

FORMULATION AND EVALUATION OF CREAM FROM NATURALLY CONTAINING PLANT EXTRACTS

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Article Received on
05 March 2018,

Revised on 25 March 2018,
Accepted on 15 April 2018

DOI: 10.20959/wjpps20185-11481

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ABSTRACT

Aim: the aim of the present study is to formulate and evaluate of cream from naturally containing plant extracts prepared by using oil in water method. **Methods:** Different activities of aqueous and alcoholic extracts was assessed by oil in water type emulsion method. By discovering different types of formulations, such as oil in water, we were able to create several face creams respectively classified from C1 to C6, by incorporating different concentrations of stearic acid and acetyl alcohol. The evaluation of all formulations (C1 to C6) has been done by the analysis of different parameters like pH, viscosity, spread ability and stability. **Results:** An aqueous and

alcoholic fraction analyzed from a sample of Natural remedies (plant extracts) showed a significant different activities. Among the six formulations (C1-C6) C3 and C6 showed good spread ability, good consistency, homogeneity, appearance, pH; there is no proof of a separation phase and ease of removal. Also the formulations C3 and C6 showed no redness or edema or erythema and irritation during irritancy studies. **Conclusions:** These formulations can be safely used on the skin. Hence, the study suggests that the composition of extract and the base of the cream C3 and C6 are more stable and safe.

KEYWORDS: Cream, Plant extracts, Aqueous and alcoholic extracts, oil in water type emulsion, different formulations.

INTRODUCTION

The word 'Cosmetic' derived from a Greek word – 'kosmesticos' that means to adorn. From that time any materials used to beautification or promoting appearance is known as cosmetic various types of natural material were used for these purpose.^[1] Since the ancient times women have started to dress themselves because they wanted to increase their own beauty.

Even today, people especially in rural areas, choose natural remedies (plants extracts) for traditional cosmetics. Cosmetics are products which are used to purify and beautify the skin. These products are of active ingredients purporting to have medical and drug-like benefits. A certain number of women are still using herbal cosmetics to beautify their skin.

CREAMS^[14]

Cream consist of medicament dissolved or suspended in water removable or emollient bases, classified as water-in-oil or oil-in-water and intended for application on the skin or accesible mucous membrane to provide localized and sometimes systemic effects at the site of application. The function of a skin cream is to protect the skin against harshness from the environment and any dry conditions of the skin. A skin cream should aid the skin in carrying out its normal functions, that is, restoring moisture to dry skin, allowing the elimination of waste matter through the pores, and the cooling of the body by evaporation of water (perspiration) and radiation, thus aiding in the maintenance of the normal body temperature.

TYPES OF CREAM

On the basis of phase

OIL- IN-WATER (O/W)

As- Fluocinolone acetonide cream

WATER-IN-OIL (W/O)

As- cold cream

CLASSIFICATION OF CREAM ON THE BASIS OF FUNCTION-

Cleansing and cold cream.

Foundation and vanishing cream.

Night and massage cream.

Head and body cream.

All purpose and general cream

Topical skin infections commonly occur and often present therapeutic challenges to practitioners, despite the numerous existing antimicrobial agents available today. The necessity for developing new antimicrobial means has increased significantly due to growing concerns regarding multi drug resistant bacterial, viral, and fungal strains.^[21-24] Consequently, attention has been devoted to safe, new, and/or alternative antimicrobial

materials in the field of antimicrobial chemotherapy. Common examples for topical skin infections include diaper rash, cold sores, and tinea (also called pityriasis) versicolor.

METHODOLOGY

PREPARATION OF EXTRACT

Two methods are used for Preparation of extract.

Aqueous extract(Turmeric, lemon peel, mint, Neem)

5gm of Each ingredient weighed accurately & dissolve each in 50 ml of water. This solution is placed on water bath at 80-100°C. The heating solution was concentrated up to 20 ml. Then follow Filtration process of each ingredient and collect the each filter product.^[10,11]

Alcoholic extract(Papaya, Garlic)

5gm of Each ingredient weighed accurately & dissolve each in 50 ml of alcohol. This solution is placed on water bath at 80-100°C. The heating solution was concentrated up to 20 ml. Then follow Filtration process of each ingredient and collect the each filter product.

[Fig 1]

FORMULATION PREPARATION

The formulation can be prepared by adding two phases which are mentioned as following

Phase 1: The emulsifying agent stearic acid was dissolved in cetyl alcohol and heated to 75°C. It can be named as oil phase i.e., Part A.

Phase 2 In this phase mix the both above collected extracts of aqueous and alcoholic followed by adding preservatives & other water soluble components like methyl paraben, propyl paraben, triethanol amine, propylene glycol, Honey and heated to 75°C. It can be named as aqueous phase i.e., Part B.

After heating aqueous phase was added into oil phase at same temperature with continuous stirring the smooth & homogenous cream was prepared. The formula for given. (Table 1).^[12,13]

Table 1: Formulation of Cream.

SI. No.	Ingredient	Formulation1 (C1)	F2(C2)	F3(C3)	F4(C4)	F5(C5)	F6(C6)
1.	Mentha spicata	0.25 ml	0.25 ml	0.75 ml	0.75 ml	0.50 ml	0.50 ml
2.	<i>Citrus limon</i> (Lemon peel oil)	1.25 ml	1.25 ml	1.25 ml	1.25 ml	1.25 ml	1.25 ml
3.	<i>Curcuma longa</i> (Turmeric)	0.5 ml	0.5 ml	0.5 ml	0.5 ml	0.5 ml	0.5 ml
4.	Carica papaya	0.5 ml	0.5 ml	1 ml	1 ml	0.5 ml	1 ml
5.	<i>Allium sativum</i> (Garlic)	1 ml	1 ml	1 ml	----	----	-----
6.	western honey bee	1.25 ml	1.25 ml	1 ml	1 ml	1.5 ml	1.5 ml
7.	<i>Azadirachta indica</i> (Neemleaves)	0.25 ml	-----	-----	1.25 ml	1.25 ml	1.25 ml
8.	Stearic acid	2 g	2g	4 g	4 g	3 g	3 g
9.	Cetyl alcohol	1.5 g	1.5 g	2 g	2 g	2.5g	2.5g
10.	Methyl paraben	0.1 g	0.2 g	0.2 g	0.2 g	0.2 g	0.2 g
11.	Propyl paraben	0.1 g	0.2 g	0.2 g	0.2 g	0.2 g	0.2 g
12.	Triethanolamine	1 g	1 g	1 g	1 g	1 g	1 g
13.	Propylene glycol	4 ml	4 ml	4 ml	4 ml	4 ml	4 ml
14.	Distilled Water	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.	Q.S.



Figure 1: Extract of Natural plant Ingredients.



Figure 2: Cream formulations.

EVALUATION OF CREAM

Physical Properties

The Cream was observed for color, odour and appearance.^[4]

Test for Thermal Stability

The formulated cream was inserting into glass bottle with the help of spatula, and taped to settle to the bottom. Filled up to two-third capacity of bottle and insert plug and tighten the cap. Filled bottle was kept erect inside the incubator at $45^{\circ} \pm 1^{\circ}$ for 48 hrs. The sample passed the test, if on removal from the incubator shows no oil separation or any other phase separation.^[5]

Test for microbial growth in formulated creams

The formulated creams were inoculated on the plates of agar media by streak plate method and a control was prepared by omitting the cream. The plates were placed in to the incubator and are incubated at $37^{\circ}C$ for 24 hours. After the incubation period, plates were taken out and check the microbial growth by comparing it with the control^[6]

Spreadability

The Spreadability was expressed in terms of time in seconds taken by two slides to slip off from the cream, placed in between the slides, under certain load. Lesser the time taken for separation of the two slides, better the Spreadability. Two sets of glass slides of standard dimensions were taken. The herbal cream formulation was placed over one of the slides. The other slide was placed on the top of the formulation, such that the cream was sandwiched between the two slides weight was placed upon the upper slides so that the cream between the

two slides was pressed uniformly to form a thin layer. The weight was removed and the excess of formulation adhering to the slides was scrapped off. The upper slide allowed slipping off freely by the force of weight tied to it. The time taken for the upper slide was noted.

Spreadability= $m \times l / t$

m = weight tied to the upper slide (30g) l =length of glass slide (5cm) t =time taken in seconds.^[7]

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.^[8]

Wash ability

A small amount of cream applied on hand & washed under running tap water.^[8]

Viscosity

Viscosity of formulated cream was determined by book field viscometer at 100 rpm using spindle No 7.^[8]

pH of the cream

The pH of various formulations was determined by using digital pH meter. About 1 g of the cream was weighed and dissolved in 100 ml of distilled water and stored for two hours. The measurement of pH of each formulation was done in triplicate and average values were calculated.^[9]

Phase separation

The formulated cream was kept intact in a closed container at 25 – 300 C not exposed to light. Phase separation was observed carefully every 24 hrs for 30 days. Any change in phase separation was checked.^[9]

Moisture absorption studies

About 50 mg of cream was taken on a watch glass. A beaker was taken with full of water and was kept in a desiccator without adsorbents and allowed to get saturated. Watch glass with cream was introduced into the dessicator. It was left for 24 hrs.^[9]

RESULTS AND DISCUSSION

In our work we are prepared six (C1-C6) different cream formulations. Among these formulations to choose final selection, the all formulations are tested for further final selection purpose.

PHYSICAL PROPERTIES

The physical properties & all formulated cream were judged by its color. Odour & texture. The results are tabulated below.

Table 4: Physical Properties of cream.

Parameters	Formulations					
	C1	C2	C3	C4	C5	C6
Color	Lemon yellow	Lemon yellow	Lemon yellow	Lemon yellow	Lemon yellow	Lemon yellow
Odour	characteristic	Characteristic	characteristic	characteristic	characteristic	Characteristic
Texture	Smooth	Smooth	Smooth	Smooth	Smooth	Smooth

TEST FOR THERMAL STABILITY

Thermal stability of the formulation was determined by the humidity chamber controlled at 60- 70% RH and $37 \pm 1^{\circ}\text{C}$. Finally all the formulations stable and no oil separation was observed.

Table 5: Test for thermal stability of cream.

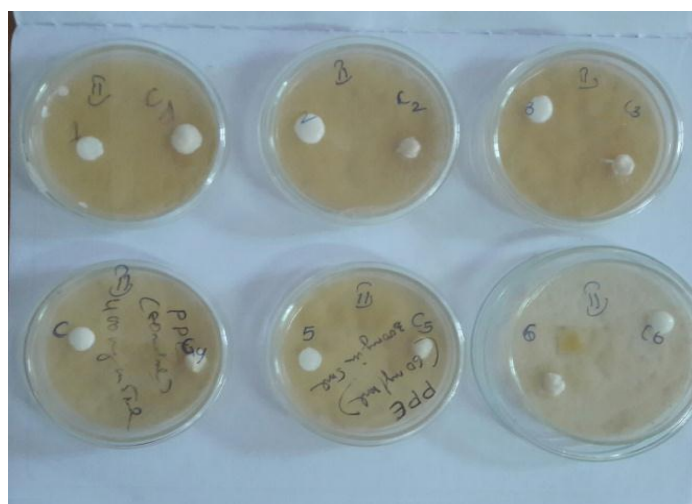
Test/Formulations	C1	C2	C3	C4	C5	C6
Thermal Stability (atRH 65% and $30 \pm 40^{\circ}\text{C}$)	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation

TEST FOR MICROBIAL GROWTH IN FORMULATED CREAMS

The formulated creams were inoculated on the plates of agar media by streak plate method and a control was prepared by omitting the cream. The plates were placed in the incubator and are incubated at 37°C for 24 hours. After the incubation period, plates were taken out and check the microbial growth of gram positive (Bacillus) and gram negative (E.coli) by comparing it with the control.

Table 6: Test for Microbial growth of cream.

Sl. NO.	Formulation	Growth	
		Bacillus	E-coli
1	C1	Absent	Absent
2	C2	Absent	Absent
3	C3	Absent	Absent
4	C4	Absent	Absent
5	C5	Absent	Absent
6	C6	Absent	Absent
7	Control	Absent	Absent

**Figure 3: Microbial study of Creams.****SPREADABILITY**

Spreadability of cream formulations, that is, the ability of a formulated cream to evenly spread on the skin plays an important role while comparing with the administration of a standard dose of a medicated formulation to the skin and the efficacy of a topical therapy. The spreading values, that is, diameters observed for the formulations, after one minute. Results indicated that our cream had comparable spreadability to that of commercial product which was used as comparator in the study. The results was noted on the table no 7.

Table 7: Spreadability of cream.

Formulations	TIME (sec)	Spreadability (g×cm/sec)
C1	15	8.3
C2	14	8.9
C3	16	7.8
C4	15	8.3
C5	15	8.3
C6	16	7.8

IRRITANCY

All formulation shows no irritation, Erythema & edema during Irritancy test study. The resulted of Irritancy test formulations were safe to use for skin. The results were shown in below table No. 8.

Table 8: Irritancy of cream.

Formulation	Irritant	Erythrema	Edema
C1	NIL	NIL	NIL
C2	NIL	NIL	NIL
C3	NIL	NIL	NIL
C4	NIL	NIL	NIL
C5	NIL	NIL	NIL
C6	NIL	NIL	NIL

WASH ABILITY

A small amount of cream applied on hand & washed under running tap water. The washability of all formulations shown as below table.

Table 9: Wash ability of cream.

Formulation	Wash Ability
C1	Easily Washable
C2	Easily Washable
C3	Easily Washable
C4	Easily Washable
C5	Easily Washable
C6	Easily Washable

VISCOSITY

Viscosity of formulated cream was determined by brook field viscometer at 20 rpm using spindle No LV-4(64). The viscosity of cream was found in range of 49990 to 30000cp which indicates that cream was easily spreadable by small amount of shear. The result is tabulated below.

Table 10: Viscosity of cream.

	Formulations					
	C1	C2	C3	C4	C5	C6
Viscosity	49010	48980	49090	48890	48980	49210

PH OF THE CREAM

The result of pH of prepared creams (C1 – C6) was found to be around 6 which are suitable for topical application. Because skin pH is between 4.5-6. The result of pH is summarized in table No. 10.

Table 11: pH of cream.

FORMULATION	PH
C1	6.85
C2	8.44
C3	7.51
C4	7.80
C5	7.90
C6	7.10

PHASE SEPARATION

The formulated cream was kept intact in a closed container at 25 – 100°C not exposed to light. Phase separation was observed carefully every 24 hrs for 30 days. In this cream formulations no phase separation was observed and results were shown in below table.

Table 12: Phase separation of cream.

Formulation	Phase Separation
C1	No Phase Separation
C2	No Phase Separation
C3	No Phase Separation
C4	No Phase Separation
C5	No Phase Separation
C6	No Phase Separation

MOISTURE ABSORPTION STUDIES

About 50 mg of cream was taken on a watch glass. A beaker was taken with full of water and was kept in a desiccator without adsorbents and allowed to get saturated. Watch glass with cream was introduced into the desiccator. It was left for 24 hrs. After 24hrs the moisture absorption was noted and results shown in below table.

Table 13: Moisture absorption studies of cream.

Formulation	Moisture Absorption
C1	Moisture Not Absorption
C2	Moisture Not Absorption
C3	Moisture Not Absorption
C4	Moisture Not Absorption
C5	Moisture Not Absorption
C6	Moisture Not Absorption

CONCLUSION

The present study involves Formulation, Development and Evaluation of Multipurpose Skin Cream. The present work mainly focuses on the potential of extracts from cosmetic purposes. The uses of cosmetic have been increased in many folds in personal care system. The prepared body cream was o/w type emulsion, hence can be easily washed with plane water which gives better customer compliance. Our study indicated that the formulations(C3 and C6) were more stable. The prepared formulations showed good spreadability, no evidence of phase separation. These formulations (C3 and C6) had almost a constant PH, emollient properties; they were not greasy and easily removable after the application. The stable formulations were safe and skin irritations and allergic sensitizations were scarce. All the formulations passed the microbial limit test which included some parameters like total bacterial count and fungal count; pathogens like E.Coli, Bacillus were also absent.

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