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HERBAL OIL: FORMULATION & EVALUATION

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ABSTRACT

Soft, glossy, lustrous and bristling hair not only add to beauty but moreover is an indicator of wellbeing. Self-grooming is necessary to reflect a good impact of one's personality for which everyone is involved by utilising various cosmetics. Currently hair predicaments affect both men and women alike which may be due to genes, stress, hormonal fluctuation, chemical exposure, improper diet, pollution, irregular hair care, stress, anxiety etc. Since ages medicinal and aromatic herbs have been utilised by humans as an essential haircare remedy. Apart from being used as medicament herbs are nowadays also contributing in formulating cosmetic preparations. Reportedly herbs have multiple phytoconstituents that provide numerous benefits to skin, hair, nails, teeth, eye etc when incorporated in cosmetic preparations. In our current study we formulated a polyherbal hair oil, utilising the herbs reportedly contributing towards wellness and overall hygiene of hair. We incorporated Til oil, Coconut oil, Nagarmotha, Amla and Hibiscus powder. Herbal aqueous extract by mixing all powders was prepared and incorporated with the oil base. Formulation was assessed by experimental paradigms including- organoleptic and physicochemical evaluation, phytochemical screening of extracts, stability testing and evaluation of antimicrobial activity. The zone of inhibition exhibited by formulation at 0.2ml concentration was found to be beneficial to provide optimised antimicrobial activity. The overall results of the formulation were adequate. It was concluded that amalgamation of herbal powders and oils was advantageous to prevail over hair problems.

KEYWORDS: Hair, Herbal oil, Nut grass, Hibiscus, Til oil, antimicrobial activity.

INTRODUCTION

Hair is a keratinous filament emerging out of the epidermis. It is primarily made of dead, keratinized cells. Strands of hair originate from an epidermal penetration of the dermis called the hair follicle which facilitates hair growth.[1]

In ancient texts like Ayurveda, hair loss is termed as "Khalitya" under the category of "Shiroroga" meaning disease of head and scalp. It described Shiro Abhyanga / head oiling under the concept of "Dinacharyas" and how it is of great significance than just a cosmetic habit.[2]

The herbal hair oil augments these hair follicles to nurture and endorse the growth of hair. Hair oil preparation helps to overcome various hair problems like alopecia, greying of hair, split ends, dandruff, frizzy hair etc.

Compendias called Charak Samhita and Sushrutha Samhitha provide insights into obtaining these medicinal herbal extracts, to notably diminish khalitya.

Herbal hair oils are the formulations that are health-giving, provide strength, make hair flakes and seborrheic free. They mostly include amla oil, coconut oil, almond oil, olive oil, jojoba oil, sesame oil boiled along with powdered mixture of herbs.[3]

MATERIALS AND METHODS

A) Plant material

The powder of Nagarmotha, Hibiscus, Amla and oil of Til and Coconut were procured from the authenticated source.

Nagarmotha

Fig. 1: Nagarmotha.

Commonly known as Nut grass, Lavala is a perennial herb (weed) that has significant value in Ayurvedic medicines. The botanical name is *Cyperus rotundus* and belongs to the sedge Family Cyperaceae.

Herb shows the presence of terpenoids, essential oils, flavonoids and resins.

Nagarmotha revives and replenishes dull and dried hair, helps to restore natural vibrancy and health of hair. Along with til oil, nagarmotha too provides antibacterial properties[4] that helps to maintain good health of hair. It contributes as a natural deodorizer and excellent moisturizer to provide deep nourishment to the hair.

Hibiscus

Fig. 2: Hibiscus.

Hibiscus commonly known as Azalea, Jaswand. It contains fresh flowers & leaves of *Rosa sinensis*, Family Malvaceae.

Hibiscus flowers consist of cyanidin, Di-glucoside, flavonoids and vitamins, thiamine, riboflavin, niacin and ascorbic acid (vitamin C).

Hibiscus being a rich source of flavonoid and amino acids provides the hair with various micronutrients like fiber, protein, carbohydrate that stimulate hair growth by activating dormant follicles. As it contains good amount of vitamin C, A and iron it exhibits antimicrobial and antioxidant property. This powdered herb is believed to be used in earlier times as anti-dandruff agent, and also to treat alopecia [5] Additionally amino acids help to enhance the production of keratin, a primary building block of hair. According to Ayurveda, the reason for hair loss is extreme body heat, and hibiscus helps overcome the same due to its cooling action.

Amla

Fig. 3: Amla.

Amla is also known as Indian gooseberry, Amalki or Emblica. It is dried as well as fresh fruit pericarp of plant *Emblica officinalis* L, Family Euphorbiaceae.

Amla, popularly also known as "Queen of the Ayurvedic Rejuvenating Herb",[6] is rich in Vitamin C (ascorbic acid). Fruits also contain phyllemblin, fat, tannin, calcium, phosphorus, iron along with this, it also has gallic acid, gallotanin and ellagic acid.

Fatty acids in amla promote hair strength and lustre while tannins and calcium provide protection against photo and heat damage. Vitamin C in amla enhances enhance collagen production[7] that adds length and volume to hair.

Til oil

Fig. 4: Til oil.

Til oil also known as Sesame oil, Gingelly oil, Benne oil is extracted from the seeds of *Sesamum indicum* L. (Pedaliaceae), herb cultivated in India, China, Japan, Caribbean islands and tropical countries.

Seeds contain 45-50% fixed oil, principal constituents are glycerides of oleic and linoleic acids and small fractions of palmitic, stearic and arachidic acids.[8] Moreover around 5% of olein and phenol called sesamol is present. Besides it comprises sesamin, sesamolinol and sesamolin.

These compounds make oil a rich source of antioxidant[9] that has a plethora of benefits in particular like defence against UV rays. Moreover, it counteracts hair and scalp infections, eradication of dandruff, getting rid of hazardous pollutants and toxins.

Til oil act as an emollient thus its use in pharmaceutical contributes to maintain soothe skin and make the strands of hair look sleek and soft. It contains the same kinds of healthy fatty acids that are added to shampoos, skin creams, and makeup. According to ayurveda on massaging the oil on the scalp, it improves blood circulation,[10] and by virtue of its antimicrobial properties it ensures the scalp is free of filth, contamination and impurities.

Coconut oil

Fig. 5: Coconut oil.

Coconut oil or copra oil is obtained from the dried solid part of the endosperm of coconut, *Cocos nucifera* L. Family Palmae. It consists of triglycerides of lauric and myristic acids, along with small portions of caproic, caprylic, oleic, palmitic and stearic acids.

Fatty acids in coconut oil reduce sebum. Lauric acid and caprylic acid in coconut helps to prevent bacterial and viral infections.[11] It is been used as moisturiser for both skin and

hair[12] that makes healthy looking tresses. These enormous benefits take the formula up a notch.

Formulation

Sr. No.	Ingredients	Quantity
1	Nagarmotha powder	20g
2	Hibiscus flower powder	5g
3	Amla powder	10g
4	Til oil	20ml
5	Coconut oil	30ml

Procedure

Polyherbal hair oil was prepared (50 ml) by boiling all the prescribed herbs with suitable oil base of coconut and til according to the mentioned formula. This process helps for better absorption of the bio actives of the herbs utilised in formulation.

- All the ingredients were weighed accurately.
- The herbs were then added to the oil base.
- The mixture was heated on low flame with continuous stirring to avoid adherence of material.
- Moisture of the plant material commenced to evaporate so the mixture does not stick to the bottom surface of the vessel.
- Heating made the oil to form a froth so all the active ingredients of plant material get concentrated in oil.
- The resultant mixture was filtered through muslin cloth and the collected strain was Polyherbal hair oil.

Evaluation of Polyherbal hair oil

The prepared polyherbal hair oil was assessed using various parameters that are mentioned as follows:

1) Organoleptic Properties**:** Colour was observed by visual inspection and odour was evaluated olfactorily.
2) Phytochemical screening of polyherbal hair oil preparation**:**

The qualitative chemical analysis of polyherbal hair oil was performed to find out the presence of significant bio actives such as alkaloids, flavonoids, tannins, terpenoids, saponins, glycosides and phenols.

- Alkaloids - Dragendorff's test
- Flavonoids - Shinoda test
- Tannins and phenolics - Ferric chloride test
- Terpenoids - Salkowski test
- Saponins - Foam test
- Glycosides - Borntrager's test

3) pH Determination**:** Formulated hair oil was evaluated for pH using a digital pH meter.
4) Viscosity**:** The viscosity was determined by Ostwald's Viscometer.
5) Specific gravity**:** Specific gravity of formulation was determined by specific gravity method.
6) Saponification value: The refluxed mixture of 2g of oil and 25 ml of 0.5M ethanolic KOH along phenolphthalein as an indicator was titrated against 0.5M HCL.
7) Refractive Index: The refractive index was determined using Refractometer.
8) Skin irritation test (Patch Test): The formulation applied to $1cm^2$ area of sensitive skin i.e., skin behind ear and dorsal part of left hand. The site of patch was observed for any reaction, irritation, edema or erythema for 24 hrs. The same was performed 3 times.
9) Stability studies**:** The oil was observed for stability conditions by storing it at room temperature and observing it at different time intervals of 1, 2, 4 and 6 months respectively.
10) Antimicrobial activity**:** The antimicrobial activity of polyherbal hair oil was determined using the Agar well diffusion method. To previously inoculated culture (*Candida albicans*), hair oil samples of different concentrations 0.1ml, 0.2 ml were placed aseptically having wells of agar plate and incubated at 37°C for 2 days. Fluconazole was used to serve as standard. After the incubation period plate was observed and then zone of inhibition was measured.

RESULT AND DISCUSSION

Table 1: Physical evaluation of Polyherbal Hair Oil.

Sr. No	Parameters	Observations
1	Colour	Brown
2	Odour	Characteristic
3	pH	4.8
4	Viscosity	0.00510 centipoise
5	Specific gravity	1.015
6	Saponification value	199.05
7	Refractive index	1.120

8	Skin irritation	No irritation

Table 2: Phytochemical Screening of Polyherbal Hair Oil.

Sr.No	Name of the test	Results
1	Alkaloids test	+ve
2	Flavonoids test	+ve
3	Tannins and phenolics	+ve
4	Terpenoids	+ve
5	Saponins	+ve
6	Glycosides	+ve

(+ve indicates positive)

Table 3: Anti microbial activity determination.

Concentration (ml)	Zone of Inhibition					
	Trial 1 (cm)		Trial 2 (cm)		Trial 3 (cm)	
	Test	Standard	Test	Standard	Test	Standard
0.1	0.6	2.1	1.2	2.1	1.5	2.1
0.2	0.9	2.1	1.3	2.1	1.9	2.1

Fig 6..1 Plate 1

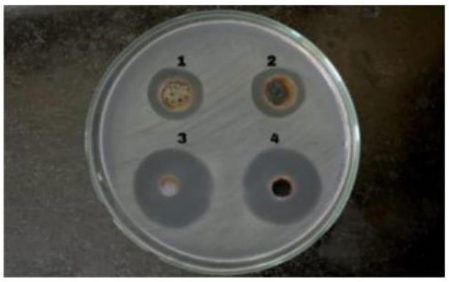

Fig 6.2 Plate 2

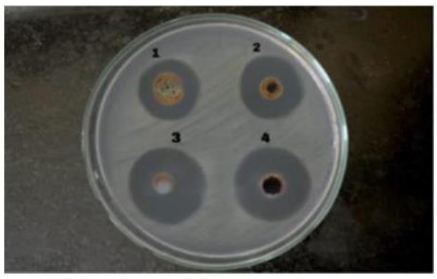

Fig 6.3 Plate 3

Fig. 6: Determination of Antimicrobial activity by agar well diffusion method.

(The numbers 1 and 2 near well served as test sample while 3 and 4 served as standard reference)

The prepared formulation had its colour imparted due to its various constituents and was identified as brown and odour was characteristic.

The phytochemical screening confirmed the presence of alkaloids, flavonoids, tannins, phenols, terpenoids, saponins and glycosides that added to antimicrobial activity which was proved by agar well diffusion method.

Further the pH was found to be 4.8 which was pertinent to human skin while viscosity depicted was 0.00510 centipoise.

The specific gravity of the formulation was measured as 1.051. The saponification value determines the average molecular weight of fatty acids in the sample, higher the saponification value lower is the fatty acids weight. The formulation's saponification value was reported as 199.05, achieving this value indicates the oil is relevant to be used as a cosmeceutical.

The refractive index of formulation was found to be 1.120. After application of oil on the skin of an individual it didn't show any side effects which indicated that the formulation is suitable for use without any irritant effects.

Antimicrobial activity was determined using agar well diffusion method, where two wells 1 and 2 were used for test samples while the 3 and 4 wells were utilised as standard. The three trials were performed with two different concentrations 0.1ml and 0.2ml.

The zone of inhibition is a measure of antimicrobial activity of the agent and it is proportional to effectiveness of the antimicrobial agent or the formulation, the same parameter was compared between the formulation and the standard. The formulation exhibited 1.9cm zone of inhibition at 0.2ml concentration which, when compared to the standard, depicts that the formulation has optimum antimicrobial activity.

CONCLUSION

Currently there is an increased demand for herbal preparations than synthetic ones as people believe that the products from nature have lesser or no side effects. Considering the same, current research work aimed at formulating and evaluating a polyherbal hair oil formulated using Til oil, Coconut oil, Nagarmotha, Amla and Hibiscus powder.

The formulation was assessed by various parameters and the results were within the acceptable limits and satisfactory. It was concluded that the oil is beneficial to counteract

scalp and hair infection as the hair oil showed significant antimicrobial activity when compared to standard.

The formulation aimed to put together the numerous benefits of herbs to establish a good blend of terpenoids, flavonoids, vitamins and various essential nutrients that contribute to maintaining a healthy hair regimen.

This work was conducted to develop a polyherbal hair oil which was reported to have antimicrobial activity due to incorporation of different herbs that provided a mixture of suitable phytoconstituents that contributed to promising antimicrobial activity.

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