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Research Article

Formulation And Evaluation of Herbal Cream Containing Cassia Fistula Linn Flower (Aragwadha Pushpa) For Acne

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ABSTRACT

Acne is a prevalent dermatological issue, especially among adolescents and young adults, with conventional treatments often causing side effects such as dryness, irritation, and antimicrobial resistance. This study aims to develop and evaluate an herbal cream formulated with Cassia fistula Linn (Aragwadha Pushpa) flower extract, traditionally known for its anti-inflammatory, antimicrobial, and antioxidant properties, to address acne in a gentler, natural way. Utilizing an emulsification process with almond oil, beeswax, and borax as emulsifiers, the cream was assessed for physical, chemical, microbial, and efficacy properties. Results revealed that the cream formulation had a favorable pH (5.5-6.5), optimal spreadability, and effective inhibition of Propionibacterium acnes and Staphylococcus epidermidis. The study demonstrates the potential of Cassia fistula as a natural ingredient in acne treatment formulations. Further research could enhance formulation stability and validate clinical efficacy in broader populations.

INTRODUCTION

Acne is a widespread skin condition affecting adolescents and young adults globally, with common symptoms like inflammation, pustules, and come dones. The causes are complex, involving hormonal shifts, excess sebum production, and bacterial growth, particularly of Propionibacterium acnes and Staphylococcus epidermidis. Although conventional treatments such as antibiotics, benzoyl peroxide, and retinoids are available, they often bring side effects like dryness, irritation, and antibiotic resistance over prolonged use. This has increased interest in natural alternatives that offer effective acne management without adverse effects.

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One such promising natural remedy is *Cassia fistula*, also known as Indian laburnum or Aragwadha in Ayurveda. Historically valued for its therapeutic benefits, *Cassia fistula* is rich in bioactive compounds such as flavonoids, tannins, and chrysophanic acid, which have anti-inflammatory, antioxidant, and antibacterial properties. These properties make *Cassia fistula* an effective agent against acne-causing bacteria and inflammation. The plant's flowers, in particular, have been incorporated in traditional skincare for treating various skin ailments, as they reduce inflammation, control bacterial growth, and support the skin's natural healing processes.

Studies have shown that *Cassia fistula* exhibits significant antibacterial activity against *Propionibacterium acnes* and *Staphylococcus epidermidis*, two bacteria involved in acne development. Its anti-inflammatory effects also help reduce redness and swelling in acne lesions. Furthermore, chrysophanic acid, a bioactive component of *Cassia fistula*, functions as both an anti-inflammatory and mild exfoliant, assisting in unclogging pores and thus preventing new breakouts. Formulating *Cassia fistula* in a cream base offers an effective topical approach, allowing direct delivery of active compounds to the skin. Combining it with natural ingredients like almond oil and beeswax enhances the cream's properties. Almond oil provides essential fatty acids that nourish and moisturize, while beeswax helps stabilize the formula and forms a barrier to lock in moisture and aid in skin repair. This formulation aims to treat acne and promote skin health, appealing to consumers seeking gentle, nature-based skincare solutions. This study aims to develop and evaluate an herbal cream with *Cassia fistula* flower extract to assess its potential as a natural acne treatment. By harnessing *Cassia fistula*'s antibacterial and anti-inflammatory effects, this research seeks to provide a safe, effective, and affordable alternative for acne management that aligns with consumer demand for plant-based skincare.

Materials:

Table 1: Uses of ingredients[12]

Ingredients	Uses
Cassia fistula Linn flower powder (Aragwadha pushpa)	Herbal drug
Bees wax Almond oil	Oil Phase
Borax	Water Phase
Rose water	Flavoring Agent
Methyl paraben Propyl paraben	Preservative

Authentication

The plant material collected was identified and authenticated by Dr. M Devika, Principal, Sarada Vilas College, Krishnamurthypuram, Mysuru.

Methodology:

Here's the revised version with the group perspective:

Collection and Preparation of Cassia Fistula Flower Powder:

Fresh *Cassia fistula* flowers were collected and carefully cleaned to remove any dirt. They were then dried in a shaded area to preserve their natural active compounds. Once dried, the flowers were ground into a fine powder and sieved to achieve a uniform texture, suitable for use in the cream formulation.

Preparation of the Oil Phase:

The oil phase was prepared by weighing out beeswax and almond oil, which were then melted

together in a water bath at 70°C. The mixture was stirred continuously until it was fully melted and homogeneous, then removed from the heat and allowed to cool slightly for the next steps.

Preparation of the Water Phase and Emulsification:

Borax was dissolved in distilled water to create a borax solution. This solution was carefully added to the melted oil phase while stirring steadily. The emulsification process created a smooth, creamy consistency, ensuring the stability of the final product.

Incorporation of Active Ingredients:

A paste was prepared by mixing Cassia fistula flower powder with warm water. This paste was then added to the emulsified base. The mixture was thoroughly stirred to ensure that the active ingredients were evenly distributed throughout the cream.

Addition of Preservatives and Rose Water:

A blend of methylparaben and propylparaben was added to the cream to prevent microbial growth and ensure its safety. Rose water was incorporated to provide a natural fragrance and enhance the cream's appeal. The ingredients were mixed well to ensure a smooth and well-balanced product.

Packaging and Storage:

The finished cream was transferred into clean, airtight containers and labeled with the necessary product details. The containers were then stored in a cool, dry place, away from direct sunlight, to preserve the cream's freshness and ensure its stability over time.

EVALUATION:

Sensory Evaluation:

A group of testers evaluated the cream's color, odor, texture, and skin feel. Each property was rated on a scale from 1 (worst) to 5 (excellent). This helped gauge the cream's overall appeal and user experience.

Spreadability Test:

The spreadability of the cream was tested by applying a known weight on a specified amount of cream and measuring the resulting spread area. The spreadability was calculated as the spread area in mm^2, providing an indication of how easily the cream could be applied.

Microbial Limit Test:

To ensure the cream's safety, tests for Escherichia coli and Staphylococcus aureus were conducted using selective media. The samples were incubated and monitored for any bacterial growth, confirming that the cream met safety standards.

Viscosity Measurement:

Viscosity was measured using a Brookfield Viscometer with spindle no. 1 at 25°C, taking readings at different speeds. This test ensured that the cream had the right consistency and spreadability, making it easy to apply smoothly.

Percentage Yield:

The percentage yield of the cream was determined by comparing the final product weight to the total weight of raw materials used. This value helped assess the efficiency of the formulation process, ensuring consistency and quality in the final product.

pH Measurement:

The pH of the cream was measured using a digital pH meter. A sample was placed in a beaker, and the glass electrode was inserted to record the pH. This test was performed three times, with the average value ensuring the cream was compatible with skin pH.

Physical Test:

The physical properties of the cream, including its color, odor, and consistency, were visually examined. The color and texture were tested by applying the cream to the skin, while the odor was assessed by mixing the cream in water and observing the fragrance.

Antimicrobial Efficacy:

The cream was tested for antimicrobial activity against Propionibacterium acnes and

Staphylococcus epidermidis using the agar well diffusion method. Significant zones of inhibition were observed, indicating effective antibacterial properties.

RESULTS:

pH measurement:

The cream maintained a stable pH of 5.5-6.5 over three months, indicating skin compatibility.

Table 2: pH mearement

Sl. No.	Trial	pH				
		F1	F2	F3	F4	F5
01	I	6.2	5.8	5.8	5.7	6.3
02	II	6.4	5.6	5.9	5.8	6.7
03	III	5.7	5.8	5.7	5.9	6.8
04	Avg.	6.4	5.2	5.8	6.4	5.8

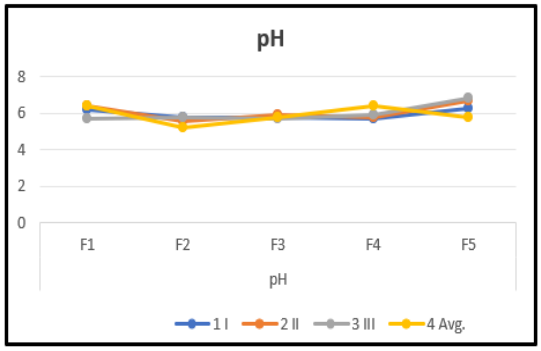

Figure 1: pH measurement

Spreadability:

The cream's spreadability ranged from 620 to 700 mm², demonstrating excellent ease of application. This range ensures that the cream glides smoothly on the skin, allowing for an even and comfortable spread, making the product pleasant and easy to use.

Table 3: Spreadability measurements

Sl No.	Formulations	Spreadability (Mm^2)
1	F1	650
2	F2	620
3	F3	630
4	F4	680
5	F5	630

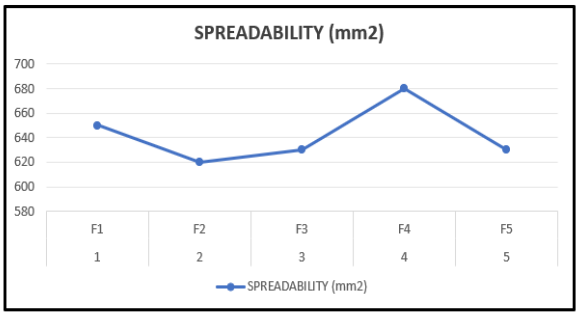

Figure 2: Spreadability

Viscosity

The cream exhibited a viscosity range of 12,000 to 20,000 centipoise, which is within the optimal range, ensuring that the cream is sufficiently thick for stability while maintaining a smooth texture for effortless application.

Table 4: Viscosity measurements

Sl. No.	Trial	Viscosity (cP)				
		F1	F2	F3	F4	F5
01	I	13,000	14,860	13,650	17,540	18,300
02	II	11,650	18,650	16,980	17,570	20,870
03	III	13,320	16,240	18,200	18,670	21,000
04	Avg.	15,156	15,250	17,276	15,693	18,430

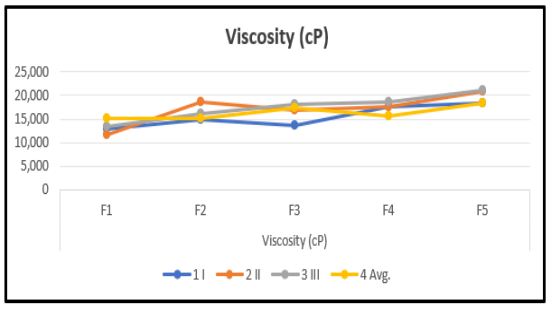

Figure 3: Viscosity

Percentage Yield

The cream formulations yielded 87.2% to 94.5%, indicating a successful formulation process. Formulation F3 had the highest yield, showing effective ingredient utilization.

Table 5: Percentage yield

Formulations	Percentage Yield
F1	93.4%
F2	90.2%
F3	94.5%
F4	89.5%
F5	87.2%

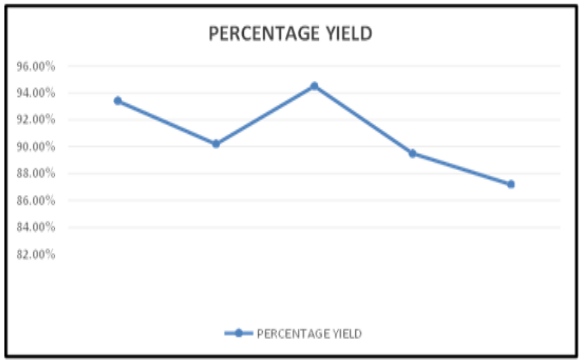

Figure 4: Percentage yield

Antimicrobial Activity

The cream demonstrated considerable antibacterial effects against acne-causing bacteria, with zones of inhibition measuring 12-15 mm against *Propionibacterium acnes* and 10-12 mm against *Staphylococcus epidermidis.*

Microbial Limit Test

Tests confirmed the absence of *Escherichia coli* and *Staphylococcus aureus*, verifying that the cream is safe and meets microbial safety standards.

Table 6: Microbial limit test

Parameter	Media	Result	Acceptance Criteria	Conclusion
Escherichia coli (E. Vcoli)	Nutrient agar media	absence	Must be absent	Pass
Staphylococcus aureus	Stephyococcus selective media	absence	Must be absent	Pass

Sensory Evaluation

The panelists gave the cream high ratings for color, fragrance, texture, and skin feel, with an average score ranging from 4 to 5 out of 5. This positive feedback indicates that the cream has been well-received in terms of its aesthetic and sensory properties, making it enjoyable and easy to use for daily application. The favorable response reflects the product's overall appeal and its suitability for regular use on the skin.

DISCUSSION

The findings from this study support the use of *Cassia fistula* as a natural remedy for acne. The anti-inflammatory and antibacterial properties of *Cassia fistula* helped effectively target *Propionibacterium acnes* and *Staphylococcus epidermidis*, two primary bacteria involved in acne pathogenesis. The cream's pH level aligns closely with the skin's natural pH, making it less likely to cause irritation and suitable for daily use.

Additionally, the cream's stable physical properties—such as appearance, consistency, and spreadability—demonstrate its potential for commercial application. Unlike many synthetic acne treatments, which often dry out the skin, this formulation retained moisture due to the presence of almond oil and beeswax, which offer additional emollient benefits. This unique combination of herbal effectiveness and moisturizing properties suggests that *Cassia fistula* cream could serve as an effective alternative for individuals with sensitive or acne-prone skin.

While this study indicates promising results, further clinical studies with larger sample sizes are needed to verify the efficacy and safety of the formulation in diverse populations. Future work may focus on optimizing the extraction process and exploring other bioactive compounds in *Cassia fistula* for enhanced acne management.

CONCLUSION

The Cassia fistula herbal cream formulation developed in this study exhibited effective antimicrobial, anti-inflammatory, and moisturizing properties, making it a promising candidate for natural acne treatment. Its favorable pH, stability, and ease of application enhance its potential as an alternative to synthetic acne medications, offering a gentler, nature-based option with reduced risks of side effects. Further research will help confirm its effectiveness and stability on a broader scale, possibly contributing to a new range of natural, effective acne treatments in the cosmetic and dermatological fields.

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REFERENCES

1. Satpute KL, Kalyankar TM. Development and evaluation of herbal cream for the treatment of acne. J Pharmacogn Phytochem . 2019;8(3):2618-24.
2. Moghimipour E, Siahpoosh A, Yaghoobi R, Malayeri A, Faramarzi F. Clinical trial of a herbal topical cream in treatment of Acne vulgaris. skin. Am. J. PharmTech Res. 2012; 2(2):264-71.
3. Singh R, Sankar C. Screening of the Cassia fistula flowers extract for the Anti-acne activity. Res. J. Recent Sci. 2012;1(11);2277-2502.
4. Kadam Y, Galhe V, Gadekar S. Formulation Of Cream Containing Active Friction Of Cassia Fistula L Pulp And Its Antimicrobial Activity Against Acne Vulgaris. Int. J. in Pharm. Sci. 2023,1(12):150-157.
5. Khan BA, Akhtar N, Menaa A, Menaa F. A novel Cassia fistula (L.)-based emulsion elicits skin anti-aging benefits in humans. Cosmetics. 2015 Nov 6;2(4):368-83.
6. Anitha J, Miruthula S. Anti-inflammatory and phytochemicals analysis of Cassia fistula Linn. fruit pulp extracts. Int J Pharmscog. 2014;1(3):207-15.
7. Biswas IR, Seth PA, Laskar SU. Exploration of therapeutic potential of anthraquinones and flavonoids isolated from different species of Cassia: a promising journey from ethnomedicine to biomedicine. Indian J. Sci. Res. 2017;13(1):01-8.
8. Modi J, Rathore S, Dwivedi S, Saraogi G. Formulation and evaluation of multipurpose herbal creamInt. J. Newgen Res. Pharm. Healthc. 2024 Jun 30:1(4):129-34.
9. Seyyednejad SM, Motamedi H, Vafei M, Bakhtiari A. The antibacterial activity of Cassia fistula organic extracts. Jundishapur J. Microbiol. 2014 Jan;7(1):25-36.
10. Nanditha M, Mahesh CD, Pradeep S. A randomized controlled clinical study to evaluate the efficacy of AragwadhaPushpaLepa (Cassia fistula Linn.) in the management of Vyanga with special reference to Melasma. J. Ayurveda Integr. Med. Sci. 2023;8(12):01-7.
11. Antonisamy P, Agastian P, Kang CW, Kim NS, Kim JH. Anti-inflammatory activity of rhein isolated from the flowers of Cassia fistula L. and possible underlying mechanisms. Saudi J. Biol. Sci. 2019 Jan 1;26(1):96-104.
12. Singh S, Zaidi SY, Maurya S. Formulation and evaluation of multipurpose herbal cream. World J. Pharm. Res. 2022 Mar 29;11(2):798-805.
13. Modi J, Rathore S, Dwivedi S, Saraogi G. Formulation and evaluation of multipurpose herbal cream. Int. J. Newgen Res. Pharm. Healthc. 2024 Jun 3;3(1):129-34.
14. Siddhuraju P, Mohan PS, Becker K. Studies on the antioxidant activity of Indian Laburnum (Cassia fistula L.): a preliminary assessment of crude extracts from stem bark, leaves, flowers and fruit pulp. Food chem. 2002 Oct 1;79(1):61-7.
15. Duraipandiyan V, Ignacimuthu S. Antibacterial and antifungal activity of Cassia fistula L.: An ethnomedicinal plant. J. Ethnopharmacol. 2007 Jul 25;112(3):590-4

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