FORMULATION AND EVALUATION OF POLYHERBAL POWDER SHAMPOO WITH ITS MORE POTENT ANTIDANDRUFF ACTIVITY

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ABSTRACT

Day by day dependency of people is rising on herbal or ayurvedic formulation not only for chronic ailments but also for number of acute problems. The assurance of therapy with minimal side effects has been proven that ayurvedic formulation is to be promising for cosmetic use too. In the scenario of changing food habits, stress level and dependent environment conditions, number of skin and hair disorders are encountered. Maintenance of other factor shall not fulfill the need so extraneous treatment is essential that to which is safe. Hair-care products may be defined as the preparations which are used for cleansing hair and scalp, modifying the texture and giving the healthy look to the hair. There are various types of hair: normal hair, oily hair, dry hair, varies from one human to other human. The problems of hairs includes hair falling, white hair, dandruff, and split end hair etc.

Keywords : Hair, Dandruff, Powder Shampoo, Herbal material, Curry leaves, Antidandruff shampoo.

1. INTRODUCTION

The term Cosmetic is derived from the Greek word Kosmetics which means cosmesis or beautifying substance. Cosmetics are substances used to enhance the appearance of the human body. Cosmetics include skin-care creams, lotions, powders, perfumes, lipsticks, fingernail and toe nail polish, eye and facial makeup, permanent waves, coloured contact lenses, hair colours, hair sprays, and gels, deodorants, baby products, bath oils, bubble baths, bath salts, kinds of butter and many other types of products are in great demand in both developing and developed countries. Herbal cosmetics have a growing demand in the world market.
and are an invaluable gift of nature. There is a wide range of herbal cosmetics products to satisfy your beauty regime, adding herbal cosmetics is very safe for skin and hair. Human beings have been using herbs for different purposes like food, medicine, and beautifying with the advancement of science & technology use of natural things.

Hairs are the integral part of human beauty. People are using herbs for cleaning, beautifying and managing hair since the ancient era the specialization of branded shampoo products for the hair and scalp, offered in multiplicity of types and forms. Now, washing the hair and scalp with shampoo has become a nearly universal practice. Shampoos are probably the most widely used hair products today, based on synthetic ingredients as well as herbal ingredients. Shampoos are of various types, like powder shampoo, clear liquid shampoo liquid shampoo, lotion shampoo, solid gel shampoo, medicated shampoo, liquid herbal shampoo etc. Dandruff is known to be controlled by fungi static ingredients in anti-dandruff shampoos. Herbal formulation have growing demand in the world market. The natural remedies are more acceptable in market because it’s safe and fewer side effect antidandruff shampoo and nutritional shampoo containing vitamin, amino acids proteins hydrolysate. Currently available treatment of dandruff include therapeutic use of zinc pyrithione, salicylic acid, imidazole derivatives, glycolic acid, steroids, and sulphur and coal tar derivatives. However, these agents show certain limitations, either due to poor clinical efficacy or due to the furthermore compliance issues, these drugs are unable to prevent recurrence. The synthetic shampoo contains cationic, anionic and non-anionic surfactant mix in this surfactant having good foaming character but its toxic and caused irritation of eye. So, these synthetic shampoos are found to have side effects like drying effect on the hair. These shampoos leave the hair too dry to handle or comb, to avoid these problems, herbal shampoos will be useful.

1.1 Structure of Hair:

A hair is composed of columns of dead, keratinized cells welded together. The shaft is a superficial portion of the hair, which projects from the surface of the skin. The shaft of straight hair is rounded in cross section, that of wavy hair is oval and that of wooly hair is elliptical or kidney shaped. The root is the portion of the hair deep into the surface that penetrates into the dermis and sometimes into the subcutaneous layer. The shaft and root both consist of three concentric layers.

**Medulla:** It is the central part of the shaft and is generally noticeable in thick hair. It is composed of two or three rows of polyhedral cells containing pigment granules and air spaces.

**Cortex:** It is located peripheral to the medulla and forms the major part of the shaft. It consists of elongated cells, containing pigment granules in dark hair while air in white hair.

**Cuticle:** It is the outermost layer of the hair and consists of a single layer of thin, flat cells, which are heavily keratinized.
1.2 Dandruff:
The relationship between dandruff and seborrhea dermatitis has at times been controversial. While most investigators regard seborrhea dermatitis of the scalp as severe dandruff, others believe that dandruff should be used to describe any flaking of the scalp. A normal scalp has few flakes and healthy looking, smooth skin. Dandruff is a clinical condition caused by Malassezia (Pityrosporum) species and is of great cosmetic concern all over the world. Pityrosporum ovale is strongly suspected to play a role in the manifestation of the seborrhea dermatitis. Dandruff is known to be controlled by fungistatic ingredients in anti-dandruff shampoos. Herbal formulation have growing demand in the world market. The natural remedies are more acceptable in market because it’s safe and fewer side effect. Antidandruff shampoo and nutritional shampoo containing vitamin, amino acids proteins hydrolysate.

A shampoo is a preparation of a surfactant i.e. surface active material in a suitable form like liquid, solid or powder, which when used under the specified conditions will remove surface grease, dirt, and skin debris from the hair shaft and scalp without adversely affecting the user.

1.3 Herbal Shampoo:

“Herbal shampoos are the cosmetic preparations that with the use of traditional ayurvedic herbs are meant for cleansing the hair and scalp just like the regular shampoo.” They are used for removal of oils, dandruff, dirt, environmental pollutions etc.

Ideal Characteristics of Shampoo:

- Should effectively and completely remove the dust, excessive sebum.
- Should effectively wash hair.
- The shampoo should be easily removed by rinsing with water.
- Should impart a pleasant fragrance to the hair.
- Should not have any side effects or cause irritation to skin or eye.
- To make the hair smooth and shiny.
- Produce good amount of foam.
- Should not cause irritation to scalp, skin and eye.
- Should completely, effectively remove dirt.
- Impart pleasant fragrance to hair.
- Good biodegradability.
- Low toxicity.
- Slightly acidic (pH less than 7) since a basic environment weakens the hair by breaking the disulphide bonds in hair keratin.
Shampoos are of the following types:

1. Powder Shampoo
2. Liquid Shampoo
3. Lotion Shampoo
4. Cream Shampoo
5. Jelly Shampoo
6. Aerosol Shampoo
7. Specialized Shampoo:
   - Conditioning Shampoo
   - Anti-dandruff Shampoo
   - Baby Shampoo
   - Two Layer Shampoo

**Composition of shampoo:**

- Surfactant
- Antidandruff agents
- Conditioning agents
- Pearlescent agents
- Sequestrants
- Thickening agents
- Colours, perfumes and preservatives

The poly herbal shampoo powder was formulated using natural ingredients with shikakai, reetha, aloe vera, hibiscus, neem, curry leaves, orange peel, methi, Kapoor karchi, babchi etc. powder of all these natural ingredients. Also it contains the synthetic sodium lauryl sulphate which acts as foaming agent and surfactant.

1.4 literature review:

1. **Suchita Gokhale, et al, June 2020:**

The shampoo sector is probably the largest unit sale among the hair care products since shampoos are one of the cosmetic products used in daily life. The herbal shampoo was Formulated using natural ingredient like Moringa, Aloe vera, and Hibiscus with proven efficacy of hair care preparation is prepared. The combination of several such ingredient of herbal origin has made it possible to secure highly effective herbal shampoo. The formulation at laboratory scale was done and evaluated for number of parameters to ensure its safety and efficacy.
2. Priya D. Gaikwad et.2018 :

The objective of this study is to formulate and evaluate polyherbal shampoo for cosmetic purpose from herbal ingredients. Hibiscus powder, Neem powder, Henna powder, Amla powder, Shikakai powder, Reetha powder, Aloe-vera gel was procured from local market in powdered form also gel form Banyan root powder and Soya milk is prepared by homemade method, then prepared decoction of these ingredients and mixing with each other and evaluated for it’s organoleptic and physicochemical characteristics. Herbal shampoo is used to cleansing of the hair also conditioning, smoothing, of the hair surface, good health of hair, hair free of dandruff, dirt grease and lice above all, it’s safety benefits are expected.

3. Dhayanithi set. 2021 :

The aim of the article is to formulate a pure herbal shampoo and to evaluate its physicochemical properties. The shampoo is enriched with herbal extracts without any synthetic additives.

2. PLANT PROFIL

2.1 SHIKAKAI (Acacia concinna) :

Botanical features :

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Fabales
Family : Fabaceae
Subfamily : Caesalpinioideae
Clade : Mimosoid clade
Genus : Senegalia
Species : S. rugata

Fig no.1 Shikakai
Chemical constituents:

Shikakai is an Ayurvedic herb that is rich in vitamins A, C, D, E, and K.

Shikakai contains saponins, alkaloids, sugar, tannin, flavonoids, anthraquinone glycosides. 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:

- Helps improve hair growth by maintaining the collagen in the connective tissues of hair follicles.
- Support hair growth and provide nourishment to the hair follicles.
- Prevents scalp infections and conditions such as psoriasis, eczema, cleanses hair.
- Its antifungal properties also reduce fungal infection and reduce itchiness and hair loss.
- Because of its anti-inflammatory and antibacterial properties, shikakai provides a soothing solution for the inflamed or infected scalp. It also helps with slight scalp cuts and abrasions.
2.2 ALOVERA (*Aloe barbadensis*):

**Botanical features:**

- **kingdom:** Plantae
- **Phylum:** Magnoliophyta
- **Class:** liliopsida
- **Order:** Asparagales
- **Family:** Asphodelaceae
- **Subfamily:** Asphodeloideae
- **Genus:** Aloes
- **Species:** A.vera

![Fig no. 2: Aloevera](image)

**Chemical Constituents:**

Aloe Vera contains 75 potentially active constituents: vitamins, enzymes, minerals, sugars, lignin, saponins, salicylic acids and amino acids.

It also contains fatty acids and amino acids and is rich in vitamins A, B12, C, and E.

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, Chrysohanolglycoside, 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.

![Salicylic acid](image)
![Cinnamic acids](image)
Uses:

- Aloe vera has many active ingredients and minerals that can help strengthen your hair.
- It has enzymes that break down fats and so strips your hair of any extra oil (sebum).
- It has an antidandruff property.
- It can significantly decrease the scariness and itchiness.
- Deep cleans oily hair.
- Strengthens and repairs hair strands.
- It promotes hair growth.

2.3 HIBISCUS (Rosa sinesis):

Botanical features:

Kingdom: Plantae
Division: Tracheophyte
Order: Malvales
Family: Malvaceae
Subfamily: Malvoideae
Genus: Hibiscus
Species: Hibiscus Syriacus

Chemical constituents:

Hibiscus contained tannins, anthraquinones, quinines, phenols, flavanoids, alkaloids, terpenoids, saponins, cardiac glycosides, protein, free amino acids, carbohydrates, reducing sugars, mucilage, essential oils and steroids.

The flowers contained four types of flavonoids, rutin, quercetin, kaempferol and myricetin, the flowers also contained substantial quantities of proanthocyanidins and anthocyanins.

Many compounds were isolated from the flowers included cyclopeptide alkaloids, vitamins, thiamine, riboflavin, niacin and ascorbic acid.
3,4-Dihydroxybenzoic acid

Quercetin

**Uses:**

- It acts as a natural ultra-emollient that traps moisture in your hair and prevents your hair from becoming dry and frizzy.
- Hibiscus leaves and flowers contain a high amount of mucilage that acts as a natural conditioner and restores elasticity in your hair.
- It is used in local medicines to treat high blood pressure, cholesterol, sore throats, digestive issues, cancer, inflammation, cardiac and nerve disease.
- It may have antiseptic properties.

### 2.3 REETHA (*Sapindusmukorossi*)

**Botanical features:**

- **Kingdom:** Plantae
- **Phylum:** Tracheophyta
- **Order:** Sapindales
- **Class:** magnoliopsida
- **Family:** Sapindaceae
- **Genus:** Sapindus
- **Species:** S. Mukorossi

![Reetha](image)
Chemical constituents:

The major constituents present in reetha are saponins, sugars and mucilage.

The seed kernels of reetha are a rich source of proteins and show a balanced amino acid composition.

It also contain phenolic acids such as proto catechuic acid, cis-p-coumaric acid, p-hydrobenzoic acid and cinnamic acid.

The major constituents of the fruits are saponins (10%-11.5%), sugars (10%) and mucilage.

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The major constituents of the fruits are saponins (10%-11.5%), sugars (10%) and mucilage.

**Uses:**

- It may clean the oily secretions in the skin and might be used as a cleanser for hair and a hair tonic as it forms a natural lather.
- The dried fruit powder may be used as a foaming agent in shampoos.
- Also showed anti-inflammatory, antioxidant, and anti-bacterial properties. It was found that the benefit of skin wound healing may be the result of the anti-bacterial, anti-inflammatory and antioxidant activity.
- It may help relieve joint pain.
- It may have de-tanning properties.
2.4 NEEM (*Azadirachta indica*) :

**Botanical features :**
- **Kingdom :** Plantae
- **Division :** Magnolipophyta
- **Class :** Magnoliopsida
- **Order :** Rutales
- **Family :** Meliaceae
- **Subfamily :** Melioideae
- **Genus :** Azadirachta
- **Species :** A. indica

![Neem](image)

Fig no. 5 : Neem

**Chemical Constituents :**

Neem leaf contains most important constituents is azadirachtin and other are nimbolinin, nimbin, nimbidin, nimbidol, sodium nimbinate, gedunin, salannin, and quercetin.

It also includes glycerides of saturated and unsaturated fatty acids, oleic acid, steric acids, sulphur containing compounds, unsaponifiable – nimbosterol.
Azadirachtin

Nimbolin A

Uses:

- Neem has properties is an effective herb to treat hair loss.
- It has antifungal properties that may help within the treatment of dandruff.
- The regenerative properties of neem help in reducing hair fall.
- It helps the hair follicles to become stronger and also encourages hair growth.
- Its medicinal properties is an effective herb to treat hair loss.
- The extracts of the leaves are widely used in skincare and hair care products.
- Ayurveda medicine for controlling blood sugar level, cleansing blood and strengthening the immune system.
- Relieves itchy scalp

2.5 AMLA (Phyllanthus emblica):

Botanical features:

Kingdom : Plantae
Phylum : Tracheophyta
Class : Magnolipsida
Order : Malpighiales
Family : Phyllanthaceae
Genus : Phyllanthus
Species : P. emblica

Fig no. 6 : Amla
Chemical Constituents:

Amla contains vitamin C (ascorbic acid) and contains several bioactive phytochemicals, of which majority are of polyphenols like ellagic acid, chebulinic acid, gallic acid, chebulagic acid, apeigenin, quercetin, corilagin, leutolin, phyllembin etc.

The fruit contains two hydrolysable tannins Emblicanin A and B, also rich in minerals like phosphorus, iron, calcium, pectin, 75% moisture in fresh fruits.

Uses:

- Amla benefits include antibacterial & astringent properties which help improve the body’s immunity system.
- Amla purifies the blood and enhances hair natural colour by preventing premature greying of hair.
- It contains calcium, which promotes healthier hair.
- It stimulates hair growth and improves the quality of hair.
- It can treat hair loss effectively.
- It has antifungal and antiviral properties, which prevent dandruff and other fungal infections and improve scalp health.

2.6 KAPOORKACHARI (*Hedychium spicatum*):

Botanical features:

Kingdom: Plantae

Division: Angiosperms

Class: Monocotyledons

Order: Zingiberales

Family: Zingiberaceae
Genus: Hedychium
Species: H. spicatum

Chemical constituents:

Major chemical constituents present in Kapoor Kachari essential oil are limonene, cineole, terpinene, linalool, p-cymene, terpeneol, and phellandrene.

Rhizome has been reported to contain sitosterol and its glucosides, furanoid, diterpene-hedychenone and 7-hydroxyhedycheno.
Uses:

- Kapoor Kachri powder promotes growth and reduces hair loss.
- It gives off a pleasant smell, which allows it to mix with your hair masks. It is an excellent dry shampoo too.
- For medicinal properties of soothing gastrointestinal pains.
- In the treatment of skin conditions like itching, prickly heat, boils, bed sores. It also helps to relieve earaches.
- Useful in the treatment of swelling, asthma, fever, and pain.

2.7 BABCHI (*Psoralea corylifolia*):

Botanical features:

Kingdom: Plantae
Division: Angiosperms
Class: Dicotyledoneae
Order: Rosales
Family: Leguminosae
Subfamily: Papilionaceae
Genus: Psoralea
Species: Corylifolia linn

Fig no. 8: Babchi

Chemical constituents:

Babchi possessed a wide range of phytochemicals including flavones, coumarins, monoterpenes, chalcones, lipids, resins, stigmasteroids, and flavonoids.

Babchi seeds contain an essential oils (0.05%), a non-volatile terpenoid oil, a dark brown resin (8.6%), a pigment (hydroxyflavone), a monoterpenoid phenol (bakuchiol), a brown fixed oil (10%), raffinose, coumarin compounds, albumin, sugar, ash 7.5 % and a trace of manganese, psoralen and isopsoralen.
Chalcone

Coumarin

Uses:

- Applying babchi oil regularly on hair and scalp vastly improves hair texture, thickness, controls hair loss and even helps in preventing premature greying of hair strands.
- It can be used to treat and prevent a variety of skin and scalp diseases, including eczema, psoriasis, alopecia areata, vitiligo, pigmentation, and wound healing.
- It helps brighten the skin by visibly reducing pigmentation and plumps the skin by boosting collagen promoting tissues.

2.8 METHI (Trigonella foenum-graecum):

Botanical features:

- Kingdom: Plantae
- Division: Magnoliphyta
- Class: Magnolio
- Order: Fabales
- Family: Fabaceae
- Subfamily: Faboideae
- Genus: Trigonella
- Species: T. foenum-graecum

Fig no. 9 : Methi
**Chemical constituents:**

Carbohydrates, proteins, lipids, alkaloids, flavonoids, fibres, saponins and steroidal saponins, as well as vitamins, amino acids and minerals are the main components of fenugreek.

Flavonoids such as apigenin, luteolin, orientin, quercetin, vitexin and isovitexin are abundant in fenugreek.

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**Nicotinic acids**

**Retinol**

**Uses:**

- Fenugreek powder soothes scalp inflammation, treats dandruff, strengthens hair, and prevents shedding.
- Fenugreek powder is a rich source of vitamins A, K & C, folic acid, potassium, calcium, iron, and protein, which are essential nutrients for hair growth.
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- It is known for its medicinal qualities such as antidiabetic, anticarcinogenic, hypcholesterolemic, antioxidant, and immunological activities.

**2.9 CURRY LEAVES (Murraya koenigii):**

**Botanical features:**

Kingdom: Plantae

Division: Angiosperms
Class: Magnoliopsida

Order: Sapindales

Family: Rutaceae

Genus: Murraya

Species: M. koenigii

Fig no. 10: Curry leaves

**Chemical constituents:**

Curry Leaves contain proteins, carbohydrate, fibers, 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, tetrahydromahanimbine are also present in the leaves.

Murrayastine, murrayaline, pyraya-foline-carbazole alkaloids and many other chemicals have isolated from Murraya koenigii leaves.

Alpha-Terpinene

Linalool

**Uses:**

- Anti-dandruff curry leaves when used regularly remove dead hair follicles, which is one of the reasons behind dandruff.
- Prevent premature greying.
- Stimulates hair growth.
- Rejuvenation of hair follicles.
- Strengthening of hair shafts.
• Prevents hair thinning.
• It has a rich source of beta-carotene and proteins. They also contain amino acids and antioxidants which strengthen the hair follicles and moisturize the scalp.
• It also help remove the dead hair follicles, which can be the reason behind dandruff.
• Leaves and roots are also used traditionally as bitter, anthelmintic, analgesic, curing piles, inflammation, itching and are useful in leucoderma and blood disorders.

2.10 ORANGE PEEL POWDER:

Kingdom : Plantae
Division : Angiosperms
Order : Sapindales
Family : Rutaceae
Genus : Citrus
Species : Citrus aurantium

Chemical constituents:
Orange peel are rich in pectin, cellulose, and hemicellulose rich in galacturonic acid, arabinose, and galactose, Limanene (90%), Citral (4%), Vitamin C, Pectin, hesperidine Aurantimarin and Aurantimarc acid (Both are glycoside and responsible for bitter), isohesperidin, neohesperidin.

![Limonene](image1.png)
![D-Galacturonic acid](image2.png)
Uses:

- Orange peels contain citric acid that helps lighten and brighten the skin organically.
- The citric acid cuts through excess oiliness and cleans up the clogged pores. The antimicrobial properties keep your scalp disease-free.
- Orange Peel powder is an excellent conditioner for your hair. Not only does it control your dandruff, but it also improves the blood circulation level, leading to more lustrous hair and less hair fall.
- Orange peels contain hesperidin, a flavonoid that helps maintain blood pressure and cholesterol.
- Orange peels help cure multiple skin problems such as blackheads, dead cells, acne, pores, dark circles, and dry skin. It also helps brighten your skin.

### 3. COMPOSITION OF POLYHERBAL POWDER SHAMPOO

<table>
<thead>
<tr>
<th>Sr. No</th>
<th>Ingredient</th>
<th>Quantity (for 20 Gm)</th>
<th>Role of ingredient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Shikakai</td>
<td>4 gm</td>
<td>Foam base, Anti-dandruff</td>
</tr>
<tr>
<td>2.</td>
<td>Aloevera</td>
<td>1 gm</td>
<td>Condition and moisturizing effects</td>
</tr>
<tr>
<td>3.</td>
<td>Hibiscus</td>
<td>1 gm</td>
<td>Improves hair growth, Premature grayness</td>
</tr>
<tr>
<td>4.</td>
<td>Reetha</td>
<td>3 gm</td>
<td>Foaming agent</td>
</tr>
<tr>
<td>5.</td>
<td>Neem</td>
<td>2 gm</td>
<td>Antimicrobial agent</td>
</tr>
<tr>
<td>6.</td>
<td>Amla</td>
<td>2 gm</td>
<td>Darkening of hairs and hair growth promoter</td>
</tr>
<tr>
<td>7.</td>
<td>Kapoor karchi</td>
<td>1 gm</td>
<td>Control hair fall</td>
</tr>
<tr>
<td>8.</td>
<td>Babchi</td>
<td>1 gm</td>
<td>Improve hair texture</td>
</tr>
<tr>
<td>9.</td>
<td>Methi</td>
<td>1 gm</td>
<td>Conditioning and nourishment of hair</td>
</tr>
<tr>
<td>10.</td>
<td>Curry leaves</td>
<td>2 gm</td>
<td>Antimicrobial</td>
</tr>
<tr>
<td>11.</td>
<td>Orange peel</td>
<td>1 gm</td>
<td>Antioxidant</td>
</tr>
<tr>
<td>12.</td>
<td>Sodium lauryl sulphate</td>
<td>1 gm</td>
<td>Surfactant</td>
</tr>
</tbody>
</table>
4. MATERIALS AND METHODS

4.1 Procurement of material:

The different parts of the plants were selected for the study having hair care property. The plants are methi powder, Neem leaf (Azadirachta indica), Shikakai fruit (Acacia concinna), Aloe leaf (Aloe barbadensis), Reetha fruit (Sapindus mukorossi), Amla fruit (Embelica officinalis), orange peel powder, hibiscus (rosa sinesis), Kapoor kachari (Hedychium spicatum), babchi (psoralea corylifolia), curry leaves (murraya koenigii). The powder of methi, Amla fruit, Neem leaf, Shikakai fruit, Aloe leaf, curry leaves, Reetha fruit, hibiscus flower, Kapoor kachari seeds, orange peel, babchi were collected from the local market. The raw materials collected were given with their respective biological source and uses in (table no.1) ingredients in the hair care; even they are responsible to provide the nutrition to the body. Herbs have long been associated with hair care and are often ingredients of conditioners, shampoos and rinses. The selection of active ingredients for hair care powder is often based on the ability of the ingredient to prevent damage to the skin as well as to improve the quality of the skin by way of cleansing, nourishing and protecting the skin. In the paper, we reported the development and evaluation of herbal hair care powder.

4.2 Method of preparation:

1. Drying: All the powder are in dry form and grinded.
2. Weighing: All the required herbal powders for shampoo preparation were weighed individually.
3. Size reduction: The crude ingredients were collected and these ingredients were size reduced using hand driven mixer individually.
4. Mixing: All these fine ingredients were mixed thoroughly by mixer to form a homogenous fine powder.
5. Sieving: Then this fine powder was passed through sieve no.:120, to get the sufficient quantity of fine powder

5. EVALUATION OF POLYHERBAL POWDER SHAMPOO

Prepared formulations of shampoos were subjected to following evaluation parameters:

5.1 Organoleptic evaluation/visual appearance:

Organoleptic evaluation for 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 were selected.

5.2 General powder characteristics:

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 particle size, angle of repose, bulk density and tapped density. All the three shampoo powders were taken at three different level i.e. from top, middle and lower level for the evaluation.
5.2.1 Particle size:

Particle size is a parameter, which 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.

5.2.2 Bulk density:

Bulk Density is the ratio between the given mass of a powder and its bulk volume. Required amount of the powder is dried and filled in a 50 ml measuring cylinder up to 50 ml mark. Then the cylinder is dropped onto a hard wood surface from a height of 1 inch at 2 second intervals. The volume of the powder is measured. Then the powder is weighed. This is repeated to get average values. The Bulk Density is calculated by using the below given formula.

\[
\text{Bulk density} = \frac{\text{Mass of the herbal powder shampoo}}{\text{Volume of the herbal powder shampoo}}
\]

5.2.3 Tapped density:

The tapped density is an increased bulk density attained after mechanically tapping a container containing the powder sample. After observing the initial powder volume or mass, the measuring cylinder or vessel is mechanically tapped for 1 min and volume or mass readings are taken until little further volume or mass change was observed. It was expressed in grams per cubic centimeter (g/cm³).

\[
\text{Tapped density} = \frac{\text{Weight of powder}}{\text{Tapped volume of powder}}
\]

5.2.4 Angle of repose:

It is defined as the maximum angle possible in between the surface of pile of powder to the horizontal flow.

**Funnel method:**

Required quality of dried powder is taken in a funnel placed at a height of 6cm from a horizontal base. The powder was allowed to flow to form a heap over the paper on the horizontal plane. The height and radius of the powder were noted and recorded the angle of repose (θ) can be calculated by using the formula.

**Open-ended cylinder method:**

The required amount of dried powder is placed in a cylindrical tube open at both ends is placed on a horizontal surface. Then the funnel should be raised to form a heap. The height and radius of the heap is noted and recorded. For the above two methods, the angle of repose (θ) can be calculated by using the formula.

\[\theta = \tan^{-1}\left(\frac{h}{r}\right)\]
Where, \( \theta \) – Angle of repose, \\
\( h \) – Height of the heap, \( r \) – Radius of the base

5.3 Physicochemical evaluation:

5.3.1 pH:

The pH of 10% shampoo solution in distilled water was determined at room temperature 25°C. The pH was measured by using digital pH Meter. Washability Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

5.3.2 Solubility:

Solubility is defined as the ability of the substance to soluble in a solvent. One gram of the powder is weighed accurately and transferred into a beaker containing 100 ml of water. This was shaken well and warmed to increase the solubility. Then cooled and filter it, the residue obtained is weighed and noted.

5.4.2 Washability:

Formulations were applied on the skin and then ease and extent of washing with water were checked manually.

5.3.4 Loss on drying:

Loss on drying is the loss of mass expressed in percent m/m. Two gram of the powder was weighed accurately and transferred into a dry Petri dish. The Petri dish is placed in a desiccator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying.

5.4 Skin /eye irritation test:

The eye and skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on skin and eye. In this formulation of herbal shampoo powder, the uses of all ingredients are obtained naturally. So it does not produce any harmful effect on skin and eye. Skin irritation test Skin irritation test is carried out by using open patch method. With many cosmetic products, whether commercial or homemade, it is recommended that you do a patch test on your skin prior to use. This is to ensure that you do not have an allergic reaction to the product and if you do, it will only be confined to a small area of skin and thus treatable with ease.

Step 1- Pour or squeeze out a little of the cosmetic preparation to your wrist.

Step 2- Dab a small amount of the preparation on the pulse of your wrist or the crook of your elbow.

Step 3- Leave the preparation unwashed for a period of 15-20 min.
Step 4 - Watch for signs of an allergic reaction. Typical signs will include redness, a rash, any form of breakouts on the skin, itchiness, pain, flaking etc. Some people may also experience nausea or respiratory reactions. If any of these signs present themselves, cease use immediately.

Step 5 - Continue to use the product if you do not have a reaction. If you do not have any allergic reaction symptoms, it is likely that the preparation is all right for your skin type.

5.5 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.

5.6 Foaming index:

One gram of the powder was weighed accurately and transferred into 250 ml conical flask containing 100 ml of boiling water. Then it is warmed gently for 30 minutes, cooled and filtered and make up the volume to 100 ml in standard volumetric flask. This extract is taken in 10 test tubes in a series of successive portion of 1, 2, 3….10 ml and remaining volume is made up with water to 10 ml. Then the test tubes were shaken in longwise motion for 15 seconds at speed of 2 frequencies / second. Then the tubes are allowed to stand for 15 minutes. The height of the foam was measured. Foaming index =1000/a

5.7 Extractive value:

5.7.1 Determination of alcohol soluble extractive:
Each 5 gm air-dried herbal powder shampoo is wet in a closed flask for 24 hours with 100 ml of a prescribed volume of alcohol. To avoid damaging the solvent by filtering, 25 mL of the filtrate was evaporated to dryness in a shallow dish flat star and kept dry at 105° C. In comparison to the air-dried medication, the percentage of soluble extract intake in alcohol has been estimated.

5.7.2 Determination of water-soluble extractive:
To determine soluble alcohol extracts, use chloroform water instead of ethanol as advised. The percentage of extract dissolved in water was calculated for each sample.

Fig no.12 : Prepared polyherbal powder shampoo formulation
Evaluation parameter of three different batches of polyherbal powder shampoo formulation:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Evaluation Tests</th>
<th>Batches</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>1.</td>
<td>Colour</td>
<td>Faint brown</td>
</tr>
<tr>
<td>2.</td>
<td>Odour</td>
<td>Slight pleasant</td>
</tr>
<tr>
<td>3.</td>
<td>Texture</td>
<td>Fine and smooth</td>
</tr>
<tr>
<td>5.</td>
<td>Angle of repose</td>
<td>28.44</td>
</tr>
<tr>
<td>6.</td>
<td>Bulk density</td>
<td>0.31gm/ml</td>
</tr>
<tr>
<td>7.</td>
<td>Tapped density</td>
<td>0.6gm/ml</td>
</tr>
<tr>
<td>8.</td>
<td>pH</td>
<td>5.44</td>
</tr>
<tr>
<td>9.</td>
<td>Washability</td>
<td>Easily washable</td>
</tr>
<tr>
<td>10.</td>
<td>Solubility</td>
<td>Soluble</td>
</tr>
<tr>
<td>11.</td>
<td>Skin irritation test</td>
<td>No harmful effect on skin</td>
</tr>
<tr>
<td>12.</td>
<td>Foaming capacity</td>
<td>Good foaming</td>
</tr>
<tr>
<td>13.</td>
<td>Stability</td>
<td>Stable</td>
</tr>
<tr>
<td>14.</td>
<td>Alcohol soluble extractive value</td>
<td>30.66%w/w</td>
</tr>
<tr>
<td>15.</td>
<td>Water soluble extractive</td>
<td>25.10%w/w</td>
</tr>
</tbody>
</table>

Table no. 2: Evaluation parameter of three different batches

6. RESULTS

6.1 Organoleptic evaluation / visual appearance:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Test</th>
<th>Observation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Colour</td>
<td>Faint brown</td>
</tr>
<tr>
<td>2.</td>
<td>Odour</td>
<td>Slight pleasant</td>
</tr>
<tr>
<td>3.</td>
<td>Texture</td>
<td>Fine and smooth</td>
</tr>
</tbody>
</table>

Table no. 3: Organoleptic evaluation of polyherbal powder shampoo
6.2 General powder characteristic:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Test</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Particle size</td>
<td>20-25 μm</td>
</tr>
<tr>
<td>2.</td>
<td>Angle of repose</td>
<td>28.36</td>
</tr>
<tr>
<td>3.</td>
<td>Bulk density</td>
<td>0.33 gm/ml</td>
</tr>
<tr>
<td>4.</td>
<td>Tapped density</td>
<td>0.5 gm/ml</td>
</tr>
</tbody>
</table>

Table no. 4: General powder characteristic of polyherbal powder shampoo

6.3 Angle of repose calculation:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Method</th>
<th>Height of the cone in cm</th>
<th>Radius of cone in cm</th>
<th>Tan θ =h/r</th>
<th>θ= 1/tan h/r</th>
<th>Flow property</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Funnel method</td>
<td>2</td>
<td>3.5</td>
<td>0.57</td>
<td>29.68</td>
<td>Good flow property</td>
</tr>
</tbody>
</table>

Table no. 5: Angle of repose calculation of polyherbal powder shampoo

6.4 Bulk density calculation:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Bulk volume</th>
<th>Mass of the powder (gm)</th>
<th>Bulk density gm/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>30</td>
<td>10</td>
<td>0.33</td>
</tr>
</tbody>
</table>

Table no. 6: Bulk density calculation of polyherbal powder shampoo

6.5 Tapped density calculation:

<table>
<thead>
<tr>
<th>Sr no.</th>
<th>Tapped volume (ml)</th>
<th>Mass of the powder (gm)</th>
<th>Tapped density gm/ml</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>20</td>
<td>10</td>
<td>0.5</td>
</tr>
</tbody>
</table>

Table no. 7: Tapped density calculation of polyherbal powder shampoo

6.6 Foaming ability calculation:

<table>
<thead>
<tr>
<th>Sr. no.</th>
<th>Time</th>
<th>Foam Volume</th>
<th>Stability</th>
<th>Foaming capacity</th>
<th>Skin irritation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>2 min</td>
<td>142 ml</td>
<td>Stable</td>
<td>Good foaming</td>
<td>No irritation</td>
</tr>
</tbody>
</table>

Table no. 8: Foaming ability calculation of polyherbal powder shampoo

6.7 Skin irritation test:

In this open patch method herbal powder shampoo is apply to the skin and observe their effect, they should not produce any side effect to the skin. They should not produce redness, a rash, any form of breakouts on the skin, itchiness, pain, flaking etc.
6.8 Physicochemical properties:

<table>
<thead>
<tr>
<th>Sr.no.</th>
<th>Physicochemical evaluation</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>pH</td>
<td>5.48</td>
</tr>
<tr>
<td>2.</td>
<td>Washability</td>
<td>Easily washable</td>
</tr>
<tr>
<td>3.</td>
<td>Solubility</td>
<td>Soluble (water)</td>
</tr>
<tr>
<td>4.</td>
<td>Skin irritation</td>
<td>No harmful effect on skin</td>
</tr>
<tr>
<td>5.</td>
<td>Foaming capacity</td>
<td>Good foaming</td>
</tr>
<tr>
<td>6.</td>
<td>Stability</td>
<td>Stable</td>
</tr>
<tr>
<td>7.</td>
<td>Alcohol soluble extractive value</td>
<td>30.60% w/w</td>
</tr>
<tr>
<td>8.</td>
<td>Water soluble extractive</td>
<td>25.15% w/w</td>
</tr>
</tbody>
</table>

Table no. 9: Physicochemical properties of polyherbal powder shampoo

7. DISCUSSION

Medicinal plants used in the formulation of herbal shampoo were found as rich source of novel drugs. These plants were Methi, reetha, shikakai, neem, curry leaves, babchi, Kapoor karchi, hibiscus, amla, aloevera had been reported for hair growth and conditioning. The various quality control parameters were checked. All parameter gives favourable result. The result obtained on present study shows that the active ingredients of these drugs when incorporated in shampoo gives more stable products with good aesthetic appeal. The pH of the shampoo has been shown to be important for improving and enhancing the qualities of hair, minimizing the irritation to the eyes and stabilizing the ecological balance of the scalp. The current trend to promote shampoos of lower pH is one of the minimizing damage to the hair. Such results are estimated out of a formulation to establish strong results for the usage and good results of the product. Though the product is in dry form inspite has wonderful wetting capacity and being dry is very good for the storage. The evaluation parameters like Organoleptic evaluation, General powder Characters, Physicochemical Evaluation, Cleaning action, foaming, Wetting agent, was carried out and was found to be within the standard range.

8. CONCLUSION

A survey of global hair care market trends indicates that consumer use of herbal products has significant increased over the past years. The factors like UV radiations, use of harsh chemical products have direct and indirect impact on the hair. To overcome this problems the present study has the best undertaken to design a herbal shampoo which will not only give hair protection but also conditioning effect, shine and manageability. The present work focuses on the potential of herbal extracts from cosmetic purposes. Hence we conclude that the formulation of polyherbal shampoo powder is effective in reducing dandruff without irritation, less adverse effect and better conditioning effect. Present investigations was carried out to formulate the herbal shampoo powder preparations based upon traditional knowledge and to develop few
parameters for quality and purity of herbal powder shampoo. Nowadays there is strong demand for natural therapies, and this is increasing in western countries. The herbs which are cheapest of phytoconstituents are on wheals to attain their role in polyherbal formulation so as to have synergistic role. Hence we conclude that the polyherbal formulation of shampoo is effective in reducing dandruff without irritation, less adverse effect and better conditioning effect. The awareness and need for cosmetics with herbs in on the rise, as it is strongly believed that these products are safe and free from side effects. For the treatment of dandruff we have both synthetic and natural herbal shampoos. But when compared to the chemical based shampoos, herbal based shampoos are more effective in terms of safety and ease of manufacturing and in the economic point of view they are cheap.

9. REFERENCES


