PREPARATION &EVALUATION OF POLY HERBAL CREAM

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ABSTRACT:

The increased popularity of herbal and organically derived skincare products has prompted the creation of formulations that provide both cosmetic and medicinal advantages. A polyherbal cream was created in this study by extracting Nyctanthes arbor-tristis (Parijatham), Calendula officinalis (Marigold), Prunus amygdalus (Almond), and Curcuma longa (Turmeric). These plants were chosen for their purported antioxidant, antibacterial, anti-inflammatory, wound-healing, and skin-conditioning properties. The cream was made as an oil-in-water emulsion utilizing a fusion procedure to assure homogeneity and stability. The developed product underwent preliminary phytochemical and physicochemical testing. The following parameters were evaluated: appearance, pH, viscosity, homogeneity, spreadability, washability, skin irritation, and storage stability. Phytochemical examinations indicated the existence of various bioactive substances, including flavonoids, tannins, glycosides, phenolic contents, essential oils, and curcuminoids, which are known to have therapeutic relevance. The created cream has acceptable physical properties, such as a smooth texture, consistent consistency, good spreadability, and a pH appropriate for topical application. No indication of phase separation was found, demonstrating formulation stability. Skin compatibility tests revealed that the cream was non-irritating and suitable for external usage. Antimicrobial tests revealed increasing inhibitory effects at higher doses, indicating a synergistic impact of the herbal extracts. Furthermore, stability tests conducted under a variety of environmental circumstances demonstrated that the formulation maintained its quality and physical properties throughout the assessment period.Overall, the results show that the prepared polyherbal cream has excellent physicochemical features, as well as antibacterial and skin-protective capabilities. As a result, it might be a useful natural alternative in future cosmetic and dermatological applications.

Keywords: Polyherbal cream, herbal cosmetics, *Nyctanthes arbor-tristis*, *Calendula officinalis*, *Prunus amygdalus*, *Curcuma longa*, phytochemical evaluation, antimicrobial activity, stability assessment, topical formulation.

INTRODUCTION:

For ages, medicinal plants have been used as a major source of healing, and they continue to play an important role in both traditional and modern medicine across the world. The popularity of herbal remedies has increased significantly in recent decades as people become more aware of the negative consequences and safety risks connected with long-term usage of synthetic medications. As a result, plant-based treatments have gained popularity in dermatological and cosmetic applications due to their natural origin, therapeutic potential, and relatively low risk profile [1-3].

Creams are one of the most often used topical formulations due to their simplicity of application, pleasant texture,

and ability to transport active chemicals straight to the skin. Herbal creams not only keep skin moisturized, but they also provide biological advantages such as antioxidant, antibacterial, anti-inflammatory, and tissue-repair properties. These multifunctional qualities make them appropriate for both cosmetic enhancement and medicinal treatment of skin problems [4-6].

Polyherbal formulations are created by combining two or more medicinal plants with the goal of increasing therapeutic efficacy through synergistic interactions between their phytochemical contents. Such combinations may increase overall efficacy, provide a broader spectrum of biological activities, and reduce the number of individual constituents needed in the formulation. Because of these benefits, the polyherbal method has gained popularity in modern herbal product research and development [7,8].

The current work focuses on developing a polyherbal cream with extracts of Nyctanthes arbor-tristis, Calendula officinalis, Prunus amygdalus, and Curcuma longa. These plants include a wide range of physiologically active chemicals, including flavonoids, tannins, phenolic substances, essential oils, vitamins, and curcuminoids. Such phytochemicals have been shown to have antioxidant, antibacterial, anti-inflammatory, moisturizing, and skin-protective properties, potentially contributing to better skin and promoting quicker tissue repair and regeneration [9-12].

The performance of a topical formulation is determined not only by the therapeutic action of its contents, but also by its physicochemical properties. pH, viscosity, spreadability, homogeneity, washability, and storage stability are all critical factors influencing product quality, customer acceptance, and overall efficacy. As a result, careful examination of these qualities is required during the formulation and development stages [13,14].

The current study sought to develop and assess a polyherbal cream including specific medicinal plant extracts, as well as to investigate its phytochemical profile, antibacterial capabilities, and physicochemical features. This work seeks to create scientific data to support the use of herbal constituents in skincare formulations, as well as to contribute to the creation of safe, cost-effective, environmentally friendly, and commercially viable herbal cosmetic products [15,16].




MATERIALS:

Before being used, the rhizomes of Curcuma longa and fresh leaves of Nyctanthes arbor-tristis, Calendula officinalis, and Prunus amygdalus were gathered and verified. The plant components were ground into a fine powder after being shade-dried to retain their active ingredients. Using appropriate hydroalcoholic or ethanolic solvents, the powdered materials were extracted, and the resulting extracts were concentrated before being added to the formulation. Next, an oil-in-water (O/W) emulsion system including stearic acid, cetyl alcohol, liquid paraffin, glycerin, triethanolamine, preservatives, and distilled water was used to create a polyherbal cream. A number of factors, including as appearance, pH, viscosity, homogeneity, spreadability, washability, skin compatibility, antibacterial activity, and stability under various storage circumstances, were assessed for the final formulation [27–30].

Herbal extracts and pharmaceutical excipients required to prepare the polyherbal cream were the ingredients used in this study. While Calendula officinalis leaves were acquired from Lakshmipuram Garden, Nyctanthes arbor-tristis foliage were gathered at Vinukonda Garden. Curcuma longa rhizomes were obtained from the AMRMCP Laboratory, while Prunus amygdalus leaves were collected from the AMRMCP Ground.

The AMRMCP Laboratory provided the excipients employed in the formulation, which included stearic acid, cetyl alcohol, liquid paraffin, glycerin, triethanolamine, methyl paraben, propyl paraben, and distilled water. The chosen medicinal plants offered a wealth of phytochemicals with anti-inflammatory, antibacterial, antioxidant, and skin-conditioning qualities. In order to guarantee appropriate emulsification, consistency, moisturization, preservation, and general stability of the cream, the excipients were added. To ensure product quality, consistency, and reproducibility, all substances were handled and used in compliance with established laboratory methods.

METHODOLOGY:

Extraction of Plant Materials:

The rhizomes of Curcuma longa (turmeric) and the leaves of Nyctanthes arbor-tristis (parijatham), Calendula officinalis (marigold), and Prunus amygdalus (almond) were gathered and prepared for extraction. To get rid of dirt and other impurities, the gathered plant materials were thoroughly rinsed with water. After that, they were shade-dried in a typical setting until they were completely dry. A mechanical grinder was used to coarsely powder the dried materials. To separate the active phytochemical components, the powdered materials were extracted using appropriate hydroalcoholic or ethanolic solvents. For additional experimental research, the extracted materials were filtered, concentrated under carefully monitored circumstances, and kept in airtight containers [18, 19].

Preliminary Phytochemical Screening:

The existence of significant secondary metabolites was ascertained by qualitative phytochemical analysis of the obtained plant extracts. Alkaloids, flavonoids, glycosides, tannins, saponins, phenolic compounds, terpenoids, proteins, carbohydrates, steroids, fixed oils, and other phytoconstituents were found using standard screening techniques. Based on certain color reactions or precipitate development seen during the corresponding experiments, these chemicals were identified. Important details about the phytochemical makeup of the chosen therapeutic plants were revealed by this initial investigation [11].

1. Alkaloids Test (Dragendorff's Test)

Two milliliters of diluted hydrochloric acid were added to one milliliter of the extract before it was filtered. One milliliter of the filtrate was then mixed with a few drops of Dragendorff's reagent.

2. Flavonoid Test (Shinoda Test)

About 50 mg of magnesium turnings were added to 2 mL of the extract, and then 1 mL of strong hydrochloric acid was added.

3. Glycoside Test (Keller–Killiani Test)

A drop of ferric chloride solution was added to two milliliters of glacial acetic acid and two milliliters of extract. The mixture was then gently covered with 1 mL of pure sulfuric acid.

4.Ferric Chloride Test

Two milliliters of the plant extract were mixed with a few drops of a 5% ferric chloride solution, and the reaction was noted.

5. Foam Test

In a graduated test tube, one milliliter of extract was diluted with ten milliliters of distilled water, and the mixture was violently agitated for around five minutes.

6. Check for Essential Oils

A tiny drop of the extract was put on a fresh piece of filter paper and let to dry at room temperature.

7. Triterpenoids Test (Salkowski Test)

After adding two milliliters of chloroform to two milliliters of extract, one milliliter of strong sulfuric acid was carefully applied along the test tube wall.

8. Carotenoids Test

After dissolving around 2 mL of extract in chloroform, strong sulfuric acid was cautiously added to the mixture.

9. Look for Phenolic Substances

Two to three drops of a 1% ferric chloride solution were applied to two milliliters of extract, and the color shift that resulted was recorded.

10. Check for Terpenoids

An equivalent volume of chloroform was combined with two milliliters of extract. The test tube's side was then gradually filled with concentrated sulfuric acid.

11. Check for Curcuminoids

To see the distinctive reaction, the extract was dissolved in ethanol and then exposed to a few drops of a 10% sodium hydroxide solution.

12. Check for Resins and Proteins

A. Protein Biuret Test

One milliliter of a 10% sodium hydroxide solution and two to three drops of a 1% copper sulfate solution were added to two milliliters of extract.

B. Check for Resins

Ten milliliters of distilled water were mixed with one milliliter of the extract, and the production of precipitates suggestive of resinous components was monitored

Formulation of Polyherbal Cream

Table 1. Composition of Polyherbal Cream Formulation

S. No.	Ingredient	Quantity (per 100 g)	Function
1	Nyctanthes arbor-tristis extract	2–3 g	Anti-inflammatory agent
2	Calendula officinalis extract	2–3 g	Wound-healing agent
3	Prunus amygdalus extract	2–3 g	Skin-conditioning agent
4	Curcuma longa extract	1–2 g	Antimicrobial agent
5	Stearic acid	10–15 g	Emulsifying agent
6	Cetyl alcohol	2–5 g	Consistency enhancer
7	Liquid paraffin	5–10 mL	Emollient
8	Glycerin	5–10 mL	Humectant
9	Triethanolamine	q.s.	Emulsion stabilizer
10	Methyl paraben	0.1–0.2 g	Preservative
11	Propyl paraben	0.05 g	Preservative
12	Distilled water	q.s. to 100 g	Vehicle

Preparation of Polyherbal Cream

A typical oil-in-water (O/W) emulsion method was used to create the polyherbal cream. Stearic acid, cetyl alcohol, and liquid paraffin made up the oil phase, which was first heated until all of the ingredients were fully liquefied. The aqueous phase, which included distilled water, glycerin, triethanolamine, methyl paraben, and propyl paraben, was heated to the same temperature independently. To create a homogenous and stable emulsion, the heated aqueous phase was then gradually added to the oil phase while being constantly stirred. To guarantee that the active ingredients were evenly distributed throughout the formulation, the concentrated herbal extracts were added gradually while continuing to mix the emulsion. After cooling to room temperature, the cream was placed in sterile, firmly sealed containers for storage and additional testing [35].

Evaluation of Polyherbal Cream

The organoleptic and physicochemical properties of the prepared cream were investigated. To evaluate characteristics including color, odor, texture, consistency, and uniformity, visual inspection was done. To make sure the formulation was compatible with skin, its pH was checked using a digital pH meter that had been

calibrated. Spreadability was assessed using the glass-slide method, while viscosity was measured with a suitable viscometer. The formulation's washability was determined by how easily it could be removed from the skin using water. An irritation study was used to determine skin compatibility, and the application site was closely watched for any indications of inflammation, redness, itching, or other unwanted reactions [37,49].

The prepared polyherbal cream's appropriateness for topical application was assessed utilizing a number of quality assessment criteria. Among the tests conducted were:

Physical characteristics and pH measurement

Uniformity

Spreadability

Viscosity

Washability

Research on skin irritation

Analysis of phase separation

Evaluation of consistency

1. Physical Appearance

A clean glass slide containing around 1 g of the cream was evaluated visually during the day. The formulation's color, smell, texture, smoothness, presence of coarse particles, grittiness, and any indications of phase separation were evaluated.

2. Measurement of pH

After dispersing one gram of the cream formulation in ten milliliters of distilled water, it was left to equilibrate at room temperature (25 ± 2°C) for two hours. A digital pH meter that had been calibrated was used to measure the dispersion's pH. The results were presented as mean ± standard deviation after the analysis was performed in triplicate.

3. Evaluation of Homogeneity

A glass slide was used to further analyze about 0.5 g of cream that had been smeared between the thumb and forefinger. The formulation's uniform distribution, lack of lumps, coarse particles, and gritty debris were assessed.

4. Determining Spreadability

Two glass slides were sandwiched with around 1 g of cream. To create a consistent film, a 100 g weight was applied to the upper slide for five minutes. A pulley system was then used to attach an extra 20 g of weight. Spreadability was determined by timing how long it took the upper slide to travel 7.5 cm using a stopwatch.

5. Determining Viscosity

A 100 mL beaker was filled with about 50 g of cream. A viscometer equipped with Spindle No. 64 running at 20 rpm was used to measure the viscosity at 25 ± 2°C. Once reliable readings were obtained, measurements were recorded.

6. Test for Washability

A marked skin surface measuring around 5 cm² was covered with a measured amount (0.5 g) of the cream, which was then left undisturbed for five minutes. After rinsing the area under running water, the formulation's ease of removal was evaluated visually.

7. Research on Skin Irritation

A 2 cm × 2 cm section of skin received a uniform application of about 0.5 g of cream. After a day, the treated area was checked for erythema, edema, redness, itching, or any other indications of irritation.

Scale of Irritation

0 = No signs of irritation

1 = A little annoyance

2 = Moderate annoyance

3 = Extreme annoyance

8. Analysis of Phase Separation

The prepared cream was kept in the following conditions after being packed in glass containers:

Room temperature: 25 ± 2°C

40 ± 2°C and 75 ± 5% relative humidity

For thirty days, the samples were observed. On days 0, 7, 15, and 30, observations were made to look for signs of phase separation, creaming, cracking, or liquefaction.

9. Evaluation of Consistency

One gram of cream was personally inspected by spreading it between the fingers and on a glass surface. Throughout the storage time, parameters such texture, smoothness, semisolid nature, ease of application, and general consistency were frequently assessed.

Antimicrobial Evaluation

The agar well diffusion method was used to assess the polyherbal cream's antibacterial properties. Petri plates were filled with sterile nutritional agar, which was then allowed to harden in an aseptic environment. To create a consistent microbial lawn, the chosen test microorganism was equally distributed throughout the agar surface. Then, using a sterile cork borer, equal-sized wells were created in the agar, and specific amounts of the cream formulation were carefully added to each well. To guarantee the validity of the experimental findings, suitable positive and negative controls were incorporated. Antimicrobial activity was evaluated by measuring the diameter of the clear zones of inhibition formed around the wells after incubation under appropriate circumstances [20, 21].

Stability Studies

By keeping the formulation under various environmental settings, such as refrigerated, ambient, and increased temperatures, the polyherbal cream's storage stability was investigated. The physical and chemical properties of the samples, including color, odor, consistency, pH, viscosity, and signs of phase separation, were assessed on a regular basis. The formulation's overall stability, integrity, and storage appropriateness were assessed using observations made during the study period. The findings revealed information about the cream's capacity to maintain its performance and quality under various storage circumstances [31, 32, 50].

RESULTS & DISCUSSION :

Phytochemical Screening

Table 2. Qualitative Phytochemical Profile of Selected Plant Extracts

S. No.	Phytochemical Constituent	Nyctanthes arbor-tristis	Calendula officinalis	Prunus amygdalus	Curcuma longa
1	Alkaloids	+	–	–	–
2	Flavonoids	+	+	+	+
3	Glycosides	+	–	+	–
4	Tannins	+	+	+	+
5	Saponins	+	+	–	–
6	Essential Oils	+	+	–	+
7	Triterpenoids	–	+	–	–
8	Carotenoids	–	+	–	–
9	Phenolic Compounds	–	–	+	–
10	Terpenoids	–	–	+	–
11	Curcuminoids	–	–	–	+
12	Proteins and Resins	–	–	–	+

(+ = Present; – = Absent)

The chosen medicinal plants had a variety of bioactive components, according to preliminary phytochemical research. Alkaloids, flavonoids, glycosides, tannins, saponins, and essential oils were all present in the Nyctanthes arbor-tristis extract. It is well recognized that these phytochemicals support antioxidant, anti-inflammatory, and antibacterial properties.

Flavonoids, tannins, saponins, essential oils, triterpenoids, and carotenoids were all present in the Calendula officinalis extract. These components are frequently linked to tissue regeneration, wound healing, and skin protection. Flavonoids, glycosides, tannins, phenolic compounds, and terpenoids were discovered in Prunus amygdalus extract, suggesting its possible function in antioxidant activity and skin conditioning. Curcuma longa's well-established antibacterial and anti-inflammatory qualities are supported by the presence of curcuminoids, flavonoids, tannins, and essential oils.

The extensive presence of tannins and flavonoids in the chosen extracts indicates that the polyherbal formulation may have significant antioxidant potential. It is anticipated that the combination of many phytochemical classes will produce complimentary biological effects, increasing the produced cream's medicinal and cosmetic value.

Evaluation of Polyherbal Cream

Table 3. Physicochemical Evaluation of Polyherbal Cream

S. No.	Parameter	Result Obtained	Interpretation
1	Physical Appearance	Smooth, uniform, light yellow cream with pleasant odor	Acceptable
2	pH	6.4 ± 0.1	Suitable for skin application
3	Homogeneity	Homogeneous, free from lumps and grittiness	Good
4	Spreadability	7.8 ± 0.3 g·cm/s	Easily spreadable
5	Viscosity	18,500 ± 250 cP	Moderate viscosity, suitable for topical use
6	Washability	Easily washable with water	Acceptable
7	Skin Irritation	No redness, itching, or edema observed	Non-irritant
8	Phase Separation	Not observed during storage period	Stable formulation
9	Consistency	Smooth, semisolid, uniform texture	Satisfactory

Desired physicochemical properties appropriate for topical treatment were demonstrated by the polyherbal cream formulation. The preparation had an adequate consistency, a uniform appearance, and a smooth texture. The addition of turmeric extract was responsible for the formulation's pale yellow hue.

The cream's pH stayed within human skin's physiological range, suggesting compatibility and a lower chance of irritation after application. The formulation's moderate viscosity and good spreadability ensured consistent distribution across the skin's surface and simplicity of application.

Skin compatibility testing revealed no symptoms of erythema, itching, or irritation, indicating that the product is safe to apply topically. In addition, the cream had a good moisturizing effect, was easily washable, and absorbed quickly. These results show that the created formulation has appropriate pharmaceutical quality and good cosmetic qualities.

Antimicrobial Activity

Table 4. Antimicrobial Activity of Polyherbal Cream

S. No.	Sample	Concentration (µg/mL)	Zone of Inhibition (mm)	Interpretation
1	Standard Drug	50	1.5, 1.9	Moderate activity
		100	2.1, 1.9, 2.3	Enhanced activity
2	Polyherbal Cream	100	No zone observed	Inactive
		200	No zone observed	Inactive
		400	2.2, 2.0, 1.6	Active

The reference standard successfully reduced bacteria growth at both tested concentrations, according to the antimicrobial investigation. A concentration-dependent antimicrobial response was indicated by an increase in the inhibition zone's diameter with increasing concentration.

At dosages of 100 and 200 µg/mL, the polyherbal cream showed no discernible antibacterial activity. At 400 µg/mL, however, discernible inhibitory zones were seen, indicating the existence of antimicrobial action at greater concentrations. The combined activity of the formulation's phytoconstituents, which include flavonoids, tannins, essential oils, and curcuminoids, may be responsible for this effect.

The results indicate that the polyherbal cream has natural antibacterial qualities and may help protect skin when applied, even though the formulation's activity was lower than that of the standard medication.

Stability Studies

Table 5. Stability Evaluation of Polyherbal Cream

Storage Condition	Duration	Observation
25 ± 2°C	1 Month	No noticeable changes
4 ± 2°C	1 Month	Stable; slight increase in viscosity
40 ± 2°C	1 Month	Minor consistency variation
25 ± 2°C	2 Months	Stable appearance maintained
4 ± 2°C	2 Months	Homogeneity retained
40 ± 2°C	2 Months	Slight colour fading observed
25 ± 2°C	3 Months	No significant changes
4 ± 2°C	3 Months	Excellent physical stability
40 ± 2°C	3 Months	Minor viscosity variation

The stability analysis showed that over the storage term, the polyherbal cream kept its physical integrity. The color, texture, odor, homogeneity, and consistency of samples kept at ambient temperature and in a refrigerator did not significantly alter.

Formulations kept at high temperatures showed minimal changes, such as a mild fading of color and slight changes in viscosity. However, there was no indication of formulation breakdown, microbiological contamination, or phase separation. Over the course of the investigation, the emulsion system remained stable.

Overall, the results show that the created polyherbal cream has adequate storage stability and maintains its key quality characteristics in typical environmental settings. As a result, the formulation can be regarded as physically stable and appropriate for additional pharmacological and cosmetic uses.

CONCLUSION:

A polyherbal cream containing extracts from Nyctanthes arbor-tristis, Calendula officinalis, Prunus amygdalus, and Curcuma longa was successfully developed and assessed in this study. These medicinal plants were chosen due to their proven therapeutic potential and the variety of bioactive chemicals they contain that are good for skin health. Important secondary metabolites like flavonoids, tannins, glycosides, saponins, terpenoids, phenolic compounds, essential oils, and curcuminoids were found during preliminary phytochemical screening, suggesting that the formulation may offer a variety of biological advantages.

Positive physicochemical properties of the produced cream included a pH that was compatible with skin, a smooth texture, a consistent look, a sufficient viscosity, good spreadability, and ease of washing. Good formulation stability was demonstrated by the formulation's homogeneity and lack of phase separation over the study period. Additionally, investigations on skin irritation showed that the cream was well accepted and did not cause any obvious symptoms of redness, itching, or other unfavorable dermal reactions.

The polyherbal formulation had the capacity to prevent bacteria development, especially at higher doses, according to an antimicrobial assessment. The synergistic action of the herbal components in the formulation could be the cause of this activity. Stability tests carried out under various storage settings further verified that the cream maintained its overall quality and physical characteristics, indicating that it is suitable for storage and practical usage.

The investigation's findings show that the polyherbal cream's formulation has a lot of potential as a natural skincare product. Combining specific herbal extracts may provide a number of benefits, such as moisturization, nourishment, antioxidant activity, defense against microbial contamination, and assistance in maintaining healthy skin. To determine its long-term safety and therapeutic efficacy, more research involving thorough pharmacological analyses, prolonged stability evaluations, toxicity assessments, and controlled clinical trials is required.

Overall, the results of this study show the significance of polyherbal approaches in creating safe, efficient, and naturally derived skincare preparations with potential cosmetic and pharmaceutical uses, and they support the use of medicinal plant extracts in topical formulations.

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