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FORMULATION AND EVALUATION OF HERBAL FACE CREAM USING TURMERIC RHIZOMES

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ABSTRACT

Formulation of herbal cosmeceutical in the form of a face cream has been done. Curcuminoids from Curcuma domestica Val. (turmeric) has been incorporated in the formulation. Turmeric rhizome powder has been extracted with n-hexane and curcumin content in the methanolic extract has been quantified spectrophotometrically. It has yielded 3.79 g of curcumin per 100 g of turmeric rhizome powder. Stearic acid cream base has been used to incorporate standardized n-hexane extract in isopropyl alcohol, triethanolamine, almond oil, light liquid paraffin oil, moisturizer conditioner and cetyl alcohol. Evaluation of formulated cream with parameters - type of emulsion, pH, homogeneity and sensory parameters has been conducted. Accelerated stability testing of stable formulations has been conducted at elevated temperature of $40^{o}C \pm 1^{o}C$ for 20 days. Formulations have shown stability with no signs of bleeding and no change in the color of the product.

1. INTRODUCTION

Herbal cosmetics are the products in which herbs are used in crude or extract form .The basic idea of skin care cosmetic lies deep in the Rigveda, Yajurveda, Ayurveda, Unani and Homeopathic system of medicine. In this modern era, the knowledge and experience of usage of herbs are being blend with advanced cosmetic technology to develop a safe and elegant beauty product, which has wider range of people acceptability. Herbs have the advantage of having no or least adverse effect and have a wide spectrum of consumer compliance. The herbal cosmetic market has a share of almost Rs 200 crores out of an estimated Rs 2000 crores of total cosmetic industry in the country. The total cosmetic market is growing at the rate of 20-25% per annum. Out of this growth about 60% is that of herbal cosmetic segment. Non-Governmental Organization and self-experience exposes the fact that turmeric is being exploited from unaware and poor farmers of Jharkhand region. Further it depicts that one glass full of rice is exchanged for one glass full of turmeric powder by multinational companies and large scale industries. The traditional methodology used for cultivation of turmeric provides us rhizomes which are organic certified and hence extremely safe to be used in cosmetics. Formulation of herbal cosmeceutical in the form of a face cream is the ultimate objective of the study. The formulation may provide better return for their cultivated turmeric.[1]

MATERIALS AND METHODS

Chemicals and glass wares

All the chemicals and reagents used were laboratory grade. Glass wares used were from Borosil.

Collection of Rhizomes

Turmeric rhizome was collected from local market of Nasik, Maharashtra, India.

Preparation of extracts

Collected turmeric rhizome was converted into powder with the help of grinder. Then turmeric powder was extracted with the n-hexane solvent for 2 hrs in sohxlet extractor. Then n-hexane solvent was discarded. Again marc with the methanol for 2 hrs. Finally turmeric extractor was collected and Quatntityfied at 428 nm by Ultraviolet Spectrophotometer.[2]

Formulation

The formulation components used were listed in *Table 1* Moisturizer conditioner was mixture of propylene glycol: glycerin: sorbitol:: 2:1:1. All aqueous soluble ingredients were dissolved in water and all oil soluble ingredients were mixed at $75^{o}C \pm 5^{o}C$ in separate beakers. The

aqueous phase was then added to oil phase slowly with constant stirring. Perfume was added when the temperature dropped to 45°C ± 50°C. As many as 16 formulations were prepared by varying the concentration of different ingredients. Out of these 4 most physically stable formulations, studied for 7 days at room temperature, were chosen for accelerated stability test.[3]

EVALUATION OF CREAM

Type of emulsion

Dye method: A portion of the product was taken in a watch glass. To that water soluble dye (methylene blue) was added, mixed properly and observed under microscope.[2,3 4]

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. [2,3 4]

Viscosity

Viscosity of cream was determined by Brookefield viscometer. The viscosity measurements were done using Brookefield DV-II + viscometer using SP-62 spindle. The developed formulation was poured into the adaptor of the viscometer and the angular velocity increased gradually from 0.5 to 10 rpm.[2,3 4]

Non Volatile Matter

1gm of cream was taken in glass bottle and kept in an oven at 105 ºC for 2hr. [2,3 4]

Calculation for non volatile matter:

- **Non Volatile Matter : Final Weight/Initial Weight*100**

For formulation (Curcuma Longa): $\frac{0.18}{1.0} * 100$

= 18%

Spredability of Cream

An important criteria for semisolids is that it posses good Spredability. Spredability is a term expressed to denote the extent of area 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 study the Spredability of the formulations. Spredability is expressed in terms of time in seconds taken by two slides to slip off from the formulation, placed between, under the application of a certain load. Lesser the time taken for the separation of the two, better the Spredability. Two glass slides of standard dimensions

were selected. The formulation whose Spredability had to be determined was placed over one of the slides. The other slide was placed on top of the formulations was sandwiched between the two slides across the length of 10 cm along the slide. 1000 g weight was placed up on the upper slide so that the formulation 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. 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 by the help of a simple pulley and a pan. A 35g weight was put on the pan and the time taken for the upper slide to travel the distance of 5.0cm and separate away from the lower slide under the direction of the weight was noted. The Spredability was then calculated from the following Formula: [2,3,4]

$$\textbf{Spredability} = \frac{\mathbf{m \times l}}{\mathbf{t}}$$

m = weight tied to the upper slide (35g)

l =length of glass slide (10cm)

t =time taken in seconds.

Accelerated Stability Test

Accelerated stability testing of prepared formulations was conducted for stable formulations at room temperature, studied for 7 days. They were formulation at 40^{o}C ± 1^{o}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. [2,3,4]

Homogeneity

The formulations were tested for the homogeneity by visual appearance and by touch. [2,3,4]

SR. NO	INGREDIENT	FORMULA % W/W	
		STD(100gm)	BATCH (25gm)
1	Methanolic extract dried and soln. in IPA (40 mg/ml)	2	0.5
2	Stearic acid	10	2.5
3	Triethanolamine	1.35	0.33
4	Almond oil	3	0.75
5	Mineral oil	3.5	0.87
6	Moisturizer Conditioner	10	2.5
7	Cetyl alcohol	2.0	0.5
8	Methyl paraben	0.18	0.045
9	Propyl paraben	0.02	0.005
10	Sodium metabsisulfite	0.1	0.025
11	EDTA	0.1	0.025
12	Water, qs, 100	q.S	q.S

Appearance

The appearance of the cream was judged by its color, pearlscence and roughness and graded. [2,3,4]

Rubout

It included Spredability and wetness. A fixed amount of cream was applied on dorsal skin surface of human volunteer and the properties were observed. [2,3,4]

After Feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked. [2,3,4]

TYPE OF SMEAR

After application of cream, the type of film or smear formed on the skin were checked. [2,3,4]

REMOVAL

The ease of removal of the cream applied was examined by washing the applied part with tap water. [2,3,4]

Table1: Composition of turmeric extract based face cream

* IPA: Isopropyl alcohol; *EDTA: Ethylene diaminetetraacetic acid

RESULTS:

1) Dye Test

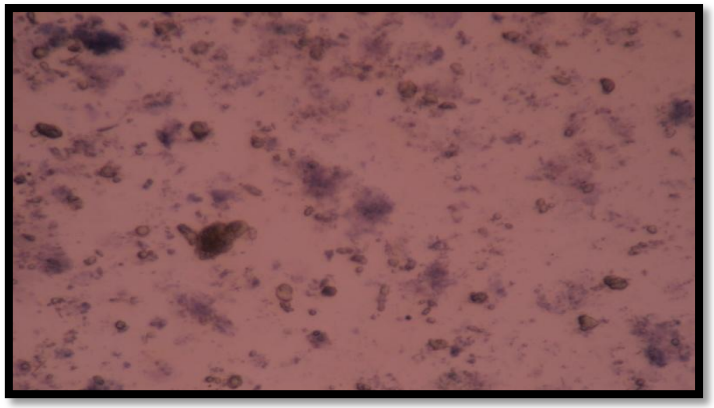

Fig 1: Microscopical Image for formulation

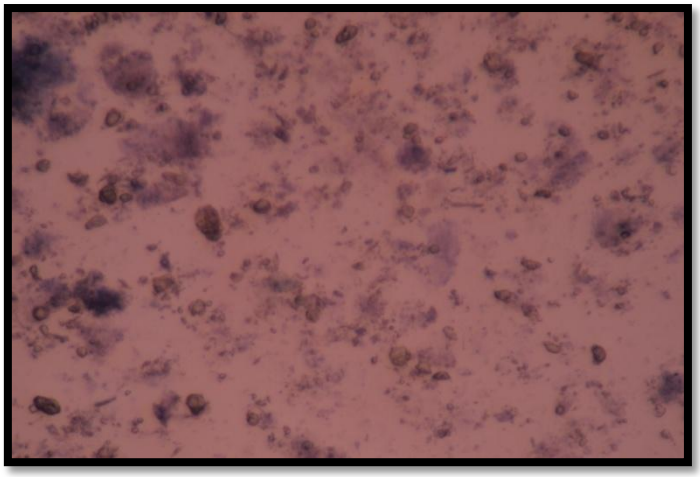

Fig 2: Microscopical Image for Marketed product

Conclusion: From Dye test conclude that formulation was o/w type of emulsion. Compared with Marketed product.

2: pH:

Sr. no.	pH	
	Formulation	**(Marketed product)**
1	6	6.2

Table 2: pH of Formulation and Marketed product (Marketed product)

Conclusion: From pH meter observed that formulation has 6pH and Marketed product has 6.2.

3: VISCOCITY:

	VISCOCITY(cps)			
RPM	**Formulation**		**(Marketed product)**	
	CP	**%T**	**CP**	**%T**
0.5	30567	52.9	34910	58.2
1.0	21439	72.7	23786	77.7
5.0	9767	85.3	9931	82.2
10	2754	92.4	2833	94.1

Table 3: Viscosity of Formulation and Marketed product

Conclusion: Viscosity was determined by using Brookefield viscometer S62 spindle no. and was compared with Marketed product.

4: NON VOLATILE MATTER:

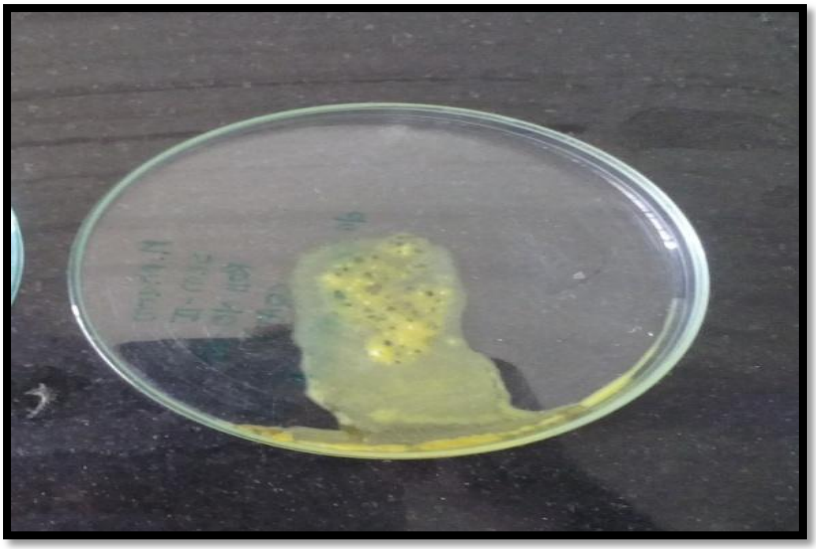

Fig 3: Non volatile matter for Marketed product

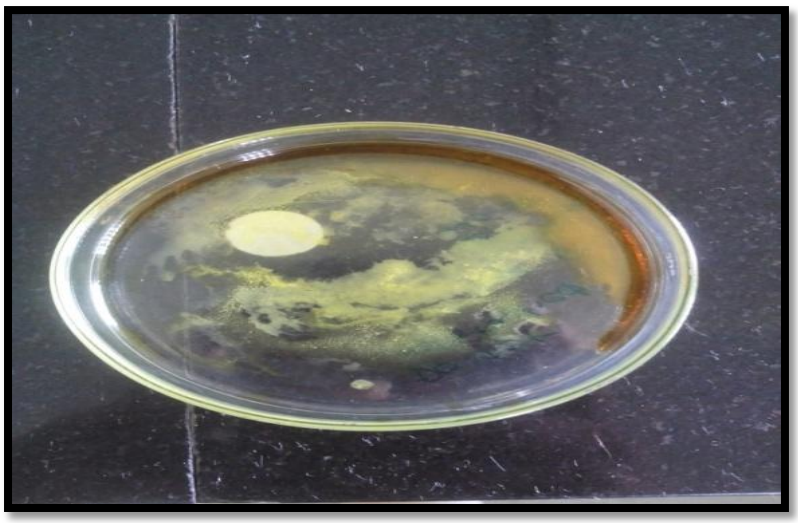

Fig 4: Non volatile matter for formulation

Conclusion: Non volatile matter was determined and their weight was found to be for our formulation it was 20% and for Marketed product it was 18%.

5: SPREADABILITY

SR NO.	SPREADABILITY(gm.cm/sec)	
	Formulation	**Brand (Marketed product)**
1	11.29	10.29

Table 4: Spredability of Formulation and Marketed product (Marketed product)

Conclusion: Spredability was determined and it was found for formulation 11.29(gm.cm/sec) and Marketed product 10.29(gm.cm/sec)

6: ORGANOLEPTIC EVALUATION

PARAMETER	FORMULATION	(MARKETED PRODUCT)
Formulation	o/w	o/w
Homogeneity	Good	Good
Appearance	Pale yellow	Faint yellow
After feel	Emollient	Emollient
Type of smear	Non- greasy	Non- greasy
Removal	Non-Removal	Non-Removal
Skin Irritancy	Non-Irritant	Non-Irritant

Table 5: Organoleptic Evaluation of Formulation and Marketed product

Conclusion: Organoleptic evaluation was performed for formulation and Marketed product and results was found according to above table.

7: ACCELERATED STABILITY TEST

Days	Temperature	Formulation	Parameters						
			pH	Homogeneity	Appearance Type of	Spredability	After feel	Removal	Type of smear
0	RT	Formulation	6.00	**	P, 8M100Y	**	E	NG	ES
5	RT	Formulation	6.00	**	P, 8M100Y	**	E	NG	ES
	40°C + 1°C	Formulation	6.23	**	P, 7M100Y	**	E	NG	ES
10	RT	Formulation	6.17	**	P, 7M100Y	**	E	NG	ES
	40°C + 1°C	Formulation	6.21	**	P, 6M100Y	**	E	NG	ES

Table 6: Accelerated Stability Studies of Formulation.

****:** Good, ***:** Satisfactory, **P:** Pearlescent, **E:** Emollient, **NG:** Non greasy, **ES:** Easy

Color index: 8M 100Y:- Intense bright yellow color, 7M 100Y: -Moderate bright yellow color, 6M 100Y:- Less bright yellow color RT: Room temperature

DISCUSSION

The marketed turmeric creams are mainly for cosmetic use. They do not provide the information regarding the quantity of Curcuminoids in the formulation. The herbal face cream was O/W type emulsion, hence can be easily washed with plane water that gives better customer compliance. Products formulated with phase inversion technique had produced finer internal phase and showed more physical stability in long storage condition. Formulations were stable with no signs of bleeding and change in color of the product. These formulations had almost constant pH, homogeneous, pearlescent, 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 mere cosmetic. It contains curcumin as bactericide, anti-fungal and anti inflammatory agent. Hence it is beneficial to normal human keratinocytes.

CONCLUSION

The formulated turmeric based herbal face cream is a cosmeceutical that contains quantified amount of curcumin. It is safe and stable too. The stable formulations were safe in respect to skin irritation. Curcumin as bactericide, anti-fungal and anti-inflammatory agent. Hence it is beneficial to normal human keratinocytes. We can formulate the curcumin extract based herbal face cream which is obtained from turmeric rhizome.

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