

FORMULATION AND EVALUATION OF HERBAL POWDERED SHAMPOO

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ABSTRACT: Hairs are the integral part of human beauty. People are using herbs for cleaning, beautifying and managing hair since the ancient era. As the time has passed synthetic agents have taken a large share but today people are getting aware of their harmful effects on hairs, skin and eyes. These regions attracted to community towards the herbal products, which are less expensive and have negligible side effects. Hair cleansers or shampoos are used not only for cleansing purpose but also for imparting gloss to hair and to maintain their manageability and oiliness for hair. Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. As far as herbal shampoos are concerned in stability criteria. Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic or antidandruff shampoo and nutritional shampoo containing vitamin, aminoacids proteins hydrolysate. The preparations were formulated using bahera, amla, neem, tulsi, shikakai, henna & brahmi at different ratio. Ash value is calculated to determine the inorganic contents which are characteristic for an herb. Particle size Angle of repose Bulk density 25-20 micrometer 20.550 5/g/cc of powdered shampoo. Average % foaming capacity, total Ash, acid insoluble, Moisture Content, pH value 151.8, 4.45 % w/w, 2.35%, 2.00 % w/w, 6.5 was found respectively. Cleaning percentage, surface tension, detergency, viscosity, foaming ability and foaming solubility was found to be 24.21, 32.15dyne/cm, 64.23%, 94607.84 cps, 170 ml respectively.

Keywords : Foam boosters, Foam boosters, Conditioning agents, Cleaning percentage, surface tension, detergency, viscosity, foaming ability and foaming solubility

MANUSCRIPT

Selected herbal drugs in dried form were purchased from the authenticated agencies. Herbs along with their part used, their use in shampoo and quantity taken are tabulated in table 1. four shampoos were prepared by the uniformly powdering and mixing in ascending order by weight with continuous trituration 5, 6. Six batches of each formulations were prepared labeled and kept in closed container for further studies.

SI NO.	Constituents	F1	F2	F3
1	Amla	25	30	20
2	Neem	30	25	30
3	Tulsi	2	1	2
4	Shikakai	10	10	15
5	Behera	20	15	20
6	Henna	12	17	12
7	Brahmi	1	2	1

TABLE.1- formulation of herbal shampoo

AMLA

Phyllanthusemblica, also known as emblic, emblicmyrobalan, myrobalan, Indian gooseberry, Malacca tree, or amla from Sanskrit amalaki is a deciduous tree of the family Phyllanthaceae. It is known for its edible fruit of the same name. The tree is considered sacred by Hindus as a deity, Vishnu, is believed to dwell in it.

Traditional medicine

In traditional Indian medicine, dried and fresh fruits of the plant are used. All parts of the plant are used in various Ayurvedic/Unani medicine (*Jawarishamla*) herbal preparations, including the fruit, seed, leaves, root, bark and flowers. According to Ayurveda, amla fruit is sour (*amla*) and astringent (*kashaya*) in taste (*rasa*), with sweet (*madhura*), bitter (*tikta*) and pungent (*katu*) secondary tastes (*anurasas*). Its qualities (*gunas*) are light (*laghu*) and dry (*ruksha*), the postdigestive effect (*vipaka*) is sweet (*madhura*) and its energy (*virya*) is cooling (*shita*). In Ayurvedic polyherbal formulations, Indian gooseberry is a common constituent, and most notably is the primary ingredient in an ancient herbal *rasayana* called *Chyawanprash*. This formula, which contains 43 herbal ingredients as well as clarified butter, sesame oil, sugar cane juice, and honey, was first mentioned in the CharakaSamhita as a premier rejuvenative compound. Popularly used in inks, shampoos and hair oils, the high tannin content of Indian gooseberry fruit serves as a mordant for fixing dyes in fabrics. Amla shampoos and hair oil are traditionally believed to nourish the hair and scalp and prevent premature grey hair.

Chemical constituents

Although these fruits are reputed to contain high amounts of ascorbic acid (vitamin C), up to 445 mg per 100 g, the specific contents are disputed, and the overall bitterness of amla may derive instead from its high density of ellagitannins, such as emblicanin A (37%), emblicanin B (33%), punigluconin (12%) and pedunculagin (14%). It also contains punicafofin and phyllanemblin A, phyllanemblin other polyphenols, such as flavonoids, kaempferol, ellagic acid, and gallic acid.

NEEM

Azadirachtaindica, commonly known as **neem**, **nimtree** or **Indian lilac**, is a tree in the mahogany family Meliaceae. It is one of two species in the genus *Azadirachta*, and is native to the Indian subcontinent, i.e. India, Nepal, Pakistan, Bangladesh, Sri Lanka, and Maldives. It is typically grown in tropical and semi-tropical regions. Neem trees also grow in islands located in the southern part of Iran. Its fruits and seeds are the source of neem oil. Neem leaves are dried in India and placed in cupboards to prevent insects eating the clothes, and also in tins where rice is stored. Neem leaves are dried and burnt in the tropical regions to keep away mosquitoes. These flowers are also used in many Indian festivals like Ugadi.

Traditional medicinal use

Products made from neem trees have been used in India for over two millennia for their medicinal properties. Neem products are believed by Siddha and Ayurvedic practitioners to be Anthelmintic, antifungal, antidiabetic, antibacterial, antiviral, contraceptive, and sedative. It is considered a major component in siddha medicine and Ayurvedic and Unani medicine and is particularly prescribed for skin diseases. Neem oil is also used for healthy hair, to improve liver function, detoxify the blood, and balance blood sugar levels. Neem leaves have also been used to treat skin diseases like eczema, psoriasis, etc.

TULSI

Ocimum tenuiflorum (synonym *Ocimum sanctum*), commonly known as **holy basil**, **tulasi** (sometimes spelled **thulasi**) or **tulsi**, is an aromatic perennial plant in the family Lamiaceae. It is native to the Indian subcontinent and widespread as a cultivated plant throughout the Southeast Asian tropics.

Tulasi is cultivated for religious and supposed traditional medicine purposes, and for its essential oil. It is widely used as a herbal tea, commonly used in Ayurveda, and has a place within the Vaishnava tradition of Hinduism, in which devotees perform worship involving holy basil plants or leaves.

Chemical composition

Some of the phytochemical constituents of *tulsi* are oleanolic acid, ursolic acid, rosmarinic acid, eugenol, carvacrol, linalool, β -caryophyllene (about 8%). Tulsi essential oil consists mostly of eugenol (~70%) β -elemene (~11.0%), β -caryophyllene (~8%) and germacrene (~2%), with the balance being made up of various trace compounds, mostly terpenes.

Shikakai

Acacia concinna has been used traditionally for hair care in the Indian Subcontinent since ancient times. It is one of the Ayurvedic medicinal plants. It is traditionally used as a shampoo. In order to prepare it the fruit pods, leaves and bark of the plant are dried, ground into a powder, then made into a paste. While this traditional shampoo does not produce the normal amount of lather that a sulfate-containing shampoo would, it is considered a good cleanser. It is mild, having a naturally low pH, and doesn't strip hair of natural oils. Usually no conditioner is needed, for shikakai also acts as a detangler. An infusion of the leaves has been used in anti-dandruff preparations. *A. concinna* extracts are used in natural shampoos or hair powders and the tree is now grown commercially in India and Far East Asia. The plant parts used for the dry powder or the extract are the bark, leaves or pods. The bark contains high levels of saponins, which are foaming agents found in several other plant species used as shampoos or soaps. Saponin-containing plants have a long history of use as mild cleaning agents. Saponins from the plant's pods have been traditionally used as a detergent, and in Bengal for poisoning fish; they are documented to be potent marine toxins.

Henna

(Arabic: حِنَّاء) is a dye prepared from the plant *Lawsoniainermis*, also known as **hina**, the **henna tree**, the **mignonette tree**, and the **Egyptian privet**, the sole species of the *Lawsonia* genus.

Henna can also refer to the temporary body art (staining) based on those dyes (see also mehndi). Henna has been used since antiquity to dye skin, hair and fingernails, as well as fabrics including silk, wool and leather. Historically, henna was used in the Arabian Peninsula, Indian Subcontinent, parts of Southeast Asia, Carthage, other parts of North Africa and the Horn of Africa. The name is used in other skin and hair dyes, such as *black henna* and *neutral henna*, neither of which is derived from the henna plant.

Bramhi

Bacopamonnieri (waterhyssop, brahmi, thyme-leafed gratiola, water hyssop, herb of grace, Indian pennywort) is a perennial, creeping herb native to the wetlands of southern and Eastern India, Australia, Europe, Africa, Asia, and North and South America. Bacopa is a medicinal herb used in Ayurveda, where it is also known as "Brahmi", after Brahmā, the creator God of the Hindu pantheon.

It is a non-aromatic herb. The leaves of this plant are succulent, oblong and 4–6 mm (0.16–0.24 in) thick. Leaves are oblanceolate and are arranged oppositely (opposite decussate) on the stem. The flowers are small, actinomorphic and white, with four to five petals. Its ability to grow in water makes it a popular aquarium plant. It can even grow in slightly brackish conditions. Propagation is often achieved through cuttings.

Why You Should Use Natural Shampoo

Natural and eco-friendly products are becoming increasingly popular amongst the health and environmentally conscious shoppers of today. This new age craze also extends itself to hair care, the never-ending struggle of maintaining healthy hair has posed to be a problem and constant battle among many people today. They are starting to realise that this is potentially the result of continuous exposure of harmful chemicals to the hair. With people becoming more aware of how natural products can positively affect our lives they are making the switch and opting for safer and healthier options.

Natural shampoos contain beneficial natural plant and herb extracts which provide a number of positive results for the hair and scalp. You can enjoy these natural benefits and maintain healthy hair without having to put your body at risk by exposing it to harmful chemicals. Benefits of using natural shampoos are outlined as follows:

- Promotes new hair growth by naturally stimulating the hair follicles
 - Infuses natural oils, minerals, and herbal extracts into hair follicles to maintain moisture and improving the overall condition
 - Because it contains all natural ingredients it is a non-allergenic product which makes it suitable for all skin types including sensitive and allergy prone skin
 - Natural shampoos feature a more natural and mild aroma
 - Natural shampoos are environmentally friendly as they contain bio-degradable materials rather than harsh chemicals
- A general rule of thumb for choosing natural shampoos is to make sure the label does not contain more than 9 ingredients; products with more are most likely to contain harmful synthetic ingredients. Some natural products state they are organic however this is not always the case. Try looking for the following natural ingredients:
- Coconut oil and aloe Vera have been proven to stimulate the growth of hair by keeping the scalp moisturized
 - Organic Shea butter enhances the natural shine and colour of hair
 - Beta glucan contains immune-enhancing qualities which help to soothe irritated skin cells
 - Organic tea tree oil contains antiseptic properties which help to maintain the health of the scalp by preventing skin irritations

Regular shampoo can wreak havoc on not only our hair but also our bodies. Because it contains harmful and synthetic chemicals that are absorbed through the skins pores we are putting ourselves at risk by directly applying carcinogenic chemicals into the scalp. By doing this on a regular basis we are basically inviting these dangerous ingredients in to damage our system and potentially putting ourselves at risk of cancer and disease. Ingredients typically contained in regular shampoos have been proven to reduce the size of hair follicles, irritate and disrupt oil glands, dry out the scalp, which ultimately can result in hair loss.

The herbs used in the preparati on of herbal shampoo powder

Sl. No.	Constituents	Biological source	Use
1	Amla fruit	Dried ripe fruits of <i>E. officinalis</i>	Hair darkening Hair growth promoter
2	Neem	Dried leaves of <i>A. indica</i>	Anti-dandruff agent Anti-bacterial agent
3	Shikakai fruit	Dried pods of <i>A. concinna</i>	Foaming agent Anti-dandruff agent
4	Tulsi	Dried leaves of <i>O. sanctum</i>	Anti-dandruff agent
5	Bahera	Dried fruits of <i>T. bellirica</i>	Hair darkening Hair growth promoter
6	Brahmi	Dried leaves of <i>C. asiatica</i>	Support Health of Hair
7	Henna	Dried leaves of <i>L.inermis</i>	Hair conditioner

S.No	Constituents	F1	F2	F3
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2	Amla	30	20	15
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MATERIALS AND METHODS PREPARATION-

Selected herbal drugs in dried form were purchased from the authenticated agencies. Herbs along with their part used, their use in shampoo and quantity taken are tabulated in table 1. four shampoos were prepared by the uniformly powdering and mixing in ascending order by weight with continuous trituration 5, 6. Six batches of each formulations were prepared labeled and kept in closed container for further studies.

EVALUATION

Prepared formulations of shampoos were subjected to following evaluation parameters.

Organoleptic evaluation 7, 8. organoleptic evaluation on the parameters like colour, odour taste and texture was carried out. Colour and texture was evaluated by vision and touch sensation respectively. For taste and odour evaluation a team of five taste and odour sensitive persons was formed and random sampling was performed.

(II) General powder characteristics, 9, 10: General powder characteristics includes evaluation of those parameters which are going to affect the external properties (like flow properties, appearance, packaging criteria etc.) of the preparation, Characteristics evaluated under this section are powder form, particle size angle of repose and bulk density. Sample for all these evaluation were taken at three different level i.e. from top, middle and lower level. Particle size is a parameter, which could affect various properties like spreadability, grittiness etc., particle size was determined by sieving method by using I.P. Standard sieves by mechanical shaking for 10 Min. Angle of repose affects the flow properties of a powder. It was determined by glass funnel method. A distance of 6.5 cm is maintained between the graph paper and the bottom of a powder. It was determined by glass funnel. Flowing is continued till the top of the heap touches the bottom of funnel¹¹. Bulk density is an important property for the packaging of product. Bulk density depends on particle size, particle size distribution and cohesiveness of particle. For measuring bulk density a weighted amount of powder was introduced in 100ml graduated cylinder. The cylinder is fixed on bulk density apparatus and bulk density was calculated.

(III) Physical Evaluation 12, 13: Physical evaluation includes determination of extractive values, Ash value, moisture content and ph. Extractive values were calculated for solvents, like petroleum ether, acetone, benzene, chloroform and methanol. 5Gm of powder shampoo was macerated with different solvents and kept for 24hr, filtered and solvent was evaporated dried extracts were weighted to calculate extractive value % w/w. Ash value is calculated to determine the inorganic contents which is characteristic for a herb. About 2 Gm of powder drug was taken in silicon dish previously ignited and weighed. Temperature was increased by gradually increasing the heat not exceeding to red colour. After complete burning, ash is cooled and weighed. Acid insoluble ash was calculated by boiling above obtained ash with 25ml dil. HCl for 5min, insoluble matter was collected in gouch crucible, washed with hot water, ignited and weighed. Moisture content in the formulation is very important as it contains herbs which are liable to be attacked by weather. 2gm of powder was taken and kept in an oven and dried up to two constant reading and % moisture content was calculates as w/w. ph affect the pharmaceutical consideration as well as it affect the effect of shampoo on hairs. 1 Gm of powder shampoo was taken and 9ml of distilled water was added to it. pH of the resulting solution was calculated using pH meter at 37o C. Foaming Capacity- Foaming capacity of the test herbal powder shampoos were calculated using foam stability test with 2 grams of powder with 50 ml water in a graduated cylinder for different time interval.

Evaluation of herbal shampoo powder

Particle size

The particle size of herbal shampoo powder was determined by using microscopic method. Place the stage micrometer on the stage of the microscope and initially focus on lower power by positioning the object to the centre of the object. Focus the object, measure the size of each particle in terms of eyepiece division. Select two points one on left side other on right side. Calculation can be done by using calibration factor:

Calibration Factor= number of stage division/ Number of eyepiece division ×10

Angle of repose

A glass funnel was held in place with a clamp on ring support over a glass plate. The glass plate was placed on a micro lab jack. Approximately, 10 g of the powder was transferred into the funnel keeping the orifice of funnel blocked by the thumb. As the thumb was removed, the lab jack was adjusted so as to lower the plate and maintain about 2 cm gap between the bottom of the funnel stem and the top of the powder pile. When the powder was emptied from the funnel, the angle of the heap to the horizontal plane was measured with a protractor. The height and radius were measured using a ruler. The angle of repose was thus estimated by the following formula. It is expressed in g/cm³.

$$\Theta = \tan^{-1} (h/r)$$

Where,

h= Height of the pile formed.

r = the radius of the base of pile.

Bulk density

The bulk density of a powder is the ratio of the mass of an untapped powder sample and its volume, including the contribution of inter particulate void volume. Hence, the bulk density depends on both the density of powder particles and the spatial arrangement of particles in the powdered. The bulk density is expressed in g/cm³. A volume of 100 ml graduated cylinder was taken and required amount of herbal shampoo powders was added to the graduated cylinder. This was transferred to bulk density apparatus and bulk density was calculated. It is an important property for packaging and uniformity in the bulk of the product.

Bulk density=Mass of powder/Bulk volume of the powder

Physicochemical evaluation

Ash value

This value is used to determine quality and purity of herbal shampoo powder and to establish the identity of it.

Determination of total ash

A flat, thin, porcelain dish or a tarred silica crucible was weighed and ignited. About 2 g of herbal shampoo powder formulation were weighed and taken into a dish. Support the dish on a pipe-clay triangle placed on a ring of retort stand. Heat the dish about 7 cm above the flame, with the help of a burner, using a flame of about 2 cm high, heat till vapors almost cease to be evolved, then lower the dish and heat more strongly until all the carbon is burnt off. Cool in a dessicator. Weigh the ash and calculate the percentage of total ash with reference to the air dried shampoo powders.

Total ash value of the sample= $100(z-x)/y\%$

Moisture content determination

10 g of herbal shampoo powder formulations was placed in a tarred evaporating dish and kept in hot air oven for 105°C. The weight loss was observed at an interval of 15 minutes until constant weight was obtained.

pH

A pH meter is an electronic device used for measuring the pH of a liquid. A typical pH meter consists of a special measuring probe connected to an electronic meter that measures and displays the pH reading [11].

1 g each of herbal shampoo powder formulations was taken and dissolved in 10 ml of water. Their pH was checked with the help of pH meter.

Cleaning action

5 g of wool yarn/cotton ball was taken and placed in grease; the same was then placed in a 200 ml of water containing 1 g of each herbal shampoo powder formulations in a flask and was shaken for 4 minutes. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated using the formula [12]:

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

Foaming capacity

2 g of each herbal shampoo powder formulations were taken in a 250 ml graduated cylinder, 50 ml of water was added and shaken for 5-10 times. The foaming capacities of all the formulations after 1 minute shaking and % foaming capacities of all the five formulations for a time period of 60 minutes were performed [13].

Dirt dispersion

Two drops of each 1% herbal shampoo powder formulations were added in a large test tube containing 10 ml of distilled water. A drop of Indian ink was added; the test tubes were stoppered and shaken. The amount of ink in the foam was estimated as none, moderate, or heavy [14].

Wetting time

A canvas was taken and cut into 1 inch diameter discs. The discs were floated on the surface of each formulations of 1% herbal shampoo powder solution and time was noted. The time required for the disc to begin to sink was measured accurately and noted as wetting time [15].

Nature of hair after wash

Nature of hair after wash was done by applying a small quantity of herbal shampoo powder formulations on hair and then washed [16].

RESULTS AND DISCUSSION

TIME (minutes)	F1	F2	F3
0	187.5	282.3	175.2
5	160.0	210.5	159.3
30	140.0	189.5	138.5
60	120.0	192.2	120.5
Average foaming capacity	151.8	218.6	148.3

TABLE 2: % Fomaing capacity

The preparations were formulated using bahera, amla, neem, tulsi, shikakai, henna & brahmi (F2). Ash value is calculated to determine the inorganic contents which are characteristic for an herb. Particle size Angle of repose Bulk density 25-20 micrometer 20.550 5/g/cc of powdered shampoo. Average % foaming capacity, total Ash, acid insoluble, Moisture Content, pH value 151.8, 4.45 % w/w, 2.35%, 2.00 % w/w, 6.5 was found respectively. Cleaning percentage, surface tension, detergency, viscosity, foaming ability and foaming solubility was found to be 24.21, 32.15dyne/cm, 64.23%, 94607.84 cps, 170 ml respectively.

CONCLUSION

Depending upon the nature of the ingredients they may be simple or plain shampoo, antiseptic or antidandruff shampoo and nutritional shampoo containing vitamin, aminoacids proteins hydrolysate. The preparations were formulated using bahera, amla, neem, tulsi, shikakai, henna & brahmi at different ratio. but today people are getting aware of their harmful effects on hairs, skin and eyes. These regions attracted to community towards the herbal products, which are less expensive and have negligible side effects. The formulated shampoos were not only safer

than the chemical conditioning agents, but also greatly reduce the protein loss during combing. The pH of the shampoos was adjusted to 5.5, to retain the acidic mantle of scalp.

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