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FORMULATION AND EVALUATION OF POLY HERBAL COSMETIC FACE CREAM

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Abstract:

Natural remedies are safer with fewer side effects than the synthetic ones. The present work deals with the Formulation development and evaluation of the poly herbal skin cream containing hydro-alcoholic extract of Liquorice, ashwagandha, Nagarmotha, Terminalia Chebula, carrot and aloe Vera along with the cream base ingredients liquid paraffin, cetyl alcohol, stearic acid in various concentrations along with other ingredients and preservatives in various trials F1-F5. The present study proposes to make use of hydroalcoholic extract of these plant materials to make the cream more effective as these plants have been reported in the literature to exhibit good anti- microbial, anti-oxidant and anti-inflammatory properties. Various trials of polyherbal creams F1 to F5 were formulated by incorporating different concentrations of ingredients, then they were evaluated for various parameters like pH, viscosity, spreadability, Washability, consistency, irritancy, etc., Based on the results trial F3 was found to be optimized as it exhibited excellent properties mandatory for cream. Formulation F3 showed good spreadability, good consistency, homogeneity, appearance, pH with no evidence of phase separation and it shows no redness, inflammation and irritation during irritancy studies, hence it is was optimized and identified as a safe formulation to be used for skin and the formulation F3 proves it is stable when subjected for stability test.

Key words: *Extracts, Cream, Stability, Consistency and Viscosity.*

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INTRODUCTION:

Herbs have played an important part in our development. More than 2000 years ago, Hippocrates wrote extensively about herbal medicine healing. Until the 20th century, medicine mostly relied on plants, plant extracts, and other plant products for treatments. The 1900s witnessed the first creations of completely synthesized medicines. And yet, decades later, three-fourths of the world's population still primarily relies on plant use in treating disease. Similarly, many of the pharmaceuticals being created today are derived from substances discovered in plants. Ayurvedic medicine has a long history of 3000 years, plant parts are used in various forms, including squeezed juices, decoctions and powder [1-4].

Cosmetic products are used to protect skin against exogenous and endogenous harmful agents, and enhance the beauty and attractiveness of the skin. The synthetic or natural ingredients present in a skin care formulation that supports the health, texture and integrity of skin, moisturizing, maintaining the elasticity of skin by reduction of type I collagen and photo protection, etc. This property of cosmetic is due to presence of ingredients in skin care formulation, because it helps to reduce the production of free radicals in the skin and manage the skin properties for the long time. The demand of herbal cosmetic is rapidly expanding. This expansion is due to the availability of new ingredients, the financial rewards for developing successful products, consumer demand, and a better understanding of skin physiology [5,6]. The plant parts used in cosmetic preparation should have varieties of properties like antioxidant, anti-inflammatory, antiseptic, emollient, antiseborrhatic, activity and antibacterial, etc. Herbal products claim to have less side effects, commonly seen with products containing synthetic agents.

Glycyrrhiza glabra Linn (Liquorice) contains important phytoconstituents such as glycyrrhizin, glycyrrhizinic acid, glabrin A and B and isoflavones. It is effectively used as anti-inflammatory, anti-bacterial, anti-fungal, anti-diabetic, anti-oxidant, skin whitening, antidiuretic agent. Liquorice flavonoids have exceptionally strong antioxidant activity. Terminalia chebula possesses potential pharmaceutical activities and used in several Ayurvedic formulations. Withania somnifera (Ashwagandha) has general regenerative qualities and is used, among others, for the treatment of nervous exhaustion, memory related conditions, insomnia, tiredness potency issues, skin problems and coughing. Aloe Vera is an ingredient used in many cosmetics because it heals, moisturizes, and softens skin [7,8]. Aloe Vera contains amino acids like leucine, isoleucine, saponin glycosides that provide cleansing action, vitamins A,C,E,B, choline, B12 and folic acid and provide antioxidant activity. Daucus carota (Carrot) has been a valuable herb for ages as it is rich natural source of Vitamin A along with other essential vitamins. Carrot seed oil is indicated for anti-aging, revitalizing and rejuvenating. As it promotes the formation of new cells and helps in reducing wrinkles. It acts as Natural toner and rejuvenator for the skin. Creams are defined as semisolid emulsions and they are of various types like cleansing creams, Cold creams, Moisturizing creams, Vanishing creams, All- purpose creams etc.

MATERIALS AND METHODS:

Materials

The plants for the study were selected and procured from local market. They were shade dried to remove any moisture presence and powdered. They were extracted using soxhlet extractor and maceration techniques employing required solvents and used for the development of formulation. The other required ingredients were also procured.

Methods

1) Extraction of constituents from the specific plant material

Preparation of extracts of Glycyrrhiza glabra (Liquorice), Withania somnifera (Ashwagandha), Terminalia Chebula and Cyperus rotundus (Nagarmotha).

The plant roots of Liquorice, ashwagandha and the plant fruits of Terminalia chebula and plant rhizomes of Nagarmotha were dried in shade to remove any moisture present and then they were powdered by grinding procedure. Later 150g of powdered sample was taken and distilled water, ethanol was added in a ratio of 50:50. They were immersed completely and extracted using maceration process [9-11]. They were allowed to macerate for 7 days. Powdered sample was placed in a stoppered container with the solvent and allowed to stand at room temperature for a period of 7 days with frequent agitation until the soluble matter has dissolved. Finally, they were filtered by muslin cloth and the solvents were completely evaporated and they were collected and stored for further use in formulation.

Preparation of extracts of Daucus carota (carrot)

The fruits of Carrot were air dried and powdered. 500g of Daucus carota was placed in soxhlet extractor and extracted using petroleum ether and

then successively with ethanol [12-14]. The extract was then concentrated to remove the solvent and subjected to dry under reduced pressure and controlled temperature and finally they were collected and stored for further use in the formulation.

Preparation of Aloe Vera extract

Fresh Aloe Vera leaves were collected and Aloe Vera gel was extracted, then Aloe Vera gel was converted into liquid form by heating at a low temperature for two hours. It was heated at a low temperature in order to retain thermo sensitive ingredients present in it [15-17]. Tartaric acid was added to the Aloe Vera concentrate to adjust the pH within the range from 5.5 to 6.0. In separate container, the hydrogel forming polymers glycerin, potassium sorbate and sodium benzoate were dissolved in small amount of double distilled water and then remaining ingredients were added. Now, Aloe Vera liquid extract was added to it and the volume was made up to 100 ml. The pH of this gel preparation was maintained 6±0.4 and stored in a well closed container and used for further formulations.

2) Formulation of Poly herbal cream

The composition for formulating poly herbal cream is tabulated in table 1. An O/W cream was prepared by taking the emulsifier stearic acid and other oil soluble components like Cetyl alcohol, liquid paraffin in china dish and the mixture was heated to 75° C which includes the oil soluble components and denoted as part A. The water soluble components like extracts of Liquorice, Ashwagandha, Nagarmotha, Terminalia Chebula, Aloe, Carrot, Methyl paraben, Propyl paraben, Triethanolamine, Propylene glycol were taken with the other china dish and the mixture was heated to 75° C which includes the water soluble components and denoted as part B [18-20]. After heating, the aqueous phase (part B) was added in portions to the oil phase (part A) with continuous stirring until cooling takes place. It was cool until a uniform, homogenous semisolid cream was formed.

Table 1 Composition of poly herbal cream

Ingredients (%)	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)
Carrot extract	1	1	1	1	1
Liquorice extract	2	2	2	2	2
Nagarmotha extract	0.5	0.5	0.5	0.5	0.5
Ashwagandha extract	2	2	2	2	2
Terminalia chebula extract	1	1	1	1	1
Aloe vera extract	2	2	2	2	2
Stearic acid	8	6	5	6	5
Cetyl alcohol	1	2	3	3	3
Liquid paraffin	1	2	2	3	1.5
Methyl paraben	0.5	0.5	0.5	0.5	0.5
Propyl paraben	0.5	0.5	0.5	0.5	0.5
Triethanolamine	1	1	1	1	1
Water	qs	qs	qs	qs	qs
Total weight	100 g	100 g	100 g	100 g	100 g

EVALUATION OF POLYHERBAL CREAM

1) Appearance

The appearance of the cream was judged by its color, pearlscence and roughness.

2 Homogeneity

The formulations were tested for the homogeneity by visual appearance and by touching the formulations physically.

3. Test for type of emulsion

Dye test

Scarlet red dye is mixed with cream. Place a drop of cream on a microscopic slide cover it with a cover slip and examine under microscope. If disperse globules appear red and ground is colorless, then it is O/W emulsion. If it is in reverse, i.e., globules appearing colorless and ground is red color then it is W/O type [21-23]. But the result indicated it is O/W emulsion.

Dilution Test

Small quantity of cream was taken in a test tube and diluted with oil. If the oil is distributed uniformly in emulsion without breaking of an emulsion, then the emulsion is W/O type. Small quantity of cream was taken in a test tube and diluted with water [24,25]. If water is distributed uniformly in emulsion without breaking of an emulsion, then the emulsion is O/W type. But the result indicated it is O/W emulsion.

4. PH of the Cream
The pH meter should be calibrated using standard buffer solution. About 0.5 g of the cream was taken and dissolved in 50.0 ml of distilled water then PH was measured using pH meter.

5. Viscosity
The Viscosity of the formulations was determined by Brookfield Viscometer at 100 RPM, using spindle no 7.

6. Consistency
Consistency of the formulation was determined by simply touching the cream.

7. Acid value
10 gm of cream was dissolved in 50 ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated to sample was dissolved completely, to this 1 ml of phenolphthalein was added and titrated with 0.1N NaOH, until faintly pink color appears after shaking for 30 seconds [26].
Acid value = n*5.61/w
n = the number of ml of NaOH required.
w = the weight of the substance.

8. Saponification value
2 gm of cream was refluxed with 25 ml of 0.5 N alcoholic KOH for 30 minutes to this 1 ml of phenolphthalein was added and titrated immediately, with 0.5 N HCL.
Saponification value = (b-a)*28.05/w
The volume in ml of titrant = a
The volume in ml of titrate = b
The weight of a substance in gm = w

9. Spreadability
Cream was placed between two glass slides and compressed to uniform thickness by placing 100 g of weight for 5 min. A weight was added to the pan. The time required to separate two slides i.e., time in which upper glass slide moved over lower slide was taken as a measure of spreadability [27].
S=m*l/t
m = weight on upper slide
l= length moved on a glass slide
t= time taken
Spreadability was also studied by placing a fixed amount of cream on the dorsal surface of the skin and observing for spreadability.

10. Washability
The ease of removal of the cream applied was examined by washing the applied part with tap water and the ease with which the washing of the cream was observed [28].

11. Irritancy test
An area (1sq.cm) on the left hand dorsal surface was used for this purpose. 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 hr [29-31].

12. Stability studies
Stability testing of prepared formulations was conducted at room temperature and at accelerated conditions for a duration of 15 days. Then they were evaluated for various parameters by taking the samples on 15th day [31].

RESULTS AND DISCUSSION:

The polyherbal cream was observed for its color, pearlscence and roughness and according to the appearance of the cream they were judged and the appearance was good for all the batches. Homogeneity was observed by visual appearance and by touching the formulations physically. The formulations of all the batches were subjected to scarlet dye test and dilution test and all the formulations were O/W type. PH of the cream was observed to be around 5.3-6.7, which is slightly acidic to neutral. The consistency of all the formulations was observed to be satisfactory with perfect semisolid nature and Viscosity was satisfactory and was observed to be 590-690 cps. Acid value was performed for all the formulations and the values were found between 5.4-6.4. Saponification value was performed for all the formulations and the values were found between 24.8-30.1. Spreadability was performed and was found satisfactory with few formulations. The ease of removal of the cream applied was observed for all the formulations and were observed to be satisfactory. Irritancy test was performed for all the batches and no irritation was observed and the results were tabulated in table 2 and 3.

Table 2: Evaluation of poly herbal cream

Evaluation parameters	F1	F2	F3	F4	F5
Appearance	Good	Good	Good	Good	Good
Color	Light brown	Light brown	Light brown	Dark brown	Dark brown
Homogeneity & Roughness	Little roughness were observed	No roughness were observed	No roughness were observed	No roughness were observed	No roughness were observed
Dye test & Dilution test	O/W	O/W	O/W	O/W	O/W
pH	5.3	5.5	6.2	6.4	6.3
Consistency	Semisolid and dry	Semisolid and dry to little soft	Semisolid and soft	Semisolid and more oily	Semisolid and dry
Viscosity	590cps	610cps	650cps	690cps	680cps
Acid value	6.8	6.4	5.9	6.6	5.4
Saponification value	30.1	28.2	26.4	27.2	24.8
Spreadability	Poor	Good	Excellent	Good	Poor
Washability	Good	Good	Excellent	Poor	Good

Table 3: Evaluation of adverse effects and irritancy tests of formulation

Formulation	Irritant effect	Erythema	Edema
F1	Nil	Nil	Nil
F2	Nil	Nil	Nil
F3	Nil	Nil	Nil
F4	Nil	Nil	Nil
F5	Nil	Nil	Nil

Polyherbal skin cream was formulated using various natural plant material by extracting the plant material and the cream was formulated as O/W emulsion. Five formulations were formulated by varying the percentage of Cetyl alcohol, Steraic acid and liquid paraffin and by maintaining all other ingredients concentration stable in all the formulations. In the first trial F1, percentage of Ssteraic acid used to be high and Cetyl alcohol, liquid paraffin was used in lower concentrations and results of F1 were not as desired as it exhibited certain roughness, dryness and the Spreadability of the cream was poor. In the second trial F2, percentage of Steraic acid used was decreased and Cetyl alcohol, liquid paraffin concentration was increased and results of F2 were satisfactory when compared to F1 but were not satisfied as it exhibited certain dryness and little softness in its consistency and the Spreadability of the cream was improved when compared to previous trial. In the third trial F3, percentage of steraic acid used was still decreased and cetyl alcohol concentration was increased maintaining the concentration of liquid paraffin constant and results of F3 were satisfactory as it fulfilled all the required characters for a perfect skin cream. It exhibited perfect consistency for a skin cream and it was semisolid with good softness. Spreadability and Washability were observed to be excellent. No irritation was observed and the cream was exhibiting good appearance. Formulation F4, inferred that the consistency of the cream was observed to be oilier with an impact on washability. In the formulation F5, the consistency of the cream was observed to be dry with impact on spreadability.

Hence, by considering all the above trials and after the evaluation of all the formulations the formulation F3 was optimized as it exhibited satisfactory consistency and softness with excellent spreadability and washability. The formulation F3 exhibited satisfactory viscosities and no irritation was observed hence F3 was optimized as perfect polyherbal cream**,** which was further evaluated for stability studies at room temperature and at accelerated conditions for 15 days and the samples were analyzed on the 15th day and the results of stability studies were tabulated in table 4.

Table 4: Stability study data for optimized formulation F3

S No	Evaluation parameters	F3	F3
		Room temperature	**Accelerated conditions (45°C)**
1	Appearance	Good	Good
2	Color	Light brown	Light brown
	Homogeneity & Roughness	No roughness were observed	No roughness were observed
3	Dilution	O/W	O/W
4	pH	6.2	6.3
5	Consistency	Semisolid and soft	Semisolid and soft
6	Viscosity	650cps	630cps
7	Spreadability	Excellent	Excellent
8	Washability	Excellent	Excellent
9	Irritancy test	No irritation was observed	No irritation was observed

The results of stability studies inferred that the formulation F3, exhibits excellent stability at both room temperature and at accelerated conditions, hence it passes the stability.

CONCLUSION:

Various batches of polyherbal cream were formulated in trials (F1-F5) using stearic acid, liquid paraffin, Cetyl alcohol, extracts of herbs and other ingredients. Among all the formulations, trial F3 was optimized based on its consistency, spreadability, Washability and as it satisfies all the characters required for a good quality cream. The prepared formulations exhibited proper pH range that is approximately around pH 6, it confirms the compatibility of the formulations with skin secretions. Formulation F3, a natural ingredients containing herbal cream was found to have satisfactory properties such that it can be used as a face cream with fewer reduced side effects when compared to synthetic creams containing chemicals. The study suggests that the composition of extracts and base of cream of F3 was more stable and safe and has shown excellent stability at accelerated conditions. From the present study it can be concluded that it is possible to develop creams containing herbal extracts having various skin protective, cleansing and antioxidant properties and by combining the different plant extracts, it can be possible to increase the efficacy of extracts which can be used as the provision to protect skin. By using all these ingredients in combination it can be concluded that this cream has a multi usage as the ingredients used can produce a synergistic effect of the other. Hence a Poly herbal cream, which is non-toxic, safe and effective and improves patient compliance with the utilization of herbal extracts was formulated and evaluated.

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