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PREPARATION AND EVALUATION OF POLYHERBAL CREAM

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ABSTRACT

Throughout the world, there has been an increasing incidence of bacterial infections and because of drug resistance and toxicity associated with long-term treatment with antibacterial drugs, search for new drugs to treat bacterial infections is ongoing. The aim of the present study was to formulate polyherbal antibacterial cream and evaluate its physicochemical properties and stability. To select the best cream formulation, one general formula of cleansing cream was considered and then corrected. The best base formula was chosen according to its monotonousness, straightness and external attractiveness. The formulation containing the plant extract of *Psidium guajava*, *Luffa acutangula* and *Curcuma aromatica* was prepared. Finally, a cream containing stearic acid, triethanolamine, liquid paraffin, propylene glycol, cetostearyl alcohol, methyl paraben, propyl paraben and water was chosen as the best formulation. The final product was a o/w emulsion cream with suitable appearance and desirable physicochemical stability. Due to the stability of the extract in the cream formulation, it was formulated for treatment of bacterial skin infections.

KEYWORDS: *Psidium guajava, Luffa acutangula, Curcuma aromatica,* cream, polyherbal.

INTRODUCTION

The *Luffa acutangula* var *amara* (Family:Cucurbitaceae) is a fairly large climber found in Western, Central and Southern India. All parts of the plant are bitter in taste. Indigenous system of medicine are using the leaf or dried fruit powdered or fruit juice in the treatment of jaundice in the tribals of Madhya Pradesh of India.[1] The parts of plant were showed

bronchitis, emetic, expectorant, demulcent ascites, uterine and vaginal tumours, cytotoxic activity, snake bite and CNS depressant activity in mice.[2,3,4,5]

Curcuma aromatica salisb, known as wild turmeric (Jangli halad in hindi, Ambe halad in marathi), belonging to the family Zingiberaceae, is a threatened aromatic medicinal plant, well known for its multifaceted properties. It is mentioned as 'Vanaharidra' in Ayurveda. *Curcuma aromatica* is known as the "golden spice" as well as the "spice of life." It has been used in India as a medicinal plant and held sacred from time immemorial. It has strong associations with the socio-cultural life of the people of the Indian subcontinent. This "earthy herb of the Sun" with the orange-yellow rhizome was regarded as the "herb of the Sun" by the people of the vedic period. The medicinal properties of this plant are being used in many traditional systems of medicines like Ayurveda and Unani. It is also one of the ingredients of many herbal medicines used in China and other South East Asian countries. Investigation of bioactive compounds in such plants is a novel area in pharmacological research. The use of this plant for many purposes has become more significant in the light of many scientific literatures published in the past decade showing its multifaceted properties.[6,7,8]

Guava tree (psidium guajava) is basically from the Meso Americam area. It can also find in tropical and subtropical areas. Guava tree is member of myrtaceae family, all the parts of this tree widely use in curing many health problems. A lot of work on Pharmalogical researches has been done to demonstrate the use of extract from guajava leaves which proved that guajava leaves extracts are such a useful medicine, widely using by doctors and pharmacist. WHO (world health organization) also says that plants would be the best source for obtaining different types of medicines and drugs. These natural products are widely used by human with its effective results. Extraction from guajava leaves mostly essential oil, tannins, flavonoids, phenol compounds, carotenoids and vitamin C, Flavonoids particularly rich in quercetin, saponins, alkaloids, cardiac glycosides, phlobatannis and anthraquinones. Guava leaf extracts introduces many biological activities i.e. Antibacterial, antioxidant and analgesic, anti-inflammatory, antimicrobial, phytotoxic, hepatoprotection and anti hyperglycaemic and anti-cancer activities.[9]

Fig 1*: Gourd Luffa acutangula.*

Fig 2: leaves *Psidium guajava.*

Fig 3: Rhizome of *C.aromatica.*

MATERIAL AND METHOD

- **Collection of Plant Material**

1. *Luffa acutangula* variety amara

Fresh leaves of Luffa acutangula variety amara were collected from area of Dist: Kolhapur, Maharashtra, India. The fruits were washed under running water to remove adhered dust and other particles. Fruits are shade dried. Seeds are removed. Fruits were mechanically

powdered and sieved. The material was air-dried and ground to a fine powder. Powder is stored in air-tight containers prior to further analysis.

2. Leaves *Psidium guajava*

Fresh whole plant of *Psidium guajava* were collected from R.K.Nagar, Kolhapur, fresh plant was collected in bulk, washed under running tap water, dried under shade for a period of 7 days and then pulverized in mechanical grinder to obtain coarse powder. The dried powder was stored in airtight bottles.

3. *Curcuma aromatica salisb*

Dried rhizomes of *Curcuma aromatica salisb* were collected from local market of Kolhapur, and then pulverized in mechanical grinder to obtain coarse powder. The dried powder was stored in airtight bottles.

- **Chemicals**

Ethanol, stearic acid, triethanolamine, liquid paraffin, propylene glycol, cetostearyl alcohol, methyl paraben, propyl paraben.

- **Extraction process**

1. *Luffa acutangula* variety amara[10]

The coarse powdered material (each 755 gm) was soaked in 95% ethanol (1200ml) by maceration technique for 72 hours. The extract was evaporated to dryness until dry mass is obtained.

2. Leaves *Psidium guajava*

The coarse powdered material (each 30 gm) was soaked in 95% ethanol (120ml) by occasional shaking. The solution was filtered and extract was evaporated at 40^{o}C until dry mass is obtained.

3. *Curcuma aromatica Salisb*[11]

200 gm air-dried rhizome of *Curcuma aromatica Salisb*. were reduced to fine powder and extracted in Soxhlet apparatus till completely exhausted with Ethanol (solvent). The extraction process is carried out 10 hours for complete extraction. The extracts were concentrated under reduced pressure to a dry residue. Weight of extract was recorded. The yield of extract for *Curcuma aromatica* was found to be 8.55%.

- **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, alcoholic extract of *Luffa acutangula* variety amara, *Psidium guajava*, *Curcuma aromatica Salisb* 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 2.

Table 1: Phytochemical Evaluation of *Luffa acutangula* variety amara, *Psidium guajava, Curcuma aromatica Salisb.*

Sr. No.	Phytochemical tests	Extracts		
		Luffa acutangula	***Psidium guajava***	***Curcuma aromatica Salisb***
1.	**Alkaloids**	Present	Present	Present
2.	**Tannins**	Present	Present	Absent
3.	**Flavanoids**	Present	Present	Present
4.	**Saponins**	Present	Present	Present
5.	**Steroids**	Present	Present	Present
6.	**Cardiac glycosides**	Present	Present	Present
7.	**Amino acids**	Absent	Absent	Absent
8.	**Carbohydrates**	Present	Present	Present
9.	**Anthraquinones**	Absent	Absent	Present

Table 2: Composition of Cream.[12]

Sr. No.	Ingredients	Formula % w/w			
		V1	**V2**	**V3**	**V4**
1.	*Luffa acutangula*	0.25	0.25	0.25	0.25
2.	*Psidium guajava*	0.25	0.25	0.25	0.25
3.	*Curcuma aromatica*	0.25	0.25	0.25	0.25
4.	Stearic acid	2	2.5	3	3.5
5.	Triethanolamine	0.25	0.3	0.35	0.4
6.	Almond oil	0.5	0.75	1	1.25
7.	Mineral oil	1.125	0.875	0.625	0.375
8.	Propylene glycol	2	2.5	3	3
9.	Cetostearyl alcohol	0.5	0.375	0.25	0.25
10.	Methyl paraben	0.0375	0.0375	0.0375	0.0375
11.	Propyl paraben	0.0125	0.0125	0.0125	0.0125
12.	Sodium metabisulphite	--	O.025	0.025	--
13.	EDTA	--	0.025	--	0.025
14.	Distilled water	q.s	q.s	q.s	q.s

Fig 4: Cream Preparation.

EVALUATION OF CREAM[13, 14, 15,16,17,18]

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 40oC ± 1oC for 20 days. The formulations were kept both at room and elevated temperature and observed on 0th, 5th, 10th, 15th and 20th 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.

2. Dye test

This dye test confirms that all formulation were o/w type emulsion cream.

3. Homogeneity

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

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.

5. Spreadability

All formulations are easily spreadable by small amounts of shear. But formulations V3 and V4 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 V3 and V4, the type of smear formed on the skin were non greasy.

8. Removal

The cream of V3 and V4 applied on skin was easily removed by washing with tap water.

9. Irritancy test

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

10. Accelerated stability testing

Accelerated stability testing of prepared formulations was conducted for formulation number V3 and V4 at 40oC ± 1oC for 20 days. The formulations were kept both at room and elevate temperature and observed on 0th, 5th, 10th, 15th and 20th day for the parameters like Homogeneity, Appearance, Spreadibility, After feel, Type of smear, Removal, change in colour Emollient & Non greasy nature. The formulations were stable and there was no any change in any of the parameters (Table 3).

Table 3: Physical parameters of V3 and V4 cream at room and accelerated temperature.

Days	Temperature	Formulations	Parameters						
			pH	A	B	C	D	E	F
0	RT	V3	6.3	X	NCC	X	EMO	NG	ES
	40^0 to ± 1^0c	V4	6.4	X	NCC	X	EMO	NG	ES
5	RT	V3	6.3	X	NCC	X	EMO	NG	ES
	40^0 to ± 1^0c	V4	6.4	X	NCC	X	EMO	NG	ES
10	RT	V3	6.3	X1	NCC	X1	EMO	NG	ES
	40^0 to ± 1^0c	V4	6.4	X	NCC	X	EMO	NG	ES
15	RT	V3	6.5	X	NCC	X	EMO	NG	ES
	40^0 to ± 1^0c	V4	6.6	X	NCC	X	EMO	NG	ES
20	RT	V3	6.4	X	NCC	X	EMO	NG	ES
	40^0 to ± 1^0c	V4	6.5	X1	NCC	X1	EMO	NG	ES

A-Homogeneity, B-Appearance, C-Spreadibility, D-After feel, E-Type of smear, F-Removal, X: Good, X1: Satisfactory, EMO: Emollient, NG: Non greasy, ES: Easy, NCC: No change in colour.

DISCUSSION

From above result it is concluded that on combining the extract *Luffa acutangula, Psidium guajava, Curcuma aromatica* are having antibacterial and multipurpose effect such as whitening, antiwrinkle, antiaging and sunscreen effect on skin. As it is not possible that efficiency of medicinal and cosmetic property in single plant extract, but by combining the different natural components can be possible to increase the efficacy of extract. The prepared cream improve and synergize the cosmetic properties as compare to individual extract. These studies suggested that these extract and base of cream are more stable up to 12 months and safe.

CONCLUSION

Oil in water emulsion based cream was formulated using natural ingredients and was evaluated. By combining all these ingredients it can be concluded that this cream can be used as a multipurpose cream and the ingredients mixed can produce synergistic effect of other. These studies suggest that base of cream of V3 and V4 are more stable and safe for use.

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