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Formulation and evaluation of herbal shampoo using cassia Roxburghii

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ABSTRACT

Aim and Objective: The aim of the present study is to formulate and evaluate the herbal shampoo by using *Cassia roxburghii* and to assess its physiochemical function that emphasis on safety, efficacy, eliminating harmful synthetic ingredient, and substitute with harmless synthetic ingredient, safe natural ingredients.
Methods: The formulation of shampoo using the extracts of Emblica officinalis, Hibiscus rosa-sinensis, Eclipta prostrata, Sapindus mukorossi, Aloe barbadensis, Jasminum grandiflorum, Albumin and Cassia roxburghii in different proportions .Evalution of pH, physical appearance, Viscosity (Rheology), Antimicrobial studies, skin irritation, stability study, Dirt dispersion test, surface tension, foam stability, wetting time, Detergency ability was performed.
Results: The created cleanser was clear and good appealing. It demonstrated good froth stability, detergency, good cleansing, small bubble size, low surface strain, and execution of good conditioning.
Conclusion: The physicochemical evaluation of the formulated shampoo showed ideal results. However, to improve its quality, product performance, and safety, under ICH guidelines 30°C 2°C/ 65% RH 5% RH . Further development was required.

Keywords: Herbal shampoo; Cassia roxburghii, Eclipta prostrata, Sapindus indica, Evaluation of shampoo.

INTRODUCTION

Shampoos are most probably used as cosmetics. It is a hair care product that is used for cleaning scalp and hair in our daily life. Shampoos are most likely utilized as beautifying agents and are a viscous solution of detergents containing suitable additives preservatives and active ingredients. It is usually applied on wet hair, massaging into the hair, and cleansed by rinsing with water. The purpose of using shampoo is to remove dirt that is build up on the hair without stripping out much of the sebum. Many synthetic shampoos are present in the current market both medicated and non medicated; however, herbal shampoo popularized due to natural origin which is safer, increases consumer demand and free from side effects [1-3]. In synthetic shampoos, surfactants (synthetic) are added mainly for their cleansing and foaming property, but the continuous use of these surfactants leads to serious effects such as eye irritation, scalp irritation, loss of hair, and dryness of hairs [4]. Alternative to synthetic shampoo we can use shampoos containing natural herbals. However, formulating cosmetic products containing only natural substances are very difficult [5]. There are a number of medicinal plants with potential effects on hair used traditionally over years around the world and are incorporated in shampoo formulation [6]. These medicinal plants may be used in extracts form, their powdered form, crude form, or their derivatives [7]. To develop a shampoo containing an only one natural substance which would be safer with milder effect, then the synthetic shampoo is difficult and also it should possess good foaming, detergency, and solid content

as such synthetic shampoo. Hence, we considered in detailing an unadulterated natural cleanser utilizing conventional technique using regularly utilized plant material for hair washing In the present study, herbal shampoo was formulated containing suitable ingredient such as Hibiscus rosa-sinensis, Emblica officinalis, Sapindus mukorossi, Eclipta prostrata, Aloe barbadensis,jasminum grandiflorum and Cassia roxburghii, Albumin in different proportions to formulate and evaluate its physicochemical properties. The pericarp of S. mukorossi Poir. (Soapnut), products of Phyllanthus emblica (Amla), and units of dried Rosa-sinensis (Hibiscus) have been utilized customarily as old stories framework for purging hair [8]. Cleanser nut and when shaken with water create rich foam due to their high saponin content [9] it indicates frothing impact. Amla fruit and Cassia roxburghii leaves are used to promote hair growth, acting dry scalp, anti-dandruff agent, strengthen hairs, and prevent hair fall [10].E. prostrate leaves (Bhringraj) commonly known as false daisy in English and Bhringraj in India, to promote hair growth and prevent graying of hair [11]. H. rosa-sinensis flower and used as a conditioning agent.Jasminum grandiflorum used as a fragrance.Albumin used as a hair nutritious one.

METHODS

Plant

The plant materials required for the present study were obtained from in and around Tiruvanamalai, Tamil Nadu, and authenticated by the botanist Dr. M.U.Sharief, Scientist 'E', Botanical Survey Of India ,Coimbatore.

Preparation of extract

The leaves and stem of plant *Cassia roxburghii* were dried and powdered. After that it was sequentially extracted with aqueous solution. The solution was removed and used in formulation. The prepared extracts were stored for further studies.About 5g of powdered plant materials, namely *C. roxburghii* ,it is mixed with water and dissolve it properly after some times it is filtered by using whatmann filter paper and the obtained extract is used in the formulation. About 2.5g of powdered plant materials, namely H. rosa-sinensis, E. officinalis, E. prostrata, A. Barbadensis, Sapindus mukorossi was extracted with distilled water. The extract of each plant material was separately filtered and used in formulation.

Procedure

General methods for Preparation of Base for herbal shampoo

Sodium lauryl sulphate, Sodium alginate are weight and grind individually in the mortar pestle for the prevention of clogging of powders and transfer the grind powders to the beaker one by one with stirring by adding water and add egg white to the base and mix gently to prevention the formation of Foam. Hence base for herbal shampoo is prepared.

General methods of Preparation of herbal shampoo using plant extracts

After the preparation of base for the herbal shampoo weight the powdered plant material of H. rosa-sinensis, E. officinalis, E. prostrata, A. Barbadensis, Sapindus mukorossi to that powders add water and mix well and filter that extact by using whatmann filter paper and the extract is added to the formulation.

To the preparation, then add the main drug Cassia roxburghii is weighed and dissolved in water and they are filtered and then the filterate is added to the formulation and add egg white and flavouring agent Jasminum grandiflorum, preservative Methyl paraben and add Q.S. of water to the formulation in Table 1 . Mix gently to prevent the formation of foam. Hence the herbal shampoo is formulated.

Evaluation of herbal shampoo

The prepared formulation was evaluated for product performance which includes organoleptic characters, pH, characterization, and Rheologica evaluationl. To guarantee the nature of the items, particular tests were performed for surface tension, foam volume, foam stability, and wetting time using standard ICH gudieline protocol.

Visual assessment

The prepared formulation was assessed for color, clarity, odor, and froth content.

pH determination

The pH of the prepared herbal shampoo in distilled water (10% v/v) was evaluated by means of pH analyzer at room temperature.

Surface tension measurement

The prepared shampoo in distilled water (10% w/v) was evaluated for surface tension using stalagmometer in room temperature.

Table 1: Ingredients of the herbal shampoo

MATERIALS	QUANTITY
Sodium lauryl sulphate	2g
Sodium alginate	3.75g
Egg white	5ml
Cassia roxburghii	5g
Sapindus mukorossi	2.5g
Hibiscus rosa sinesis	2.5g
Aloe barbadensis miller	2.5g
Phyllanthus emblica	2.5g
Eclipta prostrata	2.5g
Jasminum grandiflorum	0.5ml

Methyl paraben	0.2g
Distilled water(up to 75ml)	q.s

Testing of wetting

Wetting time was calculated by noting the time required by the canvas paper to sink completely [3]. A canvas paper weighing 0.44 g was cut into a disc of diameter measuring 1-inch. Over the shampoo (1% v/v) surface, the canvas paper disc was kept and the time taken for the paper to sink was measured using the stopwatch.

Foam stability test

The stability of the foam was determined using cylinder shake method. About 50 ml of formulated shampoo (1%) solution was taken in a graduated cylinder of 250 ml capacity and shaken for 10 times vigorously. Foam stability was measured by recording the foam volume of shake test after 1 min and 4 min, respectively. The total foam volume was measured after 1 min of shaking.

Dirt dispersion test

To 10 ml of refined water two drops of cleanser were included and taken in a wide-mouthed test tube. To the formulated shampoo, added one drop of Indian ink and shaken for 10 min after closing the test tube with a stopper. The volume of ink in the froth was measured and the result was graded in terms of none, slight, medium, or heavy.

Conditioning performance evaluation

An artificial hair tress of Indian women was received from a salon and divided into two swatches of length 10 cm approximately, weighing 5 g. The control swatch was the one without washing and the test swatch using the formulated shampoo was washed with. Each tress was added for 2 min to the combination of shampoo in water in the proportion 10:15 taken in a conical flask and washed using 50 ml of distilled water. Each tress was air dried at room temperature and the procedure was repeated for maximum of 10 times. The conditioning effect of the prepared shampoo in terms of softness and smoothness was determined using a blind touch test using volunteers of student 20 numbers selected randomly [17]. The conditioning performance of the shampoo was rated in terms of Score 1–4 (4 excellent, 3 - good, 2 - satisfactory, and 1 - poor) by asking all the selected students to touch the tress washed with prepared shampoo.

Table 2: Description of the ingredients of the herbal shampo

S.No	Common name	Pictures	Botanical name	Family name	Category
1	Cassia roxburghii		Cassia roxburghii DC	IMLI FAMILY	Anti-dandruff, skin diseases
2	Bhringraj		Eclipta prostrata	Asteraceae	Hair growth
3	Hibiscus		Hibiscus rosa-sinensis	Malvaceae	Conditioning agent
4	Amla		Embilica officinalis	Euphorbiacae	Anti-dandruff
5	Aloe vera		Aloe barbadensis	Liliaceae	Coolant
6	Reetha		Sapindus mukorossi	Sapindaceae	Detergent
7	Jathimalli		Jasminum grandiflorum	Oleaceae	Fragrance
8	Egg white		Albumin	Chicken,Hen	Nutritious

Fig 1 : ***Cassia roxburghii*** **shampoo in Petridish**

Foam stability test: The stability of the foam was determined using cylinder shake method. About 50 ml of formulated shampoo (1%) solution was taken in a graduated cylinder of 250 ml capacity and shaken for 10 times vigorously. Foam stability was measured by recording the foam volume of shake test after 1 min and 4 min, respectively[25] . The total foam volume was measured after 1 min of shaking.

Antimicrobial activity: The assay was done by Agar well Diffusion method. The inhibition zone diameters were measured and the results were noted.

Washability: The formulation was applied to the skin and then was manually tested for ease and degree of washing with water.

Evaluation of formulated shampoo Physical appearance: The prepared shampoo showed good characteristics in terms of foaming effect and appearance on the visual inspection of the formulation. The results are shown in Table 2,3

pH

The pH of the prepared solution of shampoo using distilled water (10%) was evaluated at 25°C temperature. For enhancing and improving the hair quality, pH of the shampoo is very important and also for stabilizing the scalp and minimizing irritation to the eyes [18]. For minimizing the damage of hair using shampoo, one of the ways in the present trend is to develop shampoos having lower pH value.

Lowering of pH (mild acidity) promotes tightening of the scales and prevents swelling, thereby producing sheen. The results are presented in Table 2,3 .

Surface tension

The surface tension reduction in the prepared shampoo was found to be of about 33.70dynes/cm (Table 3). One of the mechanisms in the detergency property is the lowering of surface tension, and this will be the marker for a good detergency effect of the shampoo which could be done by reducing the surface tension of water from 72.8 dynes/cm to the surface tension of water 32–37 dynes/cm

Wetting time

To test the efficacy of the shampoo, wetting ability of a surfactant needs to be calculated which depends on the concentration of surfactant . For the evaluation of wetting ability of the shampoo, canvas disc method is used which is an efficient, quick, easy, and reliable method. The prepared shampoo shows the wetting time of the about 3 s. The maximum of wetting time shows that the shampoo contains lower amount of detergents.

Table 3: Physicochemical study of the herbal shampoo

Evaluation test	Formulated shampoo
Colour	Dark brown colour
Transparency	Clear
Odor	Good
pH of 10% solution	7.6
Foam volume (ml)	36
Foam type	dense, small
Surface tension (dynes/cm)	33.70
Wetting time (s)	3 s
Viscosity (Pa.s)	1.25

The formulation was applied to the skin and then was manually tested.

Anti microbial activity by Agar well diffusion method

B- Extract 5ml from 3gm of powder C-Herbal Shampoo with preservative

Foaming ability and foaming stability

From the consumer point of view, foam stability is one of the important needs of a shampoo. Important parameter that was considered in the shampoo evaluation was determination of foaming stability. The foam volume produced by the formulated shampoo is above 50 ml. The prepared shampoo generates uniform, small sized, compact, denser, and stable foam. The foam volume remains same throughout the period of about 5 min showing that the generated foam by the shampoo has good stability and the prepared shampoo exhibits higher foam property which may be due to the presence of both SLS and soapnut.

Dirt dispersion test

In the dirt dispersion test using Indian ink, the volume of ink in the froth was measured and the result was graded as none, light, moderate, or heavy.

Conditioning performance

Based on the conditioning performance of the prepared shampoo, the average value reported by the student is given in Table 4. The score of conditioning performance of the control tress (without washing) was found to be 1.1 and for the tress that was washed with prepared shampoo; the score out of 4 was 3.0. The results revealed that the shampoo formulated is having good conditioning effect.

CONCLUSION

The present study was carried out with the aim of preparing the herbal shampoo that reduces hair loss during combing, safer than the chemical conditioning agents as well as to strengthen the hair growth. Herbal shampoo was formulated with the aqueous extract of medicinal plants that are commonly used for cleansing hair traditionally. Use of conditioning agents (synthetic) reduces the protein or hair loss. To provide the effective conditioning effects, the present study involves the use of cassia, amla fruit, and other plant extracts instead of synthetic cationic conditioners. The main purpose behind this investigation was to develop a stable and functionally effective shampoo by excluding all types of synthetic additives, which are normally incorporated in such formulations. To evaluate for good product performance of the prepared shampoo, many tests were performed. The results of the evaluation study of the developed shampoo revealed a comparable result for quality control test, but further scientific validation is needed for its overall quality under ICH guidelines stability studies 30°C ± 2°C/ 65% RH ± 5% RH. In future further invivo studies will be conducted.

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