

DEVELOPMENT AND EVALUATION ANTI AGING MULTI HERBAL CREAM

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Abstract—According to research, cellular DNA damage and protein ageing generate a constant deteriorating process in the skin. The major goal of this project is to create a herbal anti-aging cream with all-natural components. Pomegranate, curcuma longa, amla, hibiscus, green tea, vitamin E, coconut oil, olive oil, aloe vera, basil oil, and mint oil are among the natural constituents. Natural ingredients are used in the formulation of oil-based creams. The creams were made in the F1 through F4 concentration range. The creams met ICH standards for stability during stability studies. $30 \pm 20\text{C} / 45 \pm 5\% \text{RH}$ and $40 \pm 20\text{C} / 75 \pm 5\% \text{RH}$ were utilised for a month. It is evident that multi-herbal creams are advantageous, having a variety of benefits, good spreadability, and low irritancy

Keywords— Anti aging, Natural ingredients, Oil base cream, Multi purpose.

I. INTRODUCTION

We use a range of cosmetics to tone up our skin and minimise wrinkles, blackheads, acne, pimples, and other indicators of ageing since we all want to seem young and appealing. [1] Damage to cellular DNA and proteins is the main cause of the deterioration process that results in ageing skin. Sequential skin ageing and photoaging are the two types of skin ageing.

Sequential ageing of the skin is a universal and predictable process because it alters the skin's physiological characteristics and function. Dry, pale skin and wrinkles are the result of the stratum corneum delaying the production of neutral lipids during the ageing process because there is insufficient keratinocyte synthesis in the skin layer. On the other hand, excessive UV exposure results in photoaging. Elasticosis and heliodermatitis, together with a random mixture of dermal and epidermal sections, are the causes of photoaging, which is marked by dry, pale skin, shallow skin, fine wrinkles, and deep furrows.

In addition to protecting skin from external and internal pollutants, cosmetics are used to improve the appearance and allure of skin. Cosmetics are used not only for development but also for treating a range of skin diseases and giving us a nice appearance on the outside. By reducing type I collagen and offering UV protection, natural chemicals in skin formulations preserve skin elasticity while also improving the skin's health, texture, and moisture content. Longer skin protection is made possible by natural ingredients in cosmetic preparations, which help to inhibit the production of free radicals in the skin. Using cosmetic products with

natural ingredients is the best option for minimising skin problems like wrinkles, hyperpigmentation, rough skin texture, acne, and skin tanning.

The market for herbal cosmetics is growing quickly despite the availability of numerous synthetic cosmetics that are just as effective but have a number of unfavourable side effects that have consumers worried about their health. [2]

II. MATERIALS AND METHODS

Preparation of Aloe vera extract

An aloe vera leaf was cleaned with tap water and then weighed. It was crucial to avoid tearing the rind since the fillet could become contaminated by the aloe vera leaf exudates. Aloe leaves were prepared by hand using the conventional filleting technique. The bottom portion of the leaf base, the tapering tip at the leafy top, and the tiny spines along the leaf border are removed with sharp blades. After that, the top rind was cut off and the vascular bundles were eliminated by inserting the blade beneath the green rind in the mucilage layer. After the parenchymatous tissue was collected and the aloe vera leaf skin was scraped off, the clear, dense mucilaginous gel was sliced into pieces. After that, the gel was broken up and lyophilized. Subsequently, the lyophilized gel powder is put into a soxhlet device and extracted using 90% ethanol for four hours at 90°C. A rotary evaporator is used to screen and concentrate the extract-containing ethanol before it is kept in storage at 90°C. [3]

Preparation of Curcuma longa extract

Rhizomes of turmeric were collected and thoroughly cleaned throughout this procedure. The drying and grinding were then finished. Because size influences the amount of bioactive compounds that migrate from the source into the solvent during processing—the smaller the size, the more bioactive components migrate from the origin to the solvent—drying and size reduction are necessary steps in the processing process. Extraction and Purification: Next, an extraction procedure is applied to the ground samples. The most popular method for extracting curcumin is the traditional procedure because to its low operating cost and simplicity of handling. Across the various extraction processes, the reflux approach of turmeric powder with dichloromethane produced a higher extraction efficiency, ranging from 81.81 to 86.36%. However, as a green extraction method, the sub-critical water extraction approach increases extraction efficiency to 76% when compared to other existing extraction procedures. Identification and measurement: The most reliable method used to describe curcumin was HPLC with a column C18 of different lengths (100–250 mm), inner lengths (2.1–4.6 mm), and particle diameter (0.45–5 m). With a maximal separation capacity, high performance liquid chromatography (HPLC) is a sophisticated technology. Additionally, the samples were scanned using a range of modalities. The comparison of the observed MS/MS spectra was the primary method for determining the bioactive compounds.

Formulation of Cream (25 gm)

The formula in the table served as the basis for the formulation studies. Azadiractaindica, Curcuma longa, pomegranate, Aloe vera, Vitamin E, Amla oil, Green tea oil, Coconut oil, Hibiscus oil, Olive oil, Tulsi oil, and Mint oil are all used in the composition.

- In a borosilicate glass beaker, place the beeswax and keep it heated to 70°C.
- Continue stirring while adding the other ingredients one at a time.
- Mix the mint oil and then add it right before pouring the formulation into a container that is adequate.
- After mixing the mint oil, fill the container and let it cool.

Ingredients	F1	F2	F3	F4
Aloe-Vera ext.	1	2	3	4
Pomegranate oil	1	1	1	1
Curcuma Longa ext.	2	2	2	2
Vitamin E oil	2	2	2	2
Olive oil	1	1	1	1
Amla oil	1	1	1	1
Hibiscus oil	2	2	2	2
Tulsi oil	1	1	1	1
Green tea oil	1	2	3	4
Mint oil	1	1	1	1
Coconut oil	2	2	2	2
Bees wax	Qs.	Qs.	Qs.	Qs.

III. HERBAL INGREDIENTS USED IN ANTI-AGING FACE CARE

1. Hibiscus:^[4-6]

Botanical Name – Hibiscus rosa

Family – Malvaceae

Chemical Constituents – Tannins, Anthraquinones, Quinines, Phenols, Flavanoides, Alkaloids, Terpenoids, Saponins, Cardiac glycosides, Protein, free amino acids, Carbohydrates, Reducing sugars, Mucilage, Essential oils and steroids.

Uses - Anti-aging, Wound healing,

2. Curcuma longa:^[7-11]

Botanical Name – Curcuma longa

Family – [Zingiberaceae](#)

Chemical Constituents – Curcumin, Carbohydrates, Essential Oil, Demethoxycurcumin, fats, dietary fibers, proteins, bisdemethoxycurcumin

Uses - Heal wounds, Brighten dark circle, Treat inflammation, Treats eczema & psoriasis, Reduce acne scarring

3. Green tea:^[12]

Botanical Name – Camellia Sinensis

Family – Theales

Chemical Constituents – Vit. (B, C & E), Enzymes & peptides, Glucose, sucrose, fructose, pectin and cellulose, Caffeine, Theophylline, Chlorophyll, Carotenoids.

Uses - Catechins help in anti-aging, Prevent skin redness

4. Amla:^[13 14 15]

Botanical Name – Phyllanthusembilca

Family – Euphorbiaceae

Chemical Constituents – tannins, alkaloids, phenols, proteins, fats, calcium, nicotinic acid, fibres, iron, mineral matter, phosphorous, vitamin C, carbohydrate.

Uses - anti-inflammatory, free radicals .

5. Olive Oil:^[16 17 18]

Botanical Name – E. Oleaster

Family – Oleaceae

Chemical Constituents – Triglycerides, Di and mono glycerides, hydrocarbons, Pigments, sterols, polyphenols, tocopherols, volatile compounds, triterpene acid.

Uses - anti-aging antioxidant, healing of injured skin tissues, It revitalises and enhances the tonicity of the skin, It help to remove sun tan.

6. Vitamin-E :^[19 20 21 22]

Since plants are the primary source of vitamin E, food is a crucial means of obtaining this vitamin. The finest sources are almonds, spinach, whole grains, sunflower oil, and olive oil.

IUPAC Name - (2*R*)-2,5,7,8-Tetramethyl-2-[(4*R*,8*R*)-4,8,12-trimethyltridecyl]-3,4-dihydrochromen-6-ol

Mol. Formula - C₂₉H₅₀O₂

Mol. Weight - 430.7 g mol⁻¹

Uses - Fine lines and wrinkles are prevented. Applied to skin to moisturise it, It guards against sunburn. Participate in the healing of wounds, helpful in preventing skin cancer, relieve the dry skin's itching It also takes care of psoriasis and eczema.

7. Piper Mint:^[23 24]

Family: Labiatae

Botanical name: Menthapipertia L

Chemical constituents: Menthol, Menthone, Menthyl acetate, Menthofuran, 1,8-cineol, Limonene, Pilegone, Caryophyllene, Pinene, Eriocitrin, Hesperidin

Uses: It reduces pimples, cools skin and scalp, stimulates blood flow, regulates sebum and anti-inflammatory effect.

8. Pomegranate:^[25 26 27]

Family: Lythraceae

Botanical name: PunicaGranatum

Chemical Constituents: Anthocyanins, Quercetin, Gallic acid, Asistic acid, Rutin, Punicicacid, Flavones, Punicalin.

Uses: It provides relaxing effects on the skin, improves skin tone, and anti-aging qualities. It is excellent for sun bunnies, giving them a vibrant, new look. It leaves the skin feeling hydrated..

9. Aloe Vera:^[27]

Family: Liliaceae

Botanical Name: Aloe barbadensis miller

Chemical Constituents & Active Components: **Vitamins** – Vit-A,C,E,B1, B2,B6 and B12, **Enzymes** – Aliase, amylase, oxidase, catalase, lipase, **Minerals** – Calcium, copper, potassium selenium, chromium, **Sugars** – Glucose, polymannose, alprogen., **Organic Acids** – salicylic acid sorbate, **Anthraquinones** -Aloin, anthranol, emodin. **Fatty acids & Steroids** – Beta-sisosterol, Lupeol, cholesterol, **Non-essential aminoacids**– Arginine, glycine, alanine, **Essential aminoacids** – Methionine, leucine, lysine, **Hormones** –Auxins, Gibberellin.

Uses: Anti aging, Anti fungal, Anti oxidant, Wound healing, Anti inflammatory, moisturize the skin.

10. Coconut Oil:^[28]

Family: [Arecaceae](#)

Botanical Name: Cocosnucifera (L.)

Chemical Constituents: Saturated fats ; Lauric acid (45% to 52%), Myristic acid (16% to 21%), Palmitic acid (7% to 10%), Caprylic acid (5% to 10%), Capric acid (4% to 8%), Stearic acid (2% to 4%), Caproic acid (0.5% to 1%), Palmitoleic acid (in traces)

Unsaturated fats: Oleic acid (5% to 8%), Linoleic acid (1% to 3%), Linolenic acid (up to 0.2%)

Uses:Wound healing, Antioxidant, Dermatitis, Anti-fungal, Anti inflammatory

11.Tulsi.^[29 30]

Family: Lamiaceae

Botanical Name: Ocimum sanctum

Chemical Constituents & Active

Components:Eugenol, methyl eugenol, carvacrol, sesquiterpine hydrocarbon caryophyllene, cirsilineol, rosameric acid, isothymusin, curcimaritin, apigenin.

Uses:Take action to prevent ageing, completely cleanses the skin When used to treat acne, aids in skin tone lightning It possesses antiviral, antifungal, antibacterial, antitubercular, and antimalarial properties.

IV. OPTIMIZATION OF BASE FORMULATION

- Physical evaluation of preparation**

Every basic formulation's look, consistency, colour, and smell were evaluated visually. In order to choose the most stable basic formulation, evaluate as + Poor, ++ Good, and +++ Better.

S.N	Parameter	F1	F2	F3	F4
1	Appearance	++	+	++	+++
2	Consistency	++	++	+++	+++
3	Odour	++	+	++	++

Abbreviation: Poor = +, Good = ++, Better = +++

Discussion: Based on the preceding table, it was observed that the formulation F4 has no changes in color, consistency, or odour.

- Determination of pH**

Apperatus include a beaker, a pH metre, a stirrer, and a wash bottle.

Procedure: The pH meter's calibration was done using a standard buffer solution. After weighing 0.5 g of the cream and mixing it with 50 ml of distilled water, the pH of the mixture was measured at 27 °C. The pH meter's calibration was done using a standard buffer solution. After weighing 0.5 g of the cream and mixing it with 50 ml of distil water, the pH of the mixture was measured at 27 °C.

S.No	Days	Formulation			
		F1	F2	F3	F4
1	Initial Days	6.0	6.2	6.5	6.5
2	7 days	6.1	6.3	6.3	6.5
3	15 Days	6.3	6.4	6.0	6.4
4	21 Days	6.2	6.5	6.5	6.5
5	30 Days	6.4	6.3	6.4	6.4

Discussion: The formulations F1, F2, F3, F4, and all others have the required pH based on the results. (The ideal pH range is between 5.5 and 7.5.)

- Determination of viscosity**

Brookfield viscometer, beaker, thermometer, and wash bottle are some of the **apparatus** used.

Procedure: Each formula's 100 gm sample was weighed, then moved to a beaker to be tested for viscosity using a Brookfield Viscometer (DV II+ Pro model) with spindle number S64 at 20 rpm and 25 °C.

Discussion: Among the three formulations examined (F1, F2, and F3), F4 had the most stable and sufficient viscosity, according to the previously mentioned data.

S. N	Days	Formulation			
		F1	F2	F3	F4
1	Initial Days	21650 cps	22790 cps	23760 cps	25480 cps
2	7 days	23415 cps	25340 cps	25470 cps	27140 cps
3	15 Days	24488 cps	27255 cps	27383 cps	27005 cps
4	21 Days	25683 cps	28160 cps	28260 cps	26115 cps
5	30 Days	25390 cps	29280 cps	29340 cps	27220 cps

• **Spreadability test**

Parameter	Formulation			
	F1	F2	F3	F4
Spreadability	25.23 ± 0.5	23.37 ± 0.5	22.15 ± 0.5	21.93 ± 0.5

Discussion Based on the findings, the formulation BF4 had better Spreadability over BF1, BF2, and BF3.

• **Determination of Thermal Stability**

Parameter	Formulation			
	F1	F2	F3	F4
Thermal Stability	Oil not Separate	Oil not Separate	Oil not Separate	Oil not Separate

Discussion: As seen above, the formulations F1, F3, and F4 showed no oil separation, however F2 did.

• **Stability study**

- The aforementioned observation indicates that the formulation F4 is stable at room temperature. The F1, F2, and BF3 formulas had different feels.

- The following results showed that Batch No. F4 of cream base satisfies all requirements specified by the Indian standard for cream. Consequently, the trial number F4 is selected to serve as the basis for further investigation

Formulation	Physical Characteristic		
	Color	Sudden Viscosity Change	Feel
Initial Days			
F1	White	No Change	Smooth
F2	White	Change	Smooth
F3	White	No Change	Smooth
F4	White	No Change	Smooth
After 1 week			
F1	White	No Change	Tacki
F2	White	Change	Smooth
F3	White	No Change	Smooth
F4	White	No Change	Smooth
After 2 weeks			
F1	White	No Change	Tacki
F2	White	Change	Smooth
F3	White	No Change	Tacki
F4	White	No Change	Smooth
After 3 weeks			
F1	White	No Change	Tacki
F2	White	Change	Smooth
F3	White	No Change	Smooth
F4	White	No Change	Smooth

V. EVALUATION OF ANTI-AGING HERBAL SKIN CREAM

a) Physical evaluation of the formulation :

The compositions were visually assessed for colour, appearance, and odour.

b) Measurement of pH :

The pH was measured using a pH metre, which was calibrated prior to each use using standardised buffer solutions at pH 4, 7, and 9.

The electrode was inserted into the sample ten minutes prior to the measurement, at room temperature.

c) Viscosity

The viscosity of the compositions was measured using a Brookfield viscometer (DV-I PRIME, USA). Three different rotational speeds of 0.3, 0.6, and 1.5 rotations per minute were applied to the gels. The viscosity of the gel was determined by multiplying the dial reading that matched by the coefficient given in the Brookfield Viscometer manual.

d) Spreadability

The number of seconds it takes for two slides to slide off the gel when they are positioned between each other and subjected to a specific force. In order to compress the excess sample to a uniform thickness, it was placed between the two glass slides and subjected to a specific amount of stress. After adding a 70-gram weight, the time it took to tell two slides apart was noted. The probability calculation formula was applied.

$$S = M.L / T$$

where M is the weight attached to the top slide, L is the length of the glass slides, and T is the time it took to split the slides.

e) Stability

Drug product stability testing starts with the development of new drugs and ends with the chemical or commercial product being destroyed. According to ICH guidelines, stability tests were conducted to evaluate the drug's and formulation's stability. The ICH guidelines were followed when conducting the stability testing. The cream was put into a bottle and kept for three months at 40

2°C and 75 % relative humidity in a humidity chamber. At the end of the studies, the samples' physical qualities, pH, and viscosity were assessed.

Measure out 10 grammes of the substance precisely, then dissolve it in 50 millilitres of solvent ether and alcohol. Attach the flask to a reflux condenser and heat it gradually until the sample dissolves completely. After 30 seconds of shaking, add 1 millilitre of phenolphthalein and titrate with 0.1N NaOH until a light pink hue develops.

$$n \cdot 5.61/w = \text{acid value}$$

$$n = \text{amount of ml of NaOH necessary}$$

The weight of the material is denoted by the letter w.

g) Saponification value

Introduce roughly 2 gm of material, refluxed for 30 minutes by 25 ml of 0.5 N alc KOH, 1 ml of phenolphthalein, and titrated with 0.5 N HCL immediately.

$$\text{Saponification value} = (b-a) \cdot 28.05/w$$

$$\text{The volume in ml of titrant} = a$$

$$\text{The volume in ml of titrate} = b$$

$$\text{The weight of substance in gm} = w$$

h) Irritancy test

Draw a 1-sq-cm area on the dorsal side of the left hand. The cream was then applied to the specified area, and the amount of time was noted. Up to 24 hours, erythema, edoema, and irritation were measured and reported on a recurring basis.

i) Microbial growth test

The designed cream was inoculated on Muller Hinton agar media plates using the streak plate technique, and the cream was removed to create a control. The samples were stored in the incubator and warmed to 37 degrees Celsius for the entire night. The plates were taken out of the incubation period soon after, and the microbial growth was measured by comparing them to the control.

VI. RESULT AND DISCUSSION

➤ **Determination of pH:**

Sr No	Days	Formulation			
		F1	F2	F3	F4
1	Initial Days	6.0	6.2	6.5	6.5
2	7 days	6.1	6.3	6.3	6.5
3	15 Days	6.3	6.4	6.0	6.4
4	21 Days	6.2	6.5	6.5	6.5
5	30 Days	6.4	6.3	6.4	6.4

Discussion:- The pH test was run on the base formulation for 30 days. The pH of the cream was found to be between 5.6 and 6.8, which is the perfect range for the pH of skin. Although the pH of formulations F1, F2, and F3 changed over time, all of the cream formulations had a pH that was closer to what the skin needed. Formulation F4 has a constant pH.

Determination of Viscosity:

S. No	Days	Formulation			
		F1	F2	F3	F4
1	Initial Days	21650 cps	22790 cps	23760 cps	25480 cps

2	7 days	23415 cps	25340 cps	25470 cps	27140 cps
3	15 Days	24488 cps	27255 cps	27383 cps	27005 cps
4	21 Days	25683 cps	28160 cps	28260 cps	26115 cps
5	30 Days	25390 cps	29280 cps	29340 cps	27220 cps

Discussion: There was a 30-day viscosity test for the Active Base Formulation. Because of the active ingredient, formulas F1, F2, and F3 were slightly more viscous than formula F4, while formula F4 had a consistency more like cream.

Acid Value and saponification value

	F1	F2	F3	F4
Acid Value	6.3	5.4	5.5	6.1
Saponification	27.0	27.5	26.8	26.2

Discussion: Based on the results, the formulations F1, F3, and F4 have the desired acid and saponification values.

➤ **Irritancy test**

Formulation	Irritant Effect	erythema	Edema
F1	No	No	No
F2	No	No	No
F3	No	No	No
F4	No	No	No

Discussion: All formulations show no signs of redness, edoema, inflammation, or irritation during irritancy studies. Applying these items to the skin is safe.

➤ **Spreadability test**

Parameter	Formulation			
	F1	F2	F3	F4
Spreadability	25.23 ± 0.5	23.37 ± 0.5	22.15 ± 0.5	21.93 ± 0.5

Discussion: Based on the results, the formulations F3 and F4 have good spreadability.

➤ **Accelerated stability testing**

S. No	Evaluation Parameter	F4	F4
		Room Temperature	Accelerated condition(45°C)
1	Appearance	Excellent	Excellent
2	Color	Light Brown	Light Brown
3	pH	6.4	6.7
4	Consistency	Soft and Semisolid	Soft and Semisolid
5	Viscosity	25880 cps	25915 cps
6	Spreadability	Good	Good
7	Washability	Good	Good
8	Irritency Test	Irritation was not observed	Irritation was not observed

Discussion: Based on the results, the F4 formulation is stable at room temperature and at accelerated conditions.

➤ **Microbial growth test**

Discussion: After a 24-hour incubation period at 37°C, there were no indicators of microbial development, which was comparable to the control.

DISCUSSION

- In Indian traditional medicine and ayurvedic preparation, ingredients like Azadiractaindica, Curcuma longa, pomegranate, Aloe vera, Vitamin E, Amla Oil, Green Tea Oil, Coconut Oil, Hibiscus Oil, Olive Oil, Tulsi Oil, and Mint Oil are generally acknowledged for their medicinal qualities.

- As an oil-based product, the poly-herbal anti-aging herbal face cream can easily penetrate the skin's dermal layer and offer excellent action, which raises customer happiness.

- Herbal cosmetics are a precious natural gift that is in high demand on the international market. Thus, using extracts of Azadiractaindica, Curcuma longa, pomegranate, Aloe vera, Vitamin E, Amla oil, Green tea oil, Coconut oil, Hibiscus oil, Olive oil, Tulsi oil, and Mint oil in different proportions, we tried to make a polyherbal face cream. Based on our research, formulation F4 was shown to be more stable than the other formulations, although not as stable as F4.

- The F4 formulation was homogenous, emollient, non-greasy, and easily removed after use. Its pH was almost constant.

- The stable formulations exhibited no change in skin irritation or allergy sensitization. Extracts of pomegranates (*Punica granatum*) and green tea (*Camelia sinensis*) include a range of advantageous antioxidants and free radical neutralizers, including ellagic acid, punicalagins, gallic acid, and punicalins.

- These antioxidants contain vitamin E, which is essential for both healing and soothing inflamed skin in addition to preserving healthy skin..

- Aloesin, a bioactive compound identified in extract from aloe vera, has been documented. Moreover, aloe vera has been suggested to

shield skin from ultraviolet radiation damage due to its antioxidant properties.

- Aloe vera contains mucopolysaccharides that help bind moisture to the skin. It also activates fibroblasts, which produce collagen and elastin fibres that plump up and prevent wrinkles on the skin.
- Amla oil has anti-oxidant properties and is firming, brightening, softening, and tightening pores.
- Hibiscus oil promotes the creation of collagen, blood purification, and skin brightness in addition to its anti-aging qualities.
- Tulsi oil provides a cooling and soothing effect, improves skin brightness, and has antimicrobial qualities.
- Mint oil soothes irritation and inflammation, helps maintain collagen structure, and has antibacterial, antimicrobial, and cooling qualities. Keepers
- Coconut oil exhibits anti-itch, moisturising, and flavouring properties for dry skin.
- Curcuma longa oil has been shown to have anti-inflammatory, antibacterial, and antioxidant qualities.

VII. CONCLUSION

As discussed above, the produced formulation showed good spreadability, no evidence of phase breakdown, and great consistency during the study period. Based on previous studies, it can be inferred that creams can be made with herbal extracts.

The antioxidant activity of aloe vera and punica granatum extracts was strong. According to the findings of several cream tests, the

composition can be applied topically to protect skin and slow down the ageing process. Creams made with natural extracts are feasible.

The results showed that combining the Punica granatum leaf extracts with other ingredients in varying ratios had a multifunctional effect on the skin, resulting in antiaging, whitening, and sunscreen properties. As is well knowledge, the therapeutic and cosmetic qualities of a single plant extract cannot be improved, but the effectiveness of extracts can be raised by combining different natural ingredients.

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