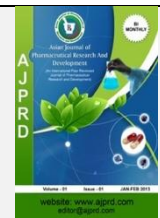


Available online on 15.4.2025 at <http://ajprd.com>

# Asian Journal of Pharmaceutical Research and Development

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Research Article

## Formulation and Evaluation of Herbal Sunscreen Cream Encompassed With Tomato, Papaya, Aloe Vera, Sandalwood Natural Extracts for Essential Sun Protection Factor and UV Protection

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### ABSTRACT

The Present study aims at developing herbal sunscreen cream using natural ingredients from plant sources which helps in reducing toxicity and helps in improving safety of formulation. The trend of using herbal cosmetics has been increased due to various advantages like natural antioxidant, anti-inflammatory effects, improved moisturization, natural elegance and shine, natural UV protection with good SPF etc. Herbal sunscreens are beautifying products which are made-up of natural plant extracts that protect skin with original freshness. The objective of the present research involves formulation and evaluation of herbal sunscreen using natural material from sources such as papaya, aloe vera, sandal wood, tomato, etc. The composition includes natural ingredients such as avocado oil, almond oil, carrot seed oil, raspberry oil, etc were used to formulate herbal sunscreen. All the formulated herbal sunscreen were evaluated for different evaluation tests like color, texture, pH, Spreadability, viscosity, dilution test, thermal stability, skin irritation, after feel, Washability and for sun protection factor. The results revealed that evaluation parameters of prepared herbal sunscreen were in standard limit values. It can be finally concluded that the F5 was found to be good with respect to all the evaluation parameters like Spreadability, thermal stability and the Sun protection factor (SPF) produced was 24.99 indicating good sun protections. The F5 formulation meets with all the ideal requirements of good sunscreen and it was ideal with stability based on the composition of ingredients. The research concludes that herbal sunscreens are safe to use with less or no toxicities as compared to synthetic formulations

**Key words:** Herbal extracts, safety, toxicity, Sun protection factor (SPF) and papaya.

**ARTICLE INFO:** Received 10 Dec. 2024; Review Complete 28 Feb. 2025; Accepted 15 March 2025. ; Available online 15 April. 2025



### Cite this article as:

V Anusha, P Moulika, Jadhav SC, Seshasarvani N, Kumar YG, Sushma K, Formulation and Evaluation of Herbal Sunscreen Cream Encompassed With Tomato, Papaya, Aloe Vera, Sandalwood Natural Extracts for Essential Sun Protection Factor and UV Protection, Asian Journal of Pharmaceutical Research and Development. 2025; 13(2):01-11, DOI: <http://dx.doi.org/10.22270/ajprd.v13i2.1532>

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### INTRODUCTION

Cosmetics refer to products that are used to enhance or alter the appearance of the face, body, or hair. These products can include items such as makeup, skincare preparations, hair dyes, perfumes, and toiletries. The primary purpose of cosmetics is often aesthetic, allowing individuals to achieve desired looks, enhance features, or cover imperfections. However, cosmetics can also serve practical purposes, such as protecting the skin from environmental damage, moisturizing, or treating

specific skin concerns. Herbal cosmetics are beauty and skincare products formulated primarily with ingredients derived from plants, herbs, flowers, fruits, roots, and other botanical sources. Unlike conventional cosmetics that often contain synthetic chemicals, herbal cosmetics harness the natural healing and nourishing properties of botanical extracts to promote skin health and enhance beauty. These products may include a wide range of items such as cleansers, moisturizers, toners, masks, serums, hair care products, and more, all formulated with natural ingredients<sup>1</sup>. One of the key advantages of herbal

cosmetics is their potential to provide nourishment, hydration, and protection to the skin without the harshness or side effects associated with some synthetic ingredients. Many botanical extracts are rich in vitamins, antioxidants, minerals, and other bioactive compounds that can help improve skin texture, tone, and resilience, as well as address specific concerns such as aging, acne, inflammation, and sensitivity<sup>2</sup>.

## SUNSCREEN

Sunscreen is a topical product designed to protect the skin from harmful ultraviolet (UV) radiation emitted by the sun. It typically contains active ingredients that either absorb, reflect, or scatter UV radiation, thereby reducing its penetration into the skin. The primary purpose of sunscreen is to prevent sunburn, premature aging of the skin, and skin cancer caused by excessive UV exposure. Sunscreens are available in various forms, including lotions, creams, gels, sprays, sticks, and powders, with different formulations catering to different skin types and activities. They often contain a combination of organic and/or inorganic compounds, such as avobenzone, oxybenzone, octocrylene, zinc oxide, or titanium dioxide, which work synergistically to provide broad-spectrum protection against both UVA and UVB rays<sup>3</sup>. Additionally, sunscreens may be labeled with a sun protection factor (SPF), which indicates the level of protection against UVB rays, with higher SPF values corresponding to greater protection. It's essential to apply sunscreen generously and reapply it regularly, especially after swimming, sweating, or prolonged sun exposure, to maintain its effectiveness and ensure adequate protection for the skin.

## HERBAL SUNSCREEN

The primary objective of herbal sunscreens is to provide protection against harmful UV radiation from the sun, similar to traditional sunscreens, but with an emphasis on using natural, plant-based ingredients. These typically incorporate a variety of botanical extracts known for their potential sun-protective properties. Examples of such ingredients may include extracts from plants like aloe vera, green tea, chamomile, licorice root, grape seed, and shea butter, among others. These botanical extracts often contain antioxidants, vitamins, and other compounds that may help to neutralize free radicals generated by UV radiation, thereby reducing oxidative stress and potential damage to the skin. Some herbal sunscreens also utilize mineral-based ingredients, such as zinc oxide and titanium dioxide, which are natural minerals that physically block or scatter UV rays without penetrating the skin. These mineral ingredients provide broad-spectrum protection against both UVA and UVB rays, making them effective alternatives to chemical UV filters. One of the perceived benefits of herbal sunscreens is their potential to be gentler on the skin, particularly for individuals with sensitive skin or those who prefer to avoid synthetic chemicals<sup>4</sup>.

## MATERIALS AND METHODS

The materials for formulation of herbal sunscreen cream were procured from the following as presented in the table 1. Papaya, tomato, aloe Vera were obtained from local market and residential area.

**Table 1:** Materials used in Herbal sunscreen formulation

Materials	Company name/ Brand
Papaya	Local market
Tomato	Local market
Sandal wood powder	Indus valley- Biorganic
Aloe vera	Residential Locality
Carrot seed oil	Vihado...Care for your health
Avocado oil	The Organic Forest
Raspberry oil	Wildflower essentials
Almond oil	Dabur
Stearic acid	Loba Chemie
Cetyl alcohol	Sigma Aldrich
Stearyl alcohol	Sigma Aldrich
Glycerine	Sigma Aldrich
Triethanolamine	Sigma Aldrich
Potassium hydroxide	Loba Chemie

## METHODS

### Preparation and extraction of herbal constituents from the natural plant material

#### A) Preparation of herbal extract powder from Aloe vera

Two long aloe vera leaf strands were collected from aloe vera plant and was washed with pure water for removal of any dust or foreign materials. The sharp ends of the aloe vera were slowly removed by slicing them off. It is presented in figure 1. Now the aloe vera strands were cut into thin slices along with its upper layer along with its mucilaginous inner layer<sup>5</sup>. They were placed in trays of

dehydrator and closed with lid for duration of 10-12 hours at 130 F until complete moisture has been removed. This method of using dehydrator will not damage the constituents of material being dried and it is best choice for preparing dry powder ingredients for cosmetic purpose. Then the dried aloe vera slices after efficient moisture removal was transferred into mixer grinder and they were finely powdered. The powder was sieved using sieve no 80 to obtain fine powder. It was stored in air tight container for future use.



Figure 1: Aloe vera

#### B) Preparation of herbal extract powder from Papaya

One kg big ripe papaya was purchased from local market and washed with pure water for removal of dust and foreign materials. Slightly and slowly peel of the skin of papaya. Separate the flesh of papaya and cut it into thin slices. It is presented in figure 2. Those slices were spread on large plate and cover the tray with thin net holders for protection from dust and insects. These trays were sun dried for 4 days from morning to evening by flipping the sides of papaya slices frequently on each day for exposure to sun which naturally dries the material by moisture removal without damaging the constituents of material being dried<sup>6</sup>. The slices of papaya were completely dried to crisp after efficient moisture removal. They were transferred into mixer grinder and they were finely powdered. The powder was sieved using sieve no 80 to obtain fine powder. It was stored in air tight container for future use.



Figure 2: Papaya

#### C) Preparation of herbal extract powder from Tomato

One kg ripe red tomatoes were purchased from the local market and they were cleaned with potable water to remove any dust or foreign materials. Tomatoes were cut into thin slices of uniform size<sup>7</sup>. They were placed on a paper towel and kept in trays. These trays were sun dried by covering with thin net holder's protection from dust and insects for three days from morning to evening on each day for exposure to sun which naturally dries the material by moisture removal without damaging the constituents of material being dried. The slices of tomatoes were completely dried to crisp after efficient moisture removal. They were transferred into mixer grinder and they were finely powdered<sup>8</sup>. The powder was sieved using sieve no 80 to obtain fine powder. It was stored in air tight container for future use.



Figure 3: Tomatoes

#### Formulation of herbal sun screen cream

The herbal sunscreen cream preparation involves general method of formulation of creams with following steps. The aqueous phase was prepared by weighing required quantities of glycerine, potassium hydroxide, Triethanolamine and dissolving them in measured quantity of water and they were heated to 70°C followed by addition of various extracts as per the composition of formula like tomato, papaya, aloe vera, sandal wood extract powder and heating them with continuous stirring to produce uniform mixture<sup>9</sup>. The oil phase was prepared by weighing required quantities of stearic acid, Cetyl alcohol, Stearyl alcohol, raspberry oil followed by addition of various essential oils like carrot seed oil, avocado oil and almond oil as per the composition of formula and heating them at 70°C with stirring continuously. After heating, the oil phase was added in portions to the aqueous phase at same temperature of 70°C with continuous stirring and the preparation was cooled slowly by avoiding sudden cooling until a product with desired cream consistency was formed. It was further homogenized until uniform preparation has formed<sup>10</sup>. It was finally poured into suitable container and stored at cool place. The composition for formulating herbal sunscreen cream is tabulated in table 2 and figure 4. The source of other natural ingredients like Avocado, sandalwood, carrot and raspberry is presented in figure 5



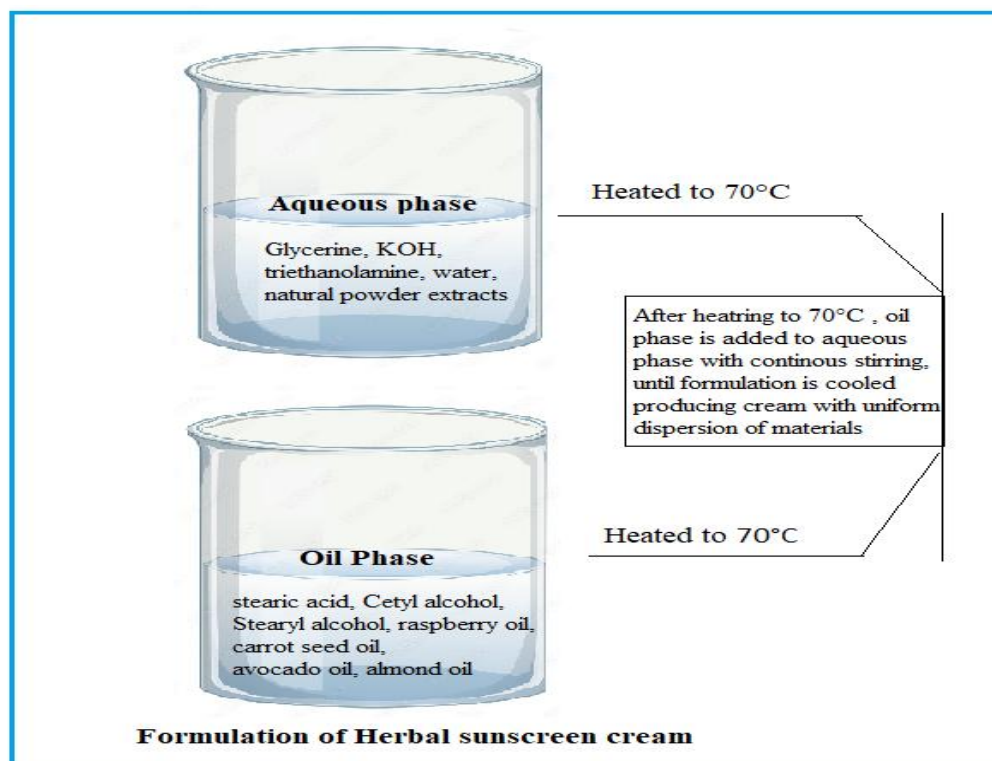


Figure 4: Formulation of Herbal sunscreen cream

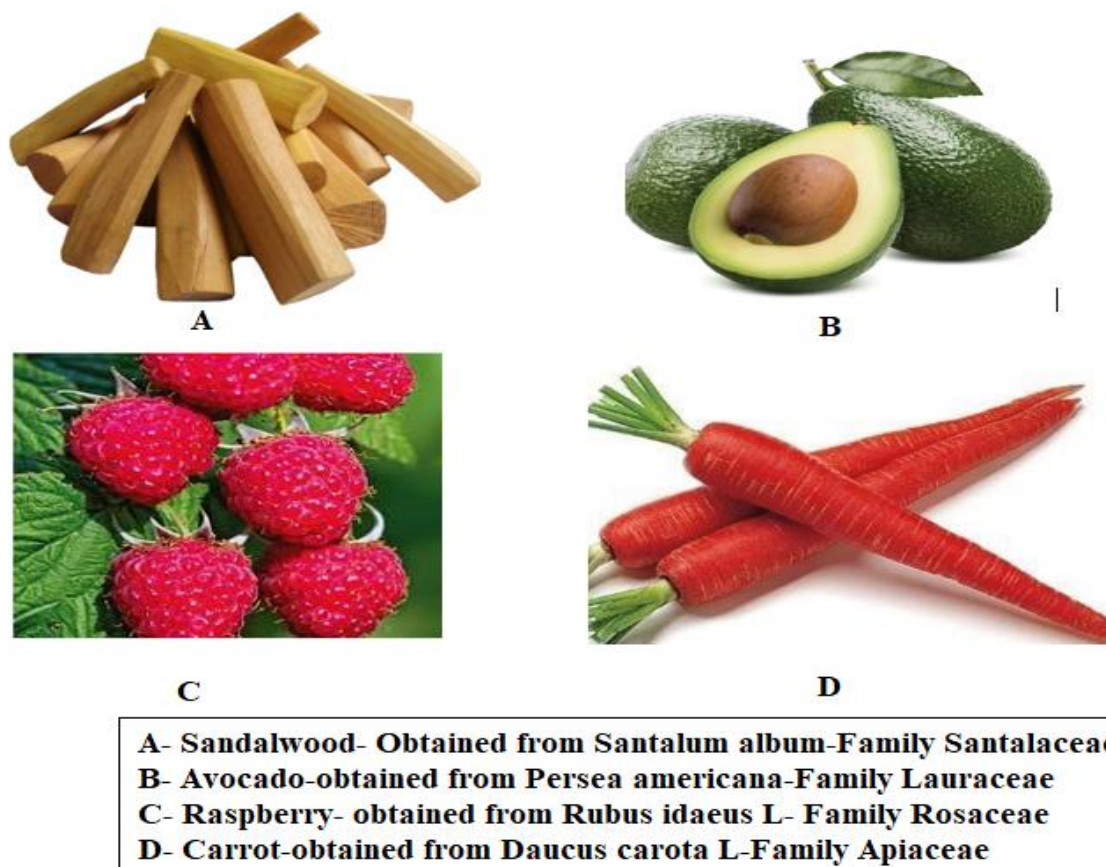


Figure 5: Various Natural Ingredients used in Herbal sunscreen cream

**Table 2:** Composition of herbal sunscreen cream

Ingredients(%)	F1 (%)	F2 (%)	F3 (%)	F4 (%)	F5 (%)
Papaya extract	6	--	6	--	3
Tomato extract	6	--	--	6	3
Sandal wood powder	--	6	--	6	3
Aloe vera extract	--	6	6	--	3
Carrot seed oil	2	--	2	--	2
Avocado oil	2	2	--	2	--
Raspberry oil	2	2	2	2	2
Almond oil	--	2	2	2	2
Stearic acid	13	12	12	11	13
Cetyl alcohol	1	2	1	2	1
Stearyl alcohol	1	1	2	2	1
Glycerine	10	10	10	10	10
Triethanolamine	1	1	1	1	1
Potassium hydroxide	1	1	1	1	1
Purified water q.s. to 100g	q.s	q.s	q.s	q.s	q.s

Note: The formula is presented in (%w/w) quantities (For 100 g)

For Glycerine density is considered for calculating 10 % which is 12.5 ml

## EVALUATION OF HERBAL SUNSCREEN CREAM

### Physical Parameters

The preparation should be evaluated for appearance, colour, and homogeneity.

### Homogeneity

The prepared formulations were evaluated for homogeneity by means of simple visual appearance and also by touching the formulations<sup>11</sup>.

### Appearance

The formulations were subjected to test for appearance by observing its color, grittiness, pearlscence and roughness<sup>12</sup>.

### PH of the Cream

Initially the pH meter was calibrated utilizing standard buffer capsule solution. Then weighed quantity of 0.5g of cream was dissolved in 50.0 ml of suitable solvent, followed by determination of pH using pH meter<sup>13</sup>. The electrodes were dipped into cream solution which helps in determining pH of the sunscreen cream.

### Spread ability

The procedure involves selection of two glass slides with dimensions of 20 × 5 cm. The formulation will be placed on one of the slides and the other slide will be placed on top of sunscreen cream so that the cream is sandwiched between the slides with area occupied by 6.5 cm, a weight of 100 g was placed on slides to produce a uniform layer of formulation. The excess cream on slides was wiped off after removing the weight from the slide. The two slides

were fixed to stand such that lower slide is held in position by fangs of clamp which allows the movement of upper slide depending on the force due to the weight attached to it<sup>14</sup>. A weight of 60 g was tied to the upper slide and time required for this upper slide to move through a distance of 5cm and get separated from lower slide was determined. The procedure was repeated and mean of 3 repetitions were noted down.

The Spread ability is calculated by using formula:

$$S = M \cdot L / T$$

Where, S= Spreadability, L= Length of the glass slide, M= Weight tied to upper slide and T= Time.

### Viscosity

The Brookfield viscometer was used to test viscosity, with the proper number of spindle selected (No. 4). A 50 ml beaker was used to hold 50 g of preparation until the spindle groove was dipped and the rpm was set at 100 rotations per minute. Herbal sunscreen viscosity was measured at 100 rpm<sup>15</sup>. The viscosity was determined using the factor attained from the reading

$$\text{Viscosity} = \text{Dial Reading} \times \text{Factor.}$$

### Dilution test

The procedure includes mixing of water to the sample. If the emulsion is o/w the preparation doesn't exhibit phase separation and breaking. If the emulsion is w/o the emulsion immediately exhibits phase separation and breaking<sup>16</sup>.

### After feel

The prepared cream was applied on surface of skin and its emolliency, the residue left over after application of cream and its slipperiness was determined.

### Removal

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

### Thermal Stability

The study helps to identify oil separation from the prepared sunscreen formulations using a humidity chamber at 60-70 % RH and 37±1°C. A 20 mm wide and 5 mm thick layer of prepared formulation was spread on to the internal walls of a 100 ml capacity chamber in its whole heights<sup>17</sup>. The beaker was stored in the humidity chambers for 8 hours at 60-70 % relative humidity and 37°C. To pass the test there should not be any observed oil separation in the cream<sup>18</sup>.

### Rancidity

Rancidity indicates partial or complete oxidation/hydrolysis of fatty materials and oils, this is observed when they are exposed to air/ moisture or light or due to the activity of bacteria. This results in unpleasant odour and taste. Phloroglucinol solution is used to determine rancidity, the free fatty acids liberated during oxidation will react with solution of Phloroglucinol which produces pink colour such that it infers presence of rancidity. Weighed quantity of cream was taken and 10 ml of concentrated Hydrochloric acid along with 10 ml of Phloroglucinol and mixed for one-two minutes. The formulation passes the test if no pink colour is observed<sup>19</sup>.

### Irritancy test

An area of (1sq.cm) was marked on the left hand dorsal surface. The cream was applied to the specified area and time was noted<sup>20</sup>. It was continuously monitored for duration of 24 hours at regular intervals for presence of any Irritation, edema and erythema.

### In Vitro Sun Protection Factor (SPF) determination

The sunscreen formulation's efficacy can be identified by calculating sun protection factor which is commonly abbreviated as SPF. It is given by the following equation<sup>21</sup>

$$\text{SPF} = \frac{\text{Minimal erythema dose in sunscreen protected skin}}{\text{Minimal erythema dose in non-sunscreen protected skin}}$$

The minimal Erythema dose (MED) is generally defined as lowermost time interval or dosage of an UV light

irradiation which is sufficient enough to generate minimal, perceptible erythema on the unprotected layer of skin<sup>22</sup>. In Vitro SPF values for oily preparations comprising vegetable oils and/or organic UV filters were frequently calculated with spectrophotometric procedure and the observed absorbance values at 5 nm intervals between 290-320 nm were calculated by the following equation. Mansur et al, developed a simple equation which substitutes in vitro method proposed by Sayre et al., 1979, using UV spectrophotometry and the Mansur equation is as follows

$$\text{SPF} = \text{CF} \times \sum_{290}^{320} \text{EE}(\lambda) \times \text{I}(\lambda) \times \text{Abs}(\lambda)$$

where,

CF = Correction Factor (10)

EE(λ) = Erythema Effect Spectrum

I(λ) = Solar Intensity of Radiation with wavelength λ

Abs(λ) = Absorbance of the sunscreen product at wavelength λ

EE × I = Constant Value

### Procedure

The procedure involves weighing 1.0 g of cream sample and it was transferred into 100 mL volumetric flask, which is further diluted to its volume with ethanol as solvent. It is further sonicated for duration of 5 min and filtered. A 5.0 mL aliquots was again transferred into 50 mL volumetric flask and it is further diluted to its volume with ethanol as solvent. Then again 5.0 mL was transferred to a 25 mL flask and made to volume with ethanol. The absorption spectra data were determined in range of 290 to 320, at every 5 nm, then the equation was applied for further calculation of SPF<sup>23</sup>.

## RESULTS AND DISCUSSION

### Evaluation of Herbal sunscreen creams

#### Physical Parameters

The formulated herbal sunscreen formulation comprising of aloe vera extract, papaya extract, tomato extract, and sandal wood powder, carrot seed oil, Avocado oil. Raspberry oil, Almond oil etc as natural ingredients were visually inspected for their colour, appearance and homogeneity and also results are tabulated in table 3 and in figure 6,7,8,9 and 10.

**Table 3:** Physical parameters of herbal sunscreen cream

Formulation	Colour	Appearance	Homogeneity and texture
F1	Light orange	Good	Smooth
F2	Brownish shade	Good	Little gritty
F3	Beige-tan shade	Good	Smooth
F4	Dark brown	Good	Smooth
F5	Beige-brown shade	Good	Smooth



**Figure 6:-F1****Figure 7: F2****Figure 8:F3****Figure 9:F4****Figure 10:F5**

### PH of the Cream

The pH meter was used for determining pH and the pH was found between 5.9 to 6.8, results are in table 4.

**Table 4:** PH of different formulations

Formulation code	pH of formulation
F1	5.9
F2	6.5
F3	6.3
F4	6.6
F5	6.8

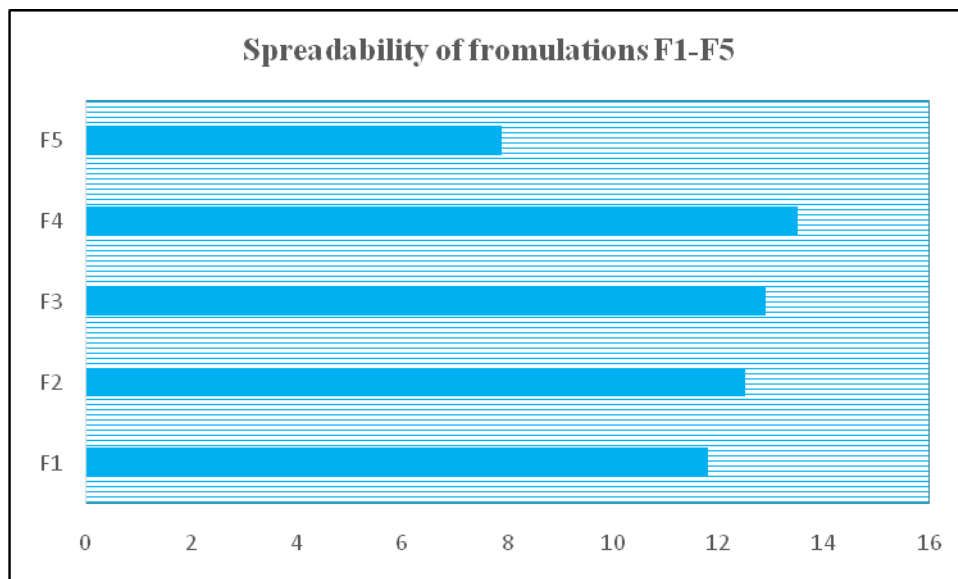
## Spreadability

The Spreadability is calculated by using formula:

$S = M \cdot L / T$ , Where, S= Spreadability, L= Length of the glass slide, M= Weight tied to upper slide and T= Time. The results are presented in table 5 and figure 11.

**Table 5:** Spreadability of different formulations

Formulation code	Spreadability
F1	11.8
F2	12.5
F3	12.9
F4	13.5
F5	7.9



**Figure 11:** Comparison of Spreadability of different formulations

## Viscosity

The Brookfield viscometer was used to test viscosity, with the proper number of spindle selected (No. 4). A 50 ml

beaker was used to hold 50 g of preparation until the spindle groove was dipped and the rpm was set at 100 rotations per minute, the results are presented in table 6 and figure 12.

**Table 6:** Viscosity of different formulations

Formulation code	Viscosity in cps
F1	20248
F2	19011
F3	18995
F4	20185
F5	18180



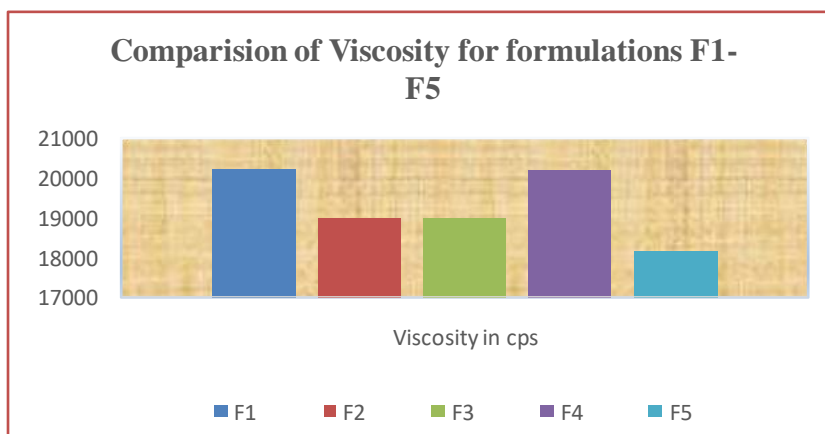


Figure 12: Comparison of Viscosity of different formulations F1-F5

### Dilution test

To the sample required quantity of water will be mixed. If the emulsion is o/w the preparation doesn't exhibit phase separation and breaking. If the emulsion is w/o the emulsion immediately exhibits phase separation and breaking<sup>24</sup>. Test exhibits all the formulations are o/w type and results are presented in table 7.

Table 7: Dilution pattern of different formulations

Formulation code	Nature of dilution
F1	O/W
F2	O/W
F3	O/W
F4	O/W
F5	O/W

### After feel

Emolliency, slipperiness and amount of residue left after the application of fixed amount of cream was checked. All the formulation exhibited good emollient properties and no sticky or oily residue was observed after application.

### Washability and ease of removal

The ease of removal of the cream applied was examined by washing the applied part with tap water. All the formulations exhibited easy removal after application

### Thermal Stability

The oil separation from herbal sunscreens was evaluated in a humidity chamber at 60-70 % RH and 37±1°C. All the formulations did not release or separate oil after performing the test.

### Rancidity

Weighed quantity of cream was taken and 10 ml of concentrated Hydrochloric acid along with 10 ml of Phloroglucinol and mixed for one-two minutes. All the formulations have passed the test and no pink colour was observed.

### Irritancy test

The cream was applied to the specified area and time was observed for irritancy, erythema, and edema. The formulations did not exhibit any erythema or edema after application. These parameters related to Colour, homogeneity, appearance, after feel, Washability, thermal stability, irritancy and rancidity are presented in table 8.

Table 8: Evaluation parameters of herbal sunscreen creams

S. No	Evaluation parameters	F1	F2	F3	F4	F5
1.	Homogeneity and texture	Smooth	Smooth	Smooth	Smooth	Smooth
2.	Appearance	Good	Good	Good	Good	Good
3.	After feel	No residue	No residue	No residue	No residue	No residue
4.	Washability	Good	Good	Good	Good	Excellent
5.	Thermal stability	No oil Phase was separated	No oil Phase was separated	No oil Phase was separated	No oil Phase was separated	No oil Phase was separated
6.	Irritancy test	No irritation	No irritation	No irritation	No irritation	No irritation
7.	Rancidity	No pink colour	No pink colour	No pink colour	No pink colour	No pink colour

**In-Vitro SPF- Sun protection factor**

SPF can be calculated by using the Mansur equation

$$SPF = CF \times \sum_{290}^{320} EE(\lambda) \times I(\lambda) \times Abs(\lambda)$$

The aliquots of samples were scanned in the range 290 and 320 nm, followed by the obtained absorbance values were multiplied by corresponding EE (λ) and I (λ) values represented in table 9<sup>25</sup>. Then, the summation was taken which is multiplied with correction factor. The values of EE×I between 290 to 320 nm are constants. The SPF is calculated and data is represented in table 10, 11, 12 for formulations F1, F2, F3, F4 and F5.

**Table 9:** constants values of EE×I between 290 to 320 nm are

S.no	Wavelength (nm)	EE×I (normalized)
1.	290	0.0150
2.	295	0.0817
3.	300	0.2874
4.	305	0.3278
5.	310	0.1864
6.	315	0.0839
7.	320	0.0180

**Table 10:** SPF for formulation F1 and F2

Wavelength (nm)	EE (X) I	Absorbance	EE (X) I (X) Abs	Absorbance	EE (X) I (X) Abs
290	0.0150	2.801	0.04201	2.198	0.03297
295	0.0817	2.558	0.20898	1.788	0.14607
300	0.2874	1.923	0.55267	1.565	0.44978
305	0.3278	1.780	0.58348	1.152	0.37762
310	0.1864	1.164	0.21696	0.924	0.17223
315	0.0839	0.789	0.06619	0.798	0.06695
320	0.0180	0.503	0.00905	0.481	0.008658
Final SPF	= 1.67934 F1=1.67934× 10 = 16.79		= 1.25427 F2=1.25427× 10 = 12.54		

**Table 11:** SPF for formulation F3 and F4

Wavelength (nm)	EE (X) I	Absorbance	EE (X) I (X) Abs	Absorbance	EE (X) I (X) Abs
290	0.0150	2.382	0.03573	1.582	0.02373
295	0.0817	2.144	0.17516	1.344	0.10980
300	0.2874	1.642	0.53824	1.132	0.32533
305	0.3278	1.442	0.47268	0.942	0.30878
310	0.1864	0.954	0.17782	0.811	0.15117
315	0.0839	0.567	0.04757	0.474	0.03976
320	0.0180	0.319	0.00574	0.212	0.00381
Final SPF	=1.45294 F3 = 1.45294×10= 14.52		= 0.96238 F4 =0.96238×10= 9.62		

**Table 12:** SPF for formulation F5

Wavelength (nm)	EE (X) I	Absorbance	EE (X) I (X) Abs
290	0.0150	3.256	0.04884
295	0.0817	3.143	0.25678
300	0.2874	2.731	0.78488
305	0.3278	2.487	0.81523
310	0.1864	2.189	0.40802
315	0.0839	1.861	0.15613
320	0.0180	1.649	0.02968
Final SPF	= 2.49956 F5=2.49956× 10 = 24.99		

The SPF was best in all the formulation which was found between 9.62 to 24.99, for formulations of F1 to F5. Depending on the evaluation parameters it is observed that F5 formulation it has smooth texture with beige-

brown shade. No skin irritation was observed and the SPF was found to be 24.99 for F5 formulation and results are presented in figure 11.

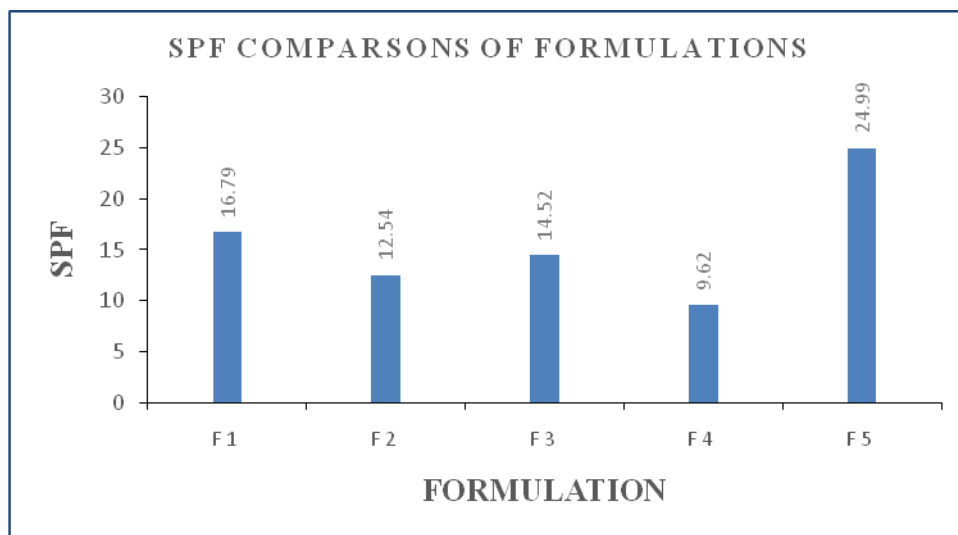


Figure 13: SPF comparison of different formulations

## DISCUSSION

The formulated herbal sunscreen creams were evaluated for various parameters like colour and appearance, homogeneity, dilution test, Spreadability, pH, skin irritancy test, viscosity, thermal stability, SPF, and ease of removal. Depending on the evaluation parameters it is observed that F5 formulation has smooth texture with beige-brown shade and pH was found to be 6.8 with 7.9 Spreadability and no residue was formed after application of cream. No skin irritation was observed and the SPF was found to be 24.99 which is considered to be medium. Based on the evaluation parameters observed between F1 to F5, the formulation F5 was found to be good with respect to all the evaluation parameters like Spreadability, thermal stability, pH, Homogeneity and SPF. The formulation F1, F2, F3 and F4 were also found to be satisfactory with respect to the evaluation parameters and but produced low SPF when compared to F5. The formulation F5 meets with all the ideal requirements of good herbal sunscreen cream and it was ideal with thermal stability and also with good SPF.

## CONCLUSION

This research study deals with the exploration carried out with objective of developing herbal sunscreen cream using natural ingredients like papaya extract, tomato extract, Aloe vera extract and sandal wood powder along with natural essential oils. The present study intends to formulate herbal sunscreen cream such that the side effects produced by synthetic agents could be minimized. This research concludes that a successful formulation has been prepared using natural herbal extract material along with carrot seed oil, almond oil, raspberry oil, avocado oil. These natural agents are safe when compared to synthetic agents. Natural substances also produce required UV protection, softness, glow, smoothness, suppleness, nourishing effect and moisturizing effect to the skin along with anti-inflammatory and antioxidant potential. None of the formulations produced skin irritation and no thermal stability issues were found in any formulation. Homogeneity and texture was smooth for all the five formulations from F1 to F5. Based on the evaluation

parameters observed between F1 to F5, the formulation F5 was found to be good with respect to all the evaluation parameters like Spreadability, thermal stability, pH, Homogeneity with SPF of 24.99. The F5 formulation meets with all the ideal requirements of good herbal sunscreen cream and it was ideal with thermal stability and also with good SPF. In future herbal formulations like sunscreens will be ruling the commercial cosmetic industry after screening through clinical trials for quality control measures and safety measures. They play a great role in maintaining the health and beauty of individuals.

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