

Original Article

FORMULATION AND EVALUATION OF MULTIPURPOSE HERBAL CREAM

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Received: 25 Jan 2020, Revised and Accepted: 23 Mar 2020

ABSTRACT

Objective: To formulate and evaluate herbal cream using Aloe Vera gel, dimethyl sulphoxide extracts of Neem (*Azadirachta indica*) and Tulsi (*Ocimum tenuiflorum*) to give multipurpose effect.

Methods: The cream was prepared by using the cream base that is bee's wax, liquid paraffin, borax, methylparaben, distilled water, rose oil, Aloe Vera gel, dimethyl sulphoxide extracts of Neem and Tulsi. The cream was prepared by using the slab technique/extemporaneous method for geometric and homogenous mixing of all the excipients and the herbal extracts. By using slab technique, we have developed three batches of our herbal cream, namely F1H, F2H, and F3H. All three batches were evaluated for different parameters like appearance, P^H, viscosity, phase separation.

Results: All the three formulations F1H, F2H, F3H showed good appearance, P^H, adequate viscosity and no phase separation was observed. Also, the formulations F1H, F2H, F3H showed no redness, erythema and irritation during irritancy study and they were easily washable. All the three formulations F1H, F2H, F3H were stable at room temperature.

Conclusion: All three herbal ingredients showed significant different activities. Based on the results, we can suggest that all the three formulations F1H, F2H, F3H were stable and can be safely used on the skin.

Keywords: Aloe barbadensis (gel), *Azadirachta indica* (Neem), *Ocimum tenuiflorum*/*Ocimum sanctum* (Tulsi), Herbal cosmetic, Multipurpose cream

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DOI: <http://dx.doi.org/10.22159/ijcpr.2020v12i3.38300>. Journal homepage: <https://innovareacademics.in/journals/index.php/ijcpr>

INTRODUCTION

Cream is defined as semisolid emulsions which are oil in water (o/w) or water in oil (w/o) type and these semisolid emulsions are intended for external application [1]. Cream is classified as oil in water and water in oil emulsion. It is applied on outer part or superficial part of the skin and its main ability is to remain for a longer period of time at the site of application. The function of a skin cream is to protect the skin against different environmental condition, weather and gives soothing effect to the skin. There are different types of creams like cleansing, cold, foundation, vanishing, night, massage, hand and body creams. The main aim of our work is to develop a herbal cream which can give multipurpose effect, like moisturizer, reduce acne and skin irritation, reduce skin diseases

like eczema, psoriasis, dry skin, wrinkles, rashes etc. and also adding glow to the face. We have used three herbal ingredients in our preparation which are Aloe Vera gel, Neem, Tulsi. Aloe Vera gel is used as a moisturizer, to reduce pimples and acne and also used for treatment of burn wounds [2, 3]. Neem is used as an antifungal and anti-inflammatory and it is also used to reduce scar, pigmentation, redness and itching of the skin [1, 4]. Tulsi is used to add glow to the skin and to promote wound healing [5].

MATERIALS AND METHODS

Collection of plant material

Aloe Vera, Neem, Tulsi leaves were collected from the local botanical garden in Solapur.

Excipients and herbal ingredients with their roles

Table 1: Role of ingredients

S. No.	Ingredients	Roles
1.	Aloe Vera gel	Anti-ageing, anti-inflammatory, moisturizer, reduce acne and pimples.
2.	Tulsi	Antibacterial, adds glow to the face.
3.	Neem	Promote wound healing, relieves skin dryness, itching and redness.
4.	Bees wax	Emulsifying agent, stabilizer and gives thickness to the cream.
5.	Liquid paraffin	Lubricating agent
6.	Borax	Alkaline agent which reacts with emulsifying agent to form soap
7.	Methylparaben	Preservative
8.	Rose oil	Fragrance

Extraction processes (For different Plant extracts refer fig. 1)

i] Aloe Vera gel

Mature, healthy and fresh aloe Vera leaves were collected and washed with distilled water. Then after proper drying of leaves in hot air oven, the outer part of the leaf was dissected longitudinally using a sterile knife. Then the aloe Vera gel that is the colorless parenchymatous tissue was removed using the sterile knife. Then it is filtered using muslin cloth to remove the fibers and impurities.

Then the filtrate or the filter product which is a clear aloe Vera gel was used in the preparation.

ii] Extraction of neem leaves

Neem leaves were collected and washed with distilled water and dried in hot air oven. After proper drying, leaves were powdered. Then 5g Neem leaves powder, 80 to 100 degree Celsius. dimethyl sulfoxide was taken in a volumetric flask and shaken for 3 d on REMI RSB-12 mechanical shaker. Then the solution was heated on a water bath at 80-100 °C and

concentrated up to 20 ml and then filtered using muslin cloth to remove impurities. Then the filtrate or filter product obtained, which is a clear solution or clear extract of Neem leaves, was used in the preparation.

iii] Extraction of tulsi leaves

Tulsi leaves were collected and washed with distilled water and dried in hot air oven. Then after proper drying, the leaves were

powdered. Then 1g Tulsi leaf powder+10 ml dimethyl sulfoxide was taken in a volumetric flask and then shaken for 3 d on REMI RSB-12 mechanical shaker. Then the solution was heated on water bath at 80 to 100 degree Celsius. for few minutes and then concentrated up to 5 ml and filtered using a muslin cloth to remove impurities. Then the filtrate or the filter product in which a clear solution or clear extract of Tulsi leaves was used in the preparation.



Fig. 1: Extracts of natural plant ingredients

Formulation of cream

Heat liquid paraffin and beeswax in a borosilicate glass beaker at 75 °C and maintain that heating temperature. (Oil phase). In another beaker, dissolve borax, methylparaben in distilled water and heat this beaker to 75 °C to dissolve borax and methylparaben and to get a clear solution. (Aqueous phase). Then slowly add this aqueous phase to heated oily phase [7]. Then add a measured amount of aloe

Vera gel, Neem extract, and Tulsi extract and stir vigorously until it forms a smooth cream. Then add few drops of rose oil as a fragrance. Put this cream on the slab and add few drops of distilled water if necessary and mix the cream in a geometric manner on the slab to give a smooth texture to the cream and to mix all the ingredients properly. This method is called as slab technique or extemporaneous method of preparation of cream. (For formulation table refer table 2) (For different cream formulations refer fig. 3).



Fig. 2: Slab and spatula



Fig. 3: Cream formulations

Table 2: Formulation of cream

S. No.	Ingredients	Formulation F1H	Formulation F2H	Formulation F3H
1.	Aloe Vera gel	1.5 ml	1 ml	1 ml
2.	Neem extract	0.5 ml	0.2 ml	0.4 ml
3.	Tulsi extract	1.5 ml	1 ml	1 ml
4.	Beeswax	3 g	3.5 g	3.2 g
5.	Liquid paraffin	10 ml	15 ml	12 ml
6.	Borax	0.2 g	0.4 g	0.3 g
7.	Methylparaben	0.02 g	0.04 g	0.03 g
8.	Distilled Water	Q. S	Q. S	Q. S
9.	Rose oil	Q. S	Q. S	Q. S

Evaluation of cream

Physical evaluation [8]

In this test, the cream was observed for color, odor, texture, state (table 3)

Irritancy [8]

Mark the area (1 cm²) on the left-hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24 h and reported (table 4).

Wash ability [8]

A small amount of cream was applied on the hand and it is then washed with tap water (table 5).

P^H [1]

0.5 g cream was taken and dispersed in 50 ml distilled water and then P^H was measured by using digital P^H meter (table 6)

Viscosity [8]

Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 °C using spindle No. 63 at 2.5 RPM (table 7).

Phase separation [8]

Prepared cream was kept in a closed container at a temperature of 25-100 °C away from light. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked (table 8).

Spread ability [8]

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 dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then other slide was placed on the top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to

the slides was scrapped off. The upper slide was allowed to slip off freely by the force of weight tied to it. The time taken by the upper slide to slip off was noted. (table 9)

$$\text{Spread ability} = m \times l/t$$

Where,

m= Standard weight which is tied to or placed over the upper slide (30g)

l= length of a glass slide (5 cm)

t= time taken in seconds.

Greasiness

Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like (table 10).

Compatibility study [9, 10]

Compatibility study of the herbal APIs was done by using IR spectroscopy and the IR spectrum was measured in there solid state. The region in which the IR spectrum was measured falls in between 4000.12 to 525.03. The sensitivity was 75. The characteristics peaks which are observed in the IR spectra of the mixture of herbal APIs are 1026.79, 1368.24, 1438.73, 1604.78, 1728.45, 3289.05 cm⁻¹. The same peaks were also observed in the IR spectra of individual herbal APIs. (table 11, 12, 13) (fig. 4, 5, 6).

RESULTS AND DISCUSSION

Evaluation results of all the 3 formulations are gives below.

Physical evaluation

In this test color, odor, texture and state of the three formulations were checked.

Irritancy

Mark the area (1 cm²) on left hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24 h and reported. According to the results all the three formulations that is F1H, F2H and F3H showed no sign of irritancy, erythema and edema.

Table 3: In this test color, odor, texture and state of the three formulations was checked

S. No.	Parameters	Formulation F1H	Formulation F2H	Formulation F3H
1.	Color	Faint green	Faint green	Faint green
2.	Odor	Pleasant	Pleasant	Pleasant
3.	Texture	Smooth	Smooth	Smooth
4.	State	Semisolid	Semisolid	Semisolid

Table 4: Irritancy study observations

S. No.	Formulation	Irritant effect	Erythema	Edema
1.	F1H	Nil	Nil	Nil
2.	F2H	Nil	Nil	Nil
3.	F3H	Nil	Nil	Nil

Washability

Washability test was carried out by applying a small amount of cream on the hand and then washing it with tap water. All three formulations were easily washable.

pH

According to the results, the P^H of all the three formulations that is F1H, F2H and F3H were found to be nearer to skin P^H so it can be safely used on the skin.

Table 5: Washability observations

S. No.	Formulation	Washability
1.	F1H	Easily Washable
2.	F2H	Easily Washable
3.	F3H	Easily Washable

Table 6: pH observation table

S. No.	Formulation	P ^H
1.	F1H	6.7
2.	F2H	6.2
3.	F3H	6.6

Viscosity

Viscosity of cream was done by using Brooke field viscometer at a temperature of 25 °C using spindle No. 63 at 2.5 RPM. According to the results all the three formulations showed adequate viscosity.

Phase separation

Prepared cream was kept in a closed container at a temperature of 25-100 °C away from light. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked. According to the results no phase separation was observed in all the three formulations.

Spreadability

The spreadability of the three formulations that is F1H, F2H, and F3H was carried out and out of that for F2H the time taken by the 2 slides to separate is less so as said in the description of evaluation

test lesser the time taken for separation of the two slides better the spreadability so according to this statement F2H showed better spreadability.

Greasiness

Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like. According to the results, we can say that all three formulations were non-greasy.

Compatibility study

From fig. 4, 5, 6 we can say that herbal ingredients that is Aloe Vera gel, Neem, Tulsi are compatible with each other and active ingredients in them showed proper peaks in the IR graphs and all the three herbal ingredients showed matching peaks in there IR graphs. The peaks of Tulsi were shown in table 11, peaks of Neem were shown in table no. 12 and peaks of the Tulsi+Neem+Aloe Vera gel mixture were shown in table 13.

Table 7: Viscosity observation table

S. No.	Formulation	Viscosity(Cps)
1.	F1H	21020
2.	F2H	11810
3.	F3H	18820

Table 8: Phase separation observation table

S. No.	Formulation	Phase separation
1.	F1H	No phase separation
2.	F2H	No phase separation
3.	F3H	No phase separation

Table 9: Spreadability observation table

S. No.	Formulation	Time(sec)	Spread ability (g×cm/sec)
1.	F1H	10	22.8
2.	F2H	7	32.4
3.	F3H	15	15.18

Table 10: Greasiness observation table

S. No.	Formulation	Greasiness
1.	F1H	Non-greasy
2.	F2H	Non-greasy
3.	F3H	Non-greasy

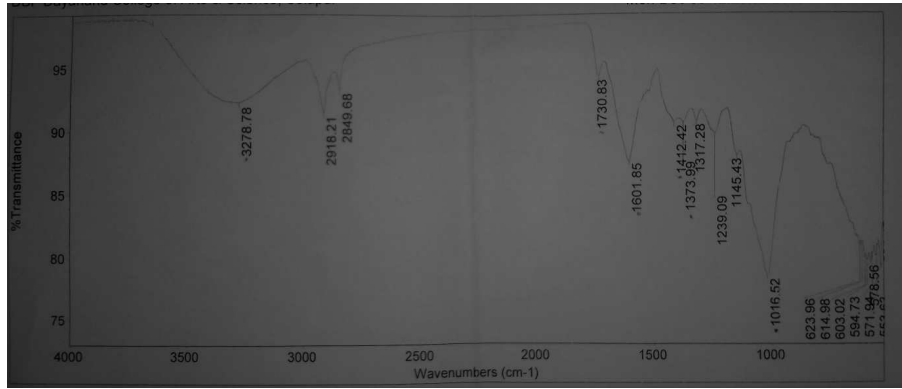


Fig. 4: IR graph of tulsi

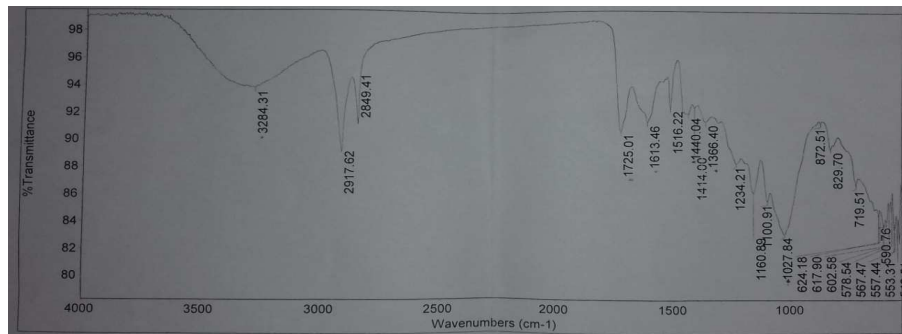


Fig. 5: IR graph of neem

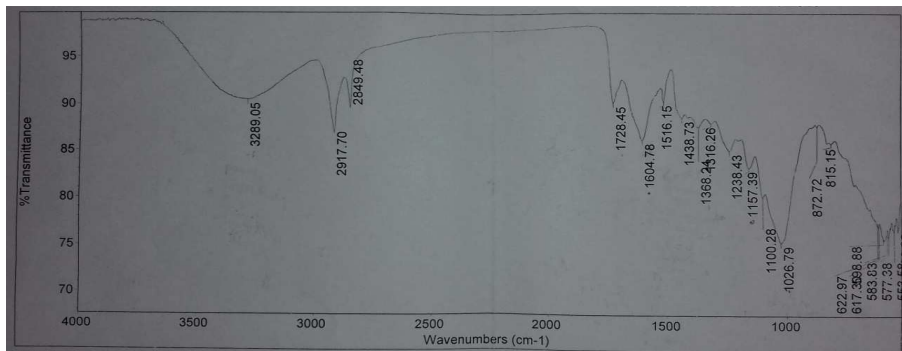


Fig. 6: IR graph of Tulsi+Neem+Aloe Vera gel mixture

Table 11: Interaction studies through IR spectroscopy (Refer fig. 4)

Material	Peaks (Cm ⁻¹)	Characteristic functional group
Tulsi	1016.52	C-O stretching vibration
	1373.99	Sulfate stretching vibration
	1412.42	C-O-H Bending vibration
	1601.85	C=O stretching vibration
	1730.83	C=O stretching vibration
	3278.78	N-H Bending vibration

Table 12: Interaction studies through IR spectroscopy (Refer fig. 5)

Material	Peaks (cm ⁻¹)	Characteristic functional group
Neem	1027.84	C-O stretching vibration
	1366.40	Sulfate stretching vibration
	1440.04	C-O-H bending vibration
	1613.46	C=O Stretching vibration
	1725.01	C=O Stretching vibration
	3284.31	N-H Bending vibration

Table 13: Interaction studies through IR spectroscopy (Refer fig. 6)

Materials	Peaks	Characteristic function group
Tulsi+Neem+Aloe Vera gel mixture	1026.79	C-O stretching vibration
	1368.24	Sulfate stretching vibration
	1438.73	C-O-H Bending vibration
	1604.78	C=O stretching vibration
	1728.45	C=O stretching vibration
	3289.05	N-H Bending vibration

CONCLUSION

By using Aloe Vera gel, Neem and Tulsi the cream showed a multipurpose effect and all these herbal ingredients showed significant different activities. Based on results and discussion, the formulations F1H, F2H and F3H were stable at room temperature and can be safely used on the skin.

ACKNOWLEDGMENT

The authors would like to sincerely thank the Principal, DSTS Mandals College of Pharmacy, Solapur, Mr. R. Y. Patil sir for providing all the excipients and proper facilities that are required for the formulation. The authors are also thankful to Prof. K. A Kamalapurkar for providing consistent support and timely guidance.

ABBREVIATIONS

APIs	Active pharmaceutical ingredients
IR	Infra-Red
QS	Quantity Sufficient

FUNDING

Nil

AUTHORS CONTRIBUTIONS

All the authors have contributed equally.

CONFLICT OF INTERESTS

Declare none

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