

## Original research Article

## Formulation and evaluation of herbal cream for skin care using extracts of Krishna Tulsi as active ingredient with anti-microbial activity

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### Abstract

**Aim:** The purpose of the present research work was to formulate and evaluate herbal cream. The objectives of this research work were to formulate the cream which does not cause any adverse or side effects, with anti-microbial properties.

**Methodology:** The present study was to prepare and evaluate the polyherbal cosmetics cream comprising extracts of natural products with Krishna Tulsi as the main active ingredient. The method utilized to prepare herbal cream was very lucid. Different types of formulation of oil in water (O/W) F1 to F5 were formulated by integrating different concentrations of stearic acid, cetyl alcohol, lanolin, propylene glycol, and potassium hydroxide. The evaluations of all parameters like pH, stability study, spreadability studies and anti-microbial study were examined.

**Results:** Several advantages are offered by Herbal creams over other creams. The majority of existing or other cream which has concocted from drugs of synthetic origin, such as acyclovir, triamcinolone, different drugs gives fairness to appearance, nonetheless it has several side effect such as irritating or several allergic reactions. Herbal cream sorts out to have nothing of any of these side effects, and helps fairness look to skin. Formulation F2 and F3 shows no edema, redness, irritation and inflammation during irritancy studies.

**Conclusions:** These studies suggested that composition of extracts and foundation of cream of F2 and F3 are more stable and safe. These formulations are safe to use for skin. From the prevailing examination and procured results it might be concluded that it's possible to broaden poly natural cream containing natural extracts having anti-oxidants belongings and which can be formulated to act as a barrier or to defend skin, also to make cosmetic cream.

**Keywords:** Krishna Tulsi; Polyherbs; Skin Care; Herbal Cream; Pharmaceutical Cream; Anti-microbial activity

### Introduction

Now every day in cosmetic formulations, herbal extracts are used to improve beauty and attractiveness. Herbal cosmetics are categorized according to the dosage type, like cream, powder, soaps, and solutions and according to the component or organ of the body to be used, like hair, skin, nail, mouth, and teeth cosmetics. Creams are semisolid emulsions meant to be applied to the mucosa or skin. This softens the skin leaving nothing. O/W emulsion based formulations containing oil

phase and aqueous phase are herbal cream [1–4]. Cream could even be mixable and quickly washed away or thick and sticky

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Received 24 August 2021

Revised 28 September 2021

Accepted 10 December 2021

PHARMAWAVE 2021; 14:35-43

which count on the fraction of water to grease. It's also the topical medication most commonly prescribed. Largely patients find it more user-friendly, since it's less slippery, less messy and fewer sticky [2,5]. A natural product may be a compound, produced by living organism that's found in nature. The natural product can also be prepared by chemical synthesis and has played a central role within the event of the world of chemistry by providing challenging synthetic targets and sometimes have therapeutic benefits as traditional medicine for treating diseases, yielding knowledge to derive active compounds for drug discovery [6–8]. Before the arrival of the allopathic system of drugs, conventional medical methods, established over the years, were liable for safeguarding the world's healthcare. Since the latter method used knowledge of recent biology and chemistry, it found fast suitability among users for both treatment and discovery, and now it occupies predominant space within the field of health care. Despite this, thanks to the overall perception that these products are healthy, the contributions of conventional preparations, which are usually poly-herbal, are increasing; whilst the single-molecule on basis of modern drugs utilized in allopathic systems can have significant adverse effects [2, 9].

Most botanists will describe an herb as a plant that dies annually back to the bottom without woody stem tissue forming. The amount of plants technically called herbs is restricted by this description. Plants are of the important sources of medicine & an outsized numbers of drugs in use are derived from plants. The therapeutic uses of plant are safe, economical & effective as their simple availability. Plants with culinary, medical, aromatic, or ornamental uses are the bulk of gardeners. Lavender, rosemary and bay forming woody stems are going to be a part of this idea [10, 11]. Herb is an herb or plant extract that's furnished with nourishing and healing elements, including leaves, bark, berries, roots, gums, seed, stem and flower. Cosmetics alone are inadequate to require care of the skin and other parts of the body, requiring the mixture of active ingredients to watch the damage and aging of the skin. Among the population, herbal cosmetics became quite common [12, 13]. Herbal cosmetics products say that thanks to normal use in lifestyle, they need effectiveness and inherent acceptability and stop the side effects that are typically seen in synthetic products. The present article deals with herbal cosmetics literature associated with the present status, benefits, Indian extract, ailment treatment, and herbal cosmetic-related properties [10, 12, 14]. The conception of beauty and makeup dates back to humanity and ancient mankind. Natural cosmetics are often commonly mentioned as herbal cosmetics. Herbal cosmetics are formulated using various cosmetic ingredients to shape the inspiration that's went to treat different skin conditions with one or more herbal ingredients [15–17]. The products during which herbs are utilized in the shape of crude or extracts are highly used for herbal cosmetics. Herbal cosmetics, mentioned as products are manufactured using several permissible cosmetic ingredients to make the idea on which just one or more herbal ingredients are wont to provide specified cosmetic benefits, called herbal cosmetics [18, 19]. Instant remedies aren't provided by herbs. They provide how to place the body in tune with nature properly, an outsized number of cosmetic and toiletry formulations supported Indian herbs have recently been developed and developed. Additionally to

historically recorded uses, the effectiveness of Indian herbs in care items has also been seen in some modern trials [8, 19–21].

### **The Krishna Tulsi Leaf (*Ocimum sanctum* Linn)**

*Ocimum sanctum* Linn., commonly known as Krishna tulsi, is a tree of family Labiatae. Ayurveda was the primary to bring the Krishna tulsi leaf antimicrobial, antifungal, antibacterial, and antioxidant constituents to the notice of chemists for natural and erect, herbaceous, much-branched, softy hairy, biennial or triennial plant, 30-75 cm high. Most species have pinnate green leaves. Blooms naturally occur in Purple or reddish flowers and produce tiny rust-colored fruit [22, 23]. Tulsi is preeminent, and research project is now confirming its beneficial effects. there's mounting evidence that tulsi can address physical, chemical, metabolic, and psychological stress through a singular combination of pharmacological actions [22–25]. Tulsi has been found to protect organs and tissues against chemical stress from industrial pollutants and heavy metals, including physical stress from prolonged workouts, physical restraint, ischemia, exposure to cold and excessive noise. Tulsi has also been shown to counter metabolic stress through normalization of blood glucose, regulate lipid levels and vital signs, and psychological stress through positive effects on memory with cognitive function and through its anti-depressant and anxiolytic properties [26, 27]. Tulsi's broad-spectrum antimicrobial activity, which incorporates activity against a variety of human and animal pathogens, suggests it are often used as a hand sanitizer, mouthwash, and water purifier also as in the conservation of foodstuffs, animal rearing, wound healing, as herbal raw materials and traveler's health [25,28,29]. Cultivation of Tulsi plants has both spiritual and practical significance that connects the grower to the creative powers of nature and organic cultivation which offers solutions for food security, hunger, rural poverty, environmental degradation, and global climate change [24, 30].

### **Chemical Constituents and Anti—Microbial Phytopharmacology [22, 31, 32]**

Tulsi leaf contains bright, green-colored, and pleasant essential oil (0.1 to 0.9%). The oil contains of the drug various depending upon the sort, the place of cultivation, and therefore the season of the gathering. The oil is collected by the steam distillation method from the leaves and flowering tops. It contains approximately (70%) eugenol, carvacrol (3%), and eugenol-methyl-ether (20%). Krishna Tulsi has several therapeutic and pharmacologic activities. It also contains caryophyllin where seeds contain fixed oil with good drying properties. The plant is additionally reported to contain alkaloids, saponin, glycosides, tannins, and an appreciable amount of vitamin-c and traces of citric, maleic, and acid. The subsequent are the foremost important phyto-pharmacology and therapeutic properties of Krishna Tulsi. As mainly Antimicrobial activity Evaluation of the antimicrobial activity of *Ocimum sanctum* leaf extract in normal water and native river water with different concentrations (100 to 600 mg) reveals that 600 mg concentration of plant extract treated water showed effective antimicrobial activity at 15 to 16 hrs. than the opposite concentration of extract. The five hundred mg of extract-treated water showed 95-98% antibacterial activity in 14 to 16 hrs. The minimum bacterial concentration (MBC) was observed in 500 and 600 mg extract concentrations where the



Fig 2. Soxhlet Extraction of Krishna Tulsi



Fig 1. Dried Krishna Tuli leaves



Fig 3. Krishna Tulsi leaves extract

concentration of the bacterial cells inhibited gradually for an hour was studied by the spread plate method. The utmost antibacterial activity was observed at 600mg concentrated water treatment in both samples at the pH range of 6.8-7.0 for 15 to 16 hrs., which was concluded that the human harmful organisms were inactivated by this plant extract at 600 mg in 15 to 16 hrs.

**Benefits and uses of krishna tulsi [30, 33]**

It helps in Fight with inflammation. Leaves are used as stimulants, aromatic, anticatarrhal, spasmolytic, and diaphoretic. Brew of the leaves is employed as a stomachic and the juice of leaves gives relief in cold, fever, bronchitis, cough also digestive complaints. The seeds are utilized in curing urinary problems. The drug may be a good immune-modulatory agent. Oil has marked insecticidal activity against mosquitoes. Tulsi oil is additionally used as ear drops within the case of the pane. The juice is employed as an antiperiodic and as a constituent of numerous preparations for disease of the skin and also to cure earache. Rich in antioxidants, Tulsi also can be the simplest remedy for heart-related problems; it's a property which will tone the guts muscle. Besides this, it rectifies the blood circulation and reduces the cholesterol level within the body. Uses in skin and wonder care and Tulsi leaves are often also helpful in treating infections, particularly of the mouth. Besides this, it's furthermore, beneficial in alleviating from mouth ulcers. Tulsi is said not only to control the pestilence throughout the body but also aids in toning gum and nourishes the hygienic conditions of the body. Tulsi leaves are effective in stabilizing the nephritic troubles. Holy basil juice is sort of efficient in treating the renal calculi and additionally helps in ending of the stone within the kidney. The broken calculi within the nephritic get drove out from the tract by way of urine. A Tulsi leaves is that the best remedy and may be the foremost natural thanks to affect respiratory disorders. To take Tulsi leaves extract with honey; it's a superb remedy to support the throat and respiratory disturbances.

**Materials and methods**

The approach of work and the procedure followed for this experimentation was performed by Matangi and team in the year 2014 and also similar cited papers [5,34,35] It means the procedure of the work followed. We cite the principle methodology. The experiment was performed in Bharat Technology, Uluberia within the year 2018 as a tutorial project for the partial fulfilment of Bachelor of Pharmacy degree. Similar sorts of research with similar components are reported, but during this experiment, the formulation were different, and this work is kept cost-efficient and easy, it's an effort to scale back few components and prepare cream and evaluate its potential, consistent with The International Council for Harmonisation of Technical Requirements for Pharmaceuticals for Human Use (ICH) guidelines, the cream was stable during stability studies [36].

**Materials**

Stearic acid, cetyl alcohol, lanolin, propylene glycol, potassium hydroxide, sodium benzoate, peppermint oil, extract of krishna tulsi, and purified water (q.s – quantity as per required).

**Preparation of Krishna Tulsi leaves extract**

The krishna tulsi leaves were collected from the surrounding area locally. In an effective grinder mixture, air dehydrated leaves were ground to a satisfactory powder. Shade dried leaves (500 gm) was extracted with distilled water, petroleum ether and ethanol using the soxhlet extractor. The extracts were then condensed and stored in a refrigerator in decreased pressure and controlled temperature for dryness.

**Poly herbal cream formulation**

Oil in water (O / W) emulsion based cream herein Semisolid formulation was formulated. The emulsifier which is stearic acid and other oils soluble components as Cetyl alcohol,



Fig 4: Prepared Polyherbal Cream F3

peppermint oil were dissolved within the oil phase and heated to 75°C. The preservative herein sodium benzoate and other components dissolvable in water were dissolved within the aqueous process and heated to 75 °C. After heating, the aqueous phase was applied to the oil introduce portions with continuous stirring until the emulsifier was cooled.

#### Evaluation of cream

##### Evaluation of cream pH of the cream

Using normal buffer solutions, the pH meter was performed calibration. Approximately 0.5 g of the cream was balanced and dissolved in 50.0 ml of distilled water, calculating its pH. In a 100ml beaker, 5 ± 0.01g of the cream was correctly measured. 45ml of water was applied and the cream was spread therein. Using the pH meter, the pH of the suspension was estimated at 27°C. The cream pH was found to be in the range of 6-7.5, which is good for the PH of the skin. All the formulations showed pH closer to the appropriate skin. Result found of every formulation is specified in Table 2.

##### Viscosity

The viscosity determinations were administered employing a Brookfield viscometer (DV II + Pro model) using spindle number S-64 at 20 rpm at a temperature of 25°C. Result found of every formulation is specified in Table 3,4,5,6 & 7.

##### Test for thermal stability

Thermal stability of the formulation was determined by the humidity chamber controlled at 60- 70% RH and 37 ± 1°C, relative humidity (RH). Result found of every formulation is specified in Table 9.

##### Organoleptic evaluation

The cream thus acquired was assessed for its organoleptic properties, such as color, odor, and condition. The appearance of the cream was measured and graded by its roughness and Colour. Result found of every formulation is specified in Table 12.

##### Dye test

This process was pertained from the work of Dhase and Team in the year 2014. It combines the scarlet red dye with the cream. With a cover slip, place a drop of the cream on a microscopic slide covering it and examine it under a microscope. The ground is colorless if the scattered globules appear red. The cream is a kind of o/w. In the w/o form cream, the opposite condition occurs, i.e. the scattered globules appear colorless in the red ground.

##### Homogeneity

The formulations were tested for the homogeneity by visual appearance and by touch. Result found of every formulation is specified in Table 3,4,5,6 & 7.

Table.1: Formulation of the creams

Formulation Code	Extract of Turmeric and Aloe vera (gm)	Stearic acid (gm)	Cetyl Alcohol (gm)	Lanolin (gm)	Propylene Glycol (ml)
F1	38	4	1	2	4
F2	38	4.5	0.5	2	4
F3	38	5	0.5	2	4
F4	38	5.5	1.5	2	4
F5	38	6	1.5	2	4

Table.1: Formulation of the creams

Formulation Code	Potassium Hydroxide (gm)	Pepper mint Oil (ml)	Sodium Benzoate (mg)	Purified Water
F1	0.2	0.5	0.5	q.s
F2	0.2	0.5	0.5	q.s
F3	0.2	0.5	0.5	q.s
F4	0.2	0.5	0.5	q.s
F5	0.2	0.5	0.5	q.s

Table 2: pH of the cream

pH of the Formulations	F1	F2	F3	F4	F5
	6.9	7	7.2	7.4	7.5

Table 3: Homogeneity, type of smear & Viscosity of Formulation 1

Time Interval (Day)	Homogeneity	Type of smear	Viscosity(cp) mm <sup>2</sup> /s	Physical changes	pH
0	Good	Good	1.201	No change in color and odour	6.9
5	Excellent	Good	1.237		
15	Excellent	Excellent	1.283		
20	Good	Good	1.324		
30	Average	Average	1.365		

Table 4: Homogeneity, type of smear & Viscosity of Formulation 2

Time Interval (Day)	Homogeneity	Type of smear	Viscosity(cp) mm <sup>2</sup> /s	Physical changes	pH
0	Good	Good	1.342	No change in color and odour	7
5	Excellent	Good	1.375		
15	Good	Excellent	1.425		
20	Good	Good	1.458		
30	Average	Average	1.506		

Table 5: Homogeneity, type of smear & Viscosity of Formulation 3

Time Interval (Day)	Homogeneity	Type of smear	Viscosity(cp) mm2/s	Physical changes	pH
0	Good	Good	1.401	No change in color and odour	7.2
5	Excellent	Excellent	1.435		
15	Excellent	Good	1.485		
20	Average	Good	1.499		
30	Average	Average	1.515		

Table 6: Homogeneity, type of smear & Viscosity of Formulation 4

Time Interval (Day)	Homogeneity	Type of smear	Viscosity(cp) mm2/s	Physical changes	pH
0	Good	Good	1.561	No change in color and odour	7.4
5	Excellent	Excellent	1.585		
15	Good	Good	1.593		
20	Average	Average	1.604		
30	Average	Good	1.621		

Table 7: Homogeneity, type of smear & Viscosity of Formulation 5

Time Interval (Day)	Homogeneity	Type of smear	Viscosity(cp) mm2/s	Physical changes	pH
0	Average	Good	1.835	No change in color and odour	7.5
5	Good	Good	1.842		
15	Good	Excellent	1.652		
20	Good	Excellent	1.662		
30	Average	Average	1.75		

Table 8: Physical Properties of herbal Cream

S.N.	Physical Properties	F1	F2	F3	F4	F5
1	Colour	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green
2	Odour	Characteristics	Characteristics	Characteristics	Characteristics'	Characteristics
3	Appearance	Semi-solid	Semi-solid	Semi-solid	Semi-solid	Semi-solid

Table 9: Thermal stability determination

S.N.	Thermal Stability (at RH 65% and 37 ± 1°C)	F1	F2	F3	F4	F5
1		Stable, no oil separation	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation	Stable, no oil separation

Table 10: Spreadability test

S.N.	Time(Sec)	F1	F2	F3	F4	F5
1	15	14.8	14.6	14.5	13.9	13.6
2	20	14.1	13.5	13.6	13.3	13.1
3	25	13.5	13.5	13.3	13.6	12.8

Table 11: Accelerated stability studies

Stability Studies	F1		F2		F3	
	Initial	After 7 days	Initial	After 7 days	Initial	After 7 days
<b>Physical appearance</b>	Semi-solid	Semi-solid	Semi-solid	Semi-solid	Semi-solid	Semi-solid
<b>Texture</b>	Ok	Ok	Ok	Ok	Ok	Ok
<b>Colour</b>	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green
<b>Thermal Stability</b>	Ok	Ok	Ok	Ok	Ok	Ok
<b>Degradation Of the product</b>	Nil	Nil	Nil	Nil	Nil	Nil

Table 11: Accelerated stability studies

Stability Studies	F4		F5	
	Initial	After 7 days	Initial	After 7 days
<b>Physical appearance</b>	Semi-solid	Semi-solid	Semi-solid	Semi-solid
<b>Texture</b>	Ok	Ok	Ok	Ok
<b>Colour</b>	Yellowish Green	Yellowish Green	Yellowish Green	Yellowish Green
<b>Thermal Stability</b>	Ok	Ok	Ok	Ok
<b>Degradation</b>	Nil	Nil	Nil	Nil
<b>Of the product</b>				

**Appearance**

The appearance of the formulated cream was judged by its color, it was observed as pearlescent. Result found of every formulation is specified in Table 8.

**After feel**

Emolliency, amount of residue left after the application of fixed amount and slipperiness of cream was checked. Result found of every formulation is specified in Table 8.

**Determination of type of smear**

It was decided by the appliance of the cream to the human volunteer's skin surface and therefore the sort of smear or film created on the skin was tested following the appliance of the cream. it had been determined by applying the cream on the surface of the skin of a person's volunteer (Self, no ethical permission need because it is non-toxic, natural, and safe

components which makes it exceptional [37]. Result found of every formulation is specified in Table 3,4,5,6 & 7.

**Irritancy test**

Label an area on the dorsal surface of the left hand (1sq.cm). For the defined area, the cream was applied and time was noted. Irritants, erythema, edema, were tested and reported at regular intervals of up to 24 hours, if any. It was determined by applying the cream on the surface of the skin of a person's volunteer (Self, no ethical permission need because it is non-toxic, natural, and safe components which makes it exceptional).

**Patch test**

Approximately 1-3gm of the substance to be examined was mounted on a piece of cloth or funnel and applied behind the

Table 12: Organoleptic properties

S.N.	Specification	Limit
1	State	Semi-solid
2	Colour	Yellowish Green
3	Odour	Characteristic
4	Texture	Smooth

Table 13: Microbial Test

S.N.	Microbial Load	Limits	Result
1	Total Microbial Count	Not More Than 100	79
2	Limit Tests: E. coli	No Characteristic Colonies	Complies

ears to the subtle part of the dermal membrane, such as the skin. On a part of 1sq.m. of skin, the cosmetic to be checked was added. It was determined by applying the cream on the surface of the skin of a human volunteer (Self, no ethical permission need as it is non-toxic, natural and safe components which makes it exceptional). There was also control patches added. After 8 hours, the patch site is inspected.

**Test for microbial growth in formulated creams**

This technique was applied from the produce of Matangi and Team in the year 2014 also others [1, 34, 35]. Here, Streak Plate Method [38] was used, where the prepared creams were inoculated in a plate with the Muller Hinton agar media, and a control was prepared by omitting the cream. Put in the incubator, the plates are incubated for 24 hours at 37° C. Plates were taken out after the incubation time and checked the microbial growth. The objective was to see the product shows result which is not more than 100 Microbial counts, which shows preliminary result that this possesses antimicrobial properties. Hence, it is not a comparative study so the study did not include comparison with the control. Result found of every formulation is specified in Table 13.

**Spreadability studies**

This method was applied from the work of Dhase and Team in the year 2014, Chen and Team in the year 2016 [1, 39]. An important criterion for semisolids is that they possess good spreadability. Spread ability may be a term expressed to denote the extent of the planet to which the cream readily spreads on application to the skin. The therapeutic efficacy of a formulation also depends on its spreading value. A special apparatus has been designed to review the spreadability of the formulations. Spreadability is expressed in terms of your time in seconds taken by two slides to slide far-away from the formulation, placed between, under the appliance of a particular load. Two glass slides of ordinary dimensions were selected. The formulation whose spreadability had to be determined was placed over one of the slides and the other slide was placed on top of the formulations was crammed between the two slides across the length of 5 cm alongside the slide. 100 g weight was placed upon the upper slide so as that the formulation between the two slides was pressed uniformly to form a thin layer. The load was removed and thus the quite formulation adhering to

the slides was scrapped off and one of the slides was fixed on which the formulation was placed. The second movable slide was placed over it, with one end tied to a string to which load could be applied with the help of a simple pulley and a pan. A 30g weight was placed on the pan and thus the time taken for the upper slide to travel the space of 5.0cm and separate distant from the lower slide under the direction of the load was noted. The Spreadability (S) are often determined using the formula [1, 39]. Result found of every formulation is specified in Table 10.

$$\text{Spreadability} = m \times l / t$$

m = weight tied to the upper slide (30g)

l=length of glass slide (5cm)

t=time taken in seconds.

**Accelerated stability testing**

Accelerated stability examination of prepared formulations was conducted for 2 most stable formulations at room temperature, planned and observed for 7 days. They were formulation number 4 and 5 at 40°C ± 1 °C for 20 days. The formulations were kept both at room and elevated temperature and witnessed on 7th day of the evaluation parameters. Result found of every formulation is specified in Table 11.

**Result and Discussion**

In a discussion, we've prepared a special batch of polyherbal cream that doesn't cause any side effects or adverse reactions using the extract of Krishna Tulsi leaf. By adding the various concentrations of stearic acid and cetyl alcohol, lanolin, propylene glycol, and potassium hydroxide, various sorts of formulation (O/W) oil during a water type (F1 to F5) were formulated. These studies suggested that the composition of extracts and therefore the formulated cream of F2 and F3 are more stable and safe. These formulations are safe to use for skin. Formulations F2 and F3 show no redness, edema, inflammation, and irritation during irritancy studies. We have checked the various parameters of the evaluation test. After completing & checking the evaluation parameters, we have shown that the F2 and F3 formulations showed good consistency, appearance, pH, no signs of phase separation, and simple removal. The Krishna Tulsi extract has anti-microbial



activity so, we have produced a Polyherbal anti-microbial cream containing Krishna Tulsi extract in various concentrations which are safe for skin irritation and allergic sensitization. The result obtained in this study might differ depending on environmental condition and quality of components used.

### Conclusion

Krishna Tulsi leaves are documented within the traditional Indian method of drugs and in Ayurvedic preparations for his or her medicinal benefit. It's been determined to extract and formulate herbal cream within the current work. Within the world market, there's a rising appetite for herbal cosmetics and that they are invaluable gifts from nature. Therefore, we attempted to supply a herbal anti-microbial cream containing Krishna Tulsi extract in various concentrations. In terms of dermal irritation and allergic sensitization, the stable formulations were safe. The polyherbal cream prepared is meant for cosmeceutical use which has antimicrobial activity. The commitment of the study was to formulate and assess polyherbal cream. Over other creams, herbal creams offer many advantages. The goal of this study was to formulate a polyherbal cream that doesn't cause side effects or adverse reactions. By adding different concentrations of octadecanoic acid and cetyl alcohol, various sorts of oil formulations in water (O / W) herbal creams, namely F1 to F5, were formulated. On various parameters like pH, viscosity, and stability, the assessments of all formulations (F1 to F5) were performed. The F2 and F3 formulations showed good consistency, appearance, pH, no signs of phase separation, and simple removal. In irritancy tests, the formulations F2 and F3 show no inflammation, edema, redness, and irritation. The formulations secure to use for skin applications. These studies indicate that the extract and base cream composition of F2 and F3 is more stable and healthy.

### Acknowledgement

This project was carried out by Supriyo Das under the guidance of Puja Saha in Bharat Technology Uluberia, Howrah for the B.Pharm 7th Sem Final academic Project in the year 2019. Authors would like to thank Mr. Mayukh Jana (Assistant Professor, Department of Pharmaceutics, Bharat Technology, Uluberia) for the guidance and help during this research.

### Conflict of interest

Authors do not claim any conflict of interest.

### Source of funding

Authors declare that there is no such funding related to this article.

### References

1. Dhase AS, Khadbadi SS, Saboo SS. Formulation and Evaluation of Vanishing Herbal Cream of Crude Drugs. *American Journal of Ethnomedicine* 2014;1:313–8.
2. Ahshawat MS, Saraf S, Saraf S. Preparation and characterization of herbal creams for improvement of skin viscoelastic properties. *Int J Cosmet Sci* 2008;30:183–93. <https://doi.org/10.1111/j.1468-2494.2008.00442.x>.
3. Nair SS, Majeed S, Sankar S, Jeejamol, Mathew M. Formulation of Some Antioxidant Herbal Creams. *HYGEIA* March-Aug, 09;1:44–5.
4. Förster T, Von Rybinski W, Wadle A. Influence of microemulsion phases on the preparation of fine-disperse emulsions. *Advances in Colloid and Interface Science* 1995;58:119–49. [https://doi.org/10.1016/0001-8686\(95\)00247-N](https://doi.org/10.1016/0001-8686(95)00247-N).
5. Bharat P, Sharma P, Kabra A. Formulation And Evaluation Of Polyherbal Face Cream. *Internationale Pharmaceutica Scientia* 2013;3:63–8.
6. Abd Jalil MA, Shuid AN, Muhammad N. Role of Medicinal Plants and Natural Products on Osteoporotic Fracture Healing. *Evidence-Based Complementary and Alternative Medicine* 2012;2012:1–7. <https://doi.org/10.1155/2012/714512>.
7. Bairagi SM, Ghule P, Gilhotra R. Pharmacology of Natural Products: An recent approach on Calotropis gigantea and Calotropis procera. *Ars Pharm* 2018;59:37–44. <http://dx.doi.org/10.4321/S2340-98942018000100004>.
8. Joshi LS, Pawar HA. Herbal Cosmetics and Cosmeceuticals: An Overview. *Nat Prod Chem Res* 2015;3:1–8. <https://doi.org/10.4172/2329-6836.1000170>.
9. Akhtar N, Zaman S, Khan BA, Haji M, Khan S, Ahmad M, et al. Evaluation of various functional skin parameters using a topical cream of Calendula officinalis extract. *Afr J Pharm Pharmacol* 2011;5:199–206.
10. Sendker J, Sheridan H. History and Current Status of Herbal Medicines. In: Pelkonen O, Duez P, Vuorela PM, Vuorela H, editors. *Toxicology of Herbal Products*, Cham: Springer International Publishing; 2017, p. 11–27. [https://doi.org/10.1007/978-3-319-43806-1\\_2](https://doi.org/10.1007/978-3-319-43806-1_2).
11. Schlegel R. *Dictionary of Plant Breeding*, Second Edition. CRC Press; 2009. <https://doi.org/10.1201/9781439802434>.
12. Burlando B. Herbal Cosmetic Formulations: A Fuzzy Line between Actives and Vehicles. *Herbal Principles in Cosmetics*, vol. 20105945, CRC Press; 2010, p. 29–40. <https://doi.org/10.1201/EBK1439812136-c3>.
13. Compounds found in Herbal products. *Meyler's Side Effects of Herbal Medicines*, Elsevier; 2009, p. 237–96. <https://doi.org/10.1016/B978-0-444-53269-5.50006-6>.
14. Jagtap NS, Khadbadi SS, Farooqui IA, Nalamwar VP, Sawarkar HA. Development And Evaluation Of Herbal Wound Healing Formulations. *International Journal of PharmTech Research* 2009;1:1104–8.
15. Arora R, Aggarwal G, Dhingra GA, Nagpal M. Herbal Active Ingredients Used In Skin Cosmetics. *Asian J Pharm Clin Res* 2019;7–15. <https://doi.org/10.22159/ajpcr.2019.v12i9.33620>.
16. Steiling W. Safety Evaluation of Cosmetic Ingredients Regarding Their Skin Sensitization Potential. *Cosmetics* 2016;3:14. <https://doi.org/10.3390/cosmetics3020014>.
17. BS ISO. *Cosmetics. Guidelines on technical definitions and criteria for natural and organic cosmetic ingredients: Criteria for ingredients and products*. BSI British Standards; 2017. <https://doi.org/10.3403/30292784>.
18. Kumar D, Rajora G, Parkash O, Himanshu, Antil M, Kumar V. Herbal cosmetics: An overview. *International Journal of Advanced Scientific Research* 2016;1:36–41.
19. Fatima A, Alok S, Agarwal P, Singh PP, Verma A. Benefits Of Herbal Extracts In Cosmetics: A Review. *IJPSR* 2013;4:3746–60. [http://dx.doi.org/10.13040/IJPSR.0975-8232.4\(10\).3746-60](http://dx.doi.org/10.13040/IJPSR.0975-8232.4(10).3746-60).
20. Pan S-Y, Litscher G, Gao S-H, Zhou S-F, Yu Z-L, Chen H-Q, et al. Historical perspective of traditional indigenous medical

- practices: the current renaissance and conservation of herbal resources. *Evid Based Complement Alternat Med* 2014;2014:525340. <https://doi.org/10.1155/2014/525340>.
21. Kumar S, Swarankar V, Sharma S, Baldi A. Herbal Cosmetics: Used for Skin and Hair. *Inventi Rapid: Cosmeceuticals*, 2012;2012:1–7.
  22. Singh V, Birendra VK, Suvagiya V. A Review on Ethnomedical uses of ocimum Sanctum (Tulsi). *Int Res J of Pharm* 2011;2:1–3.
  23. Singh D, Chaudhuri PK. A review on phytochemical and pharmacological properties of Holy basil (*Ocimum sanctum* L.). *Industrial Crops and Products* 2018;118:367–82. <https://doi.org/10.1016/j.indcrop.2018.03.048>.
  24. Cohen M. Tulsi - *Ocimum sanctum*: A herb for all reasons. *J Ayurveda Integr Med* 2014;5:251. <https://doi.org/10.4103/0975-9476.146554>.
  25. Kulkarni KV, Adavirao BV. A review on: Indian traditional shrub Tulsi (*Ocimum sanctum*):The unique medicinal plant. *Journal of Medicinal Plants Studies* 2018;6:106–10.
  26. Kumar V, Andola HC, Lohan H, Chauhan N. Pharmacological Review on *Ocimum sanctum* Linnaeus: A Queen of herbs. *Journal of Pharmacy Research* 2011;4:366–8.
  27. Sachdeva MK, Katyal T. Abatement Of Detrimental Effects Of Photoaging By *Prunus Amygdalus* Skin Extract. *International Journal of Current Pharmaceutical Research* 2011;3:57–9.
  28. Jamshidi N, Cohen MM. The Clinical Efficacy and Safety of Tulsi in Humans: A Systematic Review of the Literature. *Evidence-Based Complementary and Alternative Medicine* 2017;2017:1–13. <https://doi.org/10.1155/2017/9217567>.
  29. Yamani HA, Pang EC, Mantri N, Deighton MA. Antimicrobial Activity of Tulsi (*Ocimum tenuiflorum*) Essential Oil and Their Major Constituents against Three Species of Bacteria. *Front Microbiol* 2016;7. <https://doi.org/10.3389/fmicb.2016.00681>.
  30. Mondal S, Mirdha BR, Mahapatra SC. The science behind sacredness of Tulsi (*Ocimum sanctum* Linn.). *Indian J Physiol Pharmacol* 2009;53:291–306.
  31. Naquvi KJ, Dohare SL, Shuaib Mohd, Ahmad MohdI. Chemical Composition Of Volatile Oil Of *Ocimum Sanctum* Linn. *Int J of Biomed & Adv Res* 2012;3:129–31. <https://doi.org/10.7439/ijbar.v3i2.290>.
  32. Devi PU, Ganasoundari A. Radioprotective effect of leaf extract of Indian medicinal plant *Ocimum sanctum*. *Indian J Exp Biol* 1995;33:205–8.
  33. Udupa SL, Shetty S, Udupa AL, Somayaji SN. Effect of *Ocimum sanctum* Linn. on normal and dexamethasone suppressed wound healing. *Indian J Exp Biol* 2006;44:49–54.
  34. Matangi SP, Mamidi SA, Gulshan MD, Raghavamma STV, Nadendla RR. Formulation and Evaluation of Anti Aging Poly Herbal Cream. *Int J Pharm Sci Rev Res* 2014;24:133–6.
  35. Saha P, Bhowmick J, Saha A. Formulation and organoleptic evaluation of Poly Herbal Cream of Punica, Neem, Carrot & Jamun as Active Ingredients. *RB* 2021;3:1909–16. <https://doi.org/10.21931/RB/2021.06.03.5>.
  36. 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;24:313–25. <https://doi.org/10.3109/03639049809085626>.
  37. Hanley BP, Bains W, Church G. Review of Scientific Self-Experimentation: Ethics History, Regulation, Scenarios, and Views Among Ethics Committees and Prominent Scientists. *Rejuvenation Research* 2019;22:31–42. <https://doi.org/10.1089/rej.2018.2059>.
  38. Sanders ER. Aseptic Laboratory Techniques: Plating Methods. *JoVE* 2012:3064. <https://doi.org/10.3791/3064>.
  39. Chen MX, Alexander KS, Baki G. Formulation and Evaluation of Antibacterial Creams and Gels Containing Metal Ions for Topical Application. *Journal of Pharmaceutics* 2016;2016:1–10. <https://doi.org/10.1155/2016/5754349>.