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COMPRESHSIVE STUDY DEVLOPMENT & EVALUATION OF POLYHERBAL SHAMPOO

GUIDE:- **MR. MOHAMMAD AWAIS**

MR. NAZEER AHMED

AUTHOR :- SWAPNIL MAHADEO WANKHADE

MAHESH PANDURANG PATIL

BALKRUSHNA GOKUL MAHAJAN

PRASHIK VIJAY MORE

COLLEGE NAME :- DR UTTAMRAO MAHAJAN COLLEGE OF PHARMACY CHALISGAON

ABSTRACT :- In the field of hair care, polyherbal shampoos—which are made with a combination of various botanical extracts—have grown in popularity. Shampoos are hair care products used for washing, maintaining, and beautifying hair in our daily lives, and they are mostly utilized as cosmetics. Neem leaves, ritha, shikakai, amla, e, aloevera, lemon oil, rice water, gelatin, and other plants and herbal substances are used to make shampoo. Shampoos are divided into two categories based on their functions: appearance (which includes powder, liquid, etc.) and function (which includes anti-dandruff, conditioning, etc.). Shampoos are thick detergent solutions with the right preservatives, additives, and active components. Since synthetic shampoo may have a number of negative effects on the hair and scalp, the goal of this study is to create and assess a pure herbal shampoo. the advantages of herbal cosmetics, which don't include any additional chemicals, have minimal adverse effects, and lessen allergic reactions. Index Terms: anti-dandruff, poly-herbal shampoo.

INTRODUCTION :-. One of the essential bodily elements that is thought to serve as a protective appendage is hair. In our daily routines, shampoos are probably the most often used cosmetic product to clean our hair and scalp. In essence, a shampoo is a detergent solution enhanced with additional compounds to offer a number of benefits, such as bettering lubrication, conditioning, and even possible health benefits. Nowadays, a variety of shampoos are available, including herbal, synthetic, medicated, and non-medicated varieties. However, people are increasingly choosing herbal shampoos because they believe that these products, which come from natural sources, are safe and free of negative effects. Herbal shampoos are considered alternatives to synthetic ones, however making cosmetics from only natural materials is a difficult task. A wide variety of medicinal plants are frequently utilized in shampoo composition and are said to have positive effects on hair. Customers will choose the herbal shampoo even though it performs better and is safer than the synthetic ones. Most likely, shampoos are utilized as cosmetics. It is a hair care product that we use on a daily basis to clean our hair and scalp. Shampoos are a viscous mixture of detergents with appropriate additions, preservatives, and active substances that are most commonly used as beautifying agents. Typically, damp hair is rubbed with it before being rinsed with water to remove the residue. Shampoo is meant to remove accumulated dirt from hair without removing a significant

amount of sebum. There are a lot of synthetic shampoos on the market right now, both medicated and non-medicated, but herbal shampoo gained popularity because it is natural, safer, and has no negative side effects.

Ideal Properties of Poly-Herbal Shampoo

• It is important to completely and correctly remove any loose corneal cells from the hair, excess sebum, dust, or other fatty materials.

• It should produce enough foam to satisfy the psychological requirements of the user.

• At the absolute least, it should leave the hair manageable, soft, lustrous, and non-dry. Take off.

• It ought to impart a pleasing scent to the hair.

Advantages Of Poly-Herbal Shampoo

• Cleansing qualities that enhance hair care.

• Taking care of dry scalp and other scalp issues.

• Hair loss treatment

• Reduces inflammation and itching.

• Keeps hair smooth and silky by repairing damaged hair.

Preserves the beauty and bloom of your hair. K.

Properties Of Poly-Herbal Shampoo

A healthy sheen, but when overdone, it makes the hair look disgusting. should successfully and completely get rid of the extra dust and sebum. Proper hair washing is essential.
• A significant amount of foam should be produced.
• Shampoo removal should be simple after rinsing with water.
• The end result should be manageable, silky, lustrous, and non-dry hair.
• Should impart a pleasant aroma to the hair.
• The hand shouldn't get chapped or rough.
• It shouldn't have any negative effects or irritate the skin or eyes.

❖ Function Of Poly-Shampoo

Complete and efficient removal of the dirt or soil is required.

• The hair needs to be cleansed completely.

• It must produce enough foam to satisfy the demands of the user.

• Rinsing with water ought to be a simple method of eliminating it.

• It should leave the hair with a pleasant aroma.

• It shouldn't cause irritation to the eyes or skin or have other adverse effects. • It should effectively and thoroughly remove dirt or soil. It should give the hair a good wash.

Problems Related to Hairs

: •Dandruff • Dry hair

• Split ends • Oily hair

• Hair loss • Heat damage

• Colour damage

1.Hair anatomy

Hair grows from hair follicles situated within the fatty layer of the scalp. Contrary to the popular belief that hair grows as single strands, hair follicles actually grow in groups of 1-4 hairs called. Parts of the hair

1. Dermal papillae: The dermal papilla is responsible for regulating the hair cycle and hair growth, and is also comprised of androgen receptors that are sensitive to the presence of DHT.

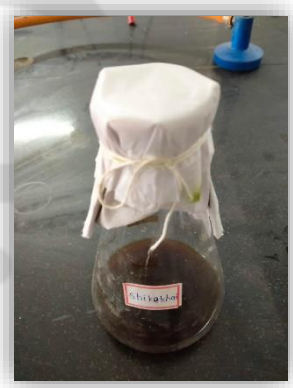
2. Matrix: The matrix surrounds the dermal papillae and contains all the active cells needed for hair growth and for the development of the different parts of the hair, particularly the outer root sheath, the inner root sheath and the hair shaft.

3. Outer root sheath: The outer root sheath, or trichilemmal, is the outermost part of the hair and is keratinized. It covers the entire hair follicle inside the dermis and then transitions through to the epidermis, providing the hair follicle with an opening from which to surface from.

4. Inner root sheath: inner root sheath is comprised of three parts: the Henley layer, Huxley layer, and cuticle. The Henley's and Huxley's layers are capsular layers that anchor onto each other with the purpose of stabilizing the hair. The cuticle, which is the

❖ **IMPORTANCE OF ACTIVE INGREDIENTS:**

1.Shikekai Acacia concinna (Shikakai),), a plant used in India, has several uses, including treating skin conditions, dandruff, and long hair. Additionally, Shikakai has a number of therapeutic qualities, including anti-dandruff, wound-healing, and anti-hair loss qualities. It also demonstrates antioxidant activity, antifungal, and anti-inflammatory properties. Additionally, it promotes rapid hair development and radiance by keeping the scalp clean and promoting hair growth without altering the pH balance of the scalp. Additionally, it works well to condition and strengthen hair



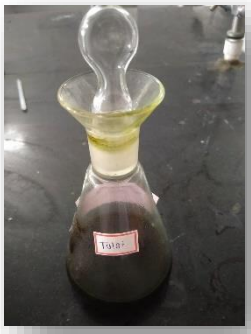
2. Ritha Reetha is a widely known ingredient in many Ayurvedic shampoos and cleaning solutions. According to the World Health Organization, the protein-rich kernels of Reetha seeds exhibit a well-balanced amino acid makeup. Vitamins A, D, E, K, saponin, sugars, fatty acids, and mucilage are all abundant in its fruit. Reetha extract helps treat dandruff and encourage hair development. For many years, soapnuts—also referred to as washing nuts—have played an important role in natural hair care. When applied frequently, the saponins included in these nuts help to preserve the health, luster, and gloss of hair.

3. Aloe- Vera Cosmetics like face cleansers and shampoos include it. Aloe Vera is applied to the skin to hydrate it. Along with the removal of dandruff, grime, grease, and lice, the expected benefits also include hair conditioning, smoothing the hair's surface, and improving the general health of the hair. Its functions include cleaning the hair, preventing debris from getting on the scalp, and eliminating residue from hair care products.It aids in hair thickening.It also aids with hair nourishment.

4. Amla encourages shine: Amla's inherent conditioning qualities may help to improve the luster and shine of your hair, giving it a more vibrant and healthy appearance. Nourishes the Scalp: Amla is said to nourish the scalp, thereby promoting hair development and preserving a healthy environment there**.**

5.Fenugreek is abundant in calcium, iron, potassium, folic acid, protein, and vitamins A, C, and K. These promote hair development and enhance the health of the scalp. By preventing the formation of bacteria and yeast on the scalp, the herb can help with issues including dandruff and itching.

6. NEEM ts antibacterial qualities can be utilized to prevent viral and fungal illnesses, and the oil is a great way to keep plants healthy and keep head lice away. Neem oil can be used to lessen dandruff, promote hair development, and lower the risk of hair loss. Hair follicles are actively cleansed and strengthened by neem. There are numerous advantages of neem for hair. Stronger and healthier roots result from increased blood flow to the scalp, which also makes your hair lustrous, robust, healthy, and clean.



7 TULSI In Ayurveda, tulsi is known as the "queen of herbs" because it strengthens the roots and revitalizes the hair follicles, both of which lessen hair loss. Rich in vitamins, minerals, and phytonutrients, it aids in the growth of hair. Tulsi, which is high in vitamin K and antioxidants, helps hair by, among other things, increasing blood flow and encouraging hair growth. Tulsi is the secret ingredient for good skin and hair since it is full of vitamins, minerals, electrolytes, and phytonutrients.

❖ EXPERIMENTAL WORK

METHOD OF EXTRACTION USING SOXLET APPRATUS

A lab tool called the Soxhlet apparatus uses a volatile solvent to extract fatty or other compounds. Franz von Soxhlet, a German agricultural chemist, created it in 1879. The following details pertain to the Soxhlet apparatus:

- **How it works**

A glass tube with a vapor and siphon tube attached to a flask and a condenser makes up the device. Within the extraction chamber, a solid sample is put in a thimble, and solvent is poured on top. After the solvent boils, its vapors pass through the vapor duct and land back on the sample in the condenser, where they condense. This procedure is carried out repeated

- **What it's used for**

• Soxhlet extraction is frequently employed when the contaminant is insoluble in a solvent and the target compound has limited solubility in that solvent. Although it is a tried-and-true method that may be done without supervision, it can be time-consuming and solvent-intensive.

METHOD OF PREPARATION:

Every component was meticulously measured in compliance with the recipe. Preparation of anti-dandruff shampoo: Shampoo was formulated using simple mixing process. Herbal shampoo was formulated by adding the required amounts of herbal ingredients as given in the formulation.The aforementioned filtrates were then mixed together and given a good stir. To keep the semi-solid consistency that is desired-enhancing and surfactant qualities. Lastly, the mixture was scented with ROSE and preservatives. Lemon also aids in balancing the formulation's pH.

❖ **EXTRACTION PROCESS :-**

Collection of plant material: Shikekai, Reetha, Fenugreek, tulsi, Neem, and Aloevera were gathered from the rural Pimpri-Chinchwad (Maharashtra) area.

Rettha, Neem, Tulsi, Fenugreek have been extracted with hydroalcoholic using Soxhlet process for 6 hr&, filtered.

Shikekai :- 10 grams soaks of powder in conical flask with 100 ml in 1:4 of solution of ethanol and water for 24 hrs and filtered .

EXTRACTED SHAMPOO INGREDIENTS

INGREDIENTS	F1	F2	F3	F4	F5	ROLE
SHIKEKAI EXTRACT	35ml	15ml	25ml	25ml	20ml	CLEAN THE SCALP
REETHA EXTRACT	15ml	35ml	25ml	20ml	20ml	FOAMING AGENT
ALOEVERA	5ml	7ml	7ml	10ml	10ml	MOISTURIZING AGENT
NEEM EXTRACT	10 ml	6ml	7ml	7ml	7ml	ANTIBACTERIAL
AMLA EXTRACT	10ml	6ml	6ml	6ml	6ml	STRENGTHEN THE HAIR
TULSI EXTRACT	5ml	3ml	5ml	6ml	6ml	PREVENT HAIR LOSS
FENUGREEK EXTRACT (METHI)	5ml	3ml	5ml	6ml	6ml	REDUCE DANDRUFF
RICE WATER	5ml	10ml	5ml	5ml	10ml	STRENGTHEN THE HAIR
GELATIN	10 ml	10 ml	10 ml	10 ml	10 ml	SMOOTH THE HAIR
PROPYL PARABEAN	0.9 ml	0.9 ml	0.9 ml	0.9 ml	0.9 ml	PRESERVATIVE
DEIONIZED WATER	5ml	5ml	5ml	5ml	5ml	VEHICLE
PERFUME	Q .S UPTO 100ml	Q .S UPTO 100ml	Q .S UPTO 100ml	Q .S UPTO 100ml	Q .S UPTO 100ml	FLAVOURING AGENT

❖ **FORMULATIONS TABLE**

❖ **FINAL FORMULATION**

❖ **EVALUATION OF FORMULATION**:

Numerous quality control procedures, such as visual evaluation, physicochemical controls, and conditioning performance tests, were carried out to assess the caliber of created and marketed formulations. 1. Visual assessment and physical appearance: The resulting formulation's color, odor, and capacity to produce foam, among other qualities, were assessed.

2. pH determination: Using a pH meter at room temperature, the pH of a 10% v/v shampoo solution in distilled water was determined.

3. Calculating the percentage of solid materials An evaporating dish that had been cleaned, dried, and weighed was filled with 4 grams of shampoo. To verify the precise weight of the shampoo, the dish and shampoo were weighed once more. The evaporating dish was set on the hot plate to evaporate the liquid part of the shampoo. The solid contents' weight and, consequently, percentage

4. The test for dirt dispersion Ten milliliters of distilled water were placed in a big test tube, and two drops of shampoo were added. After adding one drop of India ink to this solution, the test tube was sealed and given 10 shakes. The rubric used to denote the amount of ink in the foam was None, Light, Moderate, or Heavy.

5. Measurement of surface tension A stalagmometer was used to test the surface tension of 10% w/v shampoo in distilled water at room temperature.

6. The capacity to foam and the stability of foam Using the cylinder shaking method, the foaming ability was assessed. In short, a 250 mL graduated cylinder was filled with 50 ml of the 1% commercial or designed shampoo solution, covered with one hand, and shaken ten times. Following a minute of shaking, the total amount of the foam content was noted. By measuring the foam volume following a one- and four-minute shake test, foam stability was assessed.

7. Test of wetting time Canvas paper with an average weight of 0.44 g was cut into discs with a diameter of 1 inch. The stopwatch began when the disc's smooth surface was placed on top of a 1% v/v shampoo solution. The wetting time was defined as the amount of time needed for the disc to start sinking.

8. Test for skin sensitization Human volunteers' skin is used in this test to determine whether or not it causes skin irritation.

❖ **Result of evaluation of herbal Shampoo**

1.The outcome of physical attributes

The table shows the physical appearance findings from a visual examination of a number of formulations. As can be shown, every formulation exhibited favorable foaming properties. Table: Outcomes of physical appearance formulations**.**

SR NO	FORMULATIONS	APPERANCE
1	F1	PALE YELLOW COLOUR ., GOOD FOAMING
2	F2	PALE YELLOW COLOUR , MODERATE FOAMING
3	F3	PALE YELLOW COLOUR,GOOD FOAMING
4	F4	PALE YELLOW COLOUR , NOT MUCH FOAMING
5	F5	PALE YELLOW COLOUR , GOOD FOAMING

2. Result of foaming ability

Capacity to foam Despite having nothing to do with shampoos' capacity to clean, foam creation is crucial to consumers and is thus a crucial factor to consider when assessing shampoos. In distilled water, all three shampoos displayed comparable foaming properties. The table shows the three samples' capacity to retain foam. The three shampoos' foaming qualities were similar. Stable foams were formed by the final formulation, and the foam volume barely changed.

Time inMins	Foam Volume (ml)				
	F1	F2	F3	F4	F5
1 MIN	145	170	175	148	161
2 MIN	142	167	170	145	159
3 MIN	137	164	165	143	156
4 MIN	134	162	163	140	153
5 MIN	131	160	161	139	150

3. Result of cleaning action (%)

160 Dispersion of Dirt Shampoo that concentrates ink in the foam is seen to be of low quality; the dirt should remain in the water. Rinsing away dirt that remains in the foam will be challenging. On the hair, it will redeposit. The outcomes of all three shampoos were comparable. According to these findings, no dirt would remain in the foam.

SR NO	FORMULATIONS	CLEAN ACTION (%)
1	F1	23%
2	F2	27%
3	F3	29%
4	F4	22%
5	F5	24%

4. Result of pH

It has been demonstrated that shampoo pH plays a significant role in stabilizing, reducing eye irritation, and boosting hair's attributes. One strategy to reduce hair damage is the current trend of promoting shampoos with a lower pH. Shine is produced by the scales tightening and preventing swelling due to mild acidity. The table shows that all three shampoos had an acid balance and ranged from 5.78 to 5.96.

SR.NO	FORMULATIONS	PH
1	**F1**	**5.65**
2	**F2**	**5.67**
3	**F3**	**5.78**
4	**F4**	**5.81**
5	**F5**	**5.96**

•CONCLUSION

The current study aimed to develop a herbal shampoo that is safer than chemical conditioning agents, promotes hair development, and minimizes hair loss. The shampoo's formulation not only increased hair growth but also significantly reduced hair loss while combing, making it safer than chemical conditioning treatments. To avoid the risk caused by chemical preservatives, a physiochemical method was used for formulation preservation, and the pH of the shampoo was modified to retain the scalp's acidic mental state. Customers will choose poly-herbal shampoo since it is safer and more effective than synthetic shampoo. Shampoo is made with a variety of plants and herbs, including ritha, shikakai, amla, lauryl glucoside, aloevera, lemon juice, neem leaves, rice water, and gelatin, to provide conditioning properties.

The comparative evaluation of the three herbal shampoo formulations leads to the conclusion that **Formulation 3** performs better in terms of overall quality, client fulfillment, and efficacy. According to user feedback and laboratory tests, the third formulation produced the best results in terms of improving hair texture, scalp health, and long-term advantages. Additionally, it showed fewer negative reactions than the other formulations, which made it a better option for a larger variety of hair types and conditions.

In contrast to Formulations 1,2, 4 and 5, which provided limited advantages in some regions, Formulation 3 stands out for its well-balanced natural component blend, effective cleansing characteristics, and improved moisturizing effects. These qualities combine to make it a more dependable and superior choice in the field of herbal shampoos.
As a result, Formulation 3 is suggested as the most effective and user-friendly option, providing a high-quality solution for those looking for a mild but effective herbal shampoo.

❖ ACKNOWLEDGEMENT

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❖ Conflict Of Interest :-

"The authors declare that they have no conflict of interest related to the herbal shampoo research."

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