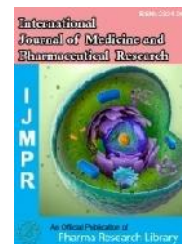




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RESEARCH ARTICLE

Formulation and Evaluation of Polyherbal Antidandruff Powder Pack

¹R. Kiran Jyothi*, ²Meena Ravindranath, ³G. Pushpa, ⁴C. Vijaykumar, ⁵D. Sreenivasulu

Jawaharlal Nehru technological university, Oil Technological Pharmaceutical Research Institute, Anantapuramu, Andhra Pradesh, India-515001

ABSTRACT

Natural beauty is blessing and cosmetics help in presenting and increasing the beauty and personality aspects of human beings. An herb is a plant or plant extract which are favour with nourishing and healing elements. Herbal cosmetics have improved much popularity among the population. Herbal cosmetics products claimed to have efficacy and intrinsic acceptability due to routine use in daily life and avoid the adverse effects which are commonly seen in synthetic products. In the scenario of changing food habits, stress level and dependent environment conditions, number of skin and hair disorders are encountered. In case of hair disorders like dandruff problem, proper selection of ayurvedic ingredient with their required amounts, dosage form can be formulated as powder pack to fight against dandruff. This herbal powder was formulated using natural ingredient like. Aloe leaf (*Aloe barbadensis*), Henna (*Lawsoniainermis*), Amla (*Emblicoefficialis*), Methi seeds (*fenugreek*), Neem (*Azadirachta indica*), Tulsi (*Ocimum sanctum*), Hibiscus (*Hybiscu rosa sinesis*), Curry leaf (*murraya koenigii*), Lemon peel (*citrus limon*), Ashwagandha (*Withania somnifera*), Ginger (*Zingiber officinale*). The combination of several such ingredient of herbal origin has made it possible to secure highly effective dry powder. The formulation was done and evaluated for number of parameters to ensure its safety and efficacy.

Keywords: Hair, Dandruff, Powder pack, Natural ingredients, Methi seeds, Antidandruff powder.

ARTICLE INFO

Corresponding Author

R. Kiran Jyothi

Jawaharlal Nehru technological university,
Oil Technological Pharmaceutical Research Institute,
Anantapuramu, Andhra Pradesh, India-515001
MS-ID: IJCPS3638



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1. Introduction

Hair is an important part of the overall appeal of the human body. The hair of the head has historically been associated

with beauty and social distinction. The appearance of hair plays an important role in people's overall physical

appearance and self-perception. Hair care is an overall term for e hygiene and cosmetology involving the hair which grows from the human scalp, and other body hair. Hair care routines differ according to an individual's culture and the physical characteristics of one's hair. With today's increasing life-expectations, the desire to look youthful plays a bigger role than ever. The hair care industry has become aware of this and is delivering active products directed towards meeting this consumer demand. There are plenty of hair cosmetics available in the market these days for hair care. However, the commercially available products are expensive and may pose certain kinds of side effects. Therefore natural products should be used to treat hair problems.

Hair:

In humans it is a special and cherished feature, especially in females, but its main functions are in protection of the skin from mechanical insults and to facilitate home therapy [1], eyebrows and eyelashes, for example, stop things entering the eyes, while scalp hair prevents sunlight, cold, and physical damage to the head and neck. It also has a sensory function, increasing the perception of the skin surface for tactile stimuli.



Fig 1: Human hair close up

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.

Physiology of the hair:

A hair arises from the integrated activities of several keratinocyte layers in the hair follicle. The development of hair is a dynamic, cyclic process in which the duration of

growth cycles is coordinated by many hormones and cytokines and depends not only on where the hair is growing but also on some other factors, such as the individual's age and stage of development, nutritional habits, or environmental alterations like day-length. Important players of this cycle are mainly cytokines (hormones), which are able to instruct the follicle to undergo appropriate changes, so that each hair can be in a different stage of growth cycle compared to the adjacent hairs. Hair follicles grow in repeated cycles, in which stages of rapid growth and hair shaft formation alternate with stages of apoptosis-driven hair follicle regression and relative hair follicle quiescence.

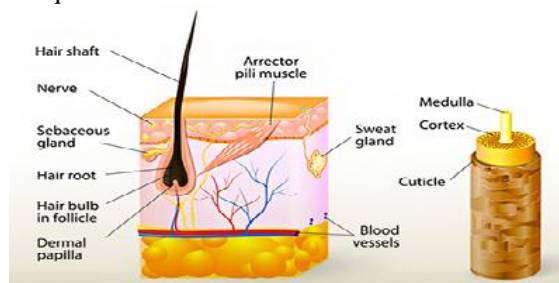


Fig 2: Anatomy and physiology of hair

Dandruff:

Dandruff is a major cosmetic problem that poses very great public health concern both in developed and developing countries (Krishnamoorthy *et al.*, 2006). No population in any geographical region would have passed through freely without being affected by dandruff at some stage in their life (Gupta *et al.*, 2004). The word dandruff (dandruff, dandriffe) is of Anglo-Saxon origin, a combination of „tan“ meaning „tetter“ and „drof“ meaning „dirty“ (Ranganathan and Mukhopadhyay, 2010). Dandruff is a chronic scalp condition characterized by scaling, itching and redness of the scalp. It occurs when scalp sheds epidermal cells in large clumps. The skin of scalp renews itself about once a month. Usually, scalp sheds dead cells in nearly invisible way, but sometimes cell turnover becomes unusually rapid and dead cells are shed as visible flakes called dandruff (Loden and Wessman, 2000).



Fig 3: Difference between normal scalp and dandruff scalp

Herbal hair pack: [15]

“Herbal packs are the cosmetic preparation that with the use of traditional ayurvedic herbs are meant for cleansing the hair, scalp and provides required nutrients just like the regular conditioners”. They are used for removal of oils, dandruff, dirt, environmental pollutions and makes healthy hair etc. benefits are expected, e.g. conditioning, smoothing of hair surface, improvement of compatability.

2. Materials and Methods

Procurement of material :

The different parts of the plants were selected for the study having hair care property. The plants are Neem (*Azadirachta indica*), Hibiscus (*hybiscuss rosasinensis*), Aloe (*Aloe barbadensis*), Henna (*Lawsonia inermis*), methi seeds (*Trigonella foenum graecum*), Tulsi (*ocimum tenuiflorum*), Amla fruit (*Embelic officinalis*), curry (*Murrays koenigii*), lemon peel (*Citrus limon*), Ashwagandha (*Withania somnifera*), Ginger (*Zingiber officinale*). The powder of Methi seeds, Amla fruit, Neem leaves, Aloe leaves, Henna Leaves, Hibiscus leaves, Tulsi leaves were collected from their plants. 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.

Method of preparation:

The experimental work was carried out in our laboratory by various methods.

Collection, Processing and Drying of Plant Material

Collection: The plant materials were collected from local market and local area. All the herbs were cleaned to remove all the unwanted, dirt particles and then subjected to shade dried for 72 hours.

Drying: All the powder are in dry form and grinded.

Weighing: All the required herbal powders for shampoo preparation were weighed individually.

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

Mixing: All these fine ingredients were mixed thoroughly by mixer to form a homogenous fine powder.

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

Table 1:Ingredients of herbal Hair Pack powder

S.No	Ingredient	Quantity (10g)
1.	Amla	1g
2.	Hibiscus leaf	1g
3.	Hibiscus flower	0.5g
4.	Neem	1g
5.	Tulsi	1g
6.	Curry	1g
7.	Aloe	0.5g
8.	Lemon peel	1g
9.	Henna	1g
10.	Ashwagandha	0.5g
11.	Methi	1g
12.	Ginger	0.5g

Evaluation of Herbal Powder Hair Pack

Prepared formulations of shampoos were subjected to following evaluation parameters.

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.

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 etc. All these powders were taken at three different level i.e. from top, middle and lower level for the evaluation.

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.

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 6 cm 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 was noted and recorded the angle of repose () can be calculated by using the formula.

Open - ended cylinder method:

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 () can be calculated by using the formula.

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

Where,

– Angle of repose, h – Height of the heap, r – Radius of the base of the sample.

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. [17]

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.

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 dessicator for 2 days over calcium chloride crystals. Then the powder was taken and weighed accurately to find out the weight loss during drying.

Moisture content determination:

10 g of each herbal shampoo powder was weighed in a tare evaporating dish and kept in hot air oven at 105°C. Repeated the drying until the constant weight loss was observed after the interval of 30 minutes. The moisture content was calculated for each sample.

Swelling index:

The swelling index is the volume in milliliters occupied by 1g of drug including any adhering mucilage, after it has swollen in aqueous liquid for 4 hours. Accurately weighed 1g of the powder and transferred it into glass stopper measuring cylinder containing 25ml of water. Then it is shaken thoroughly at every 10min for 1 hour. After that it was kept for 3 hours at room temperature. The volume was measured in ml.

Stability Study: Stability and acceptability of organoleptic properties (odor and color) of formulations during the storage period indicated that they are chemically and physically stable.

Skin 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.

Nature of hair after washes:

Nature of hair after wash was carried out with the help of application of herbal shampoo powder formulations (F1-F5) to volunteers. The volunteers observed the hairs as soft and manageable. The results were reported in Table.

Sensitivity test:

The prepared herbal hair oil was applied on 1 cm skin of hand and exposed to sunlight for 4-5 min.

3. Results and Discussion

Medicinal plants used in the formulation of herbal pack were found as rich source of novel drugs. These plants were Amla, Methi, Hibiscus leaf and flower, Neem, Tulsi, Curry, Aloe, Lemon peel, Henna, Ahwagandha, Ginger had been reported for hair growth and conditioning. The various quality control parameters were checked. All parameter gives favorable result. The result obtained on present study shows that the active ingredients of these drugs when incorporated in pack gives more stable products with good aesthetic appeal. The pH of the product 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 and being dry is very good for the storage. The evaluation parameters like Organoleptic evaluation, General powder Characters, Physicochemical Evaluation, Cleaning action, Nature of hair after wash was carried out and was found to be within the standard range.

Table 2: General powder characteristic: Particle size

S.No	Test	Result
1	F1	125 µm

Table 3: Organoleptic Evaluation/Visual Appearance: Colour

S.No	Test	Colour	Odour	Texture	Taste
1	F1	Pale green	charecteristic	Fine and smooth	Slight

Table 4: Physico chemical evaluation

S. no	Physic-chemical evaluation	F1
1	Washability	Easily washable
2	Solubility (water)	Soluble
3	Skin irritation	No harmful effect on skin
4	Moisture content determination	10% w/w
5	Swelling index	Before
		After
6	Stability	Stable
7	Nature of hair after washes	Soft manageable

Table 5: Summary of all the five formulations

S. no.	Physic-chemical evaluation	Result				
		F1	F2	F3	F4	F5
1	pH	4.8	4.15	4.10	4.19	4.65
2	Washability	Easily	slightly	Easily	Difficult	Easily

		washable	difficult	washable		washable
3	Solubility (water)	Soluble	Partially soluble	Insoluble	Partially soluble	Soluble
4	Skin irritation	No harmful effect on skin	No harmful effect on skin	No harmful effect on skin	No harmful effect on skin	No harmful effect on skin
5	Moisture contentdetermination	5 % w/w	5 % w/w	5 .1% w/w	5 % w/w	10 % w/w
6	Swelling index	Before	15cm	10cm	5cm	10cm
		After	22cm	19cm	20cm	12cm
7	Stability	stable	Stable	Stable	Stable	Stable
8	Nature of hair after washes	Soft manageable	Soft manageable	Soft manageable	Soft manageable	Soft manageable

4. Conclusion

A survey of global hair care market trends indicates that consumer use of herbal products has significantly 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 these problems the present study has the best undertaken to design a herbal hair pack 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 powder is effective in reducing dandruff without irritation, less adverse effect and better conditioning effect. Present investigations were carried out to formulate the herbal powder preparations based upon traditional knowledge and to develop few parameters for quality and purity of herbal powder. Nowadays there is strong demand for natural therapies, and this is increasing in western countries. The herbs which are a cheapest of phytoconstituents are on wheels to attain their role in polyherbal formulation so as to have synergistic role. Hence we conclude that the polyherbal powder formulation is effective in reducing dandruff without irritation, less adverse effect and better conditioning effect. The awareness and need for cosmetics with herbs is 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 products are more effective in terms of safety and ease of manufacturing and in the economic point of view they are cheap.

Conflict of Interest: We declare no conflict of interest.

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