Proceedings Academic Universitas Jambi
Volume 1, Issue 2, November 2025

Phytochemical screening of dragon's blood (*Daemonorops draco*) resin extract and hydrogel formulation

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Abstract

Objective: This study aims to identify the phytochemical constituents of dragon's blood resin extract (*Daemonorops draco*) and to develop a hydrogel formulation using the extract as an active ingredient. **Methods:** Phytochemical screening was conducted through qualitative methods to detect the presence of alkaloids, flavonoids, saponins, tannins, phenolics, steroids and terpenoids. The extract was incorporated into a hydrogel base composed of Polyvinyl Alcohol (PVA), Polyethylene Glycol (PEG 400), Hydroxypropyl Methyl Cellulose (HPMC), ethanol and distilled water. **Results:** The results revealed that the resin extract contained alkaloids, flavonoids, phenolics, tannins and terpenoids, indicating strong antioxidant and anti-inflammatory potential. The hydrogel exhibited good physical stability, thickness, uniformity of weight. **Conclusions:** The study concludes that Daemonorops draco resin extract can be effectively formulated into a topical hydrogel.

Keywords: Daemonorops draco, Dragon's blood, Phytochemical screening, Hydrogel formulation

Cite This Article

Elisma, Pratiwi, P. D., & Lipinwati. (2025). Formulation and physical property testing of dragon's blood (Daemonorops draco) extract hydrogel plaster. *Proceedings Academic Universitas Jambi*, *1*(2), 1056–1059.

Editor

I Made Dwi Mertha Adnyana, M.Ked.Trop.

Article info

Received: October 31, 2025. Revised: November 05, 2025. Accepted: November 09, 2025

INTRODUCTION

Studies on transdermal drug delivery are currently very interesting because they can enhance drug penetration through the skin. The advantage of this system over other routes of drug administration is that it can reduce or avoid problems of drug irritation in the gastrointestinal tract, first-pass metabolism, decrease the risk of drug side effects, and improve drug availability. In addition, this system can provide sustained release in the area where the drug is applied [1]. Hydrogel is a semi-solid preparation containing a hydrophilic base [2]. Hydrogel can be applied topically in the form of a patch on the skin surface. Hydrogel is very suitable for use as a wound healing because it can remove necrotic tissue and has the benefits of providing a cooling sensation, reducing swelling of the wound, and accelerating wound healing [3]. Phytochemical screening plays a crucial role in determining the bioactive components responsible for these biological activities [4].

METHODS

Materials

Dragon's blood resin (Daemonorops draco) was collected from Sarolangun Jambi, Indonesia. Solvents and reagents used included ethanol 96%, Mayer's reagent, Dragendorff's reagent, ferric chloride, magnesium powder, and hydrochloric acid. The hydrogel base consisted of Polyvinyl Alcohol (PVA), Polyethylene Glycol (PEG 400), Hydroxypropyl Methyl Cellulose (HPMC), ethanol and distilled water**.**

Extraction process

The powdered resin was macerated in 96% ethanol for 72 hours with occasional stirring. The extract was filtered and concentrated under reduced pressure using a rotary evaporator to obtain a viscous ethanolic extract [5].

Phytochemical screening

Phytochemical tests were conducted to detect alkaloids (Mayer's and Dragendorff's reagents), flavonoids (Shinoda test), saponins (froth test), tannins (ferric chloride test), phenolics (ferric chloride test), and terpenoids (Salkowski test) [6].

Preparation of hydrogel patch

The hydrogel patch formulation from *Daemonorops draco* resin extract was adapted from the method by Hanistya et al. [7], with the composition presented in Table 1.

Table 1. Formulation of Hydrogel patch

Ingredients	Formula (%)		
	F1	F2	F3
Dragon's blood resin extract	0,25	0,5	0,75
Polyvinyl Alcohol (PVA)	5	5	5
Polyethylene Glycol (PEG 400)	20	20	20
Hydroxypropyl Methyl Cellulose (HPMC)	10	10	10
Ethanol	4	4	4
Aquadest	qs	qs	qs

Polyvinyl Alcohol (PVA) was dissolved in distilled water until completely dissolved, then dried in an oven at 50 °C for 8 hours. Hydroxypropyl Methylcellulose (HPMC) was dissolved in distilled water, and the resin extract—previously dissolved in

96% ethanol—was added. Polyethylene Glycol (PEG 400) was then incorporated, and the mixture was stirred for 1 hour. The resulting solution was poured onto a backing membrane and dried at room temperature for 24 hours. After drying, the hydrogel layer was removed, stored in a desiccator.

Evaluation of hydrogel

Patch Thickness.
The thickness of the hydrogel patches was measured using a micrometer device [7].

Weight Uniformity.
The weight of the hydrogel patches was determined using an analytical balance, based on the average weight of three patches [7].

pH value
The pH value of the hydrogel patch is measured using a pH meter.

Statistical analysis

The phytochemical content of Dragon's blood resin extract was determined qualitatively, and the thickness and uniformity of the hydrogel patch were analyzed using descriptive statistics.

RESULTS

Phytochemical screening of Daemonorops draco resin extract showed positive results for flavonoids, phenolic compounds, alkaloids, tannins, and terpenoids, whereas steroids and saponins were not detected. These findings are consistent with previous studies indicating the presence of antioxidant and anti-inflammatory compounds in dragon's blood resin. Hydrogel formulations containing extract concentrations of 0.25%, 0.5%, and 0.75% demonstrated stable physical properties with a homogeneous texture. The patch thickness is 0.4 mm, and the patch weight uniformity is 1.28 g. The pH value that has been obtained is 5.5.

DISCUSSION

The ethnobotanical study of the traditional use of jernang resin by communities in the Jambi region is for treating wounds and toothaches [8]. The presence of flavonoids and phenolics supports the potential of Daemonorops draco resin as an antioxidant and anti-inflammatory agent. Terpenoids, commonly associated with antimicrobial properties, further enhance the biological potential of the extract [9] [10]. The hydrogel base provided an ideal medium for incorporating the extract, allowing effective dispersion and stability. The pH range observed was compatible with human skin, making the formulation suitable for topical applications. Compared to other natural hydrogels, the dragon's blood-based hydrogel demonstrated comparable physical characteristics and potential therapeutic benefits.

CONCLUSIONS

The phytochemical screening confirmed that *Daemonorops draco* resin extract contains bioactive compounds such as flavonoids, phenolic compounds, alkaloids, tannins, and terpenoids. The hydrogel formulated with this extract exhibited good physical properties, stability, and skin-friendly pH, suggesting its potential use as a topical antioxidant and anti-inflammatory formulation. Further studies on

quantitative analysis and biological activity testing are recommended to validate its therapeutic potential.

CONFLICT OF INTEREST

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

FUNDING

This study was funded by the Universitas Jambi with PNBP funds allocated to the Faculty of Medicine and Health Sciences in 2025.

DECLARATION OF ARTIFICIAL INTELLIGENCE USE

We hereby confirm that no artificial intelligence (AI) tools or methodologies were utilized at any stage of this study, including during data collection, analysis, visualization or manuscript preparation. All work presented in this study was conducted manually by the authors without the assistance of AI-based tools or systems.

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