International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 30, Issue 8, August 2024 pp 216-228. **ijppr.humanjournals.com** ISSN: 2349-7203

Formulation and Evaluation of Herbal Cream Using *Lantana camara* Plant

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Received: 2024-08-01 Revised: 2024-08-05 Accepted: 2024-08-10

ABSTRACT

The aim of this work is to formulate and evaluate an anti-itching cream containing *Lantana camara* leaves, specifically focusing on the extracted beta-caryophyllene, which is known for its anti-itching and antifungal properties. This cream is prepared using a combination of natural herbal and chemical ingredients sourced from local and online markets. All ingredients were accurately weighed and thoroughly mixed. The formulated cream underwent physicochemical evaluation, irritancy testing, and stability studies. The cream includes *Lantana camara* leaves for their anti-itching and antifungal properties, neem for soothing inflamed skin and regulating oil production, and methyl paraben to prevent microbial contamination. The study concluded that the F2 formulation of the itching cream demonstrated favorable physical parameters and was free from skin irritation. Further optimization studies are required to fully ascertain the benefits for human use. The present work is planned with the following objectives.

Keywords- Itching cream, Beta caryophyllene, Evaluation, Characterization, Formulation.

INTRODUCTION:

Lantana camara, commonly known as lantana, is a vibrant and versatile plant native to the tropical and subtropical regions of the Americas. Renowned for its colorful and resilient flowers, lantana is frequently used in gardens and landscapes for its aesthetic appeal and hardy nature. The plant produces clusters of small, tubular blooms in a wide range of colors, including red, orange, yellow, and pink, which often change hues as they mature. Beyond its ornamental value, Lantana camara has garnered attention for its potential medicinal properties and ecological impact. While it is celebrated for attracting butterflies and pollinators, it can also be invasive in certain environments, affecting local biodiversity. Understanding the multifaceted nature of Lantana camara involves exploring its horticultural uses, ecological significance, and the precautions necessary to manage its spread [1].

Itching, or pruritus, is a bothersome sensation that prompts scratching, which can provide temporary relief but may worsen the irritation or damage the skin. Itching can be localized or widespread and may occur with rashes or hives. Although similar to pain in that both involve unpleasant sensations and unmyelinated nerve fibers in the skin, itching triggers a scratch reflex, while pain usually causes a withdrawal reflex. Common causes of itching include allergies, skin conditions, irritants, parasites, pregnancy, and underlying medical issues like liver, kidney, or thyroid diseases. Treatment options vary from self-care measures, such as avoiding allergens and using moisturizers, to medical intervention for persistent or severe cases [2].

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Lantana camara

Figure 1: Lantana Camara

In plants, secondary metabolites are synthesized de novo from primary metabolites and cover a broad range of plant natural compounds such as flavonoids or terpenes that have held great value in commercial sectors which include pharmaceuticals (drugs), agrochemicals(insecticides/pesticides), flavors, fragrances(fragrant oils used to scent content like perfumes & personal care products) colors(used for food additives), biopesticides. A plant that belongs to the family Verbenaceae is Lantana camara called as wild or red sage. This common but much-loathed weed and popular ornamental garden plant has enormous medicinal potential. L. camara is indigenous to tropical and subtropical America, it successfully grows under broad range of climates from tropic climate down to temperate regions up until an altitude 2000m above sea level. The plant has woody stems, flowers in a range of colours with spines or prickles. Herbal medicine uses its oil and extracts to treat cases of skin itches, leprosy, cancers, chicken pox, measles, asthma ulcers tumors high blood pressure tetanus and rheumatism. This therapeutic potential is associated to its numerous bioactive substances which are steroidal, triterpenoid saponin glycosides oligosaccharide iridoids irridiods and naphthoquinones and phenylpropanoid glycosides [3].

Scientific Classification and Plant Description Family:

- **Scientific name:** Lantana camara
- **Subkingdom:** Tracheobionta
- **Super division:** Spermatophyta
- **Division:** Magnoliopsida
- **Subclass:** Asteridae
- **Genus:** Lantana
- **Family:** Verbenaceae
- **Kingdom:** Plantae
- **Order:**Lamiales
- **Synonyms:** Lantana viburnoides

The upright, robust lantana camara shrub can reach a maximum height of four meters. The leaf measures 2–10 cm in length and 2–6 cm in breadth, giving it an ovate or ovate-oblong shape. With the aid of support, it may rise up to 15 meters. Its leaves are robust, green, and have fine hairs. Its smell is strong. If the conditions are right, it can grow easily, and in the months of March and August, flowers typically occur. The fruit has two nutlets and is green in color. It is drupaceous. A mature plant can yield up to 2000 seeds per year. L. camara has incredibly robust roots, consisting of numerous tiny side roots and a main taproot.

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Parts Used: Apart from the whole plant, seeds, stem, root, leaves and flowers are also used [4].

Figure 2: Lantana camara leaves

Despite the apparent uniform profile of all the samples, a quantitative chemical heterogeneity was noted, with a notable difference in the contents of the major components. The samples' chemical compositions were characterized by a high percentage of monoterpene hydrocarbons, such as sabinene (up to 9.0%), and sesquiterpene hydrocarbons, such as (E)-□-caryophyllene (40.8%) and □-humulene (21.2%). Notably, compared to other samples, Blokauss' oil had a low concentration of sabinene (0.4%). In addition to λ-elemene (up to 3.5%), four other components were detected at notable contents: bicyclogermacrene (7.9%), germacrene D (6.9%), and η-pinene (4.4%). In contrast, the following oxygenated molecules have low representation: (E)-nerolidol, -cardanol (0.0–1.0%), panthenol (0.2–1.5%), sesquithuriferol (0.3–1.7%), and linalool (0.4–1.9%). Caryophyllene oxide concentrations rose to 4.9% in one.

MATERIALS AND METHOD:

Chemicals, plants and their extracts

All the material used in formulation, evaluation and other experiment are listed below.

1. Lantana Camara Leaves: It contains antimicrobial, fungicidal, anti-itching, insecticidal properties, which help reduce irritancy.

2. Neem oil: Its sooths the redness and irritations. It also softens and moistens dry cracked skin.

3. Sat Loban: It has antiseptic and anti-inflammatory properties, it stops bleeding and burning sensation.

4. Methyl Paraben: It prevents harmful mold, bacteria, and fungi from infecting your products.

5. Tea tree oil: There are a number of advantages to applying tea tree oil topically. For instance, it might aid in the treatment of a few skin issues like oily skin, acne, and itching. It might also aid the healing of wounds.

6. Glycerine: Glycerine functions as a humectant, a chemical that helps the skin hold onto moisture, making it a fantastic material for the skin. It can improve skin moisture, alleviate dryness, and revitalize the epidermis.

7. Cream Base:

a) It is a thickening, emulsifying and stabilizing polymer.

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Table 1: List of Ingredients

Sl. No	Common Name	Figure	Category
1.	Lantana Camara Leaves		It contains antimicrobial, fungicidal, anti-itching, insecticidal property.
2.	Neem oil		Neem has an anti-inflammatory property which helps reduces acne
3.	Glycerine		Being a humectant—a chemical that helps the skin retain moisture—glycerine is excellent for the skin. It can improve the moisture content of the skin, alleviate dryness, and revitalize the epidermis.
4.	Tea tree oil		Tea tree oil has well-established antibacterial, antifungal, and antioxidant properties that promote healing and lessen inflammation.

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5.	Sat Loban		It has anti-inflammatory property and burning sensation.
6.	Methyl Paraben		It prevents harmful mold, bacteria, and fungi from infecting your products.
7.	Cream Base		It is a thickening, emulsifying and stabilizing polymer

Table 2: Formulation Table

Sl. No	Ingredients	F1	F2	F3	F4
1.	Beta caryophyllene	0.5%	1%	2%	3%
2.	Neem oil	1ml	1ml	1ml	1ml
3.	Tea tree oil	Q. S	Q. S	Q. S	Q. S
4.	Methyl paraben	3%	3%	3%	3%
5.	Sat Loban	4%	4%	4%	4%
6.	Glycerine	1ml	1ml	1ml	1ml
7.	Cream Base	Q. S	Q. S	Q. S	Q. S

PREPARATION OF SKIN ITCHING CREAM

All the chemical, herbal ingredients and the cream base way supplied by

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1. Preparation of Extracts

Soxhlet extraction: Using a porous bag or "thimble" made of cellulose or sturdy filter paper, a finely ground material is placed within the thimble chamber of the Soxhlet apparatus. Heated in the bottom flask, the extraction solvents evaporate into the sample thimble, condense in the condenser, and then drip back. The procedure is repeated after the liquid content reaches the siphon arm and empties into the bottom flask once more [6-8].

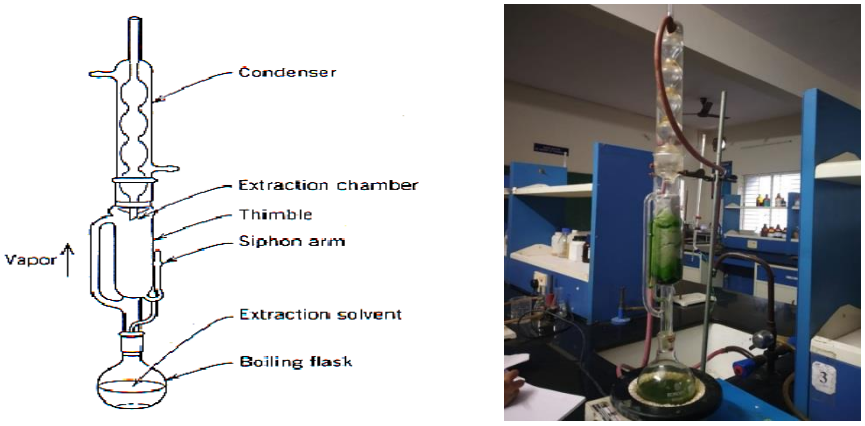

Figure 3: Soxhlet extraction

The lantana camara leaves collected weighed (100gm), cut into a small piece, The small pieces of lantana camara leaves are add into the thimble apparatus and add (1000ml) ethanol in a round bottom flask. Then the willow bark powder was mixed with 300ml of methyl alcohol. Set up for Soxhlet apparatus for extraction. And started to boil up to 40°c.

The set up Soxhlet apertured for 6 to 7 cycles repeatedly until the complete extraction was done. Content was filtered out; filtrate was allowed to evaporate in evaporating pan until the desired concentration of extract was obtained [9-12].

Formula for Percent Yield

$$\text{Percent yield} = \frac{\text{Actual Yield}}{\text{Theoretical Yield}} \times 100\%$$

Table 3. Chemical test for terpenoids[10]

Test	Result	Inference
Liebermann-Burchard Test: Drug is mixed with acetic anhydride to this con.H_2SO_4 is added.	forms layer with brown colour at junction upper layer with green colour and lower red colour layer shows terpenoids.	Present
Salkowski Test: The extract 5ml is mixed with 2ml chloroform and this 3ml con.H_2SO_4 is added.	A reddish-brown colour shows presence of terpenoids.	Present
Sulphur powder Test: Sulphur is added to mixture of drug	Sulphur sinks down.	Present
Trichloroacetic acid Test: Sample + Trichloroacetic acid	Coloured ppt	Present
Zimmer Mann Test: Meta dinitrobenzene solution is added to the alcoholic solution of the drug.	Presence of violet colour	present

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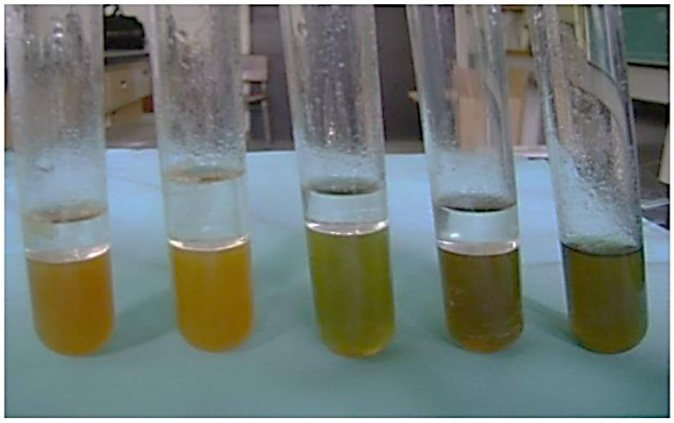

I II III IV V

- I: Salkowski Test
- II: Sulphur powder Test
- III: Liebermann-Burchard Test
- IV: Trichloroacetic acid Test
- V: Zimmermann Test

Thin layer chromatography:

TLC operates on the tenet that mixture components are separated into distinct analytes as the mobile phase passes through the stationary phase, which supports a solid or liquid. Analyte migration between the stationary and mobile phases determines when this separation happens. Low-affinity components elute first, and those with higher affinity for the stationary phase elute later.

There are two main categories of TLC methods:

1) Normal Phase TLC: This kind has a non-polar mobile phase and a polar stationary phase.
2) Reverse Phase TLC: This kind has a polar mobile phase and a non-polar stationary phase.11

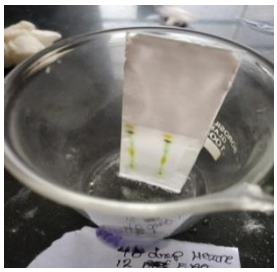

Figure 4: Thin layer chromatography

Procedure: -

1. First prepared silica slurry by using silica gel powder and chloroform in a proper proportion.
2. Now take glass slide and put / pour the silica gel on slide and then put that slide in hot air oven for 30 min.

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3. After 30 min the stationary phase become solid and drug.
4. Now prepared a development take and filled with mobile phase (solvent).
5. Prepared 3 different chambers with different proportion of solvent.

I. 20% = 16 drops = Hexane

i. 4 drops = EAA

II. 40% = 32 drops = Hexane

i. 8 drops = EAA

III. 60% = 48 drops = Hexane

i. 12 drops = EAA

6. Now put the 3 different slides in a 3 different development tanks.
7. After 30 min remove the slide and marked the spots.
8. Now determine the distance travelled by solute from base line by using formula.
9. Rf value = Distance travelled by solute / Distance travelled by solvent

After performing the calculation got some results.

$$0.9/2.4 = 0.375$$

This calculation is got from the sample which contain 40% solvent. This confirms presence of Beta caryophyllene.

Column Chromatography: -

Principle: - Fundamental idea: Column chromatography is based on the idea that a solution's solutes will adsorb through a stationary phase, separating the mixture into its constituent parts. The affinity for the fixed and mobile phases is necessary for this. Less affinity-driven molecules elute first, and those with higher affinity for the stationary phase elute later. The process of column chromatography involves separating the desired components from a mixture and letting them pass through the top of a glass or plastic column that has sinter frits to hold the packing in place. The liquid solvent descends through the adsorbent-filled column as a result of air pressure or gravity. The liquid obtained at the bottom of column is termed eluent. Equilibrium is established between the adsorbed solute and the solvent flowing down through the column [13].

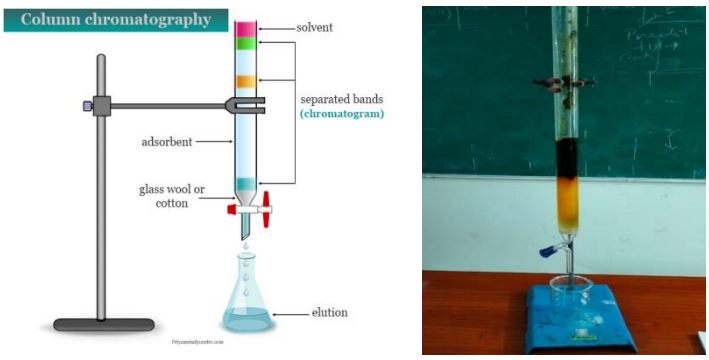

Figure 5: Column Chromatography Procedure: -

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1. First clean the all apparatus with acetic acid. And set up the glass column with stand.

2. Prepare the slurry of Silica gel mesh 600 to 1000 and chloroform in beaker, consider its solution A.

3. In another beaker prepare the slurry of silica gel, Hexane and Extract sample, consider its solution B.

4. First put slurry solution A in glass column then after 5 min again put slurry solution B.

5. Then 10% solution (1 ml Ethyl Acetate + 9ml Hexane) add in glass column and observe the release separate compound.

6. This step repeated as 20% (2ml Ethyl Acetate + 8ml Hexane), 30% (3ml Ethyl Acetate + 7ml Hexane), 40% (4ml Ethyl Acetate + 6ml Hexane). This process of obtaining the components from the chromatogram is termed elution.

7. After development, when each component reaches the column end and is released out it is collected separately in beakers.

Development of formulation

i. Various formulation batches were prepared according to the table, the desired concentration of ingredients was weighed accurately.

ii.The ingredients like neem oil, glycerine was dispersed in cream base with moderate stirring and tea tree oil is added to the above oily phase.

iii.Desired quantity of methyl paraben was dissolved in 2ml of distilled water by gentle heating. Willow bark extract is added to the above aqueous solution, vitamin-E, aloe vera and salicylic acid were added to the above aqueous solution mix well.

iv.Take the oily phase in China dish and kept it on water bath (50^0C). Aqueous phase transferred drop by drop to oily phase with continuous stirring until the cream is formed.

EVALUATION OF ITCHING CREAM

1. Organoleptic Evaluation

2. Physicochemical evaluation

3. Irritancy test

4. Stability studies

1. Organoleptic assessment: Physical characteristics like texture, color, and appearance were measured. Vision and touch perception, respectively, were used to assess color and texture. Five individuals who are sensitive to odors were chosen as a team for the smell evaluation.

2. Analysis of Physicochemical: Data The measurement of physicochemical characteristics, such as pH, moisture content, and spread ability, was done.

a) The cream's pH: A standard buffer solution was used to calibrate the pH meter. The cream was weighed out to be about 0.5 g, dissolved in 50 cc of pure water, and the pH was recorded.15

b) Moisture Content Loss on Drying: The moisture content loss experienced by the air-dried herbal face pack samples was examined. This was done with at least 0.5–1.0g of material. A precise measurement of the sample was made in a glass bottle, and the starting weight was determined. The sample was baked for three hours in an oven that was kept between 105 and 110°C. It was then allowed to cool to room temperature in desiccators before being weighed.

c) Spread ability: A Multimer et al.-recommended apparatus that was built in a lab and utilized for research was used to measure the spread ability of formulations. The device is made out of a wooden block with a stationary glass slide and a moving glass slide attached to a weight pan that is rolled on a pulley at a level with the stationary slide.15

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3. Anger Assessment: On the dorsal surface of your left hand, mark a square centimeter. Amounts of ready-made face packs were applied to the designated region, and the duration was recorded. For a full day, any signs of irritability, redness, or swelling were monitored at frequent intervals.12

4. Analysis of stability: For two months, the acne cream was kept at three distinct temperatures—8°C, 27°C, and 40°C—as part of a stability study.

RESULT:

Table 4: Organoleptic Evaluation

Sl. No	Parameter	F1	F2	F3	F4
1.	Color	Light Yellowish white	Light Yellowish white	Light Yellowish white	Light Yellowish white
2.	Odor	Pleasant	Pleasant	Pleasant	Pleasant
3.	Appearance	Smooth	Smooth	Smooth	Smooth
4.	Texture	Fine	Fine	Fine	Fine
5.	Smoothness	Smooth	Smooth	Smooth	Smooth

Table 3 displays the organoleptic parameters that were assessed for itching cream. The formulation had a light yellowish white color. The created compositions had a lovely smell. Smoothness, texture, and appearance were all acceptable in accordance with the specifications of cosmetic formulas.

Table 5: Physicochemical Evaluation

Sl. No	Parameter	F1	F2	F3	F4
1.	pH	4.4	5.9	6.9	7.1
2.	Loss on Drying	2.1	2.4	2.6	2.7
3.	Spreadability (g/sec)	46.3±0.2	46.1±0.1	46.3±0.1	46.2±0.5
4.	Particle size(µm)	25-30µm.	25 -30µm.	25 -30µm.	25 -30µm.

Itching cream was evaluated for physicochemical parameters showed in the **Table 5**. The pH of F1, F2 and F3 formulation was found close to neutral. The moisture content was within limit. Spreadability is good in all the formulations. The particle size of formulations was found in the range of 25-30µm.

Table 6: Irritancy Test

Sl. No.	Parameter	F1	F2	F3	F4
1.	Irritation	No	No	Yes	Yes
2.	Redness	No	No	No	Yes
3.	Swelling	No	No	No	No

Table 5 displayed the irritancy test findings. In irritancy testing, the formulations F1 and F2 exhibited no redness, swelling, or irritation. It is safe to use this mixture on skin.

Table 7: Stability Test

Sr. No	Parameter	F1	F2	F3	F4
1.	Colour	No change	No change	Change	Change
2.	Odour	No change	No change	Change	Change
3.	pH	4.7	6.0	6.3	6.9
4.	Texture	Fine	Fine	Fine	Fine
5.	Smoothness	Smooth	Smooth	Smooth	Smooth

The results of stability were shown in **Table 7**. No change in colour, Odor, texture and smoothness was observed in F2 at mentioned conditions of stability except pH.

DISCUSSION:

The evaluation of the herbal cream formulations using Lantana camara was conducted across several parameters to determine their suitability for use as an anti-itching agent. The results from the organoleptic, physicochemical, irritancy, and stability tests provide a comprehensive view of the cream's performance and potential.

Organoleptic Evaluation:

Table 4 shows that all formulations (F1, F2, F3, F4) exhibited a light yellowish-white color, pleasant odor, smooth appearance, fine texture, and smoothness. These characteristics align with the expected standards for cosmetic creams, indicating that the formulations have an appealing sensory profile. Consistency in these parameters across all formulations suggests that the addition of Lantana camara extract did not adversely affect the sensory attributes of the cream.

Physicochemical Evaluation:

The physicochemical properties of the creams, as detailed in Table 5, were generally favorable. The pH values of formulations F1, F2, and F3 were close to neutral, which is ideal for maintaining skin health and minimizing potential irritation. However, the pH of F4 was slightly higher, which might affect its compatibility with certain skin types or conditions. Loss on drying values were within acceptable limits for all formulations, indicating adequate moisture content and stability. Spreadability, a critical factor for ease of application, was consistent and satisfactory across all formulations, suggesting that the cream performs well in terms of application and coverage.

The particle size of all formulations was in the range of 25-30µm, ensuring that the cream has a fine texture that is likely to be well-absorbed by the skin.

Irritancy Test:

The irritancy test results, presented in Table 6, indicate that formulations F1 and F2 did not produce any redness, swelling, or irritation, demonstrating their safety for topical use. In contrast, formulations F3 and F4 exhibited some irritation and redness, which could be attributed to the variations in their pH or the concentration of the active ingredients. This suggests that while F1 and F2 are safe for use, F3 and F4 may require further optimization to reduce their irritancy.

Stability Test:

According to Table 7, F2 showed stability in terms of color, odor, texture, and smoothness, though there was a slight change in pH. This formulation appears to maintain its quality over time, making it a promising candidate for long-term use. Formulations F3 and F4 showed changes in color and odor, which might indicate potential degradation or chemical instability under the tested conditions. The pH changes in these formulations also suggest that their stability might be compromised.

CONCLUSION:

The need for herbal medication formulations is rising in the modern day. Plants are known for having a wide variety of chemical moieties with a wide range of pharmacological characteristics. From medicinal plants, numerous potent and effective medications have been extracted to cure terrible illnesses. Therefore, it is abundantly evident that research on medicinal plants is crucial for human welfare in terms of producing herbal medications. Among the essential therapeutic plants that have been utilized throughout history in traditional medicine is lantana camara.

The formulation and evaluation of itching cream were prepared successfully by using Lantana Camara leaves. This study shows that during the manufacture of the anti-itching cream by Lantana camara leaves. The chief constituent beta caryophyllene may be utilized as nature source for isolation of caryophyllene.

The Soxhlet extraction method was utilized to extract the leaves of Lantana camara. The four formulations [F1, F2, F3, F4] were created, with the F2 formulation demonstrating better outcomes in reducing inflammation and treating itching in order to avoid itching issues on the body. We discovered that the anti-itching lotion has good qualities, but more research is required to confirm any additional beneficial effects.

The overall study is useful to substantiate product claims due to its useful benefits on human beings.

ACKNOWLEDGEMENT:

The authors are thankful to Guide Mr. Chetankumar M. "Department of Pharmaceutics, BLDEAS SSM College of Pharmacy and Research Centre, Vijayapura, Karnataka, India-586103 for encouraging the research work.

FINANCIAL ASSISTANCE:

Nil

CONFLICT OF INTEREST:

The authors declare no conflict of interest.

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How to cite this article:
Chetankumar M et al. Ijppr.Human, 2024; Vol. 30 (8): 216-228.

Conflict of Interest Statement: All authors have nothing else to disclose.

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International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 30, Issue 8, August 2024 pp 216-228. **ijppr.humanjournals.com** ISSN: 2349-7203

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