

## **FORMULATION AND EVALUATION OF *CYPERUS ROTUNDUS* AND *CUCUMIS SATIVUS* BASED HERBAL FACE CREAM**

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### **Summary**

The aim of this study was to formulate and evaluate the herbal face cream containing extracts of *Cyperus rotundus*, *Cucumis sativus* and almond oil. Different types of formulations oil in water (O/W) herbal creams namely F1 to F7 were formulated from the ethanol extract of *Cyperus rotundus* (roots), *Cucumis sativus* (fruits) and almond oil in varied concentrations. All the seven formulations (F1 to F7) was evaluated for various parametrs like pH, viscosity, spreadability, rheological study, and stability along with irritancy test were examined. Formulations F4 and F5 showed good spreadability, good consistency, homogeneity, appearance, pH, ease of removal, spreadibility and no evidence of phase separation. The formulation F4 and F5 shows no redness, edema, inflammation and irritation during irritancy studies. These formulations are safe to use for skin.

**Key words** *Cyperus rotundus*, *Cucumis sativus*, almond oil, herbal face cream.

### **Introduction**

The demand of cosmeceuticals 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. Cosmetics are the products that are created for application on the body for the purpose of cleansing, beautifying or altering appearance and enhancing the beauty. Cosmetics are developed to reduce wrinkles, fight acne and to control oil secretion. For various types of skin ailments formulations like skin protective, sunscreen, antiacne, antiwrinkle and antiaging are designed using varieties of materials, either natural or synthetic. The development process for cosmetic formulation needs maintenance of quality standard. The quality of a formulation should satisfy the consumer's need in terms of its performance. The plant parts used in cosmetic preparation should have varieties of properties like antioxidant, anti-inflammatory, antiseptic, emollient, antiseborrhetic, antikerolytic activity and antibacterial etc. These herbal products claim to have less side effects, commonly seen with products containing synthetic agents. The market research shows upward trend in the herbal trade with the herbal cosmetic industry playing a major role in fueling this worldwide demand for herbals[1-6].

Literature survey revealed that Cucumber or *Cucumis sativa*, is cooling, healing and soothing to irritated skin, whether caused by sun, or the effects of a cutaneous eruption, due to highly antioxidant nature[7,8]. *Prunus amygdalus*, commercially known as almonds is a natural product whose seeds are rich in polyphenolic compounds especially flavonoids and phenolic acids. Almond oil has excellent emollient properties help the skin to balance water loss and absorption of moisture, helps relieve irritation, inflammation and itching, and is greatly lubricating[9]. *Cyperus rotundus* of antifungal, antibacterial, antiseptic, antioxidant and antibiotic property support it as a part of ingredient in cosmetic formulation[10,11]. The main aim of the present work was to formulation and evaluation of the herbal face cream.

### **Material and Methods**

**Plant Material:** The proposed study of *Cyperus rotundus* was collected from the Foolchand Moolchand shops, Bhopal, Madhya Pradesh. Care was taken to select healthy rhizomes. The *Cucumis sativus* was collected from local market of Bhopal (M.P.).

**Preparation of extract:** 500 gm of powdered drug of *Cyperus rotundus* (root) and *Cucumis sativus* (fruit) were packed in soxhlet apparatus separately and extracted with petroleum ether (60-80°C) to defat the drug. Defatted powdered drug of *Cyperus rotundus* and *Cucumis sativus* were then extracted with ethanol separately. The solvents were removed by distillation and the last traces of solvent being removed under reduced pressure.

**Drug formulation:** Oil in water (O/W) emulsion-based cream (semisolid formulation) was formulated. The emulsifier (stearic acid) and other oil soluble components (Cetyl alcohol, almond 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, Propylene glycol, ethanol extract of *Cyperus rotundus* and *Cucumis sativus* were dissolved in the aqueous phase (Part B) and heated to 75° C. After heating, the aqueous phase was added in portions to the oil phase with continuous stirring until cooling of emulsifier took place. The formula for the cream is given in table 1.

### **Evaluation of cream**

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

**Viscosity:** Viscosity of the formulation was determined by Brookfield Viscometer at 100 rpm, using spindle no 7.

**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 the ground colourless. 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 ground.

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

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

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

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

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

**Acid value:** Take 10 gm of substance dissolved in accurately weighed, 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 0.1N NaOH, until faintly pink color appears after shaking for 30 seconds.

$$\text{Acid value} = n \cdot 5.61 / w$$

n = the number of ml of NaOH required.

w = the weigh of substance.

**Saponification value:** Introduce about 2 gm 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.

$$\text{Saponification value} = (b-a) \cdot 28.05 / w$$

The volume in ml of titrant = a

The volume in ml of titrant = b

The weigh of substance in gm = w

**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.

**Rheological studies:** The formulated cream was found to be non-newtonian. Take a fixed quantity 10gms of cream in a 10 ml beaker. Keep it impact for 1 hr. The beaker was inclined to one side see whether the cream is liquefied or not. Beaker is shaken to and fro for continuous 5 min and checked whether consistency has changed or not. The beaker was again tilted and checked for pourability of the cream.

**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  $40\text{ }^{\circ}\text{C} \pm 1\text{ }^{\circ}\text{C}$  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 following parameters[12-16].

### **Results**

**pH of the Cream:** The pH of the cream was found to be in range of 6-7 which is good for skin pH. All the formulations were shown pH nearer to skin required (Table 2).

**Viscosity:** The viscosity of was cream was in the range of 27016-27035 cps which indicates that the cream is easily spreadable by small amounts of shear. But F4 and F5 shows good spreadable property than other formulations.

**Dye test:** This dye confirms that all formulations were o/w type emulsion cream. But formulation (F5) shows more stable in o/w type emulsion.

**Homogeneity:** All formulations produce uniform distribution of extracts in cream. This was confirmed by visual appearance and by touch (Table 5).

**Appearance:** When formulations were kept for long time, it found that no change in colour of cream (Table 5).

**After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was found (Table 5).

**Type of smear:** After application of cream, the type of smear formed on the skin were non greasy (Table 5).

**Removal:** The cream applied on skin was easily removed by washing with tap water (Table 5).

**Acid value and Saponification value:** The results of acid value and saponification value of all formulation were presented in table 3, and showed satisfactorily values.

**Irritancy test:** The formulation F4 and F5 shows no redness, edema, Inflammation and irritation during irritancy studies. These formulations are safe to use for skin (Table 4).

**Rheological studies:** Rheological behavior of the cream was studied and confirmed that the cream had pseudo plastic flow behavior. All the formulations showed no thixotropic (shear thinning) characteristics.

**Discussion**

*Cyperus rotundus* and *Cucumis sativus* are well known for its medicinal value in Indian traditional system of medicine and in ayurvedic preparations. In the present work, it was decided to extract and formulate herbal face cream. The herbal 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 an herbal face cream containing the extract of *Cyperus rotundus* and *Cucumis sativus* in different concentration along with almond oil. 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. The prepared herbal face cream is intended for cosmeceutical use rather than as other cosmetic. The extracts of *Cucumis sativus* produces whitening of skin as well removing marks, healing and soothing to irritated skin. The extract of *Cyperus rotundus* act as bactericide, anti-fungal and anti-inflammatory agent. The almond oil increases the glow on skin and has emollient properties Hence all these properties are beneficial to normal human keratinocytes and it is safe and stable too.

**Table 1: Composition of cream**

Ingredients	Formula % w/w						
	F1	F2	F3	F4	F5	F6	F7
Ethanol extract of <i>Cyperus rotundus</i>	2	1.5	1	2	2	1.5	1
Ethanol extract of <i>Cucumis sativus</i>	0.5	2	1.5	1.5	1.5	2	2.5
Stearic acid	7	6.5	6	5.5	5	4.5	-
White beeswax	-	0.5	1	1.5	2	2.5	7
Triethanolamine	1.5	1.8	2.0	2.2	1.8	2.0	2.2
Almond oil	6	6	6	6	5	5	5
Propylene glycol	4	4.2	4.4	4.8	5	5.2	5.4
Methyl paraban	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Propyl paraban	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Cetyl alcohol	5	5	5	5	5	5	5
Water, qs, 100	qs	qs	qs	qs	qs	qs	qs

**Table 2: pH of formulations**

Formulation	pH
F1	6.9
F2	6.8
F3	6.5
F4	6.4
F5	6.5
F6	6.8
F7	6.5

**Table 3: Test applied for acid value and saponification value**

S. No.	Parameter	Formula						
		F1	F2	F3	F4	F5	F6	F7
1	Acid value	5.7	5.8	6.1	5.7	5.9	5.8	6.2
2	Saponification value	26.3	26.2	27.1	25.3	26.3	26.4	27.2

**Table 4: Type of Adverse effect of formulations**

Formulation	Irritant	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
F7	NIL	NIL	NIL

**Table 5: Physical parameter of F5 and F4 cream on room and accelerated temperature**

Days	Temperature	Formulation	Parameter						
			pH	X <sub>1</sub>	X <sub>2</sub>	X <sub>3</sub>	X <sub>4</sub>	X <sub>5</sub>	X <sub>6</sub>
0	RT	F5	6.5	**	NCC	**	E	NG	ES
		F4	6.4	**	NCC	**	E	NG	ES
	40 °C + 1 °C	F5	6.4	**	NCC	**	E	NG	ES
		F4	6.5	*	NCC	**	E	NG	ES
5	RT	F5	6.3	**	NCC	**	E	NG	ES
		F4	6.5	**	NCC	**	E	NG	ES
	40 °C + 1 °C	F5	6.4	**	NCC	**	E	NG	ES
		F4	6.4	*	NCC	**	E	NG	ES
10	RT	F5	6.5	**	NCC	**	E	NG	ES
		F4	6.6	**	NCC	**	E	NG	ES
	40 °C + 1 °C	F5	6.5	**	NCC	**	E	NG	ES
		F4	6.5	**	NCC	**	E	NG	ES
15	RT	F5	6.3	**	NCC	**	E	NG	ES
		F4	6.6	*	NCC	**	E	NG	ES
	40 °C + 1 °C	F5	6.4	**	NCC	**	E	NG	ES
		F4	6.6	**	NCC	**	E	NG	ES
20	RT	F5	6.4	**	NCC	**	E	NG	ES
		F4	6.5	**	NCC	**	E	NG	ES
	40 °C + 1 °C	F5	6.5	**	NCC	**	E	NG	ES
		F4	6.5	**	NCC	**	E	NG	ES

X<sub>1</sub>-Homogeneity, X<sub>2</sub>-Appearance, X<sub>3</sub>-Spreadability, X<sub>4</sub>-After feel, X<sub>5</sub>-Type of smear, X<sub>6</sub>-Removal, \*\*: Good, \*: Satisfactory, E: Emollient, NG: Non greasy, ES: Easy, NCC: Not change in colour

### References

1. Dureja H, Kaushik D, Gupta M, Kumar V, Lather V. Cosmeceuticals: An emerging concept. *Indian Journal of Pharmacology* 2005; 37(3): 155-159.
2. Rasheed A, Reddy GAK, Mohanalakshmi S, Kumar CKA. Formulation and comparative evaluation of poly herbal anti-acne face wash gels. *Pharmaceutical Biology* 2011; 49(8): 771-774.
3. Rashmi MS. Topical gel: A review. *Pharm Rev* 2008; 6: 1-3.
4. Nair SS, Majeed S, Sankar S, Mathew JM. Formulation of Some Antioxidant Herbal Creams. *Hygeia* 2009; 1 (1): 44-45.
5. Ashawat MS, Banchhor M, Saraf S, Saraf S. Herbal Cosmetics: "Trends in Skin Care Formulation". *Phcog Rev* 2009; 3(5): 82-89.
6. Choudhuri, RK. Emblica cascading antioxidants: Novel natural skin care ingredients. *Skin Pharmacol. Applied Skin Physiol* 2002; 15: 374-380.
7. Karthiyayini T, Kumar R, Kumar KLS, Sahu RK, Roy A. Evaluation of antidiabetic and hypolipidemic effect of *Cucumis sativus* fruit in streptozotocin-induced-diabetic rats. *Biomedical and Pharmacological Journal* 2009; 2(2): 351-355.
8. [http://www.cosmeticsinfo.org/ingredient\\_details.php](http://www.cosmeticsinfo.org/ingredient_details.php).
9. Sachdeva MK, Katyal T. Abatement of detrimental effects of photoaging by *Prunus amygdalus* skin extract. *Int J Curr Pharm Res* 2011; 3(1): 57-59.
10. Lemaure B, Touche A, Zbinden I, Moulin J, Courtois D, Mace K, Darimont C. Administration of *Cyperus rotundus* tubers extract prevents weight gain in obese Zucker rats. *Phytotherapy Research* 2007; 21(8): 724-30.
11. Khalili M, Kiasalari Z, Roghani M, Aziz Y. Anticonvulsant and antioxidant effect of hydroalcoholic extract of *Cyperus rotundus* rhizome on pentylenetetrazole-induced kindling model in male mice. *Journal of Medicinal Plants Research* 2011; 5(6): 868-877.
12. Sahu AN, Jha SB, Dubey SD. Formulation & Evaluation of Curcuminoid Based Herbal Face Cream. *Indo-Global Journal of Pharmaceutical Sciences* 2011; 1(1): 77-84.
13. Vinod KR, Santhosha D, Anbazhagan S. Formulation and evaluation of piperine creama new herbal dimensional approach for vitiligo patients. *Int J Pharm Pharm Sci* 2011; 3(2): 29-33.
14. Jagtap NS, Khadabadi SS, Farooqui IA, Nalamwar VP, Sawarkar HA. Development and evaluation of herbal wound healing formulations. *Int.J. PharmTech Res* 2009; 1(4): 1104-1108.
15. Grimm W. Extension of The International Conference on Harmonization Tripartite Guideline for Stability Testing of New Drug Substances and Products to Countries of Climatic Zones III and IV. *Drug Development and Industrial Pharmacy* 1998; 24(4): 313- 325.
16. Forster T, Rybinski WV, Wadle A. Influence Of Microemulsion Phases on The Preparation Of Fine Disperse Emulsions. *Adv. In Colloid & Interface Sci.* 1995; 58:119-149.