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FORMULATION AND CHARACTERIZATION OF HERBAL SHAMPOO FOR ANTI-DANDRUFF BASED ON LIQUID FORMULA

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ABSTRACT:

The main object of this present study is to prepare and evaluate an herbal shampoo and determine physiochemical function that emphasizes on safety, efficacy and quality of the product Herbal Shampoo is the natural hair-care product which is use to remove grease, dirt, dandruff and promote hair growth, strength ness and darkness of the hair. Various drugs are used for the preparation of cosmetics shampoo. Such drug shows various side effects such as hair loss, increased scaling, scratching, nausea and headache. Therefore, an attempt is made to formulate herbal shampoo that is free from side effects.

Introduction:

A shampoo is a cleaning aid for the hair and is counted among the foremost beauty products. Today's shampoo formulations are beyond the stage of pure cleaning of the hair. Additional benefits are expected, e.g., conditioning, smoothing of the hair surface, good health of hair, i.e., hair free of dandruff, dirt, grease and lice and, above all, its safety benefits are expected. In the present scenario, it seems improbable that formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formula, although better in performance and safer than the synthetic ones, will be popular with the consumers [1]. We have evaluated the formulation, and compared the formulation and Characterization of Herbal Shampoo

for Anti- Dandruff based on a liquid formula, with a marketed shampoo. We have used the physicochemical approach to preservation and by formulating a self-preserving shampoo, have avoided this risk posed by chemical preservatives. However, the aesthetic attributes, such as lather and clarity, of the laboratory shampoo are not comparable with the marketed shampoo. The foam volume was on par. It is very important to know and understand effects of ingredients used in shampoo formulations. In the present study, the shampoos based on synthetic ingredients and herbal ingredients are compared for their effectiveness and safety [2].

According to the study, the Indian domestic market can be broadly segmented into two categories. The first one will cover raw materials required by the industrial units and direct consumption for household remedies, whereas the second category will cover ready-to-use finished medicines, health supplements, etc. Herbal cosmetics. The herbal cosmetics industry is “driving growth in the beauty business” in India and is expected to grow at a rate of seven percent as more people shun chemical products in favors of organic ones. During the last decade, the herbal beauty care business has actually driven the growth of the beauty business in India.

Allium sativum, family Alliaceae has been reported to possess antioxidant, antimicrobial, antitumor, antimutagenic, anti-inflammatory, antiviral, and antiulcer properties.

- Garlic and its extracts have been used to treat infections for thousands of years[3].
- Allicin (the name is derived from that of the garlic species Allium sativum is considered to be the main biologically active antimicrobial phytochemical produced in garlic extracts and was first recognized as such in 1944[4].
- Shampooing is the most common form of hair treatment. Shampoos have primarily been products aimed at cleansing the hair and scalp. Selected ingredients of shampoo that have been popular with the consumer are currently under attack because of potential risks associated with their use (e.g. halogenated organic compound, formaldehyde, musk [5].

Formulating cosmetics using completely natural raw materials is a difficult task. The challenge lies in selecting materials that can be rationally justified as ‘natural’ and formulating them into cosmetics whose functionality is comparable with their synthetic counterparts. Selecting the evaluation parameters of a shampoo is a challenging task, simply because of the multitude of both subjective and instrumental test methodologies available for this purpose [6]. A more radical approach in popularizing Formulation and Characterize of Herbal Shampoo for Anti- Dandruff based on liquid formula would be to change the consumer expectations from a shampoo, with emphasis on safety and efficacy.

BENEFITS OF APPLYING HAIR SHAMPOO

- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas are cosmetic preparations that involve the usage of traditional ayurvedic herbs to clean the scalp and the hair[7].
- The Ayurvedic Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas are very effective for people who face a lot of hair problems in their daily lives such as hair fall, dandruff, grey hair, dry hair, etc due to environmental pollution[8].
- Historically, people in the Indian continent had started using Ayurvedic extracts of various varieties from very early times. In the early days, people would extract dried gooseberries, amla, soapberries to clean the scalp and provide effective solutions[9].
- Shikakai and Reetha are a few of these ingredients in shampoo that are still known to us as one of the best Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas for getting perfectly healthy hair with reduced chances of hair fall, dandruff, and hair loss[10]. Fun Fact - Origin of ‘Shampoo’ lies in India. The word itself is derived from the Hindi word - ‘Champo’.
- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas are made out of pure and organic ingredients and there are no synthetic additives or surfactants and are free of any side effects[11].
- These shampoos are not tested on animals, unlike synthetic shampoo brands.
- Are Bio-degradable and earth-friendly.
- Skin-friendly - never causes irritation to the eyes.
- Cost friendly - not much expensive.
- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas for hair fall are made out of natural ayurvedic ingredients, natural oils, minerals, and herbal extracted compounds[12]. These ingredients work on to improve the moisture in your hair by hydrating the follicles and roots of your hair. This in turn reduces the chances of hair fall, loose, dry, and damaged hair.
- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas for hair growths are made to strengthen

the hair follicles by giving essential oils and nourishment all through the root and follicles[13]. This, in turn, promotes hair growth and stimulates the formation of new and healthy hair roots.

- Regular usage of Formulation and Characterization of Herbal Shampoo for Anti-Dandruff based on liquid formulas can do wonders for your hairs. Our scalps need to maintain a perfect balance of oil and pH levels in order to have beautiful, healthy, and strong hair. By using Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas, you can get the perfect oil balance[14].
- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas are made out of natural and essential antiseptic properties that prevent our hair and scalp from the harsh UV rays of the sun thus preventing skin infections[15].
- Ayurvedic Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas are made of natural ingredients suitable for every type of skin. So, there is no need to worry about any skin allergies with the use of Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas.
- Hair grows healthy with regular usage of Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas thus giving your hair a lustrous, shiny, and bouncy hair[16].
- Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas also keep the natural color of your hair and with regular usage, even enhance them. Along with this, they keep the hair healthy, shiny, bouncy with a well-balanced and healthy scalp.

MATERIALS AND METHODS

Preparation of extract About 100 g of each powdered plant materials, namely Neem, Hibiscus flower, Aloe-vera, Shikakae, Liquorice, Amla, Soap nut were homogenized. The powdered material was extracted with distilled water by boiling for 4 h. The extract of each plant material was separated and evaporated. Shown in table-1.

Sr. No.	Drugs Name	Parts	Quantity
1	Neem powder	leaves	09%
2	Hibiscus	flower	12%
3	Aloe-vera	leaves	07%
4	Shikakai Power	Pods	22%
5	Liquorice	Root	05%
6	Amla Power	Fruit	25%
7	Soap nut	Nut	20%

Table 1: showing ingredients its parts and quantity required

Formulation of the Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formula was done as per the formula given in Table 1. To the gelatin solution (10%), added the herbal extract and mixed by shaking continuously at the time interval of 20 min. 1 ml of lemon juice was also added with constant stirring. To improve aroma in the formulation, sufficient quantity of essential oil (rose oil) was added and made up the volume to 100 ml with gelatin.

Material required	Quantity	Medicinal use
Neem	0.5g	Antibacterial Agent
Soap nut extract	0.5g	Foaming Agent
Amla extract	0.5g	Antidandruff Agent
Shikakai	0.5g	Detergent
Hibiscus	0.5g	Conditioning Agent
Aloe-vera	01g	Moisturizing Agent

Table 2: Ingredient And Its Medicinal Use

1. NEEM

- Neem, (*Azadirachta indica*), also called nim or margosa, fast-growing tree of the mahogany family (*Meliaceae*), valued as a medicinal plant, as a source of organic pesticides, and for its timber. Neem is likely native to the Indian subcontinent and to dry areas throughout South Asia[17]. It has been introduced to parts

of Africa, the Caribbean, and numerous countries in South and Central America. The plant has long been used in Ayurvedic and folk medicine and is used in cosmetics and in organic farming applications.

- Neem trees can reach 15–30 metres (49–98 feet) in height and have attractive rounded crowns and thick furrowed bark. The compound leaves have toothed leaflets and are typically evergreen but do drop during periods of extreme drought. The small fragrant white flowers are bisexual or staminate (male) and are borne in clusters in the axils of the leaves.

2. SOAP NUT EXTRACT

- Soap nuts, or Indian soap berries, have become increasingly popular in recent years for a variety of reasons. They are an amazing natural detergent due to a natural cleaning essence that is contained in their shell[18].
- Although they have received a lot of love and attention in the last couple of years, soapnuts have been known and used for centuries: these soap berries have historically always been an integral element of Indian customs and used widely by many Indian households.
- They are the fruits of a small tree called SapindusMukorossi tree, native of the Himalayas and the mountainous region between India and Nepal. Also called soapberry nut husks, they are indeed the husk (shell) from soapberry nuts.
- Once picked and left to dry in the sun, these amazing shells contain a natural cleaning agent called saponin that produces an effect comparable to soap.

3. AMLA EXTRACT

Amla, also known as Indian Gooseberry, is an important therapeutic plant in Ayurveda, botanically known as PhyllanthusEmblica (EmblicaOfficinalis). The health benefits of Amla are attributed to its Rasayana (antioxidant), immunomodulatory (Rogpratirodhak), and anti-aging (Vayasthapana) properties. As per the ancient science, Amla pacifies the Pitta Dosha primarily, but it also calms the Kapha and VataDoshas[19]. As one of the three ingredients in Triphala, Amalaki is a potent rejuvenator that

nourishes the dhatus, or the body's tissues, and gently removes toxins from the body.

4. SHIKAKAI

Shikakai which means “fruit for hair” is a part of the traditional Indian Ayurvedic medicine. It is an herb especially used for controlling hair fall and dandruff.

Shikakai can be used alone or in combination with reetha and amla as a shampoo to help manage hair fall and prevent dandruff due to its cleansing and antifungal properties. It provides shine to the hair as well as prevents its greying. According to Ayurveda, applying Shikakai powder along with rose water or honey to wounds helps in faster healing due to its Ropan (healing) property and Sita (cold) nature.

Drinking Shikakai infusion helps manage constipation due to its Rechana (laxative) nature[20]. It is also beneficial for bleeding piles due to its Kashaya (astringent) property.

5. HIBISCUS

- Hibiscus is a genus of flowering plants in the mallow family, Malvaceae. The genus is quite large, comprising several hundred species that are native to warm temperate, subtropical and tropical regions throughout the world. Member species are renowned for their large, showy flowers and those species are commonly known simply as "hibiscus", or less widely known as rose mallow. Other names include hardy hibiscus, rose of sharon, and tropical hibiscus[21].
- The genus includes both annual and perennial herbaceous plants, as well as woody shrubs and small trees. The generic name is derived from the Greek name ἰβίσκος (ibískos) which Pedanius Dioscorides gave to Althaea officinalis.
- A tea made from hibiscus flowers is known by many names around the world and is served both hot and cold. The beverage is known for its red colour, tart flavour, and vitamin C content.

6. ALOEVERA

- Aloe is a cactus-like plant that grows in hot, dry climates. It is cultivated in subtropical

regions around the world, including the southern border areas of Texas, New Mexico, Arizona, and California.

- Historically, aloe has been used for skin conditions and was thought to improve baldness and promote wound healing.
- Aloe is used topically (applied to the skin) and orally. Topical use of aloe is promoted for acne, lichen planus (a very itchy rash on the skin or in the mouth), oral submucous fibrosis, burning mouth syndrome, burns, and radiation-induced skin toxicity[22]. Oral use of aloe is promoted for weight loss, diabetes, hepatitis, and inflammatory bowel disease (a group of conditions caused by gut inflammation that includes Crohn's disease and ulcerative colitis).

7. GELATIN

Gelatin or gelatine (from Latin: gelatus meaning "stiff" or "frozen") is a translucent, colorless, flavorless food ingredient, commonly derived from collagen taken from animal body parts. It is brittle when dry and rubbery when moist. It may also be referred to as hydrolyzed collagen, collagen hydrolysate, gelatinehydrolysate, hydrolyzed gelatine, and collagen peptides after it has undergone hydrolysis[23]. It is commonly used as a gelling agent in food, beverages, medications, drug or vitamin, capsules, photographic films, papers and cosmetics.

8. LEMON JUICE

- The lemon (*Citrus limon*) is a species of small evergreen trees in the flowering plant family Rutaceae, native to Asia, primarily Northeast India (Assam), Northern Myanmar or China.
- The tree's ellipsoidal yellow fruit is used for culinary and non-culinary purposes throughout the world, primarily for its juice, which has both culinary and cleaning uses. The pulp and rind are also used in cooking and baking. The juice of the lemon is about 5% to 6% citric acid, with a pH of around 2.2, giving it a sour taste. The distinctive sour taste of lemon juice makes it a key ingredient in drinks and foods such as lemonade and lemon meringue pie[24].

9. ROSE OIL

The distilled essence of organically grown *Rosa damascena* flowers in the Himalayan Mountains of India is a rare and precious aromatic treat. Currently only a few innovative farmers are engaged in growing and distilling *Rosa damascena* in several remote areas but the oil that they produce is of a remarkably lovely quality[25]. This precious essential rose oil, like *Rosa damascena* distilled in several other countries like Bulgaria, South Africa and Turkey, is a clear, transparent liquid when temperatures are warmer but as soon as cooler temperatures prevail becomes a solid or semi-solid waxy mass due to the presence of steroptenes floral waxes that come over in the process of distillation.

Benefit, Interaction and Side Effect of Herb

1. NEEM

BENEFITS

The leaf extract is used to reduce tooth plaque and to treat lice. Neem contains chemicals that might help reduce blood sugar levels, heal ulcers in the digestive tract, prevent pregnancy, kill bacteria, and prevent plaque from forming in the mouth.

INTERACTION

Medications for diabetes (Antidiabetes drugs) interacts with NEEM. Neem might lower blood sugar levels. Taking neem along with diabetes medications might cause blood sugar to drop too low. Monitor your blood sugar closely.

SIDE EFFECTS

These serious side effects include vomiting, diarrhea, drowsiness, blood disorders, seizures, loss of consciousness, coma, brain disorders, and death. Pregnancy and breast-feeding: Neem oil and neem bark are LIKELY UNSAFE when taken by mouth during pregnancy. They can cause a miscarriage.

2. SOAP NUT EXTRACT

BENEFITS

Antimicrobial and antifungal properties including activity against some yeasts associated with dandruff. Biodegradable thus kinder to the environment[26]. Soapnut is an effective and natural surfactant finding

use in toothpastes, facial cleansers, gentle shampoos, make-up removers and laundry detergent

INTERACTION

Cardanol, extracted from cashew nut shell liquid was used as a natural additive to NR in the form of cardanol-formaldehyde (Vu et al., 1999). The incorporation of cardanol formaldehyde significantly improved the tensile and thermal stabilities of NR along with the oxidative stability[27].

SIDE EFFECT

If in case, you develop any irritation or itching in the skin and hair after using reetha products immediately stop the usage and consult the physician. Be cautious and avoid direct contact with eyes as Reetha powder contain insecticidal properties and may irritate the eyes and cause swollen eyelids.

3. AMLA (EMBLICA OFFICINALIS)

BENEFITS

Emblica helps protect the skin from the damaging effects of free radicals, non-radicals and transition metal-induced oxidative stress. Emblica is suitable for use in anti-aging, sunscreen and general purpose skin care products[28].

INTERACTION

Indian gooseberry might increase the risk of bleeding or bruising in some people. If you have a bleeding disorder, use Indian gooseberry with caution

SIDE EFFECTS

Indian gooseberry seems likely safe for most people when consumed in amounts found in foods. Ayurveda formulations containing Indian gooseberry have been linked to liver damage. But, it's not clear if taking Indian gooseberry alone might have these effects[29].

4. SHIKAKAI

BENEFIT

Shikakai scientifically known as *Acacia concinna* is a shrub like tree grown in Central India. It has been used since centuries as cleanser for hair and body. Due to presence of saponins in its bark, it lathers moderately when shaken with water. It is rich in vitamin C and

also Vitamins A, D, E and K and other antioxidants which are very essential for healthy and quick growth of hair naturally. These vitamins help in providing necessary micro-nutrients to the hair follicle to nourish hair and grow fast and healthy.

INTERACTION

Shikakai, also known as Soap Pod in English, is a herb cherished especially for hair care in India. The herb is known to effectively treat hair growth issues and dandruff, and is a natural cleanser for hair. The saponin content in its fruits and bark acts as a great natural foaming agent.

SIDE EFFECT[30]

- Shikakai can cause asthma and respiratory problems if used excessively
- It can make the scalp oily if used regularly.
- Excessive shikakai consumption might cause nausea and even loose faeces.
- Consumption of these remaining seeds boiled in lukewarm water can be hazardous.
- Shikakai is also cause dry skin if used often.
- Shikakai is also known to produce bloating, which can leave a person feeling uneasy.
- Acidity is claimed to be caused by shikakai.

5. HIBISCUS

BENEFITS

The amino acids (Keratin) in Hibiscus make it an excellent conditioner. Hibiscus nourishes the hair follicles, soften the hair and make it more manageable[31]. To reap the nourishing benefits of Hibiscus for your hair, you can use conditioners that have Hibiscus as the key ingredient.

INTERACTION

Hibiscus tea may interfere with the effectiveness of some anti-malaria drugs. It can also interact with many other drugs including some for diabetes and high blood pressure.

SIDE EFFECT

Hibiscus may cause blood pressure to drop. It has also been linked to dermatitis, headache, nausea, and ringing in the ear.

6. ALOE-VERA

Aloe vera is a cactus-like plant in the lily family that has green, triangular leaves. Because of its moisturizing properties, it has many uses in the skin and hair care industries.

INTERACTION

The best form of aloe vera to use on your hair is the raw gel of the plant. You can buy this gel in almost any pharmacy or scoop it out of leaves cut fresh from a live plant if you have one. The gel is clear in color and slightly watery.

SIDE EFFECT

Aloe vera leaves contain latex, which comes from underneath the plant's skin. Many people are allergic to latex, which can cause stomach issues like irritation, stomach cramps and low potassium levels. Externally, latex could be safe, if applied appropriately. However, more research is required [31].

Preparation of Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on Liquid Formula

Take a bowl and add Shikakai, Soap nuts, Dried Amala. Soak in in 1.2 liters of water all over the night. In the morning, it becomes a black colour liquid. Put that liquid in a pressure cooker and let it go for three to four whistles. Remove the seeds from the soap nuts. Now we have prepare the extraction of leaves and Aloe Vera gel. For that take a pan and boil 250 ml of water. [32]Add Tulsi leaves, Neem leaves, Hibiscus leaves and Aloe Vera Gel. Boil it well and add this extraction with the Shikakai mixture. Blend this mixture very well. Strain the shampoo twice using a fine filter. Let it be cool and store it in a glass bottle.

Evaluation of Shampoo:

The formulated Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formulas containing olive leaves extract were evaluated for several physicochemical properties and the results are summarized.

A. Physical appearance: As it is clearly seen in table 4, all formulations showed good characteristics with respect to appearance and foaming.

Sr No.	Formulation	Visual Inspection
1	SAMPLE 1	Brick red, pleasant smell
2	SAMPLE 2	Brick red, pleasant smell
3	SAMPLE 3	Brick red, pleasant smell

TABLE 3:- The table showing in formation and visual inspection

B. pH: The pH balance of products is important as it affects skin and the surface on which they are used. The pH of our formulated shampoos fall within the ideal pH range for shampoo, i.e. 5- 7.

Sr. No.	Formulation	pH
1	SAMPLE F1	6.3
2	SAMPLE F2	6.2
3	SAMPLE F3	6.0

TABLE 4:-Table showing in formulation and pH

C. Percentage of solid contents: The percentage range of solid contents of well-prepared shampoos is 20-30% Low amount of solid will result in watery formulation which can be washed away quickly. However, if too many solids are present, it is difficult to wash out. The solid contents of the prepared formulas were in the range of 25.0 to 26.0%. Thus, they are considered easy to wash-out shampoos.

D. Foam ability and foam stability: One of the essential parameters in evaluating a shampoo is lathering or mostly described as foaming. The Formulation and Characterization of Herbal Shampoo for Anti- Dandruff based on liquid formula using olive leaves extract resulted in the formation of small-medium, dense and uniform type of foam. The foam volume remained unchanged during a 5-minute period which suggests that the produced foams have good stability.

E. Viscosity: Viscosity plays an important role in defining and controlling many attributes of the product such as shelf life stability, clarity, ease of flow, package removal, consistency and degree of

spreading upon application on hair. The flow characteristics of non-Newtonian materials are usually not measured with a single data point, because their viscosity is approximately measured as compared to those of the process being modeled.

- F. Stability study: Accelerated stability tests showed that pH of the shampoos was stable and suitable for hair application (F1= 5.6, F2= 6.7 and F3= 6.8). Viscosities were stable over the study period (50,000 mPa.s for sample 1, 30,000 mPa.s for Sample 2 and F3). Color and odor were stable with no observed significant changes for the three formulas. Samples were placed in opaque plastic bottles and stored in a chamber at temperatures 18-30°C. Stability studies a stable homogenous appearance during a 12 month storage period and no separation of phases occurred. The Oleuropein content was stable in formula 3 due to the presence of Benzophenone-4 in this formula, which acted as UV absorber. The Oleuropein content decreased with storage time in formula 2 due to its heat sensitivity. However, formula 1 did not give any result probably because of the presence of pearling agent, glycol stearate, which kept Oleuropein in suspension. In table 6, the degradation profile of Oleuropein incorporated into shampoo is shown. In addition, this table provides important data for the establishment of the shelf life of this product especially that of formula 3. As a rule of thumb, one month storage at 50°C is equivalent to 8 months stored at room temperature, whereas three month-storage at 37°C is equivalent to one year at room temperature. Consequently, the expiry date of formula 3 shampoo can be set to 3 years, and the consumer will still have a sufficiently active concentration of product efficacy.

Conclusion

This study aimed at preparing stable formulas shampoo rich with olive leaves extract that contains low surfactants to reduce the risk of chemicals. Results showed that all ingredients used to formulate the shampoo were found to be safe and the physicochemical evaluation showed ideal results. Stability studies showed a stable homogenous appearance during six months of storage at different temperatures (4-8°C, 40°C and at ambient

temperature). However, formula 3 (F3) gave optimum stability, especially the stability of olive leaves extract. Further research is required to improve its quality especially on the conditioning performance.

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