

“Formulation and Evaluation of Lab Based Aloe Vera Gel and Curry Leaves Shampoos”

Sangram Madan Kachare¹, Prof. Nakhate. S², DR. L.D. Hingane³

^{1,2,3}Aditya Pharmacy College, Beed 431122

ABSTRACT

The aim of the present study was to formulate and evaluate herbal shampoo containing natural ingredients with an emphasis on safety and efficacy. It clears dirt, dandruff, promotes hair growth, lustre, strengthens and darkens the hair. The shampoo was prepared by taking the extracts of Pomegranate (active ingredient), Curry Leaves, Ginger, Aloe vera, and Reetha in different proportions. Several physicochemical tests were performed for visual assessment, wetting time, pH, assurance of solid contents, surface tension, detergency, dirt dispersion, conditioning performance, foam stability. The formulated herbal shampoo is black in color with demonstrable good froth stability, detergency, good cleansing, low surface tension, optimum pH and conditioning activity. Dirt dispersion of herbal shampoo is light along with 46 ml foam height. All these are the ideal characters for good quality of the herbal shampoo to be used in daily life. However, further scientific investigation is required for validation of its overall quality.

Keywords: Herbal shampoo, efficacy, pomegranate, stability, pH

INTRODUCTION

shampoos are probably the most widely used cosmetic products for cleansing hairs and scalp in our daily life [1]. A shampoo is basically a solution of a detergent containing suitable additives for other benefits such as hair-conditioning enhancement, lubrication, medication etc. Now-a-days many synthetic, herbal, medicated and non medicated shampoos are available in the market but popularity of herbal shampoo among consumers is on rise because of their belief that these products being of natural origin are safe and free from side effects[2].

Synthetic surfactants are added to shampoo primarily for the foaming and cleansing action but their regular use leads to dryness of hairs, hair loss, irritation to scalp and eyes [3]. Herbal formulations are considered as alternative to synthetic shampoo but formulating cosmetics using completely natural raw material is a difficult task [4]. There are large numbers of medicinal plants which are reported to have beneficial effects on hair and are commonly used in formulation of shampoo[5].

These plant products may be used in their powdered form, crude form, purified extracts, or derivative form [6]. It is extremely difficult to prepare a herbal shampoo using a single natural material that would be milder and safer than the synthetic ones, and at the same time would compete favorably with its foaming, detergency and solid content. We, therefore, considered to formulate a pure herbal shampoo using traditionally and commonly used plant materials for hair washing in India.

PLANT MATERIAL AND EXCIPIENT PROFILE:-

ALOE VERA

Aloe vera is also known as Aloe barbadensis Miller and it belongs to the Liliaceae family, it has about 360 species. It is a plant just like the cactus which grows easily in dry and hot climates, but because of its high demands it is cultivated all over in large quantities. This plant can be used for its properties and its uses in many fields like beauty, health, medicinal and skin care from ancient times. The Aloe vera name is derived from the Arabic word “Alloeh” means “shining bitter substance,” and “vera” in Latin means “true.” This plant has been used for various purposes in dermatology and also used in cosmetic products now a days.



Aloe vera (Sanskrit-Ghritakumari, Kumara) is a type of perennial succulent xerophyte, and it develops or contains water-storage tissue in the leaves so that they can live in dry areas of low or erratic rainfall. The plant has green lens-shaped leaves having a clear gel in a central mucilaginous pulp. Generally, this gel has been used for medicinal purposes. Aloe vera has long been used as a traditional medicine for inducing wound healing. When the green skin of a leaf is removed a clear gel appears that contains fibers, water and the ingredient to retain the water

in the leaf. Aloe vera gel contains 99.3% of water, and 0.7% is made up of solids which is having carbohydrates that constitutes for large components. Aloe gel and its juice are helpful to stimulate the body's immune system. Concentrated extracts of Aloe leaves are also used as a laxative and in the treatment of hemorrhoid. The use of plant

Cultivation of Aloe Vera

The Aloe vera is found throughout most of the tropics and warmer regions of the world, including the West-Indies and Bahamas, southern USA, Mexico, Central America, Arabia. It is mainly distributed in the dry regions of Europe, Africa, America and Asia. In India, mainly it is found in Andhra Pradesh, Rajasthan, Tamil Nadu, Maharashtra and Gujarat. Even in drought conditions, it is easily cultivated in almost every part of India. It is propagated with the help of suckers. It tolerates higher pH with high sodium and potassium salts and poor marginal soils. Hence its growth is faster on especially fertile heavier soils that are black cotton soil. An Aloe plant needs re-plantation after the age of 2 to 5 years and its commercial yield also finished in these years

Plant Description of Aloe Vera

Taste: Bitter

Odor: None

Size & Shape: Plant growing to 60-100cm in lance shaped with elongated.

Strands Color: Leaves are green to grey.

Flower: Yellow tubular in 25-35cm in slender loose stamens.

Root: Root fibbers that can reach 30-40 cm in length

Curry Leaves

Curry leaves biological name is *Murraya Koenigii*, which is also known as "Kari patta" or "Meethineem" in the local dialect. Curry Leaves belongs to Family Rutaceae (that mainly have approximately 150 genera and 1500 species. *Murraya Koenigii* is found to be native mainly to India and Sri Lanka. Additionally, it can be found in some other South Asian countries as well. It is a deciduous, small tree or a shrub which is aromatic in nature and grows up to a height of about 6-9m and up to an altitude of 1500m. It is an important ingredient in Indian food owing to its fragrance and aroma. This plant is now to be the richest source of carbazole alkaloids.



Murraya koenigii is a very well-liked leaf-spice which is used for their distinct aroma in very small quantities due to their ability to improve digestion and the presence of volatile oil. Curry leaves are widely used for flavoring foods in Asian cuisines. The leaves possess a slightly pungent, feebly acidic and bitter taste, and even after drying they retain their flavor and other qualities. Curry leaf is also used in various traditional cultures namely Unani prescriptions and Indian Ayurvedic.

Cultivation of Curry Leaves

Flowering starts from the middle of April and ends in the middle of May. The peak flowering season was observed to be the last week of April. The fruiting season was observed to continue from the middle of July to the end of August. Curry leaf is Native to India. Large shrub to small tree. They can grow in full sun or light shade. Seeds are fragile so should be handle with care.

Plant description of Curry Leaves

Taste: Bitter

Odor: Strongly Aromatic

Shape and Size: Small and long, slender, and oval in shape narrowing to a point, averaging 2-4 centimeters in length and 1-2 centimeters in width.

Color: Green and the main stem is dark green to brownish.

Flowers: White flower

Fruit: Fruits occur in close clusters, small ovoid, and glandular, thin pericarp enclosing one or two seeds which is having green color.

Stem: small trees having 14 to 42 cm in diameter and 7 meters in height .

Chemical Constituents of Aloe Vera

There are many chemical constituents derived from Aloe vera such as; Acidic galactan, Arabinans, Glucogalactomannan, Glucomannan, Polyuronide, Cellulose, 7-Hydroxyaloin, Aloeemodin, Aloesaponarin I&II, Aloin A and B (barbaloin), Anthranol, Beta barbaloin, Chrysophanol, Chrysophanol glucoside, Isobarbaloin, Capric acid, Hexadecadienoic acid, Palmitleic acid, Stearic acid, β -Carotene, Choline, Folic acid, Vitamin K, Vitamin D, Vitamin E, Arginine, Glutamic acid, Magnesium, Calcium, Zinc, Copper, Amylase, Catalase, Echitamine, Picrinine

Chemical Constituents of Curry Leaves

Curry Leaves contain proteins, carbohydrate, fiber, minerals, carotene, nicotinic acid, Vitamin C, Vitamin A, calcium and oxalic acid. It also contains crystalline glycosides, carbazole alkaloids, koenine, koenidine and koenimbine. Triterpenoid alkaloids cyclomahanimbine are also present in the leaves. Murrayastine, murrayaline, pyrayafolinecarbazole alkaloids and many other chemicals have been isolated from *Murraya koenigii* leaves. The phytoconstituents isolated so far from the leaves are alkaloids viz., mahanine, koenine, koenigine, koenidine, girinimbiol, girinimibine, koenimbine, O-methyl murrayamine A, Omethylmahanine, isomahanine, bismahanine, bispyrayafoline and other phytoconstituents such as coumarin glycoside viz., scopotin, murrayanine, calcium, iron, phosphorus, iron, thiamine, riboflavin, niacin, vitamin C, carotene and oxalic acid. The essential oil from leaves yielded di- alpha phellandrene, Dsabinene, D- pinene, dipentene, D- terpinol and

caryophyllene. Bark contains carbazole alkaloids like murrayacine, murrayazolidine, murrayazoline, mahanimbine, girinimbine, koenioline and xynthyletin. The pulp of fruits generally contain 64.9% moisture, 9.76% total sugar, 9.58% reducing sugar and negligible amount of tannin and acids, besides containing 13.35% Vitamin C [11]

SLS (sodium lauryl sulphate):-

Sodium laurylsulfate (SLS), an accepted contraction of sodium lauryl ether sulfate (SLES), is an anionic detergent and surfactant found in many personal care products (soaps, shampoos, toothpaste, etc.). SLES is an inexpensive and very effective foaming agent[12].

Soap Nuts (Reetha):-

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. Although they have received a lot of love and attention in the last couple of years, soap nuts 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 Sapindus Mukorossi 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[13].

Amla:-

Amla is nature's gift that is a powerhouse of Vitamin C. The phy to-nutrients, vitamins and minerals present in Amla stimulate hair growth and deep conditions the hair[14]. Treat hair loss effectively. This edible fruit is considered as a miracle cure for hair care. It stimulates hair growth and improves the quality of hair. It contains calcium, which promotes healthier hair. It helps strengthen hair follicles and reduces hair thinning. You can even include amla in your diet. Adding amla to your diet helps reduce oxidative stress and reduces free radicals. Vitamin C in amla increases the antioxidants in your body. Amla purifies the blood and enhances hair natural colour by preventing premature greying of hair. It has antifungal and antiviral properties, which prevent dandruff and other fungal infections and improve scalp health. However, if you are facing hair loss problems then you can use Indian gooseberry to prevent hair loss and improve your hair health. Amla can benefit hair in multiple ways, right from controlling hair fall to reducing dandruff this potent ingredient can be very effective for hair. Here are some home remedies for how amla prevents hair loss and improve your hair health[15].

Shikakai:-

Shikakai is rich with saponins, vitamins and antioxidants that make your hair shiny. Moreover, this natural cleanser lathers mildly and thus cleanses your scalp and hair gently while improving your hair's texture. Shikakai cleanses your scalp gently and induces sebum secretion which helps reverse the dryness of your scalp. Shikakai also helps reduce the itchiness and inflammation of your scalp, thus helping your scalp heal. Shikakai has antifungal properties that help get rid of dandruff for good. Shikakai is also rich in vitamins like C, A, E and K and other micronutrients that nourish your scalp and boost hair growth[16].

Gelatin:-

For strengthening hair, increase the protein content of shampoo with gelatin. Gelatin is a great way to instantly thicken hair. It coats each strand and gives hair volume after the first use. Pour one package of unflavored gelatin into your normal shampoo. Shake well and use as often as you wash hair. The gelatin in shampoo will add texture to thin hair[17].

Rose oil :-

One of the most common, and most beneficial essential oils available is rose oil. Rose extract and oil has a laundry list of positive properties and benefits that make it ideal for skin and hair care in addition to the fact that it smells heavenly. Rose oil is what is known as an emollient, meaning it has moisturizing properties and essential vitamins and nutrients that help it moisturize the skin and hair on contact. Because rose oil has the ability to provide nourishment and moisturize dry hair, it also increases the appearance of shiny, healthy hair[18].

Lemon Juice:-

Lemons also have bleaching properties, which is why they're often found in cleaning and skin care products. Lemon juice can be used to:

- Naturally lighten hair, especially lighter hair colors
- Create shinier hair
- Reduce oil and dandruff[19].

EXPERIMENT WORK:-

Table 1 - Formulation Table:-

SR.NO.	INGREDIENTS	QUANTITY
1	Aloe vera Extract	1.0 g
2	Curry leaves Extract	1.0 g
3	Soap nut Extract	0.5 g
4	Amla Extract	0.5 g
5	Shikakai Extract	0.5 g
6	Gelatin solution (10%)	Q.S.
7	SLS	Q.S.
8	Rose oil	Q.S.
9	Lemon juice	1ml

Herb used in Shampoo



FORMULATION :- (PROCEDURE)

Preparation of extract

About 100 g of each powdered plant materials, namely *Embilicaofficinalis* (Amla), *Acacia concinna* (Shikakai), *Sapindusmukorossi* (Soapberry), *Aloe Barbadensis* (Aloe vera), and *Murrayakoenigii* (curry leaf) 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.

Formulation of herbal shampoo

Formulation of the herbal shampoo 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 solution.

EVALUATION OF SHAMPOO :-

The shampoo formulations were physically evaluated by inspecting and measuring their colour, clarity, odor, spreadability, and pH at 25°C. Likewise, the qualities of the formulations were evaluated by analyzing their solid contents, foaming ability and stability.

DIFFERENT EVALUATING TESTS FOR HERBAL SHAMPOO

Visual assessment:-

The prepared formulation was assessed for color, clarity, odor, and froth content.

PH determination:-

The pH of the prepared herbal shampoo in distilled water (10% v/v) was evaluated by means of pH paper at room temperature

Determination of solid content percentage:-

The percentage of solid substance was determined by weighing about 4 g of shampoo in a dry, clean, and evaporating dish. To confirm the result, the procedure was repeated again. The liquid portion of the shampoo was evaporated in a dish by placing on hot plate. The percentage and the weight of the solid contents present in the shampoo were calculated after drying completely.

Foaming ability and foam stability:-

Cylinder shake method was 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 were recorded. The total volumes of the foam contents after 1 minute shaking. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

Dirt dispersion test:-

To 10 ml of refined water two drops of cleanser were included and taken in a wide-mouthed test tube. To the formulated shampoo, added one drop of Indian ink and shaken for 10 min after closing the test tube with a stopper. The volume of ink in the froth was measured and the result was graded in terms of none, slight, medium, or heavy.

Stability test:-

Stability and acceptability of organoleptic properties (odour and color) of formulations during the storage period of 2 months indicated that they are chemically and physically stable.

RESULT AND DISCUSSION

Herbal shampoo formulation

The shampoo was formulated by admixing all ingredients in proportion as given in Table 1. The above plant extract contains phytoconstituents like saponins 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. The gelatin solution (10%) behaves as a pseudo plastic forming clear solutions. Lemon juice (1 ml) added to the shampoo serves as anti-dandruff agent, natural antioxidant, and chelating agent and maintains the acidic pH in the formulation.

Evaluation of formulated shampoo

Visual assessment

The prepared shampoo showed good characteristics in terms of foaming effect and appearance on the visual inspection of the formulation. The results are shown in Table 2.

pH

The pH of the prepared solution of shampoo using distilled water (10%) was evaluated at 25°C temperature. For enhancing and improving the hair quality, pH of the shampoo is very important and also for stabilizing the scalp and minimizing irritation to the eyes. For minimizing the damage of hair using shampoo, one of the ways in the present trend is to develop shampoos having lower pH value. Lowering of pH (mild acidity) promotes tightening of the scales and prevents swelling, thereby producing sheen. The results are presented in Table 2.

Solid content

Shampoo with high solid content will be very difficult to rinse and hard to work with the hair. The prepared shampoo contains 23.25% of solid content. Thus, they considered easy to wash out when having less solid content during preparation of shampoos (Table 2).

Foaming ability and foaming stability

From the consumer point of view, foam stability is one of the important needs of a shampoo. Important parameter that was considered in the shampoo evaluation was determination of foaming stability. The foam volume produced by the formulated shampoo is above 50 ml. The prepared shampoo generates uniform, small sized, compact, denser, and stable foam. The foam volume remains same throughout the period of about 5 min showing that the generated foam by the shampoo has good stability and the prepared shampoo exhibits higher foam property which may be due to the presence of both shikakai and soapnut [20].

Dirt dispersion test

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

Table 2: Physicochemical study of the herbal shampoo

Evaluation test	Formulated shampoo
Color	Brown
Transparency	Clear
Odor	Good
pH of 10% solution	7
Solid contents (%)	23.25
Foam volume (ml)	25
Foam type	Dense

CONCLUSION

The present study was carried out with the aim of preparing the herbal shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as to strengthen the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally. To provide the effective conditioning effects, for hair growth promotion, and for nourishment of hair, the present formulation the use of curry leaves and aloe vera extract. For purpose of cleansing, effective conditioning effects, the present study involves the use of shikakai, amla, reetha plant extracts instead of synthetic cationic conditioners. The main purpose behind this investigation was to develop a stable and functionally effective shampoo by excluding all types of synthetic additives, which are normally incorporated in such formulations. To evaluate for good product performance of the prepared shampoo, many tests were performed. The results of the evaluation study of the developed shampoo revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality

REFERENCES

- [1]. M.K. Ishii. Objective and instrumental methods for evaluation of hair care product efficacy and substantiation of claims. Hair and hair care, Marcel Dekker, Inc, New York (1997), pp. 261-302
- [2]. A.R. Manikar, C.I. Jolly. Evaluation of commercial herbal shampoos. Int J Cosmet Sci, 22 (5) (2000), pp. 385-391
- [3]. A. Potluri, S.S.K. Asma, N. Rallapally, S. Durrivel, G.A. Harish. Review on herbs used in Anti-dandruff shampoo and its evaluation parameters. Indo Am J Pharm Res, 3 (4) (2013), pp. 3266-3278
- [4]. P.R. Shinde, A.U. Tatiya, S.J. Surana. Formulation development and evaluation of herbal antidandruff shampoo. Int J Res Cosmet Sci, 3 (2) (2013), pp. 25-33.
- [5]. P.U. Firthouse. Effects of *Ocimum sanctum* and *Azadiractaindica* on the formulation of antidandruff herbal shampoo powder. Der Pharm Lett, 1 (2) (2009), pp. 68-76
- [6]. A. Pooja, N. Arun, K. Maninder. Shampoos based on synthetic ingredients vis-à-vis shampoos based on herbal ingredients: a Review. Int J Pharm Sci Rev Res, 7 (1) (2011), pp. 41-46
- [7]. Benefits of herbal shampoo.(meesho.com)
- [8]. V.M. Chavan et al. Formulation and Evaluation of Herbal Shampoo. American Journal of Pharm Tech Research 2019.9(5)
- [9]. How to add aloe vera to shampoo for faster hair growth | the indian spot Available from <https://theindianspot.com>
- [10]. Priya D. Gaikwa , Kamini V. Mulay, Madhavee D. Borade. Formulation and Evaluation of Herbal Shampoo 9(3) (2020).p.p.29-31. DOI: 10.21275/ART20203315
- [11]. N. Sharma., N. Minocha and N. Kushwaha. A Review on The Activities of Aloe Vera And Curry Leaves. Int J Recent Sci Res. 11(11), (2020), pp. 39985-39991. DOI: <http://dx.doi.org/10.24327/ijrsr.2020.1111.5602>
- [12]. https://en.m.wikipedia.org/wiki/Sodium_laureth_sulfate
- [13]. <https://earthbits.com/blogs/earthbits/a-guide-to-soapnuts-what-are-soap-nuts-and-how-to-use-them>
- [14]. www.google.com about amla in shampoo.
- [15]. <https://www.indiatoday.in/information/story/how-to-use-amla-to-prevent-hair-loss-7-ways-to-improve-hair-health-1738840-2020-11-07>
- [16]. <https://www.bebeautiful.in/all-things-hair/everyday/8-reasons-why-shikakai-is-good-for-your-hair?amp>
- [17]. <https://www.onegoodthingbyjillee.com/beauty-uses-of-gelatin-powder/>
- [18]. <https://lusetabeauty.com/blogs/hairgoals-92/7-benefits-of-using-rose-oil-on-your-skin-and-hair>
- [19]. <https://www.healthline.com/health/lemon-for-hair>.
- [20]. Vijayalakshmi A, sangeetha S, ranjith N. Formulation and evaluation of herbal shampoo. Asianjournal of pharmaceutical and clinical research.11 (4) (2018), p.p.-121-124.