery system for better application and efficacy. These advancements indicate the future for the shampoo industry which is driven by the consumer demand for more sustainable, effective, and personalized hair care solutions. These are free from some harsh chemicals like sulphates, parabens and phthalate. The shampoo which was prepared has good results in evaluation tests. Further we can conduct clinical trials.

### CONCLUSION

Herbal shampoos are formulated with plant-based ingredients. These are extracts from various herbs and botanicals such as GINGER, NEEM, AMLA, LEMON, RED SANDLE WOOD, TULASI these ingredients are for cleaning, moisturizing, smoothing and nourishing properties. Color (Brown, shiny), PH (7.4 ± 0.03), Percentage of solid contents (17.97 ± 0.03), Wetting time (17.8 ± 0.03), Percentage of cleaning (27.3 ± 0.3), Percentage of detergency (67.2 ± 0.3), Foam volume (45ml ± 1 ml), Surface tension (dynes/cm) (33.4 ± 0.3), Herbal shampoos avoid harsh chemicals and artificial fragrances. Many herbal shampoos are formulated with biodegradable ingredients and it comes in eco-friendly packaging. These can increase the sustainability and environmental impact more

natural hair care routine that promotes overall hair and scalp wellness. Herbal shampoos provides an opportunity for individuals.

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