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RESEARCH ARTICLE

# Formulation and Evaluation of Polyherbal Dermatological Cream

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## ABSTRACT

In this study creams were formulated based on the Neem, Aloe vera potential of herbal extract and its evaluation. Selected plant parts were dried and extracted using water by maceration .Quality evaluation of the product was assessed by using different evaluation methods. No change of the physical properties was observed the pH was in a proper range i.e.6.The formulation showed good spreadability, no evidence of phase separation and good consistency during the study period. Stability parameters like visual appearance, nature, viscosity and fragrance of the formulations showed that there was no significant variation during the study period. Combining the extracts of Aloe vera, neem in different ratio to get multipurpose effect such as whitening, antiwrinkle, antiaging and sunscreen effect on skin. As we know that it is not possible to increase the extent of efficiency of medicinal and cosmetic property of single plant extract, but by combining the different plant extracts it can be possible to increase the efficacy of extracts.

**Key words:** Antiwrinkle, antiaging, sunscreen effect, spreadability

## INTRODUCTION

A cream can be successfully used to deliver and hold nutrients and medications on the skin's surface.

- **Herbal cream**

Herbal cosmetics are the preparations used to enhance the human appearance. [1]

Herbal cosmetic also known as “natural cosmetics”. With the beginning of the civilization, mankind had the magnetic dip towards impressing others with their looks. At the time, there were no fancy fairness creams or any cosmetic surgeries. The only thing they had was the knowledge of nature, compiled in the ayurveda. With the science of ayurveda, several herbs and floras were used to make ayurvedic cosmetics that really worked. Ayurvedic cosmetics not only beautified the skin but acted as the shield against any kind of external affects for the body. [2]

Herbal cosmetics are the products in which herbs are used in crude or extract form. The basic idea of skin care cosmetic lies deep in the Rigveda, Yajurveda, Ayurveda, Unani and Homeopathic system of medicine. [3]

Creams generally consist of two basic components, an oil phase and an aqueous phase. A cream is formed when the oil phase is successfully emulsified into the aqueous phase, producing an oil in water emulsion of stable and solid consistency at room temperatures. [4]

- **Functions**

Both the oil and aqueous components can be used as a carrier. The skin has a limited capacity to absorb many oils and some chemical compounds and is responsive to surface medications such as herbal extracts, and to vibrational energies such as Flower essences. [4]

- **Applications of Herbal Products in Cosmetics [2]**

**Herbal Skin Care Products:**

Lavender Silk Soaps, Lotions creams, Body powder**,** Lavender Herbal body powder, **Skin** Care Creams. [6]

**Herbal Hair Care Cosmetics:**

Henna (Lawsonia Inermis), Amla (Emblica Officinalis), Shikakai (Acacia Concinna), Brahmi (Bacopa Monnieri),Bhringraj (Eclipta Alba), Guar Gum (Cyamopsis tetragonolobus.

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**Herbal Lip Care Cosmetics:**
Herbal Lipsticks, Herbal Lip Gloss, Herbal Lip Balm, Herbal Lip plumper.

**Advantages over existing process / product:**
Aroma – mood lifting, anti-depressant, anti stress, sensual pleasure providing, creative thought inducing, anxiety reducing, refreshing, stimulant, soothing, fragrant & antimicrobial.

**Herbal Eye Care Cosmetics:**
Eye Make Up, Eye Shadows, Eye Gloss, Liquid Eye Liners

**Herbal Creams, Lotions, Gel:**

**Creams:**
Aloe Moisturizing Hand Cream, Rich Face and Hand Cream**,** Herbal Moisturizers

**Herbal Oils:**
Herbal oils are Effective for Baldness, Falling of Hair, Thinning of Hair, Dandruff, and Irritation & Itching of Scalp.

**Herbal Perfumes &fragrances:**
Citrus Fragrance: The light, fresh character of citrus notes (bergamot, orange, lemon, petitgrain, mandarin etc...) is often combined with more feminine scents (flowers, fruits and chypre).

**Indian Extracts for Herbal Cosmetics**
Herbal extract are primarily added to the cosmetic preparation due to several associated properties such as antioxidant properties. This antioxidant botanicals are generally classified in to three categories depending upon the nature of their constituents as carotenoids, flavonoids and polyphenols. The carotenoids are structurally related to vitamin A and constituents various retinols like retinoic acid. Flavonoids in addition to the antioxidant action , impart the U.V. protection and metal chelating properties.[5]

- **Description of Aloe vera**

**Family:** Liliaceae

**Botanical Name(s):** Aloe barbadensis, Aloe indica, Aloe barbados, Aloe vera

**Popular Name(s):** Aloe, Aloe Vera, Indian Alces, Kumari, Ghirita, Gawarpaltra, Barbados aloe, Curacao aloe and Lu hui etc.

**Description**
It is a stemless or very short-stemmed plant growing to 80-100 cm tall, spreading by offsets and root sprouts. The leaves are lanceolate, thick and fleshy, green to grey-green, with a serrated margin. The flowers are produced on a spike up to 90 cm tall, each flower pendulous, with a yellow tubular corolla 2-3 cm long. The tissue in the center of the aloe leaf contains a gel which yields aloe gel or Aloe vera gel.

**Aloe vera contains an array of materials, including the following** [6]
Acids: antimicrobial, anti-helminitic (anti-parasitic worms), wound healing for skin tissue
Amino Acids: required for repair and growth. Aloe vera contains twenty of the twenty two Essential amino acids.
Enzymes: catalysts enabling chemical reactions to take place.

**Aloe Vera for A healthy skin** [6]
Apart from its effect on the internal organs, Aloe vera has a beneficial effect on the skin.

- It is rich in anti-oxidants, which neutralize free radicals. As a result, Aloe vera wards off
- Wrinkles and age related changes.
- It nourishes the skin, by boosting the circulatory system.
- Aloe vera is effective in treating skin disorders, like dermatitis, and even psoriasis.
- It heals cuts and wounds, blisters and burns, including sunburns, and even minor second
- Degree burns.
- Aloe vera clears acne and skin allergies, dark spots and skin blemishes, and makes the skin
- Clearer.
- It is also good for the hair and scalp.

- **Description of Neem**

The herb, Azadirachta indica, **family** Meliaceae has been found to have the properties of a Blood purifier, beauty enhancer. It is used for a number of medicinal purposes. Some areas where it can be uses in the treatment of common cosmetic problems are skin cleanser. [7]
Neem extract which have Nimbinin, nimbandiol as active constituents, alcoholic extract of the leaves was found to possess a significant blood sugar lowering effect, which are very useful against diabetes. Neem is used in Dermatitis Eczema, Acne, Bacterial, Fungal infections and other skin disorders. Different parts of Neem tree are being used extensively in manufacturing of soaps, skin creams/lotions, shampoos, toothpastes, beauty aids and toiletries. [8]

**Table 1: Formulation ingredients and their uses**

| Ingredients | Uses |
|---|---|
| Stearic acid | Stearic acid is a saturated fatty acid, uses as a surfactant and softening agent.[9] |
| Triethanolamine | used as a buffering agent, masking and fragrance ingredient, and surfactant, neutralizing various acids and pH adjustment.[10] |
| Cetyl alcohol | Emollient, emulsifier or thickening agent, carrying agent , surfactant, helps alter the viscosity and increase the foaming capacity of non-aqueous (i.e. lotions) and aqueous. solution.[11] |
| Methyl paraben | Antifungal and preservative. |
| Propyl paraben | Anti-fungal and anti-microbial properties to extend the shelf life of beauty and cosmetic products. |
| Glycerin | Lubricant and humectants, glycerin attracts water to skin and helps skin to feel smoother and softer. helps maintain the skin's water balance. |
| Propylene glycol | It attracts water and function as moisturizers to enhance the appearance of skin by reducing flaking and restoring suppleness. Propylene Glycol is also used to help stabilize formulations.[12] |
| Sorbitol | A humectant. Humectants draw water to the surface of the skin from the environment when there's adequate moisture in the air, thickener.[14] |
| Sodium metabsisulfite | Disinfectant and preservative agent in cosmetics, antioxidant. |
| EDTA(ethylenediaminete traacetic acid) | "chelator," which means it binds to certain mineral ions to inactivate them. a preservative, stabilizer, but has also been shown to enhance the foaming and cleaning capabilities of a cosmetic solution.[15] |
| Mineral oil | Moisturizing ingredient , emollient, skin conditioning agent. |
| Almond oil | Emollient properties help the skin to balance water loss and absorption of moisture and to promote a clear, young looking complexion. |

## MATERIALS AND METHODS

- **Materials**

Stearic acid, Cetyl alcohol, Sorbitol were purchased from Suvidhinath laboratories (Sulab) from Baroda and Triethanolamine, almond oil, mineral oil, glycerin ,methyl paraben , propyl paraben , sodium metabisulfite , Propylene glycol from Loba chemicals Ltd from Mumbai. All chemicals were of analytical grade.

- **Collection of Neem plant leaves**

Leaves from *Azadirachta indica* plant were collected from Mandsaur Institute of Pharmacy college campus , Mandsaur in October 2014 . Authentication of the plant was done by botanist Dr. Gyanendra Tiwari (Senior scientist) K.N.K. Collage of Horticulture, Mandsaur (M.P.) and specimens were submitted to department of pharmacognosy. Authenticated no. MIP Pharmacognosy / 2014/ 05.

- **Preparation of aqueous extract of leaves**

The collected leaves were thoroughly washed and dried in shadow and then grounded to powder. dried powder were macerated in 200 ml distilled water then this solution stir continuously for 30 min. filter the solution and then filtrate was evaporated completely to obtain extract of drug.

## METHOD

- **Moisturizer conditioner:**

Mixture of Propylene glycol: glycerin : sorbitol, 2:1:1

All aqueous soluble ingredients with extract solution were dissolved in water and all oil soluble ingredients were mixed at $75^0$ C in separate beakers. The aqueous phase was then added to oil phase slowly with constant stirring , then juice of aloe vera was added, perfume was added when the temperature dropped to $45^0$ C.

## FORMULATION

| Ingredients | Conc. % w/w | Conc.% w/w | Conc.% w/w |
|---|---|---|---|
| Extract soln. | 1.50 | 1.8 | 2 |
| Stearic acid | 10 | 9.8 | 10 |
| Triethanolamine | 1.35 | 1.34 | 1.35 |
| Almond oil | 2.8 | 2.8 | 2.5 |
| Mineral oil | 3.4 | 3 | 2.5 |
| Moisturizer conditioner | 10 | 10 | 9.5 |
| Cetyl alcohol | 3 | 2.34 | 2.0 |
| Methyl paraben | 0.7 | 0.14 | 0.18 |
| Propyl paraben | 0.02 | 0.03 | 0.2 |
| Sodium metabsisulfite | 0.4 | - | - |
| EDTA | 0.2 | 0.1 | 0.02 |
| Water (Q.S.100) | Q.S. | Q.S. | Q.S. |

- **Evaluation**

pH of prepared herbal cream was measured using digital pH meter.

- **Homogeneity**

Homogeneity of formulation was tested by visual observation and was ranked as follows :

+++ = Excellent

++ = very good

+ = good

_= poor

- **Consistency**

The cone attached to holding rod was dropped from the fix distance of 10 cm such that it should be fall on the centre of measuring cylinder filled with herbal cream .the distance Travelled by cone was noted down after 10 sec.

- **Rheological properties**

Take a fixed quantity 10gms of cream in a 10ml beaker. Keep it impact for 1 hr. The beaker was inclined to one side see whether the cream I liquefied or not. beaker is shaken to and fro for continuous 5mn and checked whether consistency has changed or not. The beaker was again tilted and checked for pourability of the cream.

- **Viscosity measurement**

A Brookfield Synchro electric viscometer ,

Brookfield ,MA) was used to measure the viscosity (in cps ) of cream .the spindle was rotated at 2.5 rpm .samples of the cream Were allowed to settle over 30 min. at the temperature of test ($25\pm1^0$c)before the measurement were taken .

- **Extrudability**

Extruedability was determined using an extrudability apparatus. A closed collapsible tube containing formulation was pressed firmly at the crimped end. When the cap was removed formulation extruded until the pressure dissipated.

- **Spreadability**

The spreadability determination: Excess of sample was applied in between two glass slides and was compressed to uniform thickness by placing 100gm Weight for 5 minutes. Weight was added to the pan .the time required to separate the two slides , i.e. the time in which the upper glass slide moved over the lower plate was taken as measure of spreadability.

Where; M=weight tide to upper slide, l=l ength moved on the glass slide, t=time taken

- **Irritancy test**

Mark an area (1sq.cm) on the left hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24 hrs and reported.

- **Accelerated stability testing**

Accelerated stability testing of prepared formulations was conducted for 2 most stable formulations at room temperature, studied for 7 days. They were studied at $40^0$C ± 1 for 20 days. The formulations were kept both at room and elevated temperature and observed on 0th, 5th, 10th, 15th and 20th days.

## RESULTS

**pH of the Cream**:

The pH of the cream was found to be in range of 5.6 to 6.8 which is good for skin pH.

**Irritancy test:**

The formulation shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin.

**Homogeneity:**

All formulations produce uniform distribution of extracts in cream. This was confirmed by visual appearance and by touch.

**Appearance:**

When formulation were kept for long time, it found that no change in colour of cream.

**After feel:** Emolliency, slipperiness nature of the cream.

**Removal:**

The cream applied on skin was easily removed by washing with tap water.

**Rhelogical properties:**

The formulation showed no thixotropic (shear thinning) characteristics.

**Stability testing:**

Upon stability determination prepared herbal cream showed a stable homogenous appearance during the said period and no separation phase occurred.

**Extrudability**:

Prepared herbal cream showed good Extrudability from collipasable tube containing formulation upon pressed.

## CONCLUSION

It is concluded that on combining the extracts of *Aloe vera, neem* in different ratio to get multipurpose effect such as whitening, antiwrinkle, antiaging and sunscreen effect on skin. As we know that it is not possible to increase the extent of efficiency of medicinal and cosmetic property of single plant extract, but by combining the different plant extracts it can be possible to increase the efficacy of extracts. In this regard, we mixed the extracts of *Aloe vera, neem* to improve as well synergizes the cosmetic properties of prepared products compare to individual extracts.

The prepared formulations showed good spreadability, no evidence of phase separation and good consistency during the study period. Stability parameters like visual appearance, nature, viscosity and fragrance of the formulations showed that there was no significant variation during the study period. Further clinical studies are needed to validate the therapeutic potential of this herbal cream against of skin disorder.

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