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FORMULATION AND EVALUATION OF ANTIOXIDANT ACTIVITY OF *CROCUS SATIVUS* AND *ALOE VERA* HERBAL CREAM

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ABSTRACT

Herbal cosmetics are widely used due to their safety and fewer side effects compared to synthetic products. The present study focuses on the formulation and evaluation of an herbal face cream containing Crocus sativus and Aloe vera, which possess significant antioxidant and skin-protective properties. Crocus sativus contains active compounds such as crocin and crocetin that help reduce oxidative stress and improve skin complexion, while Aloe vera provides moisturizing, soothing, and healing effects due to the presence of vitamins and polysaccharides. The herbal face cream was formulated using suitable base ingredients and evaluated for physicochemical parameters including appearance, pH, spreadability, homogeneity, and stability. The antioxidant activity of the formulation was also assessed using standard in-vitro methods. The results indicated that the prepared cream showed good stability and appreciable antioxidant activity. Hence, the formulation may serve as a safe and effective herbal cosmetic for skin care.

KEY WORDS: *Crocus sativus, Aloe vera, Cream, Antioxidant Activity, Viscosity, Formulation, Stability,*

INTRODUCTION

The skin is the largest organ of the human body and acts as the primary protective barrier against environmental factors such as ultraviolet (UV) radiation, pollutants, chemicals, and microbial invasion. Continuous exposure to these harmful factors leads to the production of reactive oxygen species (ROS) and free radicals, which can cause oxidative stress in the skin. Oxidative stress plays a major role in the development of various skin problems such as premature aging, wrinkles, dryness, pigmentation, inflammation, and loss of skin elasticity. Antioxidants are substances that can neutralize free radicals and reduce oxidative damage, thereby protecting the skin and maintaining its health and appearance.

In recent years, there has been a growing interest in herbal cosmetics due to their safety, efficacy, and minimal side effects compared to synthetic cosmetic products. Herbal formulations are prepared using plant-based ingredients that contain natural bioactive compounds such as flavonoids, phenolic compounds, vitamins, and essential oils. These compounds exhibit various beneficial properties including antioxidant, anti-inflammatory, antimicrobial, and moisturizing activities. As a result, herbal cosmetic products are widely used for maintaining healthy skin and preventing skin damage.

Crocus sativus, commonly known as saffron, is one of the most valuable medicinal plants used in traditional medicine and cosmetic preparations. It contains important active constituents such as crocin, crocetin, picrocrocin, and safranal, which contribute to its strong antioxidant, anti-inflammatory, and skin-enhancing properties. Saffron is known to improve skin complexion, reduce pigmentation, and protect the skin from oxidative stress caused by environmental factors.

Aloe vera is another widely used medicinal plant known for its excellent skin care benefits. It contains a wide range of bioactive compounds including vitamins (A, C, and E), enzymes, amino acids, minerals, and polysaccharides. *Aloe vera* also helps in maintaining skin hydration, promoting collagen production, and protecting the skin against damage caused by free radicals.

The combination of *Crocus sativus* and *Aloe vera* in a topical formulation may enhance the overall antioxidant and skin-protective effects. Therefore, the present study focuses on the formulation and evaluation of an herbal face cream containing extracts of *Crocus sativus* and *Aloe vera*. The formulated cream is evaluated for various physicochemical parameters such as appearance, pH, spreadability, viscosity, and stability.

CROCUS SATIVUS

Botanical and Cosmetic Importance

TAMIL NAME: குங்குமப்பூ

Crocus sativus L., commonly known as saffron, is a perennial herb in the **Iridaceae** family cultivated for its dried red stigmas, which are used as a spice, dye, and traditional medicine. It is mainly grown in Iran, India, Greece, and other subtropical regions. Saffron's high value results from labour-intensive harvesting and its rich composition of biologically active molecules. Saffron contains more than 150 volatile and non-volatile compounds.

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***Fig.1*: *Crocus sativus* stigmas**

The most studied chemical constituents are:

• Crocin and crocetin – carotenoid glycosides responsible for saffron's yellow–orange colour.
• Safranal – volatile compound responsible for aroma.
• Picrocrocin – bitter precursor molecule with health-related properties.

These major compounds, especially crocin and safranal, are widely reported as the main antioxidant-active constituents. The stigmas also contain flavonoids (e.g., quercetin and kaempferol), phenolic acids, and other carotenoids, contributing to biological activity.

ALOE VERA

TAMIL NAME: *சோற்றுக்கற்றாழை*

Aloe vera belonging to the family **Asphodelaceae (Liliaceae),** is a perennial succulent plant widely used in traditional and modern medicine. It is commonly known for its therapeutic, cosmetic, and nutritional applications. The plant has been extensively studied due to its rich phytochemical composition and broad spectrum of pharmacological activities, particularly its antioxidant potential. Oxidative stress caused by free radicals plays a major role in aging and various chronic diseases. Natural antioxidants such as *Aloe vera* have gained importance as safer alternatives to synthetic antioxidants.

Fig.2*: *Aloe vera

Phytochemical composition

Aloe vera contains more than 75 bioactive compounds, which contribute to its medicinal properties. Major constituents include:

• Anthraquinones: Aloin, aloe-emodin
• Phenolic compounds and flavonoids
• Vitamins: Vitamin A (β-carotene), C, and E
•Polysaccharides: Acemannan (major bioactive polysaccharide)
• Enzymes: Superoxide dismutase, catalase
• Minerals and amino acids

These compounds collectively contribute to the antioxidant and therapeutic effects of *Aloe vera*.

LITERATURE REVIEW

1. Surjushe et al. (2008) described *Aloe vera* (*Aloe barbadensis Miller*) as a medicinal plant with antioxidant, anti-inflammatory, antimicrobial, and wound-healing properties. The antioxidant activity was attributed to phenolic compounds, flavonoids, and vitamins present in the gel. The study supported its extensive dermatological and cosmetic use.

2. Hamman (2008) reviewed the chemical composition and biological activities of *Aloe vera* leaf gel. The author highlighted its antioxidant potential and moisturizing properties, which contribute to skin protection and regeneration. *Aloe vera* was recommended as a valuable ingredient in topical formulations.

3. Choi and Chung (2003) evaluated the antioxidant activity of *Aloe vera* extracts and confirmed significant free-radical scavenging ability. The study suggested that Aloe vera reduces oxidative stress in skin tissues. These findings support its use in anti-aging and protective cosmetic products.

4. Moniruzzaman et al. (2012) investigated the in vitro antioxidant activity of *Aloe vera* using DPPH and reducing power assays. The results demonstrated strong antioxidant capacity due to phenolic and flavonoid contents. The study validated Aloe vera's role as a natural antioxidant source.

5. Reynolds and Dweck (1999) reviewed the traditional and modern uses of *Aloe vera.* The authors emphasized its antioxidant and anti-inflammatory effects, particularly in dermatology. *Aloe vera* was identified as a safe and effective herbal ingredient for topical applications.

6. Dal Belo et al. (2006) studied the effect *of Aloe vera* gel on human skin hydration and barrier function. The results showed improved skin moisture and elasticity, which indirectly enhances antioxidant defense. The study supported Aloe vera's cosmetic benefits.

7. Rahmani et al. (2015) summarized the pharmacological properties of *Aloe vera*, focusing on antioxidant and wound-healing activities. The authors explained that polysaccharides and phenolics contribute to oxidative stress reduction. *Aloe vera* was highlighted as a multifunctional medicinal plant.

8. Nair et al. (2012) reported that *Aloe vera* polysaccharides protect cells against oxidative damage. The study demonstrated reduced reactive oxygen species production in treated cells. These findings support its inclusion in antioxidant topical formulations.

9. Sharma et al. (2018) formulated and evaluated *an Aloe vera* herbal cream. Physicochemical parameters and antioxidant

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activity were found to be satisfactory. The study confirmed Aloe vera's suitability for stable topical cream formulations.

10. Assimopoulou et al. (2005) investigated the antioxidant activity of saffron constituents such as crocin and crocetin. The compounds exhibited strong radical scavenging and lipid peroxidation inhibition. This study established saffron as a potent antioxidant source.

11. Hosseinzadeh and Nassiri-Asl (2013) studied the antioxidant effects of saffron extracts and its active components. Crocin and safranal showed significant antioxidant activity in experimental models. The findings supported saffron's protective role against oxidative damage.

12. Parhiz et al. (2019) summarized the health benefits of *Crocus sativus* with a focus on oxidative stress modulation. The review highlighted its anti-aging and skin-protective properties. Saffron was recommended for cosmetic and therapeutic formulations.

13. Zeka et al. (2015) assessed the cosmetic potential of saffron extracts. The study showed improved skin hydration and reduced oxidative stress markers. Antioxidant activity was identified as a key mechanism.

14. Koul and Sood (2020) reviewed the cosmetic applications of saffron. The authors emphasized its antioxidant, skin-brightening, and anti-aging effects. Saffron was considered a premium herbal cosmetic ingredient.

15. Verma et al. (2014) formulated a herbal cream containing *Aloe vera* and evaluated its stability and antioxidant activity. The formulation showed acceptable physicochemical properties. The study confirmed the feasibility of herbal antioxidant creams.

AIM

To formulate and evaluate a herbal cream containing extracts of *Crocus sativus* (saffron) and *Aloe vera* to assess its antioxidant activity.

OBJECTIVES

The present study includes the following objectives:

- Collection of *Aloe vera* and *Crocus sativus* from nursery garden and herbal store respectively at Tiruvannamalai.
- An appropriate cream base was chosen to develop a combination of *Aloe vera* and *Crocus sativus* herbal cream.
- Five different formulations with varying proportion were prepared.
- Determination of physiochemical parameters for all the five formulations.
- The developed formulations were compared with commercial herbal face cream.
- The optimized formulations were used to study antioxidant activity.
- The antioxidant activity was carried out by the following methods,
  - Antioxidant activity by Follin –Ciocalteu method.
  - Scavenging of hydrogen peroxide radical assays**.**

MATERIALS AND METHODS

Materials

Aloe vera and *Crocus sativus* extract, methyl paraben, liquid paraffin, distilled water, rose oil, Barfoed's reagent, Benedict's reagent, chloroform, ammonia, Mayer's reagent, Hager's reagent, Wagner's reagent, Dragendroff's reagent, hydrochloric acid, lead acetate, sulphuric acid, acetic anhydride, Whatman No.1 filter paper, nitric acid, phenolphthalein, ferric chloride, alcoholic potassium hydroxide solution, Molisch's reagent

INSTRUMENTS

1. UV Double beam spectrometer (Make: Lab India, Model no. UV-3200).
2. pH meter (Make: AVI, Model no.GEC-p40605V).
3. Electronic balance (Make: Phoenix Model no,602).
4. Brookfield viscometer (Make: Brookfield, Model no.DV1).
5. Moisture balance (Make: Infra Digi, Model no.IR-809).
6. Water deionization apparatus (Make: Deionizer, Modelno.KI-2278).

METHODS

Preliminary phytochemical screening of *Crocus sativus*

Steroids

Extract with chloroform and concentrated H_2SO_4 showed red upper layer and yellow-green fluorescence, indicating steroids.

Terpenoids

Extract treated with acetic anhydride and concentrated H_2SO_4 formed a blue-green ring, indicating terpenoids.

Tannins

Addition of 1% lead acetate produced a yellow precipitate, indicating tannins.

Saponins

Extract shaken with distilled water produced stable foam, indicating saponins.

Anthocyanins

Treatment with HCl and ammonia produced pink-red colour turning blue-violet, indicating anthocyanins.

Glycosides

Addition of glacial acetic acid, ferric chloride, and H_2SO_4 formed a brown ring, indicating glycosides.

Emodin

Treatment with ammonium hydroxide and benzene produced a red colour, indicating emodin.

Alkaloids (Mayer's test)

Addition of Mayer's reagent formed a cream precipitate, indicating alkaloids.

Phenols

Addition of ferric chloride produced an intense colour, indicating phenols.

Flavonoids

Addition of NaOH produced yellow colour that disappeared with dilute HCl, indicating flavonoids

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Chemical Evaluation for crude drug of *Crocus sativus*

1. Ash Content

A crucible was weighed and about 2 g of Crocus sativus sample was added and weighed. The sample was ashed at 600°C for 2 hours in a furnace. After cooling in a desiccator, the ash was weighed and the percentage of ash was calculated.

$$\% \text{ Ash} = \frac{\text{Weight of ash – crucible weight}}{\text{Weight of original sample and crucible}}$$

2. Moisture Content

Moisture content was determined using a moisture balance (Infra-Digi IR-809 model). The sample was heated at 80°C for 10 minutes, and the difference between initial (wet) and final (dry) weight was recorded.

$$\text{Moisture content (\%)} = \frac{\text{Wet weight – Dry weight}}{\text{Dry weight}}$$

3. Swelling Index

About 1 g of *Crocus sativus* powder was placed in a measuring cylinder and 25 ml of distilled water was added. After 2 hours, the increase in volume was measured to determine the swelling capacity.

$$\text{Swelling index} = \frac{W_2 - W_1}{W_1}$$

Where:
W_1 = Weight of sample before swelling
W_2 = Weight of sample after swelling

Preliminary phytochemical screening of *Aloe vera*

Test for Carbohydrates

Molisch's test: Molisch's reagent was added to the extract followed by concentrated sulphuric acid. Formation of a red-violet ring at the interface indicated the presence of carbohydrates.

Barfoed's test: The extract was mixed with Barfoed's reagent and heated in a water bath. Formation of a red precipitate indicated reducing sugars.

Benedict's test: The extract was heated with Benedict's reagent. Formation of a coloured precipitate confirmed the presence of sugars.

Test for Alkaloids

The extract was treated with Mayer's, Hager's, Wagner's and Dragendorff's reagents. Formation of cream, yellow, brown or orange-red precipitate indicated the presence of alkaloids.

Test for Saponins

Frothing test: The extract was shaken with water. Formation of stable froth for a few minutes indicated saponins.

Test for Flavonoids

Shinoda's test: The extract was treated with hydrochloric acid and magnesium. Development of reddish colour indicated flavonoids.
Lead acetate and sulphuric acid tests: Formation of yellow or orange colour confirmed flavonoids.

Test for Steroids

Salkowski's test: The extract was treated with chloroform and acetic anhydride. Formation of a brown ring indicated phytosterols.

Test for Proteins

Biuret and Xanthoproteic tests: Development of pink or yellow colour indicated the presence of proteins.

Test for Fixed Oils and Fats

Saponification test: Heating the extract with alcoholic potassium hydroxide resulted in soap formation indicating fixed oils and fats.

Test for Phenolic Compounds

Lead acetate and Ferric chloride tests: Formation of white precipitate or dark green colour indicated phenolic compounds.

Test for Gums and Mucilage

The extract was treated with absolute alcohol. Formation of white or cloudy precipitate indicated gums and mucilage.

Development of Formulation

The ingredients for the formulation development are given in Table.1.

***Table 1*: Formulation of *Crocus sativus* and *Aloe vera* herbal cream.**

S.NO	INGREDIENTS	F1	F2	F3	F4	F5
1.	*Crocus sativus* extract	1.5ml	2ml	1.5ml	1.8ml	1.1ml
2.	*Aloe vera* extract	2.8ml	1.8ml	1.5ml	2.3ml	2.5ml
3.	Beeswax	4g	3.6g	3.9g	4.2g	5g
4.	Liquid Paraffin	21ml	20ml	18ml	16ml	15ml
5.	Methyl Paraben	0.05g	0.05g	0.03g	0.02g	0.04g
6.	Rose oil	Q. S	Q. S	Q. S	Q. S	Q. S
7.	Borax	0.4g	0.4g	0.5g	0.6g	0.3g

Preparation of Oil Phase

Accurately weigh liquid paraffin and beeswax. Transfer them into a china dish and heat to 75°C until completely melted. Maintain the temperature at 75°C to obtain a uniform oily phase.

Preparation of Aqueous Phase

In a separate China dish, dissolve borax and methyl paraben in distilled water. Heat the mixture to 75°C until borax and methyl paraben are completely dissolved and a clear solution is obtained.

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Emulsification Process
Slowly add the hot aqueous phase to the hot oil phase in a mortar and pestle with continuous stirring. Stir in a single direction to ensure proper emulsification and to prevent lump formation.

Incorporation of Active Ingredient
Add the extract of *Crocus sativus* (saffron) and *Aloe vera* to the prepared cream base and mix thoroughly to ensure uniform distribution.

Addition of Fragrance
Finally, add a few drops of rose oil as a fragrance and mix properly to obtain a smooth and homogeneous cream.

Final Product
Transfer the prepared herbal cream into a suitable container and label appropriately.

Physicochemical parameters
Organoleptic Test
Colour
The colour of the cream was observed by visual examination.

Odour
The odour of the cream was evaluated and found to be characteristic.

State
The physical state of the cream was examined visually. The cream was found to be solid/semi-solid in nature.

Consistency
The consistency of the formulation was evaluated manually by rubbing a small quantity of the cream on the hand. The cream was found to have a smooth consistency.

Determination of pH
Take 0.5 g of cream and dispersed it in 50 ml distilled water. Then check its pH by using digital pH meter.

Viscosity
Viscosity has an important role in explaining and controlling many attributes like shelf-life ability and product aesthetics such as clarity, ease of flow, on removal from packing and reading when applied to face. Viscosity of cream was done by using Brooke field viscometer at the temp of 25°C.using spindle no, 63.at rpm.

Phase Separation
The prepared cream was transferred in a suitable wide mouth container. Set aside for storage the oil phase and aqueous phase separation were visualizing after 24 hours.

Washability
Wash ability test was carried out by applying a small amount of cream on the hand and then washing it with help of tap water.

Greasiness
Greasiness was evaluated by applying the cream on the skin and observing the oily residue and ease of spreading.

Microbial Test
The cream was streaked on agar plates and incubated at 37°C for 24 hours. Absence of microbial growth indicated safety of the formulation.

Antioxidant Activity
Two different chemical methods namely Antioxidant activity by Folin–Ciocalteu method and scavenging of H2O2 radical assays were utilized for assessing the antioxidant activity of *Crocus sativus* and *Aloe vera* extract.

1. Scavenging of Hydrogen Peroxide Radical Assays

- Solution of 0.2 M potassium dihydrogen phosphate and 0.2 M sodium hydroxide solutions were prepared according to the Indian Pharmacopoeia 1996 standards.
- 50 ml potassium dihydrogen phosphate solution was put in a 200 ml volumetric flask and 39.1 ml of 0.2 M sodium hydroxide solution was added and finally volume was made up to 200 ml with distilled water to prepare phosphate buffer (pH 7.4).
- 50 ml of phosphate buffer solution was added to equal amount of hydrogen peroxide to generate the free radicals and solution was kept aside at room temperature for 5 min to finish the reaction.
- 0.1ml of sample added with 3.4 ml of 0.1 M phosphate buffer and 0.6 ml of 40 ml H_2O_2. This mixture was incubated 10 minutes at room temperature.
- After incubation, absorbance was noted at λ max 230 nm against blank solution. Ascorbic acid was used as standard.

The percentage of scavenging of H_2O_2 by extract was determined by using the following equation:

$$\text{Percent scavenge } (H_2O_2) = \frac{A_0 - A_1}{A_0} \times 100$$

Where,

A_0 is the absorbance of the control and
A_1 is the absorbance in the presence of the extract and standard.

2. Antioxidant activity by Folin–Ciocalteu method

- The total phenolic content was determined using spectroscopic method as described by Ainsworth et al.
- The reaction mixture was prepared by mixing 2 ml plant extracts (0.2 g/ml), 1 ml of 10% Folin–Ciocalteu's reagent dissolved in 30 ml of deionized water followed by the addition of 0.8 ml of 7.5% sodium carbonate solution.
- The mixture was mixed thoroughly and kept in the dark at room temperature for 2 hours. The blank solution was also prepared.
- The absorbance was recorded using spectrometer at 765 nm.
- All the analysis was repeated three times and the mean value of absorbance was obtained.
- Antioxidant activity by Folin–Ciocalteu was determined by extrapolating calibration line which was constructed by gallic acid solution.

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$$\text{Percent of activity} = \frac{A_0 - A_1}{A_0} \times 100$$

Where,
A_0 is the absorbance of the control and
A_1 is the absorbance in the presence of the extract and standard.

RESULTS AND DISCUSSION

Qualitative analysis of phytochemicals of screening of *Crocus sativus*

Qualitative analysis carried out on stigmas shown the presence or absence of phytochemical constituents and the results were summarized in Table 2.

Table 2*: Phytochemical screening of *Crocus sativus

CONSTITUENTS	ETHANOL 70%
Steroids	++
Terpenoids	+++
Tannins	+
Saponins	-
Alkaloids	-
Glycosides	+
Flavonoids	++
Phenols	+++

(+++), (++), (+) and (–) refer to high, moderate, low and absent amounts respectively.

It shows the presence of phytochemicals such as steroids, terpenoids, Tannins, glycosides, flavonoids and phenols present in ethanolic and water extracts, both alkaloids and saponins were absent in ethanol (70%) and water extract**.**

Chemical evaluation for crude drug of *Crocus sativus*

The average values for the chemical composition of Saffron were given in Table (3).

Table 3*: Proximate analysis of *Crocus sativus

Chemical Parameters	Proximate %
Moisture content (%)	8.50 ± 0.32
Ash value (%)	5.20 ± 0.15
Swelling index (%)	0.90 ± 0.04

Each value was expressed as the mean ± SD (n = 3).

The average values for the chemical composition of Saffron were found to be 5.20% ash, 8.50% moisture and 0.90% swelling index.

Qualitative analysis of phytochemicals screening of *Aloe vera*

Qualitative analysis carried out on *Aloe vera* showed their presence or absence of phytochemical constituents and the results were summarized in Table 4.

Table 4*: Phytochemical screening of *Aloe vera

Phytochemical constituents	Identification	Result
Alkaloids	Mayer's Test	-
	Hager's Test	-
	Wagner's Test	-
	Dragendroff's Test	-
Carbohydrates	Molisch's Test	+
	Barfoed's Test	+
	Benedict's Test	-
Glycosides	Bontrager's Test	-
Saponins	Frothing Test	+
Flavonoids	Shinoda's Test	-
	Lead Acetate Test	+
	Sulphuric Acid Test	-
Steroids	Salkowski's Test	+
Phenolic compound	Lead Acetate Test	+
	Ferric Chloride Test	+
Protein	Biuret Test	-
	Xanthoproteic Test	+
Fixed Oils and Fats	Saponification Test	-

(-) = Negative Result
(+) = Positive Result

In a preliminary phytochemical study *of Aloe vera* extracts, different qualitative tests were performed for some major groups of phytochemical constituents. In this analysis, *Aloe vera* extracts showed the presence of carbohydrates, saponins, flavonoids, steroids, protein, and phenolic compound and absence of glycosides, fixed oil and fats, alkaloids.

Evaluation of physicochemical parameter for herbal cream

1) Physical appearance

The Formulation prepared was evaluated for the Colour, odour and Consistency. The Colour of the cream was observed by visual examination which is Faint yellow in Colour. The Odour of cream was found to be pleasant. The State was cream was examined visually. The cream was semisolid in nature. The formulation was examined by rubbing cream on hand manually.

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***Table 5*: Evaluation of physical appearance.**

CHARACTERISTIC	F1	F2	F3	F4	F5
Colour	Faint Yellow	Faint Yellow	Faint Yellow	Faint Yellow	Faint Yellow
Odour	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
State	Semi Solid	Semi Solid	Semi Solid	Semi Solid	Semi Solid

2) Determination of pH

The pH balance of the product is important as it affects skin and surface on which there are used. The pH of our formulated face cream falls with the ideal pH range of the cream i.e., 4. 5 -5.5. The results were shown in Table- 6.

***Table 6*: Determination of pH.**

S.NO	Formulation	pH
01.	F1	5.9
02.	F2	5.2
03.	F3	6.8
04.	F4	4.4
05.	F5	5.5

4) Spreadability

Spreadability of Formulated cream was measured by placing sample in between two slides then compressed to uniform thickness by placing a definite weight for defined time. The specified time required to separate the two slides was measured as Spread ability. Lesser the time taken for separation of two slides results showed better Spread ability. Spread ability was calculated by the following formula. The value should be in between 9.0 to 31. 02g.cm/s. Result were shows in Table-7.

***Table 7*: Spreadability test.**

S.NO	Formulation	Results
01.	F1	23.6g.cm/s
02.	F2	15.16g.cm/s
03.	F3	35.1g.cm/s
04.	F4	27.9g.cm/s
05.	F5	31.4g.cm/s

5) Viscosity

Viscosity has an important role in explaining and controlling many attributes like shelf-life ability and product aesthetics such as clarity, ease of flow, on removal from packing and reading when applied to face. Viscosity of cream was done by using Brooke field viscometer at the temp of 25°C.using spindle no, 63.at rpm. Results were shown in Table 8.

***Table 8:* Viscosity test.**

S.NO	Formulation	Viscosity (Cps)
01.	F1	31867
02.	F2	24389
03.	F3	33771
04.	F4	32671
05.	F5	31951

6)Washability: Wash ability test was carried out by applying a small amount of cream on the hand and then washing it with help of tap water. Results were shown in Table-9.

***Table 9*: Washability test.**

S.NO	Formulation	Washability
01.	F1	Easily washable
02.	F2	Easily washable
03.	F3	Not Easily washable
04.	F4	Not Easily washable
05.	F5	Not Easily washable

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7) Greasiness

The greasiness of the herbal cream was evaluated by applying a small quantity of the formulation on the skin surface. The cream was gently spread and observed for the presence of oily or greasy residue. The formulation was assessed based on its ease of application and after-feel on the skin. Results were shown in Table-10.

***Table 10*: Greasiness test.**

S.NO	Formulation	Greasiness
01.	F1	Non-greasy
02.	F2	Non-greasy
03.	F3	Non-greasy
04.	F4	Non-greasy
05.	F5	Non-greasy

8) Stability Test

To assess the formulation stability, the stability studies were done. Each formulation was stored at 4°C room temperature and 40°C temperature for a month and observed for physical stability like colour. Results were shown in Table-11.

***Table 11*: Stability test.**

S.NO	Formulation	Stability
01.	F1	No separation
02.	F2	No separation
03.	F3	No separation
04.	F4	No separation
05.	F5	No separation

All five formulations were compared with commercial herbal face cream (Vj – john saffron face cream). Based on the physical parameters result and comparison study, F2 formulation was chosen as best formulation of facial gel. The antioxidant activity was carried out for F2 formulation by,

- Scavenging of Hydrogen peroxide radical assays.
- Antioxidant activity by Folin-Ciocalteu method.

Antioxidant Activity

1. Scavenging of hydrogen peroxide radical assays

The results of antioxidant activity of scavenging of hydrogen peroxide radical assays of *Crocus sativus* and *Aloe vera* herbal cream was given in table 12 and figure 3.

***Table 12:* Scavenging of H2O2 radical assay.**

S.NO	Concentration (µg/ml)	Control Absorbance	Absorbance 230nm	% Inhibition
1.	20	0.872	0.606	30.50
2.	40	0.872	0.508	41.74
3.	60	0.872	0.428	50.91
4.	80	0.872	0.336	61.46
5.	100	0.872	0.241	72.36
6.	Sample	0.872	0.230	73.62

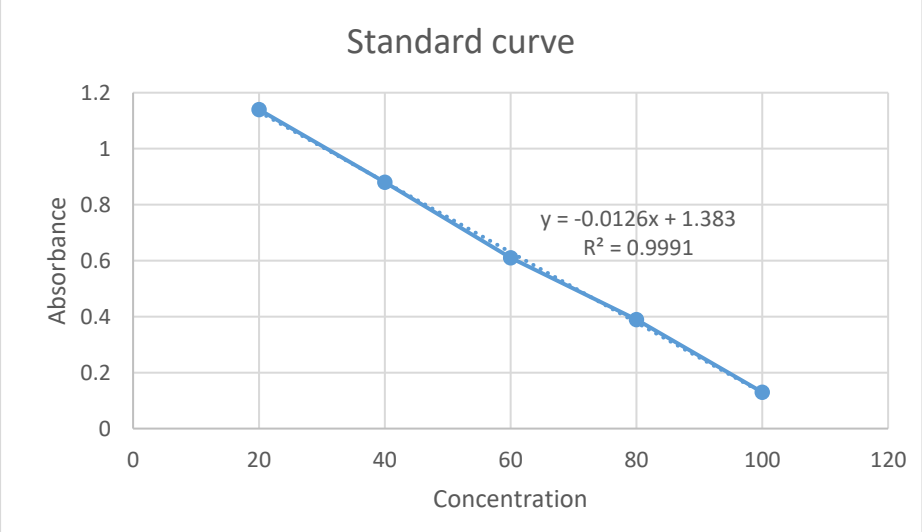

***Fig 3*: Scavenging of H2O2 radical assay.**

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2. Antioxidant activity by Folin-Ciocalteu method: The results of antioxidant activity by Folin-Ciocalteu of *Crocus sativus* and *Aloe vera* herbal cream was given in table 13 and figure 4.

***Table 13*: Antioxidant activity by Folin-Ciocalteu method.**

S.NO	Concentration (µg/ml)	Control Absorbance	Absorbance 765nm	% Inhibition
1.	20	1.247	1.14	8.58
2.	40	1.247	0.88	29.43
3.	60	1.247	0.61	51.08
4.	80	1.247	0.39	68.72
5.	100	1.247	0.13	89.57
6.	Sample	1.247	0.230	81.55

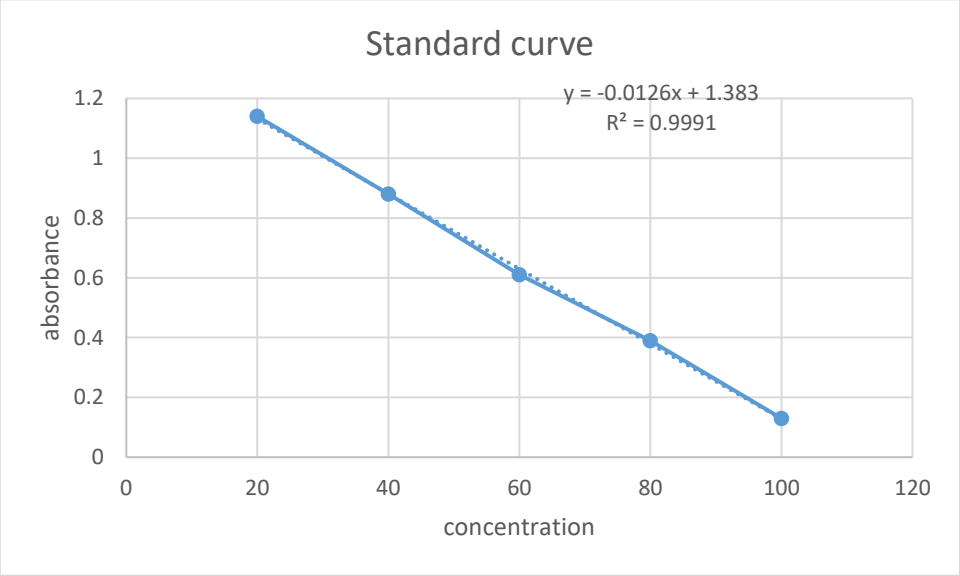

***Fig 4:* Antioxidant activity by Folin-Ciocalteu method.**

CONCLUSION

The present study confirms that the herbal cream containing *Crocus sativus* and *Aloe vera* exhibits significant antioxidant activity. The antioxidant potential is primarily attributed to the presence of bioactive compounds such as crocin, flavonoids, phenolics, and vitamins present in both extracts. *Crocus sativus* demonstrated strong free radical scavenging activity due to its rich carotenoid content, while *Aloe vera* contributed additional antioxidant and protective effects through its polyphenolic compounds.

The combined effect of these herbal ingredients enhanced the overall antioxidant capacity of the cream, indicating a synergistic action. The formulation effectively neutralizes free radicals, which are responsible for oxidative stress and premature skin aging. By reducing oxidative damage, the cream may help in preventing wrinkles, pigmentation, and skin dullness.

Therefore, the developed herbal cream can be considered a promising natural antioxidant formulation for skincare applications.

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