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FORMULATION, EVALUATION AND COMPARISON OF HERBAL SHAMPOO WITH THE COMMERCIAL SHAMPOO

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ABSTRACT

The study aimed to formulate a pure herbal shampoo and to evaluate and compare its physicochemical properties with the marketed synthetic and herbal shampoos. The herbal shampoo was formulated by adding the extracts of *Acacia concinna*, *Sapindus mukorossi*, *Phyllanthus emblica*, *Ziziphus spina-christi* and *Citrus aurantifolia* in different proportions to a 10% aqueous gelatin solution. Small amount of propyl paraben was added as a preservative and pH was adjusted with citric acid. Several tests such as visual inspection, pH, wetting time, % of solid contents, foam volume and stability, surface tension, detergency, dirt dispersion etc, were performed to determine the physicochemical properties of both prepared and marketed shampoos. The formulated herbal shampoo was also evaluated for conditioning performance by administering a blind test to 20 student volunteers. The formulated herbal shampoo was clear and appealing. It showed good cleansing and detergency, low surface tension, small bubble size and good foam stability after 5 min. The prepared shampoo and commercial shampoos showed comparable results for % solid contents also. The score of the conditioning performance of the tress washed with herbal shampoo was found to be 3.0 out of 4, while the score of the marketed synthetic and herbal shampoo was 3.4 and 3.3 respectively. The results indicated the formulated shampoo is having excellent conditioning performance, at par with commercially available shampoo. However, further research and development is required to improve it's quality and safety.

KEYWORDS: Shampoo Herbal Propyl paraben, Physicochemical properties.

INTRODUCTION

In our daily lives, shampoo is likely the most frequently used beauty product to clean our hair and scalp. In the same way that regular shampoo cleans the hair and scalp, herbal shampoo uses popular Ayurvedic herbs. They are employed to remove things like foil, bran, grime, and environmental contamination. It uses plant-based herbs as an alternative to commercially available synthetic shampoos. Because hair is one of the external barometers of a person's internal health, natural shampoo is crucial in a time when people prefer natural over chemical products to improve their appearance and general health. It is a crucial developmental stage of the human body made of ectoderm and guards the body's appendages that are connected to the sebaceous glands and sweat glands. Haircare products are tools that nourish hair, clean it, alter its texture, modify its color, and make it look healthy. Shampoo is defined as a hair washing beauty product that gathers sebum, scalp debris, and product residue from hair-grooming products. The current research project's goal is to create and take into consideration natural shampoos made with various plants. Removal of all hitherto combined artificial parts for multiple purposes. This shampoo removes oil, grime, and dandruff while strengthening, darkening, and promoting hair growth. It also functions as a conditioning agent. All of these tasks are completed by this all-natural shampoo powder without harming or altering the hair. Hair from people The weight of human hair is roughly 65– 95% protein, with the remaining 32% being water, lipid pigments, and numerous other substances. Chemically, a protein called keratin, which contains a lot of sulphur, makes up around 80% of human hair. Hair has strength, flexibility, durability, and performance thanks to keratin, a laminated complex generated with the aid of particular structures. The interaction of hair's many structural components— proteins being the most significant—leads directly to the physico-chemical composition and appearance of hair. Large hair follicles create "terminal" hair (scalp), little follicles produce outstanding "vellus" hair (body hair), and curvy hair is produced in all breeds by curved hair follicles. Many herbal crude drugs are used in shampoo formulation like moringa, aloe vera, shikakai, amla, reetha, sidr fruit, hibiscus, olive leaves, soap nut, bhringraj, senna, liquorice etc. These drugs are used in formulation by taking its aqueous or alcoholic extract with other natural or synthetic excipients. These formulations of shampoo with one or more herbs can be characterized by different methods like pH, percent of Solids, Foam formation: (Shake Test), Foam quality and retention, Surface tension, Skin irritation test, Visual stability, Viscosity, Dirt dispersion test, Visual assessment, Estimation of conditioning performance, Microbial control assessment, Microbial limits test, etc. 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.

PLANT PROFILE

***ALOE BARBADENIS MILLER* (ALOE VERA):** Aloe vera is a succulent plant species of the genus Aloe. Aloe has around 500 species and widely distributed, and is considered an invasive species in many world regions.

Figure 1: Aloe vera.

Scientific classification

Kingdom: Plantae

Clade: Tracheophytes

Clade: Angiosperms

Clade: Monocots

Order: Asparagales

Family: Asphodelaceae

Subfamily: Asphodeloideae

Genus: Aloe

Species: Aloe Vera barbadenisis miller

Phytochemicals: The phytochemical constituents of aloe vera include alkaloids, flavonoids, saponin, phenol, glycosides and tannins which shows anti bacterial activity.

Uses

- Strengthens
- Aloe vera contains proteolytic enzyme which repair dead skin cells on scalp.
- Promote hair growth
- Smooth natural curls
- Reduce frizziness

***HIBISCUS ROSA-SINENSIS* [HIBISCUS]**

The Hibiscus flowers are large and showy, and the genus grows into herbs, shrubs or small trees. There are more than hundred species found that are used throughout the world as food and medicine.

Figure 2: Hibiscus.

Scientific classification

Kingdom : plante

Clade : tracheophytes

Clade : anglosperms

Clade : eudicots

Clade : rosids

Order : malvales

Family : malvaceae

Sub family : malvoideae

Tribe : hibisceae

Genus : hibiscus

Phytochemicals: This plant is often used in the traditional medicine being rich in phytochemicals like polyphenols especially anthocyanins, polysaccharides and organic acids.

USES

Stimulate hair growth and lost hair volume

Condition hairs

Prevent baldness

Prevent premature greying.

INDIAN SOAP BERRY **[REETHA]**

Reetha is used to incite the development of the new hair follicles. It also prevents hair from sun damage and causes hair to become thicker and grow quicker. Reetha also helps you combat hair issues like hair fall, untimely graying of hair and dandruff.

Figure 3: Reetha.

Scientific classification

Kingdom : plantae

Family : sapindaceae

popular names : soap nut, soap berry, washnut.

Phytochemical constituents: The chemical components in reetha include saponins, genin, oleanolic acid, sopindic acid, sapindoside A & B which exhibits a host of health.

USES

- It is used in preparation of shampoo
- It is used as a foaming agent in the shampoo
- It Can be used as a cleanser for hair.
- It is also used for removing lice from hair.

PHYLLANTHUS EMBELICA **[AMLA]:** Amla juice is highly nutritious and has been linked to several impressive health benefits. In particular, studies suggest that it may improve kidney, liver, and heart health, enhance immune function and hair growth, and promote digestive health.

Scientific classification

Kingdom : plantae

Division : flowering plant

Class : magnoliopsida

Order : malpighiales

Family : phyllanthaceae

Tribe : phyllantheae

Sub tribe : fluegginae

Genus : phyllanthus

Species : phyllanthus emblic

Figure 4: Amla.

Phytochemical Constituents: The fruit of Amla is rich in vitamin C (ascorbic acid) and contains several bioactive phytochemicals, of which majority are of polyphenols (ellagic acid, chebulinic acid, gallic acid, chebulagic acid, apeigenin, quercetin, corilagin, leutolin, etc.)

Uses

- Strength the scalp and hair
- Reduce premature pigment loss from hair or greying .
- Stimulate hair growth
- Prevent or treat dandruff and scalp
- Prevent or treat fungal and bacterial hair and scalp infection
- Improve overall appearance of hair.

***ACACIA CONCINNA* [SHEEKAKAI]**

Senegalia rugata has been used traditionally for hair care in the Indian Subcontinent since ancient times. It is one of the Ayurvedic medicinal plants.

Figure 5: Sheekakai.

Scientific Classification

Kingdom : plantae

Family : fabaceae

Division : magnoleofaita

Class : magnoleofsida

Order : fabales

Phytochemical constituents

Lupeol, spinasterol, acacic acid, lactone, and the natural sugars glucose, arabinose and rhamnose. It also contains hexacosanol, spinasterone, oxalic acid, tartaric acid, citric acid, succinic acid, ascorbic acid, and the alkaloids calyctomine and nicotine.

USES

- Cleanses hair
- Add moreshine to the hair
- Prevent grays
- Provide nourishment to the hair
- Promote healthy and rapid hair growth

***AZADIRACTA INDICA* [NEEM]:** All parts of the neem tree- leaves, flowers, seeds, fruits, roots and bark have been used traditionally for the treatment of inflammation, infections, fever, skin diseases and dental disorders. The medicinal utilities have been described especially for neem leaf.

Figure 6: Neem.

Scientific Classification

Kingdom : plantae

Phylum : spermatophyta

Class : dicotyledonae

Order : sapindales

Family : meliaceae

Genus : azadiracta

Species : indica

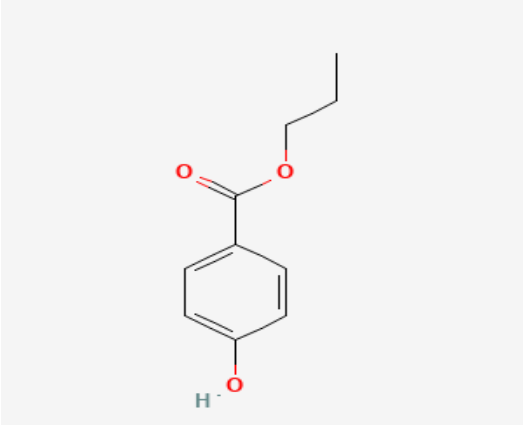
Phytochemical constituents: The most important active constituent is azadirachtin and the others are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.

Uses

- Treatment of inflammation
- Treat infections
- Treat fever, skin
- Treat dental disorders

EXCIPIENT PROFILE

Propyl Paraben



propyl 4-hydroxybenzoate

Brand / Generic Name: PARATEXIN P

Shampoo Synonyms: 4-Hydroxybenzoesaurepropylester, propyl paraben, propyl phydroxybenzoate, propyl parahydroxybenzoate Nipasol E216.

Chemical formula: C(10)H(12)O(3)

Category: Preservative

Molecular Weight: 180.02

Description: Propylparaben has antifungal and antimicrobial properties and is typically used in a variety of water-based cosmetics and personal-care products. It is also used as a food additive.

Uses

- Makeup
- Shaving products
- Hair care products
- Some Moisturizers
- Deodorants, antifungal, antimicrobial properties
- They’re also used in a number of processed foods and medications.

Mechanism of action

Interestingly, it is believed that the mechanism of action of methylparaben—like other parabens—is by interfering with cellular membrane transfer processes as well as by inhibition of the synthesis of DNA, RNA, and enzymes in bacterial cells.

Half life: 2.9 hours.

EXTRACTION

- **Extraction of Aloe Vera gel**: Mature, healthy and fresh Aloe barbadenisis miller (Aloe Vera) leaves were collected and Washed with distilled water. Then after proper drying of leaves in shade drying, the outer part of the leaf was dissected longitudinally Using a sterile knife. Then the aloe Vera gel that is the colorless Parenchymatous tissue was removed using the sterile knife. Then the filtrate or the filter product which is a clear aloe Vera gel Was used in the preparation.
- **Extraction of hibiscus:** Hot extraction. A total of 10 g of dried flower was soaked in 50 mL of hot water which was then boiled for 30 min and kept for 24 h undisturbed and then filtered through sterile filter paper, evaporated by using solvent distillation apparatus.
- **Extraction of amla:** The extract is traditionally produced by adding 5 times the volume of fresh amla juice to dried amla fruits. The mixture is left at room temperature until the liquid has evaporated. The procedure may be repeated a number of times, each time adding juice to the remaining and letting the liquid evaporate.
- **Extraction of sheekakai:** The extraction was done by soaking the reethasoapnuts and shikakai pods in 1ml methanol for 24 hours each and filtered to be used as a sample for analysis with GC-MS instrument.
- **Extraction of neem:** Neem leaves were collected and washed with distilled water and dried in Hot air oven. After proper drying, leaves were powdered. Then 5g Neem Leaves powder+50 ml dimethyl sulfoxide was taken in a volumetric flask And shaken for 3 d on REMI RSB-12 mechanical shaker. Then the Solution was heated on a water bath at 80-100℃ and concentrated up to 20 ml and then filtered using muslin cloth to remove impurities. Then the filtrate or filter product obtained, which is a clear solution or clear extract of Neem leaves, was used in the preparation.

FORMULATION

STEP 1; The plant extracts were mixed in different proportions to obtain a shampoo

STEP 2; Herbal extracts were added to 10% gelatin solution and were mixed by shaking for 20 min.

STEP 3; Lemon juice (1 ml) and Methyl paraben were also added with stirring.

STEP 4; Finally the pH of the solution was adjusted by adding sufficient quantity of 1% citric acid solution.

STEP 5; Few drops of rose essential oil were also added to impart aroma to the prepared shampoo and the final volume was made to 100 ml with gelatin solution.

Table no-1: Formulation.

S.NO	INGREDIENTS	F1	F2	F3	F4
1.	Neem	2g	1g	2.5g	1.5g
2.	Hibiscus	2g	2.5g	1g	1.5g
3.	Shikakai	2.5g	1g	2.5g	2g
4.	Amla	1.5g	2g	2.5g	1g
5.	Reetha	2.5g	2g	1.5g	1g
6.	Aloe vera	1.5ml	2ml	2.5ml	1ml
7.	Lemon juice	q.s	1ml	q.s	2ml
8.	Propyl paraben	q.s	q.s	q.s	q.s
9.	Gelatin	1g	1g	1g	1g
10.	Rose water oil	q.s	q.s	q.s	q.s
11.	Distilled water	q.s	q.s	q.s	q.s

RESULTS AND DISCUSSION

- **Physical appearance**: Dark brown in colour. It produces good foam and has a pleasant aroma from the fragrance in the ingredients.
- **pH:** The pH of our formulated shampoo was 7.0, falling within the ideal pH range for shampoo which is between 5 and 7.8.
- **Percentage of solid contents:** If the shampoo has too many solids it will be hard to work into the hair or too hard to wash out. The result of percent of solids contents was found to be 26.6% and it is suggestive that it can be washed out easily.
- **Dirt Dispersion:** Shampoo that because the ink to concentrate in the foam is considered poor quality, the dirt should stay in water. Dirt that stays in the foam will be difficult to rinse away. It will redeposit on the hair. Results indicate that no dirt would stay in the foam; so prepared formulations are satisfactory.
- **Cleaning Action**: As cleaning is the primary action of a shampoo powder, cleaning action was tested on wool yarn in grease. The results of detergency studies showed that the final formulation detergency ability was found to be 25%.
- **Foaming ability and foam stability**: Although foam generation has little to do with the cleansing ability of shampoos, it is of importance to the consumer. The final formulation produced stable foams there was little bit change in foam volume.
- **Stability Study**: Stability and acceptability of organoleptic properties (odour and colour) of formulations during the storage period indicated that they are chemically and physically stable. The formulated herbal shampoo is chemically and physically stable at standard room temperature of 2530°C.The results indicate that it possesses good stability within the 6 weeks of stability study.

Table No-2.

S. No.	Parameters	Observations
1	Colour	Dark Brown
2	pH 7.0	7.0
3	Percentage of solid contents	26.6%
4	Percentage cleaning action	25%
5	Foam ability	Foam volume 106 ml at 5 min
6	Dirt Dispersion	Moderate

Table.No.3: Comparision of Herbal Shampoo with Commericial Shampoo.

S.NO	HERBAL SHAMPOO	COMMERCIAL SHAMPOO
1	Provide the nutrients to the hair	Doesnot provide the nutrients to the hair
2	It has mild cleansing effect to remove the excess oil content from the hair.	It has more clensing effect
3.	Strengthen the hair follicles by essential oils and nourish all through roots and follicels	It will less strengthen the hair follicle
4	Formation of new and healthy hair roots	It damage the healthy hair
5	More effective	Less effective
6.	It contain natural plant extracts that help the hair and scalp in many forms without using the chemicals	it contains the synthetic ingredients that reduces the hair growth and effect the scalp
7.	Suitable for all skin types and also non allergic	It won't suitable for all skin types and it is allergic (in some shampoos)
8.	Sulfate free and toxin free	It contains SLS
9.	Thickens hair Irritates the scalp and skin	Irritates the scalp and skin

CONCLUSION

The purpose of this project was to create an all-herbal shampoo that could compete with commercially available synthetic shampoo. We created a herbal shampoo utilising plant extracts that are frequently used in folk medicine. The components in shampoo are all far safer than silicones and polyquaterniums, which are synthetic conditioning agents, and they can significantly lessen the loss of hair or protein during combing. We have employed Sheekakai, Amla, Hibiscus, and other plant extracts to give the conditioning effects rather than cationic conditioners. The physicochemical characteristics of both produced and commercially available shampoos were compared and evaluated by a number of experiments. For quality control tests, the performance of our produced shampoo was comparable to that of commercially available shampoo, but more research and development are needed to raise the product's overall quality.

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