Formulation And Evaluation Of Anti-Aging Cream From Nyctanthes Arbor - Tristis

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ABSTRACT :

More and more people are looking for natural and effective skincare products, which has led to a greater interest in plant-based ingredients known for their ability to protect and repair skin. This study introduces a new anti-aging cream that includes Astragalin, a compound found in the leaves of Nyctanthes arbor-tristis. This plant has been used for a long time in traditional medicine for its healing benefits. Astragalin is a type of flavonoid that has strong antioxidant, anti-inflammatory, and anti-collagenase properties. These qualities help fight visible signs of aging like wrinkles, fine lines, and sagging skin. Unlike many anti-aging creams that use synthetic chemicals or peptides, which can sometimes cause side effects or not work well for everyone, this cream uses a natural compound that has been shown to be both effective and gentle on the skin.The cream uses a stable oil-in-water formula, which helps the Astragalin get into the skin more effectively. Early tests show that using this cream regularly can improve skin moisture, firmness, and reduce damage from free radicals. This research highlights how Nyctanthes arbor-tristis can be a valuable and sustainable source of natural anti-aging ingredients. It also shows the potential of using plant-based active ingredients in skincare products.

KEYWORDS: Nyctanthes arbor-tristis,Anti -Aging, Antioxidant,Maceration,Spredability

❖INTRODUCTION :

Nyctanthes arbor-tristis, also called N. arbor-tristis, is a useful medicinal plant that belongs to the Oleaceae family. It grows in tropical and subtropical areas. This plant is also known by other names like Parijat, Harsinghar, and Night Jasmine. The plant begins to dry up after midnight and looks dead when the sun comes up. Different parts of this plant have been used in Indian traditional medicines because they have various health benefits. These include fighting leishmaniasis, viruses, fungi, fever, allergies, malaria, and free radicals, as well as reducing inflammation and more.[1]

Fig:1

- **TAXANOMICAL CLASSIFICATION [2]**

KINGDOM: Plantae
DIVISION: Tracheophyta
CLASS: Magnoliopsida
ORDER: Lamiales
FAMILY: Oleaceae
GENUS: Nycanthus
SPECIES: N-arbor-tristis
BIONOMIAL NAME: Nycanthus arbor-tristis

- **PHYTO-CHEMICAL CONSTITUENTS**: Nyctanthes arbor-tristis leaves contain diverse phytochemicals like flavonoid glycosides, iridoids, terpenoids, and phenolic acids, contributing to their medicinal use in Ayurveda. These compounds are known for their therapeutic effects on arthritis, fevers, sciatica, and digestive issues.[3]

- **USES:** Anti-oxidant, Anthelmintic, Antibacterial, Antifungal, Anti-Inflammatory, Antioxidant, AntiPyretic, Arthritis Asthma, Bronchitis, Cholecystagogue Constipation, Cough .[4]

- **ASTRAGALINE (KAEMFEROL-3-O-D-BETA-GLYCOPYRANOSIDE)**

Astragaline, also known as kaempferol-3-O-D-β-glycopyranoside. It is a member of the polyphenolic compound group, which is known for its antioxidant properties. In the field of cosmetics, astragaline is valued for its positive effects and skin-supporting qualities.

First, it prevents collagenase activity. Collagenase is involved in the breakdown of skin proteins, which leads to wrinkles .Secondly, astragaline functions as a powerful antioxidant that reduces the buildup of free radicals in the body. Additionally, it plays a role in regulating skin pigmentation by influencing melanin production.. Melanin is the pigment that causes dark skin, hair, and eyes.UV rays can cause various problems in the skin such as DNA damage, Astragaline, when combined with quercetin, also offers protection against the damaging effects of ultraviolet (UV) radiation, .sunburn, melanin production, aging, skin cancer, skin thickening, weakened immunity, and swelling. It helps to reduce the production of CXCL-1 and CXCL-2 in the skin, making it a useful photoprotective agent.[5]

➢**ANTIOXIDANT ACTIVITY:**

A study tested the free radical scavenging activity of Nyctanthes arbortristis leaf extracts using the DPPH assay. The effectiveness of the extracts, ranked from highest to lowest, was: ascorbic acid > butanol > ethyl acetate > BHT > pet ether. The study found that the scavenging ability depends on the extract concentration.[6]

 SKIN AGGING: Skin aging occurs as the DNA and proteins within skin cells undergo damage over time, leading to a decline in the skin's strength and overall function.[7,8]

There are two main types of skin aging: Natural aging and photoaging

❖ EXTRACTION OF ASTRAGALINE FROM NYCANTHUS ARBOR TISTIS THROUGH MACERENATION PROCESS:

For the maceration process, start by collecting Nyctanthes arbortristis leaves and drying them in the shade. (Note: drying under direct sunlight can cause the evaporation of phytoconstituents.) Once the leaves are completely dried, grind them into a fine powder and weigh the powdered material. Next, take a beaker or conical flask, add ethanol to it, and mix the weighed powder into the ethanol in the appropriate ratio. Stir well and let the mixture macerate for 5–7 days. After this soaking , filter the solution and evaporate the solvent to obtain the extract. This extract was stored in airtight containers and used for formulation or further analysis.[9]

STEPS FOR EXTRACTION OF ASTRGALINE:

Fig: 2.1 Dried leaves

Fig: 2.2 Coarse powder

Fig: 2.3 Extraction through Maceration

Fig: 2.4 Filtration of Ethanol Extract

Fig: 2.5 Ethanolic Extract

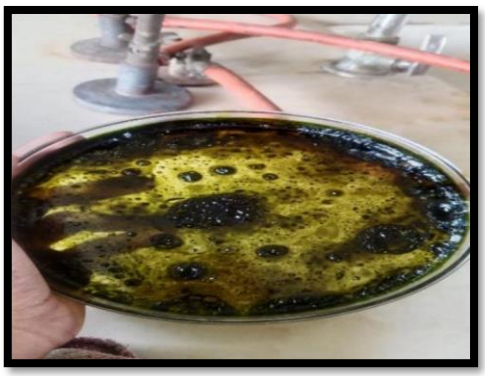

Fig: 2.6 Drying of Ethanolic Extract

Fig: 2.7 Weight of Extract

❖ANALYSIS OF EXTRACT: ASTRAGALINE

➢CHEMICAL TEST FOR FLAVANOIDS : [10]

1. Ammonia Test.
2. Sodium Hydroxide Test
3. Test with concentrated HCl
4. Ferric Chloride Test
5. 5.Lead Acetate Test

Fig: 3 Chemical test for Flavonoids

➢INFRARED TEST:[11,12]

Infrared test had been done to verify the purity and identity of astragaline in the extract by comparing the IR spectrum .

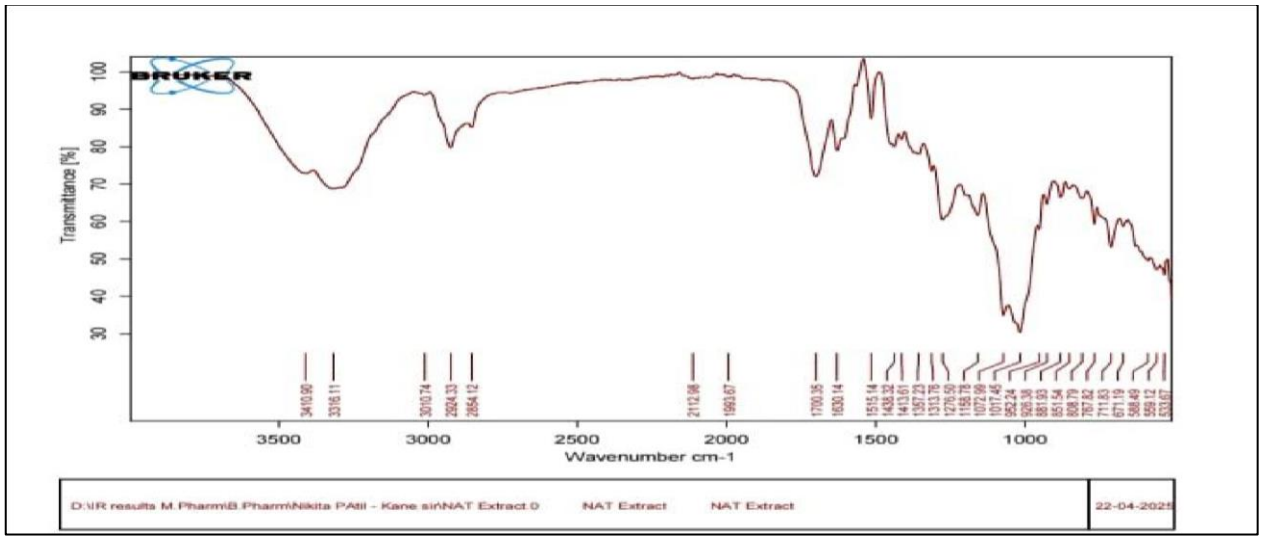

Fig:4 Infrared Analysis of Flavonoid

Analysis of graph: The IR spectrum shows a broad O–H stretch (\~3300 cm^{-1}), C–H stretch (\~2900 cm^{-1}), and a sharp C=O peak (\~1700 cm^{-1}), indicating the presence of polyphenols and flavonoids like astragalin. Aromatic C=C stretches (1600–1500 cm^{-1}) and strong C–O/C–O–C signals (1000–1300 cm^{-1}) suggest flavonoid glycosides with sugar moieties.

❖FORMULATION OF ANTI-AGING CREAM:

FORMULATION TABLE: [13]

Sr. No.	Ingredients	F1	F2	Role
1	Cocoa butter	1.5gm	5gm	Emollient, Moisturizer (oil phase)
2	Beeswax	1.5gm	2.5gm	Consistency enhancer (oil phase)
3	Stearic acid	0.9gm	3.5gm	Thickener and emulsifier (oil phase)
4	Coconut oil	0.9gm	-	Emulsifier and Moisturizer
5	Vitamin E	-	1ml	Antioxidant (oil phase)
6	Glycerine	1.2ml	2.5ml	Humectants, Retain moisture (water phase)
7	Astragalin	0.15gm	1gm	Active Pharmaceutical Ingredient(anti-aging agent), Collagen stimulator
8	Methyl Paraben	0.03gm	0.3gm	Preservative (water phase)
9	Purified Water	21ml	12ml	Vehicle

Table: 1

➢ PROCEDURE FOR FORMULATION:

1. Preparation of the Oil Phase: Weigh the required amounts of cocoa butter, stearic acid, beeswax, and vitamin E and place these ingredients in a clean, dry beaker. Heat gently (around 70–75°C) using a water bath until all components are fully melted and mixed. Stir the mixture slowly to ensure uniformity.

2. Preparation of the Aqueous Phase: In a separate beaker, weigh and dissolve methyl paraben in purified water and add glycerin and astragaline to this solution. Heat this aqueous phase to the same temperature as the oil phase (70–75°C) to prevent sudden cooling during mixing.

3. Emulsion Formation: Slowly add oil phase to the hot aqueous phase with continuous stirring (use a mechanical stirrer or overhead stirrer for better emulsification). Continue stirring for 10–15 minutes until a smooth emulsion forms. Allow the emulsion to cool gradually to room temperature while stirring. Transfer the cream into clean, dry containers and Label it.

❖ EVALUATION OF ANTI-AGGING CREAM:

8

➢ **DPPH Scavenging Activity:**[14,15]

DPPH (2,2-diphenyl-1-picrylhydrazyl) is a stable free radical with a deep violet hue that absorbs light at 517 nm. When an antioxidant is added, the compound donates an electron atom to the DPPH radical, leading to a reduction in the radical's color intensity. This leads to a visible color change from violet to yellow, which can be quantitatively measured using a spectrophotometer. The extent of this color change reflects the free radical scavenging ability of the tested substance. Higher DPPH activity indicates greater antioxidant potential.

% DPPH Scavenging Activity calculating formula:

%Inhibition = (A control - A Sample)/A control*100

A control =Absorbance of DPPH solution without antioxidant

A sample =absorbance of DPPH with an antioxidant

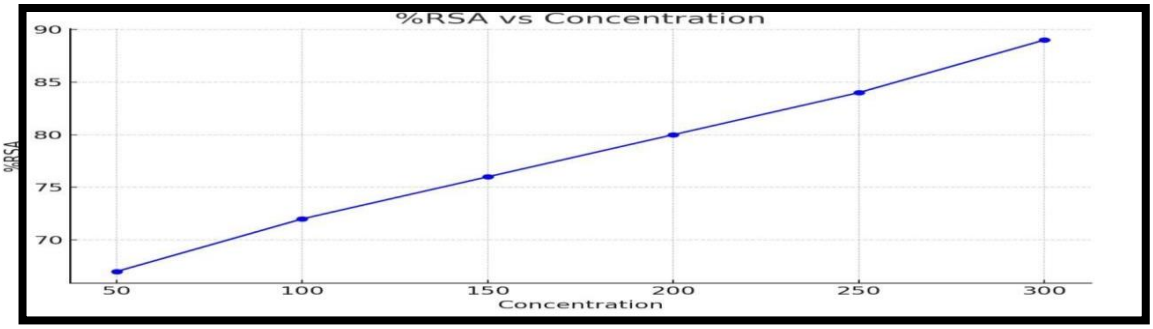

Fig: 7 DPPH Assay

➢ **Hydrogen Peroxide (H_2O_2) Scavenging Method:**[16,17]

The antioxidant activity of the cream was tested using the H_2O_2 method. To do this, 0.1 ml of the cream was mixed with 3.4 ml of 0.1 M phosphate buffer and 0.6 ml of 40 mM hydrogen peroxide (H_2O_2). The mixture was then kept for 10 minutes at room temperature. After the incubation, the absorbance was measured at 230 nm using a spectrophotometer, with a blank solution as a reference. Ascorbic acid was used as the standard antioxidant for comparison.

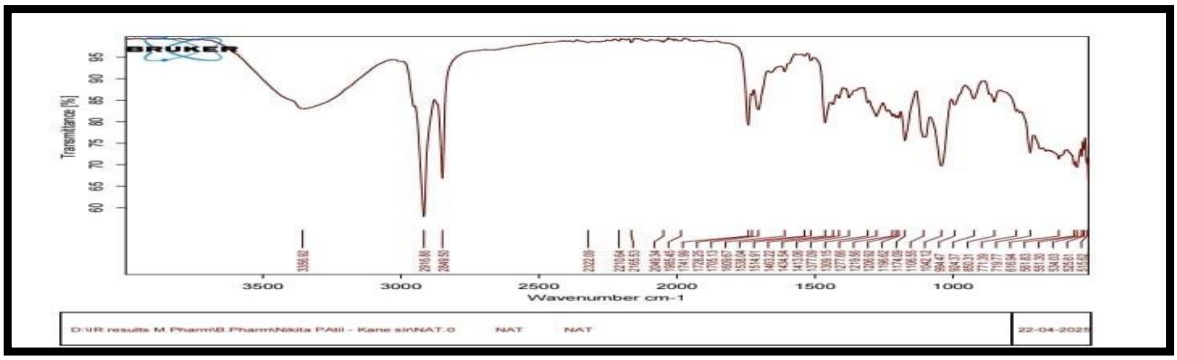

Fig: 8 Hydrogen Peroxide Test for the analysis of Antioxidant Property in Anti- Aging

- **Cream** :

The cream thus obtained was evaluated for its Organoleptic properties like color, odour, and state. The appearance of the cream was judged by its color and roughness and graded.

Fig:9 Organoleptic evaluation

- **PH of the Cream:**[18]

The pH meter was calibrated using standard buffer solution. About 0.5 g of the cream was weighed and dissolved in 50.0 ml of distilled water and its pH was measured.

Fig: 10 PH Determination

- **Stability studies:** Stability testing is use to evaluate the stability of the drug and formulation.The cream was placed in a bottle and stored at room temperature for 10–15 days. During this period, the color, appearance, and texture of the cream were monitored for any changes.[19]

10

Fig: 11.1 Stability Before 15 days

Fig: 11.2 Stability after 15 days

- **Homogeneity:** The formulations were tested for the homogeneity by visual appearance and by touch.[2]

- **Spreadability studies:** Spreadability means how easily and widely a cream spreads when you apply it. The spreadability was then calculated from the following formula:[22]

Spreadability = (m xl)/t

Fig:12.2 Spreadability

- **Irritancy test:** The irritancy test is done to check if a cream causes any harmful reaction on the skin.This includes checking for redness (erythema), swelling (edema), or any other noticeable skin reaction. Any changes are recorded to determine whether the cream is safe and non-irritating for the skin.[23]

Fig: 13.1 Before applying cream

Fig: 13.2 After applying cream

❖ RESULT:

- **<u>Antioxidant Capacities:</u>**
  - **DPPH Analysis:** From the DPPH antioxidant analysis , the % inhibition scavenging is **89.021%.**

11

- **Hydrogen peroxide Analysis:** From H2O2 antioxidant analysis we get that our formulation is **strongly antioxidant**

- **Organoleptic test:**

Sr. No.	Specification	Limits
1	State	Semisolid
2	Color	Moss Green
3	Odor	Characteristics
4	Texture	Smooth

Table: 2

- **PH:** The pH of the cream should be in range of 4.30 to 5.6 which is good and recommended pH for the skin. The PH of the formulated cream was found to be – **F2 Batch -5.23.**

- **Stability:** The cream was stored in a wide mouth transparent closely tight container for 15-20 days and no changes noticed in the cream so the cream was found to be **stable.**

- **Homogeneity:** The formulations produce **uniform distribution** of extracts in cream. This was confirmed by visual appearance and by touch.

- **Spreadability:** According to formula the spreadability was calculated and found to be **6.20gm.cm/sec**.

- **Removal:** The cream of F2 applied on skin was **easily removed** by washing with tap water.

- **Irritancy test** :The formulation F2 batch shows **no redness, edema, inflammation and irritation** during irritancy studies. These formulations are safe to use for skin

❖ CONCLUSION:

The Anti-aging cream formulated with Nyctanthus arbor-tristis extract was successfully prepared having smooth texture, easily removable and have uniform spreadability. The PH of the cream was found to be 5.23, thus it means that the cream is skin-friendly and also the Antiaging shows strong antioxidant property with 89.021%. After doing the irritancy test we also concluded that it does not cause any redness, inflammation and irritation on skin.

Further in vitro and chemical studies are recommended to confirm the anti-aging effectiveness of the cream and to ensure that it is safe for long term use.

12

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