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FORMULATION AND EVALUATION OF POLYHERBAL COSMETIC CREAM.

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ABSTRACT

Natural remedies are more acceptable in the faith that they are safer with fewer side effects than the synthetic ones. Herbal formulations have growing demand in the world market. The plants have been reported in the literature having good anti- microbial, anti-oxidant and anti-inflammatory activity. The present work deals with the development and evaluation of the poly herbal cream containing hydro-alcoholic extract of carrot (Daucus Carota), turmeric (Curcuma longa) and alcoholic extract of liquorice (Glycyrrhiza glabra) & crape Jasmine (Tabernaemontana divaricata). Different types of formulations oil in water (O/W) herbal creams namely F1 to F6 were formulated by incorporating different concentrations of stearic acid and cetyl alcohol. The evaluations of all formulations (F1 to F6) were done on different parameters like pH, spreadability and stability etc. Formulations F5 and F6 showed good spreadability, good consistency, homogeneity, appearance, pH, no evidence of phase separation and ease of removal. The formulation F5 and F6 shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin. These studies suggest that composition of extracts and base of cream of F5 and F6 are more stable and safe, it may produce synergistic action.

KEYWORDS: Daucus Carota, Curcuma longa, Glycyrrhiza glabra, Tabernaemontana divaricata, Irritation, polyherbal cream.

INTRODUCTION

Since the ancient times women have started to dress themselves in order to increase their own beauty. Even today, people especially in rural areas, choose natural remedies (plants extracts) for traditional cosmetics. A certain number of women are still using herbal cosmetics to beautify their skin. Natural remedies are more acceptable because they are safer with fewer

side effects than the synthetic ones.[1,2] Herbal formulations have growing demand in the world market. There is now, however, an increased scientific evidence that plants possess a vast and complex armory of active ingredients (photochemical) which have the ability to calm or smooth the skin but also to restore actively, heal and protect the skin. A natural skin cosmetic should moisturize, hydrate and nourish the skin. When two or more herbs are used in formulations, they are known as polyherbal formulations.[3] The present work is an attempt made to develop a cream which can produce multipurpose effect. In cosmetics, Curcuma longa has an excellent potential for antiaging, cooling, healing and soothing to an irritated skin, whether caused by sun, or the effects of a cutaneous eruption. It has important role in whitening of skin.[4] Daucus carota have the highest β-carotene, a precursor of vitamin A, and also contain abundant amount of Vitamin C. Vitamin A also acts as a very good anti-oxidant which slows down the process of aging. Vitamin C produces collagen in the body which is an essential protein for making our skin elastic. It also prevents wrinkles on the skin.[5] Glycyrrhiza glabra is a medicinal plant with rich natural antioxidants. The best natural antioxidants in extract of Glycyrrhiza glabra are glycyrrhizin (glycyrrhizic acid), triterpene, saponins and flavonoids. Glycyrrhiza glabra extract are with therapeutic effects in skin whitening, skin depigmenting, skin lightening, antiaging, emollient, anti-acne and photoprotection effects.[6] Tabernaemontana divaricata is a rich source of alkaloids with various pharmacological properties. It has been used in the medicine for anti-infection, anti-inflammation, analgesic, anti-tumour, antioxidative and for neurological disorders.[7] The above properties are reason for selection of these plant extracts in the preparation of polyherbal cosmetic cream to produce multipurpose effect on skin such as fairness, sunscreen, antiaging, antioxidant and antiwrinkle properties.

MATERIALS AND METHODS

Preparation of extracts

Hydro-alcoholic extract of carrot (Daucus Carota) & turmeric (Curcuma longa) is prepared by maceration, alcoholic extract of liquorice (Glycyrrhiza glabra) is prepared by percolation & alcoholic extract of crape Jasmine (Tabernaemontana divaricata) is prepared by soxhlation.

Cream formulation

Oil in water (O/W) emulsion-based cream (semisolid formulation) was formulated. The emulsifier (stearic acid) and other oil soluble components (Cetyl alcohol, Mineral oil) were dissolved in the oil phase (Part A) and heated to 75°C. The preservatives and other water

soluble components (Methyl paraban, Propyl paraban, Triethanolamine, glycerin, hydro-alcoholic extract of carrot (Daucus Carota), turmeric (Curcuma longa) and alcoholic extract of liquorice (Glycyrrhiza glabra) & crape Jasmine (Tabernaemontana divaricata) were dissolved in the aqueous phase (Part B) and heated to 75°C. After heating, the aqueous phase was added in small portions to the oil phase with continuous trituration in porcelain mortar until a smooth cream is formed. The formula for the cream is given in table 1.

EVALUATION OF CREAM

1. Evaluation of pH of the Cream

The pH meter was calibrated using standard buffer solution. About 0.5 g of the cream was weighed and dissolved in 50.0 ml of distilled water and its pH was measured.

2. Dye test

The scarlet red dye is mixed with the cream. Place a drop of the cream on a microscopic slide covers it with a cover slip and examines it under a microscope. If the disperse globules appear red under colourless background, the cream is o/w type. The reverse condition occurs in w/o type cream i.e. the disperse globules appear colourless in the red background.

3. Homogeneity

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

4. Appearance

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

5. Spreadability

A fixed amount of cream was applied on the dorsal skin surface of human volunteer and the properties were observed.

6. After feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked.

7. Type of smear

After application of cream, the type of film or smear formed on the skin were checked.

8. Removal

The ease of removal of the cream applied was examined by washing the applied part with tap water.

9. 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.

10. 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 formulation number 4 and 5 at $40^{o}C \pm 1^{o}C$ for 20 days. The formulations were kept both at room and elevated temperature and observed on 0^{th}, 5^{th}, 10^{th}, 15^{th} and 20^{th} day for the various parameters.

RESULTS

1. 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. All the formulations of cream were shown pH nearer to skin required i.e pH of F1-5.6, F2-5.7, F3-5.8, F4-6.3, F5-6.4 & F6- 6.3. But pH of formulation F1, F2,F3 & F4 shows variation in pH when stored for long period of time. Formulation F5 & F6 shows stable pH. So these two formulations are further processed for stability studies.

2. Dye test

This dye test confirms that all formulation were o/w type emulsion cream. But formulation (F5 & F6) shows more stable in o/w type emulsion.

3. Homogeneity

All formulations produce uniform distribution of extracts in cream. This was confirmed by visual appearance and by touch (Table 2).

4. Appearance

There is uniformity in colour of all formulations. When formulation were kept for long time, it found that no change in colour of cream (Table 2).

5. Spreadability

All formulations are easily spreadable by small amounts of shear. But formulations F5 and F6 shows a better spreadable.

6. After feel

Emolliency, slipperiness after the application of fixed amount of cream was found (Table 2).

7. Type of smear

After application of cream of F5 and F6, the type of smear formed on the skin were non greasy (Table 2).

8. Removal

The cream of F5 and F6 applied on skin was easily removed by washing with tap water (Table 2).

9. Irritancy test

All formulation shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin (Table 3).

10. Accelerated stability testing

Accelerated stability testing of prepared formulations was conducted for formulation number F5 and F6 at $40^{o}C \pm 1^{o}C$ for 20 days. The formulations were kept both at room and elevated temperature and observed on 0^{th}, 5^{th}, 10^{th}, 15^{th} and 20^{th} day for the various parameters (Table 4).

Table 1: Composition of cream.

Ingredients	Formula % w/w					
	F1	F2	F3	F4	F5	F6
Ethanol extract of T. Divaricata	0.5	0.5	0.5	0.5	0.5	0.5
Ethanaol Extract Of Liquorice	0.5	0.5	0.5	0.5	0.5	0.5
Hydroalcoholic Extract Of D. Corota	0.75	0.75	0.75	0.75	0.75	0.75
Hydroalcoholic Extract Of Turmeric	1.0	1.0	1.0	1.0	1.0	1.0
Stearic acid	8	8	10	10	12	12
Cetyl alcohol	4	3	4	3	4	3
Mineral oil	4	4	4	4	4	4
Glycerin	3	3	3	3	3	3
Methyl Paraben	0.18	0.18	0.18	0.18	0.18	0.18
Propyl Paraben	0.02	0.02	0.02	0.02	0.02	0.02
Triethanolamine	1	1	1	1	1	1
Water	q.s	q.s	q.s	q.s	q.s	q.s

Table 2: Homogeneity, appearance, after feel, type of smear & removal.

Formulation	Homogeneity	Appearance	After Feel	Type Of Smear	Removal
F1	Good	Uniformity In Colour	Emollient	Non greasy	Easy
F2	Good	Uniformity In Colour	Emollient	Non greasy	Easy
F3	Good	Uniformity In Colour	Emollient	Non greasy	Easy
F4	Good	Uniformity In Colour	Emollient	Non greasy	Easy
F5	Good	Uniformity In Colour	Emollient	Non greasy	Easy
F6	Good	Uniformity In Colour	Emollient	Non greasy	Easy

Table 3: Type of Adverse effects of formulations.

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
F6	NIL	NIL	NIL

Table 4: Physical parameters of F4 & F5 cream at Room & Accelerated temperature.

Days	Temperature	Formulation	Parameters						
			pH	X1	X2	X3	X4	X5	X6
0	RT	F5	6.3	G	NCC	G	EMO	NG	EASY
		F6	6.4	G	NCC	G	EMO	NG	EASY
	$40^0 \pm 1^0$C	F5	6.4	G	NCC	G	EMO	NG	EASY
		F6	6.4	G	NCC	G	EMO	NG	EASY
5	RT	F5	6.5	G	NCC	G	EMO	NG	EASY
		F6	6.4	S	NCC	G	EMO	NG	EASY
	$40^0 \pm 1^0$C	F5	6.3	G	NCC	G	EMO	NG	EASY
		F6	6.2	G	NCC	G	EMO	NG	EASY
10	RT	F5	6.5	G	NCC	G	EMO	NG	EASY
		F6	6.5	G	NCC	G	EMO	NG	EASY
	$40^0 \pm 1^0$C	F5	6.3	S	NCC	G	EMO	NG	EASY
		F6	6.4	G	NCC	G	EMO	NG	EASY
15	RT	F5	6.4	G	NCC	G	EMO	NG	EASY
		F6	6.5	G	NCC	G	EMO	NG	EASY
	$40^0 \pm 1^0$C	F5	6.4	G	NCC	G	EMO	NG	EASY
		F6	6.3	S	NCC	G	EMO	NG	EASY
20	RT	F5	6.5	G	NCC	G	EMO	NG	EASY
		F6	6.4	G	NCC	G	EMO	NG	EASY
	$40^0 \pm 1^0$C	F5	6.4	G	NCC	G	EMO	NG	EASY
		F6	6.3	G	NCC	G	EMO	NG	EASY

X1 – Homogenity, X2 – Appearance, X3 – Spreadibility, X4 – After feel, X5 – Type of smear, X6 – Removal, G – Good,S- Satisfactory, NCC – No change in colour, EMO – Emollient, NG – Non greasy.

DISCUSSION

Herbal medication are considered safer than allopathic medicines as allopathic medicines are associated with side effects such as like contact allergy, local irritation, scaling, photosensitivity, itching, redness, skin peeling, xerosis of the skin etc. The present research work deals with formulation and evaluation of polyherbal cosmetic cream containing Glycyrrhiza glabra, Daucus Carota, Curcuma longa, Tabernaemontana divaricata. All these are well known for its medicinal and cosmeceuticals value in Indian traditional system of medicine.

The production of free radicals in the body causes oxidative stress and oxidative photodamage of macromolecules and plasma membrane components in the skin. This further leads to premature aging of the skin which is characterized by the rough skin textures and wrinkles. ß-carotene is the most abundant and most efficient precursor of vitamin A. ß-carotene is a radical scavenger, quenching singlet oxygen and free radicals without damage to cells and tissue, hence it used as UV protection of skin. ß-carotene are capable to increase cell turn-over and regeneration in the outer layers of the skin, making it effective for diseases and skin conditions related to epithelium damage. It also enhances the appearance of dry or damaged skin by reducing flaking and restoring suppleness. In skin care products, beta-carotene is used for its antioxidant properties, its ability to protect the skin from sun damage, and its ability to help even the skin tone, deeming it an active anti-aging ingredient. It is reported that Daucus carota contain abundant amount of ß-carotene and Vitamin C.[8,9] Moreover Cucumis longa exhibited highly antioxidant activity. Curcumin the active compound of turmeric is a polyphenol, having anti inflammatory activity by inhibiting leukotriene formulation, inhibiting platelet aggregation and stabilizing neutrophilic lysosomal memberanes.[10] From above discussion it is assumed that ß-carotene containing plant as well as antioxidant activity producing plant can be used in face care cream, to produce sunscreen, antiaging and antiwrinkle effects. Hence both extracts of plants are good choice to use as ingredient in face cream.[11] Glycyrrhiza glabra is a medicinal plant with rich natural antioxidants. The best natural antioxidants in extract of Glycyrrhiza glabra are glycyrrhizin (glycyrrhizic acid) and flavonoids. The role of plant extract of Glycyrrhiza glabra on skin is mainly attributed to its antioxidant activity particularly to its potent antioxidants triterpene, saponins and flavonoids. G. glabra extract are with therapeutic effects in skin whitening, skin depigmenting, skin lightening, antiaging, anti-erythemic, emollient, anti-acne and photoprotection effects. Moreover, it has anti-inflammatory action by inhibiting some

enzymes of the arachidonic acid cascade, especially cyclooxigenase, released after exposure to UV rays.[12] Tabernaemontana divaricata is a rich source of indole alkaloids, phenols and srerols with various pharmacological properties. It has been used in the medicine for anti-infection, anti-inflammation, antioxidants, analgesic, anti-tumour and for neurological disorders.[13,14]

The prepared polyherbal face cream was O/W type emulsion, hence can be easily washed with plane water that gives better customer compliance. There is a growing demand for herbal cosmetics in the world market and they are invaluable gifts of nature. Therefore, we tried to make a polyherbal cream containing the extract of Glycyrrhiza glabra, Daucus Carota, Curcuma longa, Tabernaemontana divaricata. Our study indicated that the formulation F4 and F5 found to be more stable, while remaining formulations were not stable and resulted in breakdown of the emulsion when stored for long time. These formulations F4 and F5 had almost constant pH, homogeneous, emollient, non-greasy and easily removed after the application. The stable formulations were safe in respect to skin irritation and allergic sensitization.

CONCLUSION

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 Glycyrrhiza glabra, Daucus Carota, Curcuma longa, Tabernaemontana divaricata to improve as well synergize the cosmetic properties of prepared products compare to individual extracts. Further research will carry out to check scientifically the synergistic action of selected formulation. These studies suggest that composition of extracts and base of cream of F5 and F6 are more stable and safe, while remaining formulations were not stable and resulted in breakdown of the emulsion when stored for long time. These formulations had almost constant pH, homogeneous, emollient, non-greasy and easily removed after the application.

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