FORMULATION AND EVALUATION OF AN ANTIDANDRUFF SHAMPOO BASED ON HERBAL INGREDIENT(S)

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Abstract

The study objectives is to formulate and evaluate herbal antidandruff shampoo for cosmetic purpose by using herbal ingredients.

A liquid or cream preparation of soap or detergent to wash the hair is called as shampoo. The word dandruff (dandruff, dandriffe) is of Anglo-Saxon origin, a combination of “tan” meaning “tetter” and “drof” meaning “dirty”. Dandruff is a chronic scalp condition characterized by scaling, itching and redness of the scalp. Dandruff scale is a cluster of corneocytes, which have retained a large degree of cohesion with one another and detach as such from the surface of the stratum corneum. The size and abundance of scales are heterogeneous from one site to another. The herbal shampoo was formulated by adding different plant extracts in different proportion like Cinnamomum, Eucalyptus globulus, Ocimum kilimandscharicum, Melaleuca leucadendron.

A shampoo may be described as a cosmetic preparation meant for the washing of hair and scalp, packed in a form convenient for use. Its primary function is of cleansing the hair of accumulated sebum, scalp debris and residues of hair-grooming preparations. Different types of formulations like shampoos, creams, lotions, emulsions, hair oils and other cosmetic formulations are available in the market that are used to control dandruff. These formulations include therapeutic use of antidandruff agents that are classified into three groups according to their mechanism of action. a) Fungicidal substances: For example, zinc pyrithione, imidazoles. b) Cytostatic substances: For example, tar, selenium sulphide, octopirox. c) Keratolytic substances: For example, salicyclic acid, sulphur compounds (Adamski, 1995)

Keywords: Herbal cosmetics, Antidandruff shampoo, Evaluation of shampoo, Fungicidal, Keratolytic substance

INTRODUCTION

A shampoo may be described as a cosmetic preparation meant for the washing of hair and scalp, packed in a form convenient for use. Its primary function is of cleansing the hair of accumulated sebum, scalp debris and residues of hair-grooming preparations. The added functions of shampoo include lubrication, conditioning, bodybuilding, prevention of static charge build up, medication and so on. Finally, the complete shampoo formulation must be medically safe for long-term usage.
Shampoo types and form

According to the formulation, there are two types of shampoos:

i) Surfactant based shampoos, and

ii) Soap based shampoos

Different forms of shampoos available in the market are

i) Liquid shampoos

ii) Cream paste shampoos

iii) Gel shampoos

iv) Aerosol & dry shampoos

v) Specialty shampoos- it includes a) Shampoos for infants and children b) Shampoos that compliment particular cosmetic line by bearing matching fragrance and appearance c) Products intended to control the evidence of dandruff d) Shampoos containing dyes, intended to impose a shading or tone to hair of specified colour

Shampoo formulation

A typical formulation of shampoo consists of following components:

Surfactants: Sodium or potassium or ethanolamine salts of lauryl sulphonlic acid, lauryl ether sulphates, other synthetic detergents.

Foam boosters and stabilizers: Ethanolamine of fatty acids, amine oxides, cocobetaines and cocoamidopropyl betaines.

Conditioning agents: Quaternary compounds, silicones, lanolin derivative, mineral oil, lecithin, hydrolysed proteins, quaternized polymers.

Preservatives: Alcohol, formaldehyde, imidazolidinyl urea, benzoic acid, sodium benzoate, and butyl paraben.

Sequestering agents: EDTA and its salts, citric acid, tripolyphosphates etc.

Viscosity modifiers: Sodium carboxymethyl cellulose, methyl cellulose, and methyl isopropyl cellulose. Opacifying or clarifying agents: Ethylene glycol stearate, glyceryl monostearate, cetyl and stearyl alcohols. Stabilizers: Tocopherol, BHT and BHA.

Other group of ingredients: It includes perfumes, dyes, vitamins, vegetable oils, proteins etc.

Interest in the therapeutic use of natural medicinals in the field of infectious diseases has increased remarkably in recent years, mostly driven by the well-known side effects of conventional drugs as well as by the spread of anti-microbial resistance to otherwise efficacious and well tolerated drugs. During the past few decades, there has been a dramatic increase in the use of herbal ingredients in cosmetics. Now a days, many herbal antidandruff shampoos are available in the market. These shampoos contain herbal ingredients, such as plant extracts and essential oils that possess antifungal activity against M. furfur. In these formulations, active herbal ingredients are combined with typical surfactants. Various effective extracts commonly used in formulation of antidandruff shampoos are extracts of Tulsi, Citrus lemon, Henna, Geranium, Neem, Ashwagandha, Arnica, Walnut, etc. There are several independent studies on these herbal actives and their efficiency in anti-dandruff shampoos.

Advantages of Herbal Antidandruff Shampoo over Synthetic Shampoo

- Pure and organic ingredients are used.
- These shampoos are free from side effects.
- No synthetic additives such as sodium lauryl sulphate.
- No animal testing.
- Skin friendly.

These shampoos help in the strengthening the root of hair which in turn helps in increasing the growth of hair.
Herbal shampoos also help in increasing the shine of hair therefore for one who suffers from dry and dull hair these herbal shampoos are beneficial. It enhances the roots and helps in the formation of new root which are soft then before.

Herbal shampoos help in reducing the dandruff production in the scalp. They may be beneficial in reduction of hair fall.

Disadvantages of Herbal Antidandruff Shampoo

- Some herbs are sensitive to scalp. Example: Menthol.
- Natural products affect product uniformity and quality control. Sessional variation of plant constituents occurs. Less stable so, preservative should be added. Varying in consistency from batch to batch.
- Dry shampoo doesn’t clean hair, Skin allergies may be occurred

Material and Methods

**Table 1. Ingredient table**

<table>
<thead>
<tr>
<th>Sr No</th>
<th>Materials Required</th>
<th>Quantities to be weighed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Dalchini</td>
<td>150g</td>
</tr>
<tr>
<td>2</td>
<td>Karanji</td>
<td>150g</td>
</tr>
<tr>
<td>3</td>
<td>Blue gum tree</td>
<td>150g</td>
</tr>
<tr>
<td>4</td>
<td>Camphor basil</td>
<td>150g</td>
</tr>
<tr>
<td>5</td>
<td>Kayaputi</td>
<td>150g</td>
</tr>
</tbody>
</table>

**Table 2. Description of Ingredient**

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Common Name</th>
<th>Botanical Name</th>
<th>Family</th>
<th>Genus</th>
<th>Part used</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Tamalpatra</td>
<td>CINNAMOMUM ZEYLANICUM BLUME</td>
<td>Lauraceae</td>
<td>Cinnamomum</td>
<td>Bark</td>
</tr>
<tr>
<td>2</td>
<td>Karanj</td>
<td>PONGAMIA GLABRA VENT</td>
<td>Papillionaceae</td>
<td>Pongamia</td>
<td>Seeds</td>
</tr>
<tr>
<td>3</td>
<td>Nilgiri</td>
<td>EUCALYPTUS GLOBULUS LABILL.</td>
<td>Myrtaceae</td>
<td>Eucalyptus</td>
<td>Leaves</td>
</tr>
<tr>
<td>4</td>
<td>Kapur Tulsi</td>
<td>OCIMUM KILIMANDSCHARICUM BAKER ex GURKE</td>
<td>Lamiaceae</td>
<td>Ocimum</td>
<td>Leaves</td>
</tr>
<tr>
<td>5</td>
<td>Kayaputi</td>
<td>MELALEUCA LEUCADENDRON (L.) L</td>
<td>Myrtaceae</td>
<td>Melaleuca</td>
<td>Leaves</td>
</tr>
</tbody>
</table>

**Use of Ingredient**
1. Tamalpatra

*Fig.no.01 Bark of Cinnamomum zeylanicum Blume*

1. Cinnamon Bark is carminative, antispasmodic, aromatic, stimulant, haemostatic, antiseptic, stomachic and germicide
2. It is used as cordial in cramps of stomach in syncope, in paralysis of tongue and to block the nerve in toothache.
3. It is also used as an aromatic to mask the disagreeable taste of other drugs
4. The oil possesses antibacterial and antifungal properties.
5. The oil is styptic, emmenagogue tonic to the liver, useful in inflammation, vomiting and abdominal pains.
6. The oil is a valuable flavouring ingredient used widely in all kinds of confectionary, baked foods, meat seasonings, candies, soft drinks, ketchups, pickles, sauces, beverages, pharmaceutical and dental preparations, mouth rinses etc
2. Karanj

![Image of Pongamia glabra seeds]

**Fig.No 02: Seeds of *Pongamia glabra***

1. The seeds are used for external application in skin diseases.
2. The oil from the seeds is used in leucoderma, cutaneous infections including herpes and scabies, and also in rheumatism.
3. Internally the oil is used as a stomachic, cholagogue and in dyspepsia with sluggish liver.
4. The seeds crushed into a paste are used externally for skin diseases including leprous sores and also as a fish poison.
5. The powdered seeds are considered to be good expectorant in bronchitis and whooping cough.
6. The seed oil is antibacterial and antifungal
7. The oil is source of biodiesel and is used as fuel for cooking and lamps
3. Nilgiri

Fig.No 03: Leaves of *Eucalyptus globulus*

1. Leaves are febrifuge and carminative, stimulant, expectorant, diaphoretic and antiseptic
2. Eucalyptus oil is a powerful antiseptic and disinfectant, antimalarial, rubefacient, stimulant, antispasmodic.
3. It is much used as an inhalant.
4. It is widely used in curing headache and body pains.
5. Indian Pharmaceutical industry is using the oil largely as a mosquito repellent and as an ingredient of germicidal and disinfecting preparations.
6. It is used as an antiseptic especially in the treatment of infections of upper respiratory tract and in certain skin diseases.
7. It is found useful in rheumatism and in chronic bronchitis and asthma
4. Kapur Tulsi

![Fig. No 04: Leaves of Ocimum kilimandscharicum](image)

1. The leaves are acrid, thermogenic, aromatic, insecticidal, antiviral, appetizing, useful in cough and bronchitis, antibacterial and antifungal.

2. Traditionally it is used in abdominal pains, diarrhoea, congested chest, cough and cold. In Indian System of Medicine (Ayurveda), oil of *Ocimum kilimandscharicum* has been used as an anti-inflammatory, indigestion, insecticidal, mosquito repellent, aromatic and antimicrobial.
5. Kayaputi

Fig.05: Leaves of *Melaleuca leucadendron*

1. The oil of *M. leucadendron* is an antiseptic used externally for thrush, vaginal infections, acne, athlete’s foot, verruca, wart, insect’s bites, cold sore and nits

2. Traditionally, it is used in rheumatism, stiff joints, neuralgia, migraine, and as mosquito repellent

3. Besides it is used to heal wounds, as topical applications for skin problems such as psoriasis and eczema, used as anthelmintic and parasiticidal agent to treat roundworms, scabies and pediculosis.

4. It is also used to treat cold, fever, influenza, stomach and intestinal problems because of its antibacterial properties

**Formulation of Antidandruff shampoo**

1. Weighed all the ingredients according to the formula

2. The authenticated plant material namely, leaves of *Eucalyptus globulus* Labill., *Ocimum kilimandscharicum* Baker and *Melaleuca leucadendron* (L.)L. were collected from Medicinal Plants Garden

3. while seeds of *Pongamia glabra* Vent and bark of *Cinnamomum zeylanicum* Blume were procured

4. The drugs collected were subjected to hydrodistillation for extraction of volatile oils in Clevenger’s apparatus individually and by cold expression process for extraction of fixed oil.
Evaluation of shampoo

a) Detergency evaluation

Procedure: For this test tresses of non-remi hair were used. The hair tresses were prewashed with 5% SLS solution, dried and cut into 10 inch, 3g swatches. The hair swatch (3g) was suspended in 20ml of a 10% sebum solution in hexane for 15 min with intermittent shaking. The swatch was removed, the solvent evaporated at room temperature and the hair swatch weighed to determine the sebum load. Fifteen swatches were treated similarly and the soil levels were found to range from 9.96 to 11.05%. Each swatch was then split into two equal samples of 1.5g each: one for the shampoo treatment and the other to act as an internal control to overcome the tress-to-tress variation in soil levels. The control swatch was left untreated. The test swatch was washed with 0.1ml of a 10% shampoo solution using the finger method. It was then dried using hair dryer and further dried in an oven at 60°C for 4 hrs to ensure uniform moisture content. The sebum remaining in the test swatch after shampooing and that in the unwashed control swatch, was then extracted using 20 ml of hexane instopper flask for 30 min on a rotary shaker. The hexane solution was then evaporated to dryness and the sebum extracted from the test and control swatches was weighed. Detergency was evaluated as percentage of sebum removed after shampooing.

b) Wetting test

Procedure: The rate of wetting or the wetting ability of surface-active agents is commonly used to determine their comparative efficacies. The canvas disc wetting test method was used in this study to determine the wetting ability of the shampoo formulation.

Different types of canvas were tried for the test and the one that gave an effective balance between time saving and testing efficiency was chosen for the test. The canvas was cut into 1 inch diameter discs having an average weight of 0.44 g. The disc was immersed just below the surface of a 1% shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted as the wetting time.

c) Measurement of surface tension

Surface tension of the shampoo formulation was measured by Drop weight method using stalagmometer. Measurement was carried out with a 10% shampoo dilution in distilled water at room temperature Formula applied here was:

\[ \frac{R_1}{R_2} = \frac{M_1}{M_2} \]

Where \( R_1 \) is a surface tension of unknown sample, \( R_2 \) is a surface tension of reference (water), \( M_1 \) is a mass of sample drops and \( M_2 \) is a mass of water drops.

d) Viscosity profile

Product rheology plays an important role in defining and controlling many attributes such as shelf life stability and product
aesthetics such as clarity, ease of flow on removal from packaging and spreading on application to hair and product consistency in the package.

The flow characteristics of non-newtonian materials are usually not measured with a single data point, because their viscosity is dependent on the shear rate. The best approach is to take multipoint measurements.

e) Physical appearance or visual inspection

The formulations prepared were evaluated in terms of their clarity, foam producing ability and fluidity.

f) Determination of pH

Mix 01gm of shampoo with 09ml of water and determine the pH using pH meter at 27°C.

g) Foaming Ability and Foam Stability

Cylinder shake method was used for determining foaming ability. 50ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1-minute shaking were recorded. The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.

Observation Table

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Evaluation Test</th>
<th>Formulated shampoo</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>color</td>
<td>Brown</td>
</tr>
<tr>
<td>2</td>
<td>transparency</td>
<td>clear</td>
</tr>
<tr>
<td>3</td>
<td>odour</td>
<td>good</td>
</tr>
<tr>
<td>4</td>
<td>Foam type</td>
<td>Dense small</td>
</tr>
<tr>
<td>5</td>
<td>Wetting time</td>
<td>120s</td>
</tr>
</tbody>
</table>

Result

The shampoo was formulated by admixing the equal amount of the aqueous extracts of all the ingredients. The above plant extract contains phytoconstituents 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.

Conclusion

The present investigation demonstrated that binary mixture of cinnamon oil and kapur tulsi oil showed excellent antifungal
activity. An antidandruff shampoo was formulated by incorporating cinnamon oil and kapur tulsi oil as main antidandruff ingredients. As additives play an important role in defining the performance, stability and aesthetic appeal of any formulation, this point was kept in mind while selecting the additives for the shampoo formulation. Finally the antidandruff shampoo was formulated and evaluated. As seen from the results, it is possible to formulate a herbal antidandruff shampoo that is not only equivalent in its performance to the synthetic ones but also have better safety, efficacy and purity.

References


