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Formulation and evaluation of herbal antidandruff shampoo

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Abstract

Plants contain a number of chemical compounds which perform biological functions including defense against insects, fungi, herbivorous and mammals. Dandruff is a scalp disorder which affecting the half of post pubertal population of any ethnicity and both genders. Nowadays 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 proven ayurvedic formulation to be promising for cosmetic use too. The herbal antidandruff shampoo was formulated using natural ingredients with Acacia concinna (shikakai fruits), Aloe vera barbadensis (aloe leaf), Azadiracta indica (Neem leaf), Eclipta alba (bhringraj green leaf), Sapindus mukorosis (reetha fruits), citrus limon (lemon fruit).

Key- words: Antidandruff, Herbal Formulation, Evaluation, Malassezia furfur.

Introduction

A shampoo is a preparation of a surfactant (i.e. surface active material) in a suitable form – 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] Dandruff affects the aesthetic value and causes the itching and keratinocytes play major role in the expressions and the generation of immunological reaction during dandruff formation. The severity of dandruff may fluctuate with season as it often worsens in winter. [2-3]

Dandruff is a common scalp condition that produces the irritating white flakes and itchy scalp. Excessive drying of skin and over-activity of oil gland known as seborrhea. Dandruff is a visible desquamation of scalp is the mildest manifestation of seborrheic dermatitis and caused by P. ovale combined with multiple host factors. It is commonly aggravated by changes in the humidity, trauma (scratching), season and the emotional stress. Dandruff is a disorder and represents nothing more than physiological scaling. Seborrheic dermatitis is obviously more inflammatory in nature extending outside the limit of scalp surface. The scales are dry, white or greyish and appear as small patches specially at the top of the hairs.

Dandruff is a special case where unusually large amount of flaking occurs this causes the redness and irritation of the scalp. The three factors required for the dandruff formation: a. Natural sebaceous b. Malassezia Fungi c. Individual sensitivity [3-4]

Synthetic shampoos may cause side effects so keeping this in view an herbal anti-dandruff shampoo has been formulated and evaluated scientifically. In Indian system of medicine, various plants and their parts have been used for treatment of dandruff such as Reetha, Liquorice, Brahmi, Hibiscus, Bengal gram, marigold. Traditionally, single plants have been used & there was no scientific report available regarding totally all ingredients are natural regarding usage of such combination that we have conceived. 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 proven ayurvedic formulation to be promising for cosmetic use too. Hair-care products may be defined as the preparation which are meant for cleansing, modifying the texture, changing of the colour, giving life to the stressed hair, providing nourishment to the hair 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 another human. In today's fast life people don't have time to look on their physique also. The problems of hair: Hair falling, White hair, Dandruff, and Split end hair etc. The reasons of hair problems are tension, scalp infection, hormones disturbances, lower vitamin, food, minerals, and large chemical shampoo use. To overcome all this problem was the main intention of our project. So, we

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prepared herbal antidandruff shampoo, which is a multipurpose shampoo for hair treatment. Cleanliness of hair and scalp are among the most important personal life considered today. Dandruff is clinical condition caused by *Malassezia* (*Pityrosporum*) species is of great cosmetic concern all over the world. *Pityrosporum ovale* is strongly suspected to play a role in the manifestation of the seborrheic dermatitis. Dandruff is known to be controlled by fungistatic ingredients in Anti-dandruff shampoos. Herbal formulation has 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 includes 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 compliance issues. Furthermore, these drugs are unable to prevent recurrence. The herbal antidandruff shampoo was formulated using natural ingredients with *Acacia concinna* (shikakai fruits), *Aloevera barbadensis* (aloe leaf), *Azadiracta indica* (Neem leaf), *Eclipta alba* (bhringraj green leaf), *Sapindus mukorosis* (reetha fruits), citrus limon (lemon fruit). Lemon and shikakai, both are having antidandruff action. 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. Hard water the surfactants leave a deposit of sodium, calcium and magnesium salts on the hair shaft. 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, dandruff is commonly aggravated by changes in humidity, trauma (scratching), seasonal and emotional stresses, dandruff may improve in summer (as UV rays from sunlight counteract *p. ovale*) and it may worse in winter *pityrosporum* organism are linked to T-cell depression and they inhibit cell division & thus reduce sealing by decrease in epidermal turnover. Dandruff may cause various symptom seborrheic dermatitis, psoriasis fungal infection, or scalp & soreness, itching infestation of head lice.

Material and Methods

Procurement of the plant parts

The different parts of the plants were selected for the study having hair care property. The plants are

Acacia concinna (shikakai seeds), *Alovera barbadensis* (aloe leaf), *Azadiracta indica* (Neem leaf), *Eclipta alba* (bhringraj leaf), *Sapindus mukorosis* (reetha fruit), citrus limon (lemon fruit). Bhringraj, neem, lemon, Shikakai, Reetha fruit were collected from the local market called **Marothia**. The raw materials collected were given with their respective biological source and uses in table no. 2.1 ingredients in the hair care; even they are responsible to provide the nutrition to the body.¹¹ 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.

Table 1: Herbs Used in the Preparation Herbal Antidandruff Shampoo

S.No	Herbs	Biological name	Sources of ingredients
1.	Sikakai	Acacia Concinna	Foam base and anti-dandruff, to improve hair and skin and it clears dandruff and the dirt accrued on the scalp works as a cleanser.
2.	Bhringraj	Eclipta Alba	Hair growth, prevent hair loss, premature greying of hair, split ends.
3.	Neem	Azadiracta Indica	Antibacterial, antimicrobial, Prevents the dryness and flaking of hairs, lice and dandruff and itching and as a preservative
4.	Reetha	Sapindus Mukorosis	Reetha is a foaming agent, prevent hair loss, antibacterial and antifungal in nature.
5.	Lemon	Citrus Limon	Antidandruff, natural cleanser, oil remover, shiner, softening of hairs.
6.	Aloevera	Alovera Barbadensis	To treat hair problems like dryness, dullness, dandruff, provide Conditioner and moisturizing effect.

Preparation of the extracts

Drying-All the herbs are in dry form and grinded.

Weighing-All the required herbs for shampoo preparation were weighed individually.

Size Reduction-The crude ingredients were collected and these ingredients were size reduced using hand driven mixer individually.

Sieving- Then this fine powder was passed through sieve no.: 120, to get the sufficient quantity of fine powder.

Maceration- All the herbs are macerate individually. After 2-4 days the herbs extracts are collect separately and convert it into the semisolid form.

Preparation Shampoo

Basic ingredients, Glycerine, Aloe vera were mixed one by one with constant stirring. Mixture of herbal extract was added prior to adjusting final volume using distilled water. To this lemon is added as preservative and xanthum gum to maintain viscosity was added in parts with constant stirring to obtain viscous system. Camphor was added in quantity sufficient for fragrance.

Evaluation Parameters**Determination of Antidandruff Activity:**

Inhibitory effect of shampoo on *Malassezia furfur* was studied by paper disc-diffusion method.

Paper Disc-Diffusion Method: To determine the inhibitory effect of various components / herbs /shampoo on *Malassezia* species, paper disc-diffusion method was carried out using dextrose peptone agar (Hi-Media, M-649) as medium.

Organooleptic evaluation/visual appearance

Organooleptic 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.

Physicochemical Evaluation**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.[20]

Washability

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

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.

Skin /Eye Irritation Test

The eye and skin irritation tests revealed that the herbal shampoo powder shows no harmful effect on skin and eye. This is due to the absence of synthetic surfactants. Most of the synthetic surfactants produce inflammation of the eyelid and corneal irritation. But 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.

Dirt Dispersion

Two drops of 1% shampoo were added in a large test tube contain 10 ml of distilled water. 1 drop of India

ink was added; the test tube was stoppered and shaken for 10 times. The amount of ink in the foam of was estimated as None, Light, Moderate, or Heavy.

Nature of Hair After Washes

Nature of hair after wash can be done by collecting the responses of volunteers.

Foaming Index and Foaming Stability

1ml of the shampoo 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.

Viscosity

The viscosity of the tested shampoo was determined using Brookfield viscometer set as a different spindle speeds at 1-5,10 and 20rpm. The shampoos viscosities were measured using spindle C50-1. The temperature and sample containers size were kept constant during study.

Results and Discussion

The formulated shampoo was evaluated as per standard procedure. The results were mentioned below:

Table 2: Organooleptic Evaluation

S.NO.	Organooleptic evaluation	Result
1.	Colour	Brown colour
2.	Odour	Characteristics
3.	Taste	Characteristics
4.	Texture	Soft & smooth

Table 3: Physicochemical Evaluation

S.NO.	Physiochemical Evaluation	Result
1.	Ph	6
2.	Solubility	Soluble
3.	Washability	Easily washable
4.	Eye/skin irritation	No harmful effect on eye and skin
5.	Foaming capacity	Good foaming
6.	Stability	Stable

7.	Nature of hair after wash	Soft manageable
8.	Dirt dispersion	Moderate
9.	Viscosity	1724cps

Table 4: Foaming Index Calculation for Herbal Antidandruff Shampoo

T1	T2	T3	T4	T5
1ml= 5ml	2ml= 7ml	3ml= 8ml	4ml= 8. 5ml	5ml= 1 2ml

Note: T1 – T5 Test tube numbers 1 to 5

Foaming Index = $500/a$

= $500/4.5 = 111.1\%$

Shikakai and reetha show the inhibition. It means they inhibit the growth of *Malassezia furfur*. Lemon fresh juice which is used to reduces dandruff. Lemon has antidandruff property. Neem inhibits the microbial growth. The Herbal antidandruff shampoo inhibits the growth of fungus 1mm.



Conclusion

Dandruff, the excessive shedding of dead skin cell from scalp, is apparently caused by fungus called *Malassezia restricta*. Dandruff cannot be eliminated but can only be managed and effectively controlled. Symptoms of dandruff mainly include presence of, itching of scalp, fragments and redness around the scalp. Some of herbs which is used in the shampoo are may be antifungal, antibacterial which is eliminate or reduced the dandruff from the scalp. Synthetic shampoo means chemicals are used in the preparation, and some of synthetic antidandruff shampoo causes hair fall problems, hair damaged, stop hair growth, but the herbal antidandruff shampoo promotes hair growth, reduced hair falls problems, and hair damage also. Herbal shampoo contains only the herbs which gives the long-lasting effect without any harm of skin, eye, hair, scalp. Herbal antidandruff shampoo gently removes dandruff, nourishes and strengthens hair roots, ensuring a healthy scalp. Natural ingredients help

moisturize the hair, preventing dryness. It makes the hair healthy, shiny, lustrous, attractive, strong from the roots and repair the hair damages. It addresses the root cause of dandruff such as *Malassezia* fungus and dry scalp, while being gentle on hair.

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