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Research Article

Formulation and Evaluation of Anti-aging Cream

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ABSTRACT

The demand for herbal preparations is rising on the global market, and plants have been identified as having potent antimicrobial, antioxidant, and anti-inflammatory properties. The purpose of this study is to create and formulate a herbal anti-aging cream and to assess its physicochemical qualities, with a focus on safety and efficacy. Papaya (Carica papaya) seeds were used as natural ingredients in the creation of the oil-in-water (O/W) herbal anti-aging lotion. Beeswax and methyl paraben were also added in various concentrations. Soxhlet extraction was used to extract the seeds after they had been dried. Its anti-inflammatory and antioxidant properties have been used to treat skin disorders like rashes, dry skin, and ageing skin. Utilizing several evaluation techniques, the product's quality was evaluated. The formulation was assessed based on a variety of factors, including pH, spreadability, and stability, among others. Good spreadability, good consistency, homogeneity, appearance, pH, no signs of phase separation, and ease of removal were all displayed by the formulation. During irritancy trials, the formulation exhibits no redness, edoema, inflammation, or irritation. The skin can be safely used with these formulas. According to these research, the base of the cream and the composition of the extracts are more stable and safe, which may result in a synergistic effect. Conclusion: Antioxidant-rich herbal creams can be utilised to provide a barrier for the skin, keeping it safe and preventing ageing.

INTRODUCTION

Because of damage to cellular DNA and protein, ageing of the skin is the result of a continuous deteriorating process. "Sequential Skin Ageing" and "Photo Ageing" are two independent categories used to categorise the ageing process. Each category has unique Clinical and Historical characteristics. The universal and predictable process of chronological skin ageing is characterised by physiological changes in skin function. Keratinocytes are unable to create a viable stratum corneum as we age, and the pace at which neutral lipids are produced is decreasing. This causes wrinkles and dry, pale skin.[1] In contrast, excessive exposure to sunlight's UV

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radiation results in photo ageing. Dry, pale, and sallow skin that exhibits fine wrinkles and deep furrows due to the disorganisation of epidermal and dermal components brought on by elastosis and heliodermatis are its defining characteristics. Plants and herbs have previously demonstrated their value as supplemental medical tools.[2]

The skin is shielded from external and internal irritants by cosmetic products, which also improve skin's beauty and attractiveness.[3] The usage of cosmetics contributes to duration of good health by preventing skin problems in addition to generating a beautiful outward appearance.FR are important contributors to the development of many skin conditions, such as skin tumours, wrinkles, and ageing.[4] In order to develop FR/ROS, ultraviolet (UV) light interacts with endogenous photo sensitizers, which results in cumulative structural and physiological changes in each layer of the skin as well as changes in the way the skin looks.[5] Antioxidants used topically may be helpful for shielding the skin from external influences. In the current environment, antioxidant compounds have gained relevance as a crucial component in skin care products like creams and lotions.[6]

Numerous plants contain significant amounts of antioxidants, including Vitamins E and C, carotenoids, flavonoids, and tannins, which can be used to remove the overindulgence FR from the human body.[7] The greatest option to lessen skin conditions including hyperpigmentation, skin ageing, skin wrinkling, rough skin texture, etc. is to use cosmetic goods. The market for herbal cosmetics is growing quickly. The elimination of ageing symptoms is the focus of the anti-aging cosmetics subfield of the cosmetics industry.[8]

The anti-aging chemicals in anti-aging cosmetics help to lessen fine wrinkles and boost the skin's moisture content. And it works primarily to make the skin look less puffy and wrinkled.[9] Due to the availability of new ingredients, the financial incentives for creating profitable products, customer demand, and a deeper understanding of skin physiology, the market for herbal cosmetics is fast growing. Various qualities, such as antioxidant, anti-inflammatory, antiseptic, and antibacterial activity, should be present in the substances used in the formulation.[10]

MATERIALS AND METHODS

❖ Collection of Plant Material

Figure 1: Papaya seeds

Figure 2: Papaya plant

The plant materials (seeds) needed for the current investigation were procured in March 2023 from Sinnar, an Indian tribal region. For later usage, the plant material (seeds) was dried, ground into a coarse powder using a mechanical grinder, and then kept in an airtight container.

❖ Preparation of Extract

The Russian Federation does not currently produce Carica papaya. seed oil commercially. Because of this, there is a very small amount of papaya seed oil on the market. In a laboratory setting, the process outlined below was used to extract oil from the papaya seeds that had been harvested.[11]

After being reduced to a coarse powder, the seeds were dried for three hours. Hexane was used as the solvent and a soxhlet device was used to extract the papaya seed oils. The soxhlet equipment was heated to 40°C, and the entire procedure took place for 8 hours. Following the process' completion, the seed oils were extracted from hexane using a rotating vacuum evaporator and dried at 60 degrees Celsius. [12-15]

Figure 3: Extraction by using Soxhlet Apparatus

❖ **PAPAYA (*Carica papaya*)**

The papaya, or Carica, is a huge tree-like fruiting plant that is indigenous to Mexico, Central America, and South America. In addition, it goes by the names pawpaw, mummy apple, melon tree, mamo, and mamón. India produces more than 40% of all papaya, with Brazil and Indonesia coming in second and third.[16] The fruit's fleshy, sweet pulp has little calories, up to 1.7 grammes of dietary fibre per 100 grammes, and less than 1 gramme of protein and fat. Fruit is a good source of potassium, magnesium, folate, vitamin C, and provitamin A.[17]

Papaya bark, leaves, and roots contain higher total phenolic and flavonoid concentrations than the pulp, which is used as a measure of a natural product's therapeutic efficacy.[28] Papaya seeds and leaves extracts contain anti-inflammatory, immunomodulatory, free-radical scavenging, hypotensive, hypoglycemic, and hypolipidemic activity as a result of flavonoid and enzyme content. Additionally, there are diuretic, neuroprotective, anti-carcinogenic, and wound healing properties.[18]

The fruit's seeds, which can make up 15-20% of the fruit, can be consumed and used medicinally. Papaya seeds can be used in place of pepper in dishes with meat and fish, marinades, and salad dressings.[27] In addition to tocopherols, carotenoids, benzyl glucosinolates, and benzyl isothiocyanate (BITC), seeds also contain 25–34% oil, 28% protein, roughly 19% crude fibre, and 8% ash.[19] Extracts from seeds have ovicidal and larvicidal effects on intestinal roundworm parasites. Papaya seed oil is typically yellow and rich in phytosterols (0.56%), benzyl isothiocyanate (67-77%), and monounsaturated fatty acids (67-77% oleic acid).[20] Its anti-inflammatory and antioxidant properties have been used to treat skin disorders like rashes, dry skin, and ageing skin. Papaya oil has other uses in industry and as a biofuel.[26] Papaya seed oil is an intriguing prospective source of edible oil because it shares many of the same nutritional and practical qualities as olive oil.[21] Previous research showed that the oils from papaya seeds have a high phytosterol content (6.5–6.8 g/kg), compared to the 1–5 g/kg of sterols found in most vegetable oils. Phytosterols are crucial in the prevention of atherosclerosis and hypercholeste.[22]

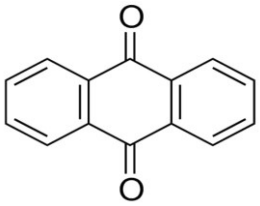
Seed Chemical Constituents:

Fatty acids, crude protein, crude fibre, papaya oil, sinigrin, Carpaine, benzylisothiocyanate, benzyl glucosinolate, glucotropacolin, benzylthiourea, hentriacontane, β-sitosterol, caricin and an enzyme myrosin, leaves related alkaloids, flavonoids, saponins, tannins, cardiac glycoside, anthraquinones and cardinolodes are present.[23]

Medicinal Use of Seeds:

Seeds: Carminative, emmenagogue, vermifuge, abortificient, counterirritant; used as a paste to treat ringworm; anti-inflammatory; antioxidant; treats psoriasis; and, for males, acts as an antifertility agent.

Seed juice: Large liver and spleen bleeding, as well as bleeding piles.[24]



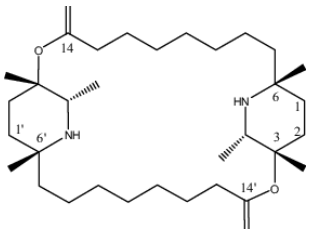


Figure 4: Anthraquinones **Figure 5: Carpaine**

FORMULATION OF CREAM

Formulation of Oil in water (O/W) emulsion-based cream was formulated. The emulsifier (Beeswax) and other oil soluble components (Liquid paraffin) were dissolved in the oil phase (Part A) and heated to 75°C. The preservatives (Methyl paraben) and other water-soluble components (Glycerin, Borax) were dissolved in the aqueous phase (Part B) and heated to 75°C. After heating, the aqueous phase was added in small portions to the oil phase slowly with constant stirring to the wax and oil mixture. Continue this process for 2 minutes, stir all the time then remove from the heat and stir until it gets cold then smooth cream is formed.[25] The formula for the cream is given in Table no. 1

Table 1: Formulation of herbal Anti-aging Cream

Ingredients	Category	Formula
Carica papaya seeds extract	Anti-aging	1 ml
Beeswax	Emulsifiers +Base	3.5 gm
Liquid Paraffin	Lubricating Agent	15ml
Borax	Alkaline agent	0.4 gm
Glycerin	Humectant, Moisturising agent	1 ml
Methyl Paraben	Preservative	0.04 gm
Rose Oil	Perfume	2-3 drops
Water	Vehicle	Q.S

EVALUATION TEST OF CREAM

1) Oganoleptic evaluation**:** The cream thus obtained was evaluated for its organoleptic properties like color, odor, and state. The appearance of the cream was judged by its color and roughness.
2) Washability: The cream was applied on the hand and observed under the running.
3) pH of the cream: The pH meter was calibrated using standard buffer solution. Weigh 0.5 gm of cream dissolved it in 50 ml of distilled water and its pH was measured with the help of digital pH meter.
4) Acid value: 10g of the cream was dissolved in 50ml mixture of equal volume of alcohol and solvent ether in a flask. The flask is connected to a reflux condenser and slowly heated, until the sample dissolve completely, to this 1ml of phenolphthalein was added and titrated with 0.1N NaOH, until faintly pink colour appears after shaking for 30sec.
   Acid value= n*5.61/w
   Where, n= The number of ml of NaOH required
   w = The weight of the cream
5) Saponification Value: 2g of the cream was refluxed with 25ml of 0.5N alcoholic KOH for 30min, to this 1ml of phenolphthalein is added and titrated immediately, with 0.5N HCL.
   Saponification value=(b-a)*28.05/w
   Where, a= volume of titrant
   b= volume of titrate
   w= weight of the cream
6) Accelerated stability testing: The purpose of stability testing is to provide evidence on how the quality of drug substance or drug product varies with time under the influence of variety of environmental factors such as temperature, humidity and light and enables to recommend storage condition and to predict the shelf life. Stability study for cream was performed at accelerated condition i.e., 40°C±2°C / 75%RH±5%RH. The formulations were kept both at room and elevated temperature and observed on 0,5th, 10th, 15th and 20th day for the various parameters.[29]
7) Irritancy test: Mark an area (1sq.cm) on the left-hand dorsal surface. The cream was applied to the specified area and time was noted. Irritancy, erythema, edema, was checked if any for regular intervals up to 24

hours and reported.

8) Homogeneity: The formulations were tested for homogeneity by visual appearance and by touch [30].
9) Test for Microbial Growth: Agar media was prepared then the formulated cream was inoculated on the plate's agar media by steak plate method and a controlled is prepared by omitting the cream. The plates were placed in the incubator and are incubated in 37 C for 24 hours. After the incubation period, the plates were taken out and the microbial growth were checked and compared with the control.[33]
10) Spreadability Test: Spread ability 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.[32]

Spreadability = m×l /T

Where,

m = weight tied to the upper slide (30g),

l =length of glass slide (5cm),

t =time taken in seconds. (10 sec)

11) 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.[31]

RESULTS AND DISCUSSION

1. Physical properties**:** The organoleptic properties of formulated cream were judged by color, odour and texture. Prepared formulation was pale yellow in color. It has pleasant odor and smooth texture. Its is shown in Table no. 2

Table 2: Physical Properties

Sr.no.	Parameter	Evaluation
1.	Colour	Pale Yellow
2.	Odour	Pleasant
3.	Texture	Smooth

Figure 6: Prepared Cream

2. Washability: The cream applied on skin was easily removed by washing with tap water.
3. pH of The Cream**:** The pH of the cream was found to be 6.9 which is good for skin pH. The herbal formulation was shown pH nearer to skin required i.e pH 6.9.

Table 3: pH of the cream

Formulation	pH
Anti-aging cream	6.9

Figure 7: pH of cream

4. Homogeneity: The formulation produce a uniform distribution of extracts in cream. This was confirmed by visual appearance and by touch.
5. Irritancy test: The formulation shows no redness, edema, inflammation and irritation after applying to the skin. These formulations are safe to use for skin.

Table 4: Irritancy Test

Evaluation Parameters	Observations
Irritation	No
Redness	No
Inflammation	No

6. Test for Microbial Growth: There was no signs of microbial growth after 24 hours of incubation at 37ºC and it was comparable with the control.

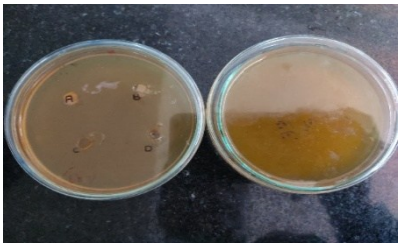


Figure 8: Before Incubation

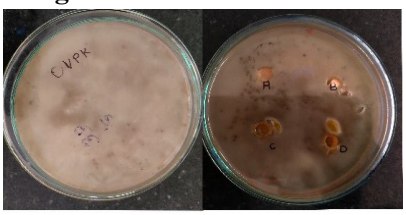


Figure 9: After Incubation

7. Accelerated Stability Testing: When formulation was subjected for long term stability studies, i.e. for about a period of 20 days, it was found that there is no change in properties of cream like pH, colour and odour.
8. Spreadability Studies: When formulation was subjected to spreadability studies, it was found that the cream takes less time to spread as shown in Table no. 3

Table 5: Spreadability Studies

Time in Seconds	Spreadability (g cm/sec)
10	15

9. Phase Separation: After 24 hours of observation there was no separation of oil and aqueous phase.[36]

CONCLUSION

The usage of natural cosmetics has been increased to many folds in personal care system and there is a great demand for herbal cosmetics. The use of bioactive ingredients in cosmetics influence biological functions of the skin and provide nutrients necessary for healthy skin.

The anti-aging cream slow down the skin aging by regenerating and activating the cells and protect against ultraviolet rays, free radicals etc. From the above results it is concluded that the formulated cream showed good consistency and spread ability, homogeneity, pH, non-greasy and there is no phase separation during study period of research. From the above study it can be concluded that the herbal anti-aging cream is safe to use as it is developed from herbal extract.

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