



# Preparation and Evaluation of Aloe-Vera and Vitamin E Anti-aging cream

Shailee V. Tiwari\*, Raturaj G. Hivrale, Kalyan S. Shinde, Mayur D. Pimple

Shri Ramkrishna Paramhans College of Pharmacy, Hasnapur, Parbhani, Maharashtra, India.

Corresponding Author mail ID: [shailee2010@gmail.com](mailto:shailee2010@gmail.com)

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## ABSTRACT

*Aging is a natural progressive process that leads to aesthetic and functional changes in the skin. Premature aging is also observed at young age around 20 due to pollution, cigarette smoke, sunlight, effects of an unhealthy lifestyle, insufficient nutritional intake, and prolonged illness. The aim of this research work is to formulate and evaluate an herbal antiaging face cream using Aloe-Vera and Vitamin E. Radical scavenging activity of prepared cream was studied using DPPH method and standard ascorbic acid was used. The evaluation test like, Organoleptic Test, pH, viscosity, spreadability, phase separation, homogeneity test, cream type, Draize test and ease to removal test were carried out. The stability study over three week was also executed.*

**Keywords:** Aging; antiaging; antioxidant; DPPH method; stability study.

## 1. INTRODUCTION

Aging can be natural or premature. Natural aging is a natural progressive process that leads to aesthetic and functional changes in the skin (1) promoted by a group of molecules known as radicals. Many cases of premature aging that transpire at a relatively young age of around 20 years. Premature aging may be seen because of the two factors namely internal factors and external factors. External factors include pollution, cigarette smoke, sunlight, and the effects of an unhealthy lifestyle. And internal factors, including genetics, insufficient nutritional intake, and prolonged illness and loss of supporting tissue under the skin (subcutaneous

tissue), stress, gravity, facial movements, obesity which can produce free radicals (2).

In normal conditions there is a balanced equilibrium existing between these radicals and the skin's natural antioxidants such as vitamin E, co-enzyme Q 10, ascorbates, and carotenoids (3). The excess generation of free radicals overwhelms the skins natural cellular antioxidants creating a condition which is known as oxidative stress. Oxidative stress leads to oxidative damage which manifest physically as aging, a process which can be effectively retarded by the use of antioxidants. Antioxidant neutralizes free radicals, unstable oxygen molecules that break down skin cells and cause wrinkles, thus preventing impairment at the

cellular level. They inhibit inflammation leading to collagen depletion and offer protection against photo damage and skin cancer. [4] It may also reduce the effect of trace, smoke and pollution. Some skin expert believes that direct application of antioxidant cream to the skin might slow down the aging process. [5] Now a day's antioxidant obtained from natural herbal source also have wide applications in preparation of cosmetic preparations because of their easy availability and non-toxicity. [6]

Aloe Vera (syn. *Aloe barbadensis* Mill... Fam. *Liliaceae*), also known as Barbados or *Curaçao Aloe*, has been used in traditional and folk medicines for thousands of years to treat and cure a variety of diseases. The Aloe Vera plant has been known and used for centuries for its health, beauty, medicinal and skin care properties (7). Today, the Aloe Vera plant has been used for various purposes in dermatology (8). Vitamin E combined with other antioxidants have shown improvement in periorbital fine lines, roughness, radiance, skin tone, elasticity, density, collagen production and overall appearance of skin. A combination of the two herbs as opposed to individual herbs may offer a synergistic activity. This study is therefore designed to formulate a polyherbal face cream that would serve as an antioxidant that will not only prevent the skin from the effects of reactive oxygen and free radicals but promote an overall healthy skin condition regardless of age.

## 2. MATERIALS AND METHODS

### Materials

Aloe Vera leaves were procured from Sardespande nursery, Parbhani India. Other chemicals used in research were obtained from College Research Laboratory. All chemicals and reagents used were of analytical grade.

### Extraction process of Aloe-Vera

A few Aloe Vera leaves from an Aloe Vera (*Barbadensis Miller*) plant were collected and washed with water thoroughly. A sharp knife was taken and carefully peeled off the yellow layer just beneath the green rind avoiding the vascular bundles and the top rind was removed. The bottom rind was similarly removed to discard the significant amount of mucilage which gets attached onto this. The clear mucilaginous gel was scooped out with a spoon. 50 ml crude clear Aloe Vera

extract was mixed uniformly by using magnetic stirrer and the plant extract was filtered through a whatman filter paper. Finally, it was transferred into a sterilized, clean glass jar and stored in the refrigerator.

### Formulation of Cream

Ingredients used in the preparation of cream are mentioned in Table 1. The cream was prepared by emulsification method.

### Preparation of Anti-Aging Cream

Borax is dissolved in hot water (about 70°C) in a beaker. White bees wax is melted with liquid paraffin together in another beaker on water bath (about 70°C). Borax solution is poured into the molten wax at same temperature (about 70°C) with Constant stirring. Vitamin E is added into the molten wax. Dissolve herbal Aloe-Vera extract in aqueous phase. Mass is stirred continuously until cold. Cream should be filled in a wide mouth container and labeled.

**Table 1.** Formulation of Cream

EXCIPIENTS	FORMULA A	FORMULA B	FORMULA C	FUNCTIONS
White Beeswax	10 gm.	20 gm.	30 gm.	Thickeners, emulsifiers, and stiffening agents in cosmetics.
Liquid paraffin	40 gm.	50 gm.	60 gm.	Waterproofing, paraffin is naturally water resistant.
Borax	1 gm.	2 gm.	3 gm.	To provide fine particles to polish.
Water	5 ml	10 ml	20 ml.	Universal constant.
Aloe Vera	1 gm.	2 gm.	3 gm.	Treat skin problems (wound, burns and anti-inflammatory processes).
Vitamin E	1 ml.	2 ml.	3 ml.	Treat skin problems.

### Evaluation of Cream

The three formulations of cream were subjected to various evaluation tests.

**1. Organoleptic Test:** The organoleptic test was observed visually by observing changes in smell, and color in the cream preparations that had been made. Organoleptic testing aims to determine the

organoleptic preparation which includes color and aroma according to the extract used (9).

**2. Determination of pH:** The pH of the cream can be measured on a standard digital pH meter at room temperature by taking adequate amount of the formulation diluted with a suitable solvent in a suitable beaker (10).

**3. Spreadability:** The spreadability was expressed in terms of time in seconds taken by two slides to slip off from the cream placed in between the slides, under certain load. Lesser the time taken for separation of the two slides better the spreadability. Two glass slides of standard dimension were taken. Then one slide of suitable dimension was taken and the cream formulation was placed on that slide. Then the other slide was placed on top of the formulation. Then a weight or certain load was placed on the upper slide so that the cream between the two slides was pressed uniformly to form a thin layer. Then the weight was removed and excess of formulation adhering to the slides was scrapped off. The upper slide was allowed to slip off freely by the force of the weight tied on it (11). The time taken by the upper slide to slip off was noted. Spreadability can be expressed as,

$$S = m \cdot l / t$$

Where, m weight applied to upper slide.

l = length moved on the glass slide.

t = time taken.

**4. Viscosity:** Viscosity of formulated creams can be determined by using Brookfield Viscometer (12).

**5. Phase separation:** Prepared cream was kept in a closed container at room temperature, away from light. Then phase separation was checked for 24 h for 30 d. Any change in the phase separation was observed/checked (13).

**6. Homogeneity:** The formulation was tested for the homogeneity by visual appearance and by touch (14).

**7. Removal:** The ease of removal of the creams applied was examined by washing the applied part with tap water (14).

### 8. Cream Type Test

A number of cream preparations are placed on a glass object, then add 1 drop of methylene blue, stir with a stirring rod. If methylene blue is spread evenly, it means that the type of cream produced is oil in water (O/W), whereas if blue spots appear, the cream produced is water in oil (W/O) type (14).

**9. After feel:** Emolliency, slipperiness and amount of residue left after the application of fixed amount of the cream was checked and its phot is added below (14).

**10. Skin sensitivity test (Draize test):** A fixed amount of cream was applied on intact skin of three human volunteers and left for 24h. The applied part of the skin was observed for any adverse reactions. Physical indications such as redness, inflammation, swelling, or a rash were observed for and noted (15).

**11. Stability Study:** The stability study at room temperature was determined for the period of 3 week. The tests were studied was color, sudden viscosity change, feel properties and emulsion stability (16-18).

**12. Antioxidant activity:** Antioxidants play an important role in the field of pharmacy. Free radicals have a key role in cancer, cardiovascular and auto-immune illnesses, as well as aging-related issues, leading to new medical approaches

The scavenging capacity of the cream was tested using the previously reported DPPH (1,1-diphenyl-2-picrylhydrazyl) technique. The radical scavenging assay of the formulations against 1,1 diphenyl-1-picryl 1 hydrazyl (DPPH) radical via UV absorbance at 517nm was done, utilizing ascorbic acid as standard and ethanol as control. Cream (100 mg) was extracted using absolute ethanol in a separating funnel. To an ethanolic solution of DPPH (100mmol/L, 2ml), 2ml of the test sample dissolved in ethanol was added at different concentrations (5-25mg/ml). Absorbance was recorded at 517 nm at 30 min (19, 20). The scavenging activity was calculated.

% Scavenging activity = [(Absorbance 517control - Absorbance 517sample) / Absorbance 517control] × 100.  
Ascorbic acid was used as a standard.

## 3. RESULTS AND DISCUSSION

### Evaluation Test

#### 1. Organoleptic Test

The organoleptic test was observed visually by observing changes in smell, and color in the cream preparations that had been made. Organoleptic testing aims to determine the organoleptic preparation which includes color and aroma according to the extract used.

The organoleptic observations showed that the three formulas had a semisolid dosage form in the form of cream and had a pleasant odor and white color as shown in table 2

**Table 2** Organoleptic test results for cream preparations

Formulas code	Color	Form	Smell	Texture
A	White	Semisolid	Pleasant	Smooth
B	White	Semisolid	Pleasant	Smooth
C	White	Semisolid	Pleasant	Smooth



**Figure 1** All the three Formulas A, B and C.

**2. Determination of pH:** Normal, healthy skin has a pH of 5.5 which is slightly acidic and Sebamed products also have a pH of 5.5. pH 5.5 leads to soft and smooth skin, aids in skin renewal and imparts a healthy glow to the skin and guards skin from infections. A pH value that is too low can cause irritation, while a pH value that is too high can cause scaly skin.

The results of pH are as reported in table 3. The pH of the formulas ranged from 4.86 to 5.30, close enough to the pH of the epidermal layer. This shows that the pH value of the cream preparations is still in the range that is allowed for use on the skin.

**Table 3** Evaluation of pH

Formulas code	pH
A	4.86
B	4.99
C	5.30

**3. Spreadability:** Spreadability test aims to determine the area of the preparation that can be spread and evenly distributed when used. Good spreading power is having a diameter of 5-7 cm. the greater the spreadability given, the ability of the active substance to spread and contact with the skin is wider. From

the results of the spreadability test as shown in table 4 on each formula showed that they had good spreadability. Among all the three formulations, for C the time taken by the two slides to separate is less so as said in the description of the evaluation test, lesser the time taken for separation of the two slides better the spreadability. So, according to this statement C showed desired Spreadability than A and B as shown in table 4

**Table 4** Spreadability observation table

Formulas code	Time (sec)	Spreadability (gcm/sec)
A	18	7.2
B	15	7.3
C	10	6.0

**Calculation of Spreadability test**

$$S = m \cdot l / t$$

Where, m weight applied to upper slide.

l= length moved on the glass slide.

t= time taken.

**4. Viscosity:** Viscosity of cream was done by using Brookfield viscometer at a temperature 25 °C using spindle No. 1 at 20 RPM. According to the results as shown in table 5, the viscosity of the cream was in the range of 544-618 Cps.

**Table 5** Viscosity observation table

Formulas code	Viscosity (Cps)
A	544
B	557
C	618

**5. Phase separation:** Prepared cream was kept in a closed container at room temperature, away from light. Then phase separation was checked for 24 h for 30 d. According to the results as shown in table 6, no phase separation was observed in all three formulations.

**Table 6** Phase separation observation table

Formulas code	Phase separation
A	No phase separation
B	No phase separation
C	No phase separation

**6. Homogeneity Test:** Based on the homogeneity test results , it shows that the four cream formulas have a homogeneous composition and there are no coarse grains when the preparations are smeared on glass objects. This is in accordance with the requirements for homogeneity of the cream, namely the cream is

said to be homogeneous if there is an even color equation and no particles are found in the cream. This homogeneity test aims to see and know the mixing of the cream preparation ingredients.

All the three formulas have shown homogeneity with no coarse particles in cream.

**7. Removal:** All the three formulas have shown ease to remove the cream by using water as solvent for washing.



**Figure 2** Removal of cream after application.

**8. Cream Type Test:** Cream type testing was carried out to determine the emulsion type of the cream preparation that had been made. If methylene blue is spread evenly, it means that the type of cream produced is oil in water (O/W), whereas if blue spots appear, the cream produced is water in oil (W/O). The results obtained show that all cream formulations are O/W cream type which is characterized by the even distribution of methylene blue in the cream without any spots forming. The reason for choosing this type of oil-in-water (O/W) cream is because it is easier to spread evenly on the surface of the skin, is not sticky and is easily removed when washed with water compared to the water-in-oil (W/O) cream type. Table 7 shows the type of emulsion prepared.

**Table 7** Emulsion test observation table

Formulas code	Cream Type Test
A	O/W
B	O/W
C	O/W

**9. After feel:** After applying the cream the skin felt cool and no irritation.



**Figure 3** After feel effect.

**10. Skin sensitivity test (Draize test):** The results of the Draize test for sensitivity demonstrated that the three formulations were safe and skin irritation and allergic sensitization were absent. All formulations showed no redness, edema, inflammation and irritation during application as reported in table 8.

**Table 8** Skin sensitivity test (Draize test)

Formulas code	Skin irritation	Redness	Inflammation
A	No	No	No
B	No	No	No
C	No	No	No



**Figure 4** Skin sensitivity test

**11. Stability Study:** After 3 week stability study at room temperature all the cream formulations were stable upto

2 week. Afterwards slight change in viscosity and feel was found with formulation A and B respectively. It might be due to less concentration of white bees wax in formula A and B compared to formula C. In 3<sup>rd</sup> week only formula C was found to be stable with white color, smooth feel and a very specific pH and viscosity. Hence, for the preparation of our herbal antioxidant face cream we considered formula C as optimized batch. This may be due to appropriate concentration of white bees wax. The results of stability study are presented in detail in table 9.



**Table 9** Stability Study of Base Formulation

Formulas code	Color	Sudden Viscosity Change	Feel	pH	Emulsion stability
		<b>After 1 Week</b>			
A	White	No change	Smooth	4.86	Emulsion Stable
B	White	No change	Smooth	4.99	Emulsion Stable
C	White	No change	Smooth	5.30	Emulsion Stable
		<b>After 2 Weeks</b>			
A	White	Slight change	Smooth	4.06	Emulsion Stable
B	White	Slight change	Smooth	4.11	Emulsion Stable
C	White	No change	Smooth	5.30	Emulsion Stable
		<b>After 3 Weeks</b>			
A	Yellowish white	Change	Tacky	4.06	Emulsion breaks
B	White	Change	Tacky	4.11	Emulsion breaks
C	White	No change	Smooth	5.32	Emulsion Stable

After the evaluation test study and stability study it was concluded that formula C was considered to be best for preparation of cream. The effect of Stability Study on Formula A and B shows instability and emulsion breaks as shown in figure 5

**Figure 5** Stability Study effect after three weeks on Formula A and B shows instability and emulsion breaks.

Formula C is finally selected as one of the best formula for the preparation of cream depending upon the results of evaluation test.

#### 4. CONCLUSION

Herbal face cream formulation containing Aloe Vera and vitamin E were successfully prepared. Aloe Vera and vitamin E, known for their antioxidant and moisturizing properties, contribute to the cream's effectiveness in reducing the signs of aging, such as fine lines, wrinkles, and skin dullness. The cream's formulation with Aloe Vera helps to hydrate and nourish the skin, improving its elasticity and overall texture. Vitamin E further enhances moisturization and promotes skin repair. The presence of vitamin E in the cream provides antioxidant protection against free radicals, which can accelerate the aging process and cause skin damage. Evaluation test results of the Aloe Vera and vitamin E anti-aging cream have shown promising results. The herbal antioxidant creams were white in color, with pH within the limits compatible with stratum corneum. Formula C was seen to be stable over a three weeks period in stability study. Formula C had the highest antioxidant activity comparable when compared with Formula A and B. A combination of the Aloe Vera and vitamin E extracts confers a synergistic activity that potentially creates a strong antioxidant activity useful for regression of age related macular degeneration. Overall, this research highlights the potential of natural ingredients like Aloe Vera and vitamin E in skincare formulations aimed at combating aging. This herbal

cream formulation can be further developed and translated to a marketed formulation for commercial use.

### Conflict of interest statement

Authors declare that they do not have any conflict of interest.

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