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Research Article

# Development and Evaluation of a Polyherbal Anti-Dandruff Hair Gel Using *Psidium guajava* and *Wrightia tinctoria*

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## ABSTRACT

Dandruff is a frequently occurring scalp condition associated with microbial colonization, excessive desquamation, and irritation. The present work focuses on the development of a polyherbal topical gel incorporating leaf extracts of Psidium guajava and Wrightia tinctoria, selected for their documented antimicrobial potential. Gel formulations were prepared using Carbopol 934 as the base polymer along with suitable excipients. Three formulations (F1–F3) were designed by varying the concentration of herbal extracts. The prepared gels were evaluated for physicochemical parameters such as pH, viscosity, spreadability, and homogeneity, along with antimicrobial efficacy against selected microbial strains. All formulations exhibited acceptable characteristics for topical application. Among them, formulation F3 demonstrated comparatively better consistency, spreadability, and antimicrobial performance. The findings suggest that the developed formulation possesses potential as a plant-based alternative for dandruff management.

## INTRODUCTION

The demand for plant-based formulations in pharmaceutical and cosmetic applications has increased considerably due to concerns regarding the long-term safety of synthetic compounds. Herbal ingredients are increasingly preferred because of their biological compatibility and lower incidence of adverse effects.

Dandruff is a multifactorial scalp disorder characterized by abnormal shedding of corneocytes, often accompanied by itching and irritation. The condition is influenced by microbial activity, particularly lipophilic fungi such as *Malassezia* species, along with physiological factors including sebum production and scalp sensitivity. Although several medicated products are available, their prolonged use may result in

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irritation or reduced effectiveness, necessitating the exploration of alternative approaches.

Polyherbal formulations offer therapeutic advantages by combining multiple plant constituents that act through different mechanisms. Such combinations may enhance overall efficacy while minimizing the risk of side effects. Medicinal plants have long been utilized in traditional systems for the treatment of skin and scalp disorders, making them suitable candidates for formulation development.

*Psidium guajava* leaves are rich in bioactive compounds such as flavonoids and tannins, contributing to their antimicrobial and antioxidant activities. *Wrightia tinctoria* is another medicinal plant recognized for its role in managing dermatological conditions due to its antifungal and anti-inflammatory properties. The combined use of these plants may result in improved therapeutic outcomes.

Topical gels are widely used due to their ease of application, non-greasy nature, and patient acceptability. Carbopol-based systems are particularly advantageous due to their ability to form stable and transparent gels with desirable rheological properties.

This study was undertaken to formulate and evaluate a polyherbal anti-dandruff hair gel using selected plant extracts, with the objective of developing a safe and effective topical preparation.

## MATERIALS AND METHODS

### PLANT COLLECTION AND AUTHENTICATION

Fresh plants of *Psidium guajava* was collected from Tavanur, Malappuram, Kerala. and *Wrightia tinctoria* was collected from Aloor, Palakkad, Kerala, were collected, authentication and certified by Sree Neelakanta Govt. Sanskrit College, Pattambi, Palakkad, Kerala-679306

### DRYING:

The collected leaves of *Psidium guajava L.* and *Wrightia tinctoria* were washed to remove the dust particles, dried under shade for 3-7 days. The dried leaves were grinding to coarse powder and stored in a tightly closed plastic container.

### PREPARATION OF PLANT EXTRACTS:

#### *Psidium guajava L.* leaf Extraction

Extraction of *Psidium guajava L.* Leaves Using Distilled Water as A Solvent. Guava leaves were extracted using water as a solvent. The extraction was carried out using heating water bath and beaker of 1000 ml. Leaves were dried under shade and dried powder of leaves was used for extraction sample of 12.5g guava leaves in 250ml distilled water was boiled for 30 min at 50-55°C. The sample was then filtered.

#### *Wrightia tinctoria* leaf extraction

The fresh leaf material of *Wrightia tinctoria* collected were washed thoroughly with running tap water and air dried under shade. After complete shade drying the plant material was grinded and the powder was kept in small plastic bags with paper labelling. The grinded leaf of 20 gm crushed in 100 ml of sterile water, boiled at 50-60 °C for 30 minutes in water bath and it was filtered through Whatman No.1 filter paper

### PHYTOCHEMICAL SCREENING

| SR. NO | TEST | PROCEDURE | OBSERVATION |
|---|---|---|---|
| **DETECTION OF ALKALOIDS** | | | |
| 1 | Mayer's test | Aqueous extract was mixed with 2 ml of 1% HCl + heated + 1-2 drops of Mayer's reagent. | Turbidity of the resulting precipitate. |
| 2 | Hager's test | Aqueous extract was mixed with 2 ml of 1% HCl + heated + 1-2 drops of Hager's reagent | Turbidity of the resulting precipitate. |
| 3 | Wagner's test | Aqueous extract was mixed with 2 ml of 1% HCl + heated + 1-2 drops of Wagner's reagents | Turbidity of the resulting precipitate. |
| **DETECTION OF PHENOLS AND TANNINS** | | | |
| 4 | Phenol and Tannins test | Aqueous extract was mixed with 2 ml of 2% solution of $FeCl3$ | Blue-black coloration. |
| **DETECTION OF FLAVONOIDS** | | | |
| 7 | Flavonoids test | Aqueous extract was mixed with 2 drops of 10% NaOH reagent. | Formation of red color |

## PREPARATION OF HERBAL HAIR GEL:

Accurately weighed carbopol 934 was taken in a beaker and dispersed in 38ml distilled water.

Kept the beaker aside to swell the carbopol 934 for half an hour then stirring should be done using magnetic stirrer at 1200 rpm for 30 minutes.

Into the beaker 5ml propylene glycol and 1g methyl paraben were taken and stirred.

Add glycerine to the above mixture.

After all carbopol 934 dispersed, varying concentration of leaves extracts were added with constant stirring.

1-2 drops of rose oil was added

Triethanolamine was added dropwise to the formulation for adjustment of required pH and to obtain gel at required consistency.

## FORMULATION OF HERBAL HAIR GEL:

In this study we prepared three formulations from different concentrations of herbal ingredients.

| INGREDIENTS | FORMULATION 1 | FORMULATION 2 | FORMULATION 3 |
|---|---|---|---|
| *Psidium guajava L.* leaf extract | 1ml | 2ml | 3ml |
| *Wrightia tinctoria* leaf extract | 3ml | 2ml | 1ml |
| Carbopol 934 | 1gm | 1gm | 1gm |
| Propylene glycol | 5ml | 5ml | 5ml |
| Methyl paraben | 1gm | 1gm | 1gm |
| Triethanolamine | 1-2 drops | 1-2 drops | 1-2 drops |
| Glycerine | 2ml | 2ml | 2ml |
| Rose oil | 1 drop | 1 drop | 1 drop |
| Water | 38ml | 38ml | 38ml |

## RESULTS AND DISCUSSION

### PHYTOCHEMICAL SCREENING OF *Psidium guajava L.* LEAF EXTRACT

| Phytochemical Test | Presence (+) Or Abscent (-) |
|---|---|
| ALKALOIDS | + |
| PHENOL | + |
| SAPONIN | + |
| TRITERPENOIDS | + |

### PHYTOCHEMICAL SCREENING OF Wrightia tinctoria LEAF EXTRACT

| Phytochemical Test | Presence (+) Or Abscent (-) |
|---|---|
| ALKALOID | + |
| PHENOL AND TANNINS | + |
| TRITERPENOIDS | + |
| FLAVONOIDS | + |

## EVALUATION TEST FOR HAIR GEL

**Physical appearance:**

| PARAMETERS | F1 | F2 | F3 |
|---|---|---|---|
| COLOUR | Brown | Amber | Golden-brown |
| ODOUR | Rose oil fragrance | Rose oil fragrance | Rose oil fragrance |
| TEXTURE | Thich and smooth | Thick and smooth | Thick and smooth |
| HOMOGENEITY | Homogenous | Homogenous | Homogenous |

**Viscosity:**

| Hair gel | F1 | F2 | F3 |
|---|---|---|---|
| VISCOSITY (cPs) | 1057 | 1184 | 1181 |

**pH:**

| Hair gel | F1 | F2 | F3 |
|---|---|---|---|
| Trail 1 | 6.8 | 6.82 | 6.89 |
| Trail 2 | 6.87 | 6.8 | 6.88 |
| Trail 3 | 6.86 | 6.83 | 6.88 |
| Average | 6.84 | 6.81 | 6.88 |

**Spreadability**

Spreadability test was done to ensure the spreadability, the formulated hair gel was found to be easily spreadable.

| Hair gel | F1 | F2 | F3 |
|---|---|---|---|
| Spreadability (gcm/sec) | 22 | 20 | 25 |

**Washability**

| Hair gel | F1 | F2 | F3 |
|---|---|---|---|
| Washability | Easily washable | Easily washable | Easily washable |

## ANTIBACTERIAL STUDY BY WELL PLATE METHOD

| SR NO | SAMPLE | ZONE OF INHIBITION (mm) |
|---|---|---|
| ***Staphylococcus aureus*** | | |
| 1 | F1 | 27 |
| 2 | F2 | 21 |
| 3 | F3 | 28 |
| 4 | Standard (Doxycycline) | 30 |

## ANTIFUNGAL STUDY BY POTATO DEXTROSE AGAR PLATE METHOD

| SR. NO | SAMPLE | ZONE OF INHIBITION (mm) |
|---|---|---|
| ***Candida albicans*** | | |
| 1 | F1 | 26 |
| 2 | F2 | 19 |
| 3 | F3 | 29 |
| 4 | Standard (Clotrimazole) | 30 |

## DISCUSSION

The study formulated and evaluated a polyherbal anti-dandruff gel using *Psidium guajava L.* and *Wrightia tinctoria* leaf extracts, assessing its phytochemical composition, physical properties, rheology, and antimicrobial efficacy.

**Phytochemical Analysis**

Phytochemical screening confirmed alkaloids, phenols, flavonoids, tannins, and terpenoids in *Psidium guajava L.* and *Wrightia tinctoria* extracts, enhancing the gel's antibacterial, antifungal, and antioxidant properties for dandruff treatment.

**Physical and Rheological Properties**

The prepared formulations F1, F2, and F3 were observed to have a brown, amber, golden-brown colour, all formulations had a pleasant rose oil fragrance, and a smooth, thick texture. The homogeneous nature of the gel ensures uniform distribution of active ingredients.

- Viscosity values ranged from 1057 cPs (F1) to 1184 cPs (F2), indicating good consistency and ease of application.
- pH values were in the range of 6.81–6.88, which is suitable for scalp application, ensuring no irritation.
- Spreadability tests confirmed that the gel was easily spreadable, enhancing ease of use.
- Washability was found to be efficient, ensuring easy removal without residue.

**Antimicrobial Activity**

The antimicrobial study demonstrated the gel's effectiveness against *Staphylococcus aureus* and *Candida albicans*, two common microorganisms associated with dandruff.

The zone of inhibition for *Staphylococcus aureus* was highest in F3 (28 mm), followed by F1 (27 mm), and F2 (21 mm), showing strong antibacterial activity.

The zone of inhibition for *Candida albicans* was highest in F3 (29 mm), followed by F1 (26 mm), and F2 (19 mm), confirming antifungal potential. The antimicrobial efficacy was comparable to standard drugs (Doxycycline for bacteria and Clotrimazole for fungi, both showing 30 mm inhibition).

## SUMMARY AND CONCLUSION

The result of this study confirms that a polyherbal anti-dandruff hair gel formulated with *Psidium guajava. L* and *Wrightia tinctoria* exhibits promising antifungal and antibacterial activity, making it an effective alternative to synthetic anti-dandruff treatments. The optimized formulation (F3) showed better spreadability, stability, and overall efficiency in combating dandruff-causing microorganisms while maintaining desirable cosmetic properties.

The study supports the potential use of herbal ingredients in pharmaceutical and cosmetic formulations, promoting safer and more sustainable hair care solutions. Further clinical evaluations and long-term stability studies are recommended to enhance the product's commercial viability and ensure broader consumer safety.

## REFERENCES

1. Kapoor VP. Herbal cosmetics for skin and hair care. Nat Prod Radiance. 2005 Jul-Aug;4(4):306-14.
2. Keragala RK, Kempitiya KS, Kumara K, Kumarapeli NN, Kasunsiri TD, Gunathilaka SS. A review on potential herbal treatments for 'dandruff'-the embarrassing scalp disorder. Anuradhapura Medical Journal. 2020 Dec 15;14(1).
3. Das M, Goswami S. Antifungal and antibacterial property of guava (Psidium guajava) leaf extract: Role of phytochemicals. International Journal of Health Sciences and Research. 2019;9(2):39-45.
4. Pramodani MP, Wickramarachchi WJ. A clinical study to evaluate the efficacy of selected traditional hair pack for dandruff. International Journal of Research-Granthaalayah. 2017 Jan;5(1):12-21.
5. Babu M, Hareeshbabu E. Pharmacological Evaluation of Wrightia Tinctoria–A Review. immunology. 1983; 65:55-63.
6. Jaya sharma, Choudhary Neetu, Sharma Ajay and prakash gour and nagor shubam. (2017);

formulation and evaluation of antidandruff hair gel. Int. J. of Adv. Res. 5 (Dec). 1581-1590] (ISSN 2320-5407)
7. Erdoğan B. Anatomy and physiology of hair. Hair and scalp disorders. 2017 May 3; 13:17.
8. Lanjewar A, Maurya S, Sharma D, Gaur A. Review on hair problem and its solution. Journal of Drug Delivery and Therapeutics. 2020 Mar;10(4066):4066
9. Singh S, Maury S. Formulation and evaluation of polyherbal antidandruff powder shampoo using pomegranate seed and guava leave. World Journal of Pharmaceutical Research. 2022 Mar 28;11(6):276-91.
10. Singh A, Saxena A. Formulation and evaluation of herbal anti-dandruff shampoo from bhringraj leaves. Pharmacy Practice and Research. 2018; 1:5-11.
11. Rathod HJ, Mehta DP. Acta Scientifica International Journal of Pharmaceutical Science. International Journal of Pharmaceutical Sciences. 2015;1(1):33-47.
12. Shruthi KA. Review: Pharmaceutical Gels and Its Types with Prominence Role of Its Drug Delivery Systems. IJRAR. 2023; 10:686.
13. Rathod HJ, Mehta DP. A review on pharmaceutical gel. International Journal of Pharmaceutical Sciences. 2015 Oct 1;1(1):33-47
14. Kaur N, Bains A, Kaushik R, Dhull SB, Melinda F, Chawla P. A review on antifungal efficiency of plant extracts entrenched polysaccharide-based nanohydrogels. Nutrients. 2021 Jun 15;13(6):2055.
15. Worku LA, Zebeaman M, Bachheti RK, Bachheti A, Rawat YS, Husen A, Shiferaw RG. Ethnomedical Use, Phytochemistry, Nutritional Profile, Commercial Potential, and Other Potential Applications of Psidium guajava (Guava). Journal of Food Quality. 2024;2024(1):6076403.
16. Gutiérrez RM, Mitchell S, Solis RV. Psidium guajava: A review of its traditional uses, phytochemistry and pharmacology. Journal of ethnopharmacology. 2008 Apr 17;117(1):1-27.
17. Toma M, Luchian V. Morphological and anatomical study of Psidium guajava Linn. (guava)-a new fruit tree and medicinal plant researched in Romania.
18. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A handbook of medicinal plants: a complete source book. Jodhpur: Agrobios (India); 2003. p. 427-548.
19. Babu M, Hareeshbabu E. Pharmacological Evaluation of Wrightia Tinctoria–A Review. immunology. 1983; 65:55-63.
20. Kirtikar KR, Basu BD. Indian medicinal plants.Delhi: Jayyed press; 1975:1581.
21. Srivastava R. A review on phytochemical, pharmacological, and pharmacognostical profile of Wrightia tinctoria: Adulterant of kurchi. Pharmacognosy reviews. 2014 Jan;8(15):36.
22. Reddy YS, Venkatesh S, Ravichandran T, Subburaju T, Suresh B. Pharmacognostical studies on Wrightia tinctoria bark. Pharmaceutical biology. 1999 Jan 1;37(4):291-5.
23. Joshi MC, Patel MB, Mehta PJ. Some folk medicines of Dangs, Gujarat state. Bull Med Ethnobot Res. 1980; 1:8-24.
24. Dixit A, Jain AK, Tiwari P, Gupta N, Gangele P. A phytopharmacological review on an important medicinal plant-Wrightia tinctoria. Current Research in Pharmaceutical Sciences. 2014 Sep 30:70-6.
25. Khyade MS, Vaikos NP. Pharmacognostical and physio-chemical standardization of leaves of Wrightia tinctoria R. Br. International Journal of Pharmaceutical Research and Development. 2009; 8:01-10.

26. Sridhar S, Kamalakannan P, Elamathi R, Deepa T, Kavitha R. Studies on antimicrobial activity, physio-chemical and phytochemical analysis of Wrightia tinctoria R. Br. IJPRD. 2011;3(8):139-44.
27. Kaneria M, Baravalia Y, Vaghasiya Y, Chanda S. Determination of antibacterial and antioxidant potential of some medicinal plants from Saurashtra region, India. Indian journal of pharmaceutical sciences. 2009 Jul;71(4):406.
28. Oviya IR, Sharanya M, Jeyam M. Phytochemical and Pharmacological assessment of Wrightia tinctoria R. BR.: A review. World J. Pharm. Res. 2015 May 10; 4:1992-2015.
29. Sathyanarayanan S, Selvam P, Jose AS, George RM, Revikumar KG, Neyts J. Preliminary phytochemical screening and study of antiviral activity and cytotoxicity of Wrightia tinctoria. Int J Chem Sci. 2009 Jul 22;7(1):1-5.
30. Selvam.P, Murugesh.N, Witvrouw.M, Keyaerts.E and Neyts.J. Studies of antiviral activity and cytotoxicity of Wrightia tinctoria and Morinda citrifolia. Indian J Pharm Sci 2009; 71(6):670-672.
31. Raj RA, Kumar AS, Gandhimathi R. Hypoglycemic and hypolipidemic activity of Wrightia tinctoria L. in alloxan induced diabetes in albino wistar rats. Pharmacologyonline. 2009; 3:550-9.
32. Safitri FI, Nawangsari D, Febrina D. Overview: Application of carbopol 940 in gel. InInternational Conference on Health and Medical Sciences (AHMS 2020) 2021 Jan 27 (pp. 80-84). Atlantis Press.
33. A-sasutjarit R, Sirivat A, Vayumhasuwan P. Viscoelastic properties of Carbopol 940 gels and their relationships to piroxicam diffusion coefficients in gel bases. Pharmaceutical Research. 2005 Dec; 22:2134-40
34. Devidas PV, Hingne DL. Formulation and Evaluation of Herbal Shampoo from Piper Betel and Psidium Guajava Leaves. Int. J. Res. Appl. Sci. Eng. Technol. 2022;10(6):3792-800.
35. Devi PS, Satyanarayana B, Naidu MT. Phytochemical Screening for Secondary Metabolites in Boswellia serrata Roxb. and Wrightia tinctoria (Roxb.) R. Br. Notulae Scientia Biologicae. 2014 Dec 8;6(4):474-7.
36. Adamu A. Phytochemical screening of guava leave extract. International Journal of Pure and Applied Science Research. 2021;12(2):89-95.
37. Jani NA, Azizi NA, Aminudin NI. Phytochemical screening and antioxidant activity of Psidium guajava. Malaysian J Anal Sci. 2020 May 12;24(2):173-8.
38. Lone ZA, Jain NK. Phytochemical Screening of Guava (Psidium Guajava L.) Leaves Extract and Its Medicinal Importance. Int. J. Innov. Eng. Res. Manag. 2022;9(06).
39. Sudira IW, Merdana IM, Qurani SN. Preliminary phytochemical analysis of guava leaves (Psidium guajava L.) as antidiarrheal in calves. Advances in Tropical Biodiversity and Environmental Sciences. 2019;3(2):21-4.
40. Regupathi T, Chitra K, Ruckmani K, Lalitha KG, Kumar M. Formulation and evaluation of herbal hair gel for hair growth potential. J Pharmacol Clin Res. 2017; 2:1-8.
41. Sharma S, Upadhyay UM, Upadhyay SU, Patel T, Trivedi P. Herbal Armamentarium for the culprit dandruff. International Journal of Phytopharmacy Research. 2013;4(1):23-8.
42. Garmus TT, Kopf SF, Paula JT, Aguiar AC, Duarte GH, Eberlin MN, Cabral FA. Ethanolic and hydroalcoholic extracts of pitanga leaves (Eugenia uniflora L.) and their fractionation by supercritical technology. Brazilian Journal of Chemical Engineering. 2019 Sep 30;36(2):1041-51.

43. Rathod HJ, Mehta DP. A review on pharmaceutical gel. International Journal of Pharmaceutical Sciences. 2015 Oct 1;1(1):33-47.
44. Mallamma T, Kumar BP, Suchindar A, Pragathi Y, Meghana C, Hemalatha KJ. Formulation and Performance of Polyherbal Antidandruff Hair Gel: A Multifaceted Solution. Asian Journal of Pharmaceutical Research and Health Care. 2024 Jan 1;16(1):67-73.
45. Khan N, Jadhav P, Jagadale S, Kachare K, Kamble S, Gandhe S, Yewale R, Kale M, Kshirsagar S. Formulation and evaluation of polyherbal hair gel formulation. Journal of Pharmacognosy and Phytochemistry. 2022;11(1):32-6.
46. Bhajan C, Govinden JS, Sanmukhiya VMR. Antidandruff property of Psidium guajava leaf extracts. Nat Resour Human Health. 2023;3(1):38-45. doi:10.53365/nrfhh/150396.
47. Jog CS, Asnani AJ, Gulkari V. Formulation and evaluation of antifungal herbal hair gel. World J Pharm Res. 2020 Mar 24;9(6):1543-52.
48. Mishra S, Tiwari S, Pal SK, Himanshu. Formulation and assessment of herbal hair gel: A natural solution for men's hair care. Int J Pharm Res Dev. 2024;6(2):189-195. doi: 10.33545/26646862.2024.v6.i2c.72.
49. Ghodke DN, Dhawale TA. Formulation and evaluation of herbal anti-dandruff hair gel. Int J Curr Sci. 2024;14(2):334-349.
50. Mishra S, Tiwari S, Pal SK, Himanshu. Formulation and assessment of herbal hair gel: A natural solution for men's hair care. Int J Pharm Res Dev. 2024;6(2):189-195. doi: 10.33545/26646862.2024.v6.i2c.72.
51. Remington: The Science and Practice of Pharmacy. 22nd ed. Vol. 1. Philadelphia: Pharmaceutical Press;2012.
52. Aulton ME, editor. Aulton's pharmaceutics: the design and manufacture of medicines. 3rd ed. Edinburgh: Churchill Livingstone Elsevier; 2007.
53. Prajapati ND, Purohit SS, Sharma AK, Kumar T. A handbook of medicinal plants: a complete source book. Jodhpur: Agrobios (India); 2003. p. 427-548.
54. Khar RK, Vyas SP, Ahmad FJ, Jain GK, editors. Lachman/Lieberman's The Theory and Practice of Industrial Pharmacy. 4th ed. New Delhi: CBS Publishers & Distributors Pvt Ltd; 2017

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