Formulation and Evaluation of Multipurpose Herbal Cream

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Abstract
The remedies used to improve a person's look are called herbal cosmetics. The current study set out to create a herbal cream with antifungal, antibacterial, anti-acne properties, as well as moisturizing, nourishing, lightening, and treating a range of skin conditions. Various unrefined medications were consumed, including Curcuma longa (turmeric rhizomes), Nirgundi (Vitex negundo Linn), Azadirachta Indica (neem leaves). The cream is prepared by slab Technique. Final samples underwent accelerated stability testing in an environmental chamber with a temperature of 25 ± 10°C and a humidity of 60 ± 10% RH. It was discovered that every product was stable, showing no evidence of phase separation or color change. Additionally, a patch test was performed for sensitivity testing, and there was no indication of any allergic reactions or skin irritation. This work primarily focuses on evaluating the microbiological quality of prepared cosmetics. To everyone's amazement, both formulations passed the microbiological limit tests according to international standards. It has been established that the formulation of herbal cosmetics is safe for use and can be applied as a barrier to protect skin.

Objective: To formulate and evaluate herbal cream using Nirgundi, Curcuma and Neem to give multipurpose effect on health.

Keywords: Turmeric, Neem, Nirgundi, Herbal Cosmetic, Multipurpose Cream.

Introduction
Plant material is a valuable resource for treating a number of severe diseases across the entire world. Traditional practices in medicine, particularly the use of medicinal herbs as pastes, powders, etc. In developing countries, medicinal herbs serve as vital for fulfilling basic health demands. The chemically active substances found in plants and secondary metabolites that can have a specific physiological effect on the human body are what give these herbs their therapeutic importance[1]. Various plant species used in herbalism (also known as "herbology" or "herbal medicine") are included under the phrase "medicinal plant." Various plant species used in herbalism (also known as "herbology" or "herbal medicine") are included under the phrase "medicinal plant." The word “herb” has been derived from the Latin word, “herba” and an old French word “herbe”. These are formulations manufactured as finished herbal products or combination herbal products that may contain excipients in addition to the active herbal constituents, as defined by the world health organization[2]. Cream is defined as semisolid emulsions of the water in oil (w/o) or oil in water (o/w) type that are meant to be applied externally. Cream is divided into two categories: water in oil emulsion and oil in water. Its primary function is to stay longer at the application site when applied to the outer or superficial layers of the skin. A skin cream's purpose is to protect the skin...
from various environmental factors and weather conditions while also providing calming effects. There are various kinds of creams, including massage, night, vanishing, cleansing, cold, and hand and body creams. Our primary goal is to create a herbal cream that has multiple uses, like moisturizer, reduce acne and skin irritation, reduce skin diseases like eczema, psoriasis, dry skin, wrinkles, rashes, etc. and also adding glow to the face. We have used four herbal ingredients in our preparation which are Neem, Nirgundi & Curcuma to reduce pimples and acne and also used for treatment of burn wounds. Neem is used as an antifungal and anti-inflammatory and it is also used to reduce scar, pigmentation, redness and itching of the skin. Curcuma is used to add glow to the skin and to promote wound healing, Nirgundi leaves are beneficial in managing in bacterial and parasitic skin infection and treating acne[3].

**Plant Profile**

1. *Vitex Negundo Linn.*

**Figure 1: Vitex Negundo Linn.**

**Botanical Name:** *Vitex Negundo Linn.*

**Family:** Verbenaceae

**Synonyms:** Sambhalu, Sephali, Nirgundi, Panjgusht, Five leaved chaste tree.

**Biological Source:** It is obtained from the leaves of the plant *Vitex Negundo*.

**Geographical Source:** It is widely spread around the world in Afghanistan, Pakistan, India, Sri Lanka, Thailand, Malaysia, Eastern Africa, Madagascar, America, Europe, China, and the West Indies. It grows in humid environments or alongside water courses in wastelands and mixed open forests[9].

**Chemical Constituents:** Leaves contain an alkaloid nishindine, flavonoids like flavones, luteolin-7, glucoside, casticin, iridioid, glycosides, an essential oil and other constituents like vitamin C, carotene, gluco-nonital, benzoic acid, B-sitosterol, and C-glycoside. Seeds contain hydrocarbons, B-sitosterol and benzoic acid and phthalic acid (Hussain et al., 1992). Anti-inflammatory diterpene, flavanoids, artemetin and triterpenoids[6].

**Medicinal uses of Nirgundi:** Anti-inflammatory, antioxidant, anticonvulsant, hepato-protective and CNS depressant activity. It also exhibits antimicrobial, anti-tumor, insecticidal, hypoglycemic, anti-arthritic. In modern practices, the application of flowers of *V. Negundo* cures fever, diarrhoea, and hepatic problems and the fruits are given in headaches[7].
2. Azadirachta Indica

![Image of Azadirachta Indica](image1)

**Figure 2: Azadirachta Indica**

**Botanical Name:** Azadirachta Indica  
**Family:** Meliaceae  
**Synonyms:** Neem  
**Biological Source:** Fresh or dried leaves and seed oil of Azadirachta Indica.  
**Geographical Source:** It is one of two species in the genus Azadirachta, and is native to the Indian subcontinent. It is typically grown in tropical and semi-tropical regions. Neem trees also grow on islands in Southern Iran.  
**Chemical Constituents:** Natural compounds present in Neem are Triterpenes or Limonoids Azadirachtin, salannin, meliantriol and nimbin are well known the bitter constituents. The nimbin contains an acetoxy, a lactone, an ester, a methoxy and an aldehyde group.[3]  
**Medicinal uses of Neem:** Acne treatment, Oral, skin and hair care, Anti-wrinkle and anti-aging, Skin disorders, Dermatitis prevention, Skin whitening.[5]

3. Turmeric

![Image of Turmeric](image2)

**Figure 3: Curcuma Longa**

**Botanical Name:** Curcuma longa and Curcuma aromatica  
**Family:** Zingiberaceae  
**Synonyms:** Haldi, manjal, Indian saffron curcuma  
**Biological Source:** It is a dried rhizomes of Curcuma Longa  
**Geographical Source:** Turmeric thrives in rainy tropical areas such as the Indian subcontinent and Southeast Asia.  
**Chemical Constituents:** Turmeric powder is about 60-70% carbohydrates 6-13% water, 6-8% proteins, 5-
10% fat, 3-7% dietary mineral, 3-7% essential oils, 2-7% dietary fibre, 1-6% curcuminoids. Phytoconstituents of turmeric include diarylheptanoids, a class including numerous curcuminoids – curcumin, demethoxycurcumin, and bisdemethoxycurcumin.

**Medicinal uses of Turmeric**: When applied topically to aseptic and septic wounds, it seems to have good promise as a wound healing powder. Additionally, it is used to prevent, treat, or manage psoriasis as well as other skin disorders such as acne, burns, eczema, UV damage to the skin, and early ageing. These qualities could provide the skin brightness and shine. Additionally, turmeric may benefit your skin by enhancing its natural brightness[3].

**Methodology Material and Methods**

1) **Collection and Extraction of Plant**
   
1.1) **Collection of Nirgundi (Vitex Negundo) leaves**
   
   Nirgundi leaves were collected from the local botanical garden in Pune.

1.2) **Extraction of Powdered Nirgundi (Vitex negundo) leaves**

   The collected Nirgundi leaves were thoroughly washed in distilled water to remove contaminants. The leaves were chopped into small pieces and dried in the shade for 1 week. Coarsely powder using a mechanical mixer. Powdered leaves of Nirgundi with a total weight of 20 g were extracted by maceration method using 20 ml of 70% ethanol as solvent for about 2 days by covering with aluminum foil with occasional shaking. The ethanolic extract of Nirgundi leaves was filtered and concentrated to dryness under reduced pressure and controlled temperature using a rotary evaporator. The extract was stored in airtight containers in a refrigerator at 4°C until further use[8].

1.3) **Collection of Neem (Azadirachta indica) leaves**

   Neem leaves are collected from herbal garden of Vidya Niketan College Of Pharmacy, Lakhewadi, Indapur, Pune

1.4) **Extraction of powdered Neem (Azadirachta Indica) leaves**

   20 g of fresh Neem leaves paste prepared above was taken. The leaves were extracted with water for 12 hours at room temperature. Extraction was carried out by Maceration method. The supernatant after 4-5 days was filtered out[7].

1.5) **Collection of Turmeric (Curcuma long) Rhizomes**

   Turmeric rhizomes are collected from herbal garden of Akluj.

1.6) **Extraction of Powdered Turmeric (Curcuma long) Rhizomes**

   Preparation of turmeric extract: Take 1 g of turmeric powder in 10 ml of distilled water and shake in a 250 ml volumetric flask heated in a water bath at 80°C to 100°C for 5 to 10 minutes. It is then filtered and turmeric extract is obtained[11].

![Figure 4: Filtered extract of herbs](Image)
2) Development of Multipurpose herbal Cream Formulation

The following table contains ingredients used in a cream formulation.

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Ingredients</th>
<th>Roles</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nirgundi</td>
<td>Antibacterial, Anti parasitic, Anti fungal.</td>
</tr>
<tr>
<td>2</td>
<td>Neem</td>
<td>Promote wound healing, relives skin dryness, itching and dryness</td>
</tr>
<tr>
<td>3</td>
<td>Turmeric</td>
<td>Anti bacterial, Anti parasitic, Anti fungal.</td>
</tr>
<tr>
<td>4</td>
<td>Liquid Paraffin</td>
<td>Lubricating agent</td>
</tr>
<tr>
<td>5</td>
<td>Borax</td>
<td>Emulsifying agent to form soap</td>
</tr>
<tr>
<td>6</td>
<td>Methyl Paraben</td>
<td>Preservatives</td>
</tr>
<tr>
<td>7</td>
<td>Bees Wax</td>
<td>Emulsifying agent, Stabilizer, and give thickness to cream</td>
</tr>
<tr>
<td>8</td>
<td>Rose Oil</td>
<td>Fragrance</td>
</tr>
<tr>
<td>9</td>
<td>Water</td>
<td>Vehicle</td>
</tr>
</tbody>
</table>

Method

The cream was created using a base consisting of beeswax, liquid paraffin, borax, methylparaben, distilled water, rose oil, nirgundi and neem leaves, and curcumin. Using the slab technique, often referred to as the important approach, all of the excipients and herbal extracts were combined in a geometric and homogenous combination to make the cream. We have used the slab approach to produce three batches of our herbal cream, designated F1, F2 and F3. Each of the three batches was evaluated based on a number of factors, such as phase separation, viscosity, pH, and appearance[4].

Formulation of Cream

Slab method

The ingredients are combined until a homogenous mixture is achieved. One small-scale method uses an ointment mill, while the other uses impromptu compounding. Hard rubber spatulas can be used if an ointment's ingredients react with metal. Place this cream onto the slab, stir it in a geometric pattern to combine all the components and give it a smooth texture, and add a few drops of distilled water as needed. This process of preparing cream is known as the slab technique or the extemporaneous approach. Heat liquid paraffin and beeswax in a borosilicate glass beaker at 75°C and maintain that heating temperature (Oil phase). In another beaker, dissolve borax, propyl paraben indistilled water and heat this beaker to 75°C to dissolve borax and Propyl paraben and to get a clear solution (Aqueous phase). Then slowly add this aqueous phase to heated oily phase. Then add a measured amount of Neem extract, Nirgundi extract, turmeric extract and stir vigorously in a ice containing water bath until it forms a smooth cream. Then add few drops of rose oil as a fragrance. Put this cream on the slab and add few drops of distilled water if necessary and mix the cream in a geometric manner on the slab to give a smooth texture to the cream and to mix all the ingredients properly. This method is called as slab technique or extemporaneous method of preparation of cream[10].
Figure 5: Slab

Figure 6: Cream Prepared by Slab Technique

Table 2: Formulation of Multipurpose Herbal Cream [10][14].

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Ingredients</th>
<th>Batch F1</th>
<th>Batch F2</th>
<th>Batch F3</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Nirgundi Extract</td>
<td>0.9 ml</td>
<td>1 ml</td>
<td>1.1 ml</td>
</tr>
<tr>
<td>2</td>
<td>Neem Extract</td>
<td>0.4 ml</td>
<td>0.5 ml</td>
<td>0.6 ml</td>
</tr>
<tr>
<td>3</td>
<td>Turmeric Extract</td>
<td>1.7 ml</td>
<td>2.1 ml</td>
<td>2.5 ml</td>
</tr>
<tr>
<td>4</td>
<td>Bees Wax</td>
<td>3.5 gm</td>
<td>4.5 gm</td>
<td>5.5 gm</td>
</tr>
<tr>
<td>5</td>
<td>Borax</td>
<td>0.4 gm</td>
<td>0.5 gm</td>
<td>0.6 gm</td>
</tr>
<tr>
<td>6</td>
<td>Propyl Paraben</td>
<td>0.4 gm</td>
<td>0.5 gm</td>
<td>0.45 gm</td>
</tr>
<tr>
<td>7</td>
<td>Liquid Paraffin</td>
<td>16 ml</td>
<td>16.5 ml</td>
<td>17 ml</td>
</tr>
<tr>
<td>8</td>
<td>Rose Oil</td>
<td>Q.S.</td>
<td>Q.S.</td>
<td>Q.S.</td>
</tr>
<tr>
<td>9</td>
<td>Distilled Water</td>
<td>Upto 30 gm</td>
<td>Upto 30 gm</td>
<td>Upto 30 gm</td>
</tr>
</tbody>
</table>
3) Evaluation of Developed Cream Formulation

1. Physical Evaluation:
In this test, the cream was observed for color, odor, texture, state\textsuperscript{[15]}.

Irritancy:
Mark the area (1 cm\textsuperscript{2}) on the left-hand dorsal surface. Then the cream was applied to that area and the time was noted. Then it is checked for irritancy, erythema, and edema if any for an interval up to 24 hrs and reported.

Wash Ability:
A small amount of cream was applied on the hand and it is then washed with tap water\textsuperscript{[15]}.

pH:
0.5 g cream was taken and dispersed in 50 ml distilled water and then PH was measured by using digital pH meter\textsuperscript{[17]}.

Phase Separation:
Prepared cream was kept in a closed container at a temperature of 15-45\textdegree C away from light. Then phase separation was checked for 24 hrs for 30 days. Any change in the phase separation was observed/checked\textsuperscript{[1]}.

Spread Ability:
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 sets of 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 other slide was placed on the 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 weight tied to it. The time taken by the upper slide to slip off was noted\textsuperscript{[16]}.

\[
\text{Spread Ability} = \frac{m \times l}{t}
\]

Where,
\(m\) = Standard weight which is tied to or placed over the upper slide (50g)
\(l\) = length of a glass slide (5 cm)
\(t\) = time taken in seconds.

Greasiness:
Here the cream was applied on the skin surface in the form of smear and checked if the smear was oily or grease-like.
Stability Study:-
Stability testing is done for the formulation batches conducted for various conditions like nature, texture, colour, odour, etc for definite period of time and check the stability of the cream.

RESULT
1. Physical parameter

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Batch A</th>
<th>Batch B</th>
<th>Batch C</th>
</tr>
</thead>
<tbody>
<tr>
<td>Colour</td>
<td>Yellowish white</td>
<td>Yellowish white</td>
<td>Yellowish white</td>
</tr>
<tr>
<td>Odour</td>
<td>Characteristics</td>
<td>Characteristics</td>
<td>Characteristics</td>
</tr>
<tr>
<td>Texture</td>
<td>Smooth</td>
<td>Smooth</td>
<td>Smooth</td>
</tr>
<tr>
<td>State</td>
<td>Semi solid</td>
<td>Semi solid</td>
<td>Semi solid</td>
</tr>
</tbody>
</table>

2. Irritancy:
The formulated cream does not cause any type of irritancy, erythema, and edema in an interval up to 24 hrs and reported.
The picture showing result after 24 hours.

![Figure 8: Result of Applying cream](image1)

3. Washability Study
Washability test was carried out by applying a small amount of cream on the hand and then washing with the help of tap water.
Formulation were easily washable.

![Figure 9: Result of After Applying cream](image2)
4. pH

Table 4: pH

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Batch A</th>
<th>Batch B</th>
<th>Batch C</th>
</tr>
</thead>
<tbody>
<tr>
<td>pH</td>
<td>6.02</td>
<td>6.20</td>
<td>6.03</td>
</tr>
</tbody>
</table>

5. Phase Separation

Table 5: Phase Separation

<table>
<thead>
<tr>
<th>Formulation</th>
<th>Observation</th>
<th>Inference</th>
</tr>
</thead>
<tbody>
<tr>
<td>F1</td>
<td>No phase separation</td>
<td>Stable</td>
</tr>
<tr>
<td>F2</td>
<td>No phase separation</td>
<td>Stable</td>
</tr>
<tr>
<td>F3</td>
<td>No phase separation</td>
<td>Stable</td>
</tr>
</tbody>
</table>

6. Spreads Ability Study Result
Figure 13: Etermination Of Spread Ability

Spread Ability = m × l/t
Spread Ability = 50 × 2.6/15
Spread Ability = 8.66 g.cm/s

7. Greasiness
We applied the cream on the skin surface in the form of smear and checked if the smear is grease like.

8. Stability Study
Stability testing for all formulated batches was conducted under various environmental conditions and check nature, texture, colour, odour, etc. For definite period of time and we observed no any changes in formulation.

Table 6: Stability Study

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Initial stage</th>
<th>15 days</th>
<th>30 days</th>
<th>45 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nature</td>
<td>Sticky</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Colour</td>
<td>Yellowish White</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Odour</td>
<td>Characteristics</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
<tr>
<td>Texture</td>
<td>Smooth</td>
<td>No change</td>
<td>No change</td>
<td>No change</td>
</tr>
</tbody>
</table>

Conclusion
The cream exhibited a multifunctional impact through the use of turmeric, neem, and nirgundi, and each of the herbal constituents shown distinct and noteworthy activities. We can conclude from the results that all three formulations- F1C, F2C, and F3C were stable at room temperature and could be applied to the skin without risk. Thus, it can be concluded that the formulation of F2C herbal cream is superior to that of F1C and F3C. The potential of plant extracts for cosmetic purposes is the main focus of the current study. The personal care system has seen a multiplication in the usage of cosmetics. The use of bioactive ingredients in cosmetics affects the skin's biological processes and supplies the nutrients required for healthy skin. Throughout the trial period, the produced formulation shown high consistency, good spreadability, and no signs of phase separation. The best qualities and nutritional value of the prepared herbal cream are achieved with minimal chemicals, protecting the skin from a variety of skin problems. The cream is also inexpensive because it was made with basic materials and a straightforward procedure. The herbal cosmetic formulation can be applied as a barrier to protect skin and is safe to use. The results of various cream tests indicated that the formulation may be applied topically to shield skin from harm. Natural cures are more widely accepted because it is thought that they are less harmful and have fewer adverse effects than synthetic ones. Additional investigation will be conducted to verify the formulation's synergistic effect scientifically.

References
1. Rajashri Dhonnar, Mona Agarwal, Dr. Yogesh Agarwal Formulation of Antifungal Polyherbal Formulation and Evaluation of In-Vitro Antifungal Activity World Journal of Pharmaceutical


