Research Article

Fabrication and Characterization of Polyherbal Dermaceutical Cream for Complexion Revitalization

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ABSTRACT

Cosmetics made from natural herbs are used universally in different forms for enhancing beauty. The demand for skin brightening cosmetics is boon in the world market, because of fewer side effects with safety. The present study focuses on the formulation and evaluation of whitening Polyherbal face cream incorporating extracts of Liquorice, mango turmeric and spiked ginger lily. These herbs are used traditionally from ancient years in AYUSH. Three preliminary formulations (F1-F3) were formulated using different extract concentration and formulation (F2) was appropriate and further three formulations (F4-F6) developed after optimization of the extract concentration. All the formulation was evaluated for various parameters like pH, viscosity, spreadability. The formulation (F5) was compatible with the skin (contains Liquorice and mango turmeric) was found to be the best after all evaluation parameters. It showed good appearance and consistency, ease of removal and no evidence of phase separation. This signifies that it would show potential synergistic effects, enhancing skin radiance safely and effectively. This study demonstrates the potential of Polyherbal whitening creams as natural alternates for skin revitalization.

Keywords: Liquorice, mango turmeric, spiked ginger lily, revitalization, complexion whitening Polyherbal face cream.

INTRODUCTION

In recent years, the demand for herbal cosmetics is increasing predominantly in the world market, and they are invaluable gifts of nature. Herbal cosmetics are receiving more attention in public as they are mild biodegradable and have low toxicity profile with less side effects.[1] The natural ingredients present in the skin care formulation supports the health, texture and integrity of skin, moisturizes maintaining elasticity of skin by reduction of type I collagen and protection from light.[2] Skin pigmentation is influenced by several factors, including Haemoglobin in the blood vessels, carotenoids in the dermis and particularly the dark pigment excess production called melanin in epidermis. This excessive Melanin production is enhanced y activation of Tyrosinase, upon exposure of skin to sun radiation.[3] Inhibition of Tyrosinase enzyme, helps in skin lightening through reduced melanin production. Tyrosinase inhibitors lightens naturally dark skin by reducing melanin in skin.[4]

Figure 1: Mango Ginger

ZAP beauty index describes 73.1% of Indonesian women aspiring for whiter skin complexion has elated. Despite the recent advances seen in modern medicine, whitening herbs are making important contribution to cosmetics.5 The plant parts used in herbal cosmetics have varieties of properties like antioxidant, antimicrobial emollient flavonoids, anti-inflammatory etc. directly or indirectly serve as skin lightening ingredients. Hence the plant parts (Liquorice, Mango Ginger and spiked ginger Lily)[6].

In the present study, an attempt has been made to combine all these plant parts in preparation of polyherbal cosmetic cream and to produce the synergistic whitening effects on face skin.[7]

Figure 2: Liquorice

Figure 3: Spiked Ginger Lily

MATERIALS AND METHODS

Materials

The plant material used in research project are Liquorice, Mango Ginger and spiked Ginger Lily was collected from Siddha shop at Puducherry, while other ingredients used as cream base for the formulations were purchased of Laboratory grade from Rohini Labs, Chennai.

Preparation of extract

Air dried rhizomes of Mango Ginger, spiked ginger Lily and roots of Liquorice were coarsely ground, weighed and stored in airtight jars in a Refrigerator. To prepare the extract, 100gms of each powder weigh separately and 500ml of ethanol (95%) added, macerated in airtight container for 3-7 days and occasionally shaken in between. The Mixture was stirred with a glass rod every 12hours and was filtered using whatman filter paper No.1, and the solvent evaporated to get dried extract of each herb, in airtight glass jars.[8]

Figure 4: Extracts of selected Herbs

Preliminary phytochemical screening was carried out for the identification of active chemical contents in the extract. (i.e.) Carbohydrates, Glycosides, alkaloids, fixed oils, fats, proteins, free amino acids, phenolic compounds, tannins, flavonoids etc. [9,10.]

Formulation of cream base[11]

Oil in water (O/W) emulsion-based cream (F1-F6) was formulated as quantities mentioned in Table 1. The emulsifier (stearic acid) and other oil soluble components (cetyl alcohol, liquid paraffin, propyl paraben) were dissolved in oily phase (part A) and heated to 75°C. The Preservatives and other water-soluble components (Carbopol, glycerine, methyl paraben, niacinamide) were dissolved in aqueous phase (Part B) and heated to 75°C. After heating, the aqueous phase was added in portions to oily phase with continuous stirring and homogenised for 15 minutes. When temperature drops below 40°C Alpha arbutin predissolved in little water, was added and again homogenised for 10 minutes as shown in Table 1.

Formulation of polyherbal cream[12]

To the formulated cream base (F1-F3) as shown in Table 2, Liquorice extract, spiked Ginger Lily and Mango Turmeric extract concentration of 0.5,1 and 1.5% were added as shown in Table.2. Triethanolamine was added to all the three preliminary formulations (F1-F3) to adjust the skin PH between 5.0-6.0 and continuously homogenised for 10 minutes to remove air bubbles. Among the three Preliminary formulations (F1-F3), formulation F2 containing 1% was optimized and selected for further three formulations (F4-F6) based on the evaluation of physical appearance, texture and non-greasiness, using either of any two extract.

Table 1: Phytochemical screening of herbal extract

Plant Extract	Phytochemical test							
	Carbohydrate	Protein	Glycoside	Alkaloid	Tannins	Flavonoids	Phenolic Compounds	Steroids
Licorice Extract	++	++	++	++	+	++	++	-
Mango Turmeric	++	++	++	++	+	++	++	-
Spiked ginger Lily extract	++	++	++	++	+	++	++	-

++ = Highly positive test + = moderately positive – = Negative test

Table 2: Formula for cream base (F1-F6)

S.NO	Ingredients	Formulations	
		Functions	Quantity (g)
1.	Stearic acid	Emulsifier / Lubricant	5
2.	Niacinamide	Anti-hyperpigmentation	4
3.	Alpha arbutin	Skin whitening / UV protect	2
4.	Cetyl alcohol	Emulsifier	2
5.	Glycerin	Humectant	4
6.	Liquid paraffin	Lubricant	5
7.	Carpobol	Thickening agent	0.2
8.	Methyl paraben	Preservative	0.2
9.	Propyl paraben	Preservative	0.05
10.	Triethanalomine	PH Buffering agent	1
11.	Purified water Q.S	Solvent/ Vehicle	100g

Table 3: Preliminary formulation of skin brightening cream

S. No.	Herbal Extract	Formulation (%)		
		F1	F2	F3
1	Liquorice	0.5	1	1.5
2	Mango turmeric	0.5	1	1.5
3	Spiked ginger lily	0.5	1	1.5

Table 4: Optimized Formulation (F 4- F6) after optimization

S.NO	Herbal Extract	Formulation (%)		
		F4	F5	F6
1.	Liquorice extract	1	1	-
2.	Mango turmeric	-	1	1
3.	Spiked ginger lily	1	-	1

RESULTS

Evalution of cream [13,14]

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

2. Viscosity: Viscosity of the formulation was determined by Brookfield viscometer at 100 rpm using spindle no. 7.

3. Homogeneity: The formulations were tested for homogeneity by visual appearance and by touch.

4. Appearance: The appearance of the cream was judged by its colour, pearlescence, roughness and graded.

5. After feel: Emollience, slipperiness and amount of residue left after the application of cream was checked.

6. Types of smear: After application of cream the types of films or smear formed on the skin were checked.

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

8. Spreadability: It indicates the extent of the area to which cream readily spreads application to the skin. The therapeutic potency also depends upon spreading value. The time taken in seconds by two slides to slip off from cream which is placed in between the slides under the direction of certain load is expressed as spreadability.

Lesser the time is taken for the separation of two slides better the spreadability. The following formula is used to calculate the spreadability

Spreadability (S) = M×L/T

Where, M= Weight tied to upper slide L= Length of glass slide T = Time taken to separate the slides

Table 5: Physical parameters

Parameters	F4	F5	F6
Color	white	Faint yellow	Pale white
Odor	Pleasant	Pleasant	Pleasant
Texture	Smooth	Smooth	Smooth
State	Semisolid	Semisolid	Semisolid

Figure 5: Preparation of Polyherbal Cream

9. Dye test

The scarlet red dye is mixed with cream. Place a drop of the cream on a cream on a microscope slide covers it with a cover slip, and examines it under a microscope. If the disperse globules appear red the ground colourless. The cream is O/W type. The reverse condition occurs in W/O types cream the disperse globules appear colourless in the red ground.

10. Acid value

Take 10gm of the substance accurately and dissolved, in 50 ml mixture of equal volume of alcohol and solvent ether, the flask was connected to reflux condenser and slowly heated, until sample was dissolved completely, to this 1 ml of phenolphthalein added and titrated with 0.1 N NaOH, until faintly pink colour appears after shaking for 30 seconds.

Acid value = n*5.61/W

n = the number of ml of NaOH required.

W = the weight of substance.

11. Saponification value

Introduction about 2gm of substance refluxed with 25 ml of 0.5 N alcoholic KOH for 30 minutes, to this 1 ml of phenolphthalein 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 titrant = b

The weight of substances in gm.

Table 6: Acid value and Saponification Value

Parameters	F4	F5	F6
Acid value	5.9	5.2	6.1
Saponification value	26.7	25.4	24.8

12. Irritancy test

Mark an area (1 sq.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 hours and reported.

Table 7: Irritancy test

Formulation	Irritant effect	Erythema	Edema
F4	NIL	NIL	NIL
F5	NIL	NIL	NIL
F6	NIL	NIL	NIL

13. Percentage of Drug content

Each formulation (1g) was accurately weighed and transferred to a 100 ml volumetric flask to which about 70 ml of methanol was added. After shaking, the volume was made up to 100 ml with methanol. The content was filtered through a suitable filter paper. 1 ml filtrate was taken and suitable diluted and the drug content (extract) was estimated by using UV/ visible spectrophotometer at 280nm, 290nm, 320nm respectively.

14. Phase separation

The cream is stored in a closed container at a temperature of 25-100°C away from light. Phase separation is checked every 24 hours for 15 days. Any change in the phase separation is observed and noted.

STABLITY TESTING[15]

Stability testing was conducted for the two most stable formulations (F4 and F5), and studied for 7 days. Then two optimized formulations F4 and F5 were kept at both room temperature and elevated temperature (40℃ ± 1℃) for 15 days and observed on 0,5,10 and 15 days.

Table 8: Stability testing

Days	Temperature	Parameters						
		pH	X1	X2	X3	X4	X5	X6
0	RT 40℃+ 1℃	6.9 6.8	++	NCC	++	E	NG	E S
5	RT 40℃+ 1℃	6.7 6.8	++	NCC	++	E	NG	E S
10	RT 40℃+ 1℃	6.6 6.7	++	NCC	++	E	NG	E S
15	RT 40℃+ 1℃	6.7 6.8	++	NCC	++	E	NG	E S

X1-Homogeneity, X2- Appearance, X3-Spreadability, X4-After feel, X5-Types of smear X6- Washability ++ -good, + - satisfactory, E – emollient, NG -Non greasy, ES-Easy, NCC- No change in colour

DISCUSSIONS

Preliminary formulation of skin brightening cream:

Cream bases were formulated as first step (F1, F2 and F3) for all the three formulation and all the three herbal extracts of Liquorice, mango turmeric, spiked ginger lily added in quantities as mentored in table 5 for F1, F2 and F3 after proper cooling of cream base.

Three preliminary (F1 to F3) of herbal extract were added in different concentration of 0.5,1 and 1.5% and cream base in quantities same for all formulations (F1 – F5) as mentioned in table 4. Based on the cream evaluation of physical appearance, texture and all other required parameters F2 formulation (1%) was selected. It was found that marketed brightening cream (Himalayan skin brightening cream) formulation were formulated using Liquorice extract and spiked ginger lily as herbal extracts. Based on evaluated parameter both formulation F4, F5 and F6 were formulated using best formulation (F2) extract concentration (1%). But formulation (F4) was formulated using herbal turmeric) extract and formulation F6 contains (1%) (Mango turmeric and spiked ginger lily)

Figure 6: Himalaya face cream

Figure 7: Formulations of F4, F5 and F6

Evaluation of Cream

In this test colour, texture, and state of cream are observed as shown in Table 5. The pH of the creams base was found to be in range of 6-7 which is good for skin. All the formulation of cream base were shown pH nearer to skin required. It was determined by using a Brookfield viscome showing spindle no 7. The viscosity of creams was in the range of 27020-27054 cps which indicates spread ability of cream. In our study F4and F5 is easily spreadable by small amounts of shear while F6 are not easily spreadable on skin but F 5shows good spreadable property than other formulations. All formulations produce uniform distribution visual appearance and by touch stability. When formulation was kept for long time, it was found that there was no change in colour of cream for F4 and F5 and change in colour observed for F6. After application of cream the type of smear formed on the skin was non greasy. The cream applied on skin was easily removed by washing with tap water. This dye test confirms that all formulations were o/w type emulsion cream. But formulation (F5) shows more stable in o/w types of emulsion. So here we select F5 cream base for further study. The results of acid value and saponification value of all formulation of cream base were presented in Table 6. and showed satisfactorily values. The formulation F5 shows no redness, oedema, inflammation, and irritation during irritancy studies as shown in Table 7. These formulations are safe to use for skin. The less time taken for the separation of the slide better the spreadability. Therefore, according to statement F5 had better spreadability. There was no phase separation in F4 and F5, and F6 showed phase separation, and F5 was found to be stable.

Table 9: Comparison F4 Vs F5 Vs F6

S.No	Parameters	F4	F5	F6
	Herbal Combo	**Licorice+SGL**	**Licorice+Mango Turmeric**	**Mango Turmeric+SGL**
1.	PH	5.9	6.1	6.5
2.	Viscosity (Cps)	27,020	27,054	27,038
3.	Spreadability	2.14	3.00 (BEST)	2.50
4.	Washability	Easily washable	Easily washable	Easily washable
5.	Drug content (%)	96.66	97.65	97.38
6.	Phase separation	None	None	Present
7.	Appearance stability	stable	stable	Color change
8.	Similarity to Market	Like Himalaya	Improved Formula	Novel Combo
	Overall rating	***	*****	**

SUMMARY AND CONCLUSION

After literature review, skin whitening polyherbal and cream base were selected for the formulation. Polyherbs (Liquorice, mango turmeric and spiked ginger lily) extracted by maceration method and cream formulations done by O/W type. Three preliminary formulations (F1 -F3) were prepared by varying the extract concentration (0.5,1 and 1.5 %) low, medium and high using selected cream base as shown in Table 3. Among the formulations (F2) was appropriate for the development of polyherbal cream based on the physical evaluation of cream (colour, odour, consistency). After optimization of extract concentration (1%) further three formulations (F4 -F6) were formulated using the best formulation (F2) extract concentration (1%) as shown in Table 4. Out of these three optimized formulations (F4) polyherbals brightening cream formulated similar to marketed skin brightening cream (Himalayan product) which contains liquorice and spiked ginger lily extract. F5 and F6 polyherbal skin brightening cream formulated with optimized 1% extract concentration. F5 contains mango turmeric and Liquorice and F6 formulation contains spiked ginger lily and mango turmeric as shown in Table 9. It was found that optimized formulation (F5) was the best formulation as there was no phase separation; good physical appearance and all other evaluated maximum parameters result were good compared to F4 and F6. The P ^{H} of the prepared polyherbal cream (F5) was neared to skin P ^{H}, emollient, non-greasy, good Washability after the application and found to be more stable. The results of all evaluation parameters are shown in Table 9.

The polyherbal skin brightening cream (F5) were faint yellow with specific odour, good consistency and no phase separation. Formulation (F5) was comparatively better than F4 and F6 in all aspects. Phase separation and good consistency was not observed in (F6).The principle constituents present in (F5) mango turmeric and Liquorice extract have potent anti tyrokinase, anti-oxidant and anti-inflammatory properties that help in skin brightening.

CONCLUSIONS

The formulated polyherbal skin brightening cream (F5) containing mango turmeric and licorice extract shows good physicochemical properties; skin friendly PH , satisfactory spreadability, Washability and stability. It may serve as a safe and effective natural skin whitening preparation The demand for herbal skin brightening cosmetics are boon in the world market and stands in second position. In South Korea skin care products usage rate high in men among the global market. In recent years the number of Asian women aspiring for skin brightening product increased dramatically because of less side effects than synthetic cosmetics.

Future Scope:

Further research on developed formulation (F5) can be extended on 1. *In vitro* release studies 2 In vivo studies on animals 3. Clinical trials in humans to study the synergistic action on reduction of melanin synthesis when Polyherbs used in combination.

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REFERENCES

1. Mali AS, Karekar P, Yadav AV. Formulation and evaluation of multipurpose herbal cream, International Journal of Science Research,2015;4(11):1495–1497. DOI: https://doi.org/10.21275/NOV151515.
2. World Health Organization. Guidelines on good manufacturing practices for herbal medicines. Geneva: WHO;2007. URL: https://iris.who.int/handle/10665/43672
3. Sharma K, Joshi N, Goyal C. Critical review of Ayurvedic varnya herbs and their tyrosinase inhibition effect, Ancient Science Life, 2015;35(1):18–25. DOI: https://doi.org/10.4103/0257-7941.165627: PMID: 26109785
a. Seiberg M, Paine C, Sharlow E, Gordon PA, et al. Inhibition of melanosome transfer Results in skin lightening, J Invest Dermatol, 2000;115(2):162–167. DOI: https://doi.org/10.1046/j.1523-1747.2000.00052. PMID: 10951231.
4. Singh A., et al. Evaluation of herbal skin cream. Journal of Natural Science Biology Medicine 2013;4(2): 385-390. DOI: https://doi.org/10.4103/2230-973X.107013. PMID: 24082740.
5. Pastorino G, Cornara L, et al. Liquorice (Glycyrrhiza glabra): A phytochemical and pharmacological review. Phytotherapy Research.2018;32(12):2323–2339 DOI: https://doi.org/10.1002/ptr.617. PMID: 30009524.
6. Singh G, Sharma P, et al. Chemical composition and antioxidant activity of essential oil from Hedychium spicatum. J Essent Oil Res 2022; 2(22): 123-129.
7. Policegoudra RS, Aradhya SM, et al. Isolation and characterization of antioxidant compounds Curcuma amada rhizome. J Food Sci Technol. 2011;48(2): doi:10.1007/s13197- 010-0203-1. PMID: 23572708 .
8. Kokate CK, Purohit AP, Gokhale SB. Textbook of Pharmacognosy. 56th ed. Pune: Nirali Prakashan; 2017. p. 6.15–6.17.
9. Evans WC. Trease and Evans Pharmacognosy. 16th ed. Edinburgh: Elsevier Saunders; 2009; 314–316.
10. Khan S, et al. Herbal cream formulation and stability study. J Appl Pharm Sci. 2012;2(7):120- 123. DOI:10.7324/JAPS.2012.2722.
11. Bissett D, Biswas D, Banerjee R, et al. Niacinamide improves skin barrier function and appearance of aging facial skin. Int J Cosmet Sci. 2005;31(6):403–410. DOI: https://doi.org/10.1111/j.1468-2494.2005.00280.x. PMID: 16262894.
12. Kumar A, et al. Herbal formulation development for skin. J Pharm Bioallied Sci. 2011;3(4):567–572. doi:10.4103/0975-7406.90110. PMID: 22219574.
13. Gupta S., et al. Herbal cosmetics review. Pharmacognosy Reviews. 2010; 4(7):45-50. DOI:10.4103/0973-7847.65323. PMID: 22228945
14. Khan S, et al. Herbal cream formulation and stability study. J Appl Pharm Sci. 2012;2(7):120–123. DOI: https://doi.org/10.7324/JAPS.2012.2722.