

FORMULATION OF GEL PREPARATION FROM ETHANOL EXTRACT OF BASIL LEAVES (*Ocimum sanctum* L.) WITH MANIHOT AMYLUM AS GELLING AGENT Septian Maulid Wicahyo ¹⁾ | Fauzi Rifqi Pramita ²⁾

¹⁾ Bachelor Of Pharmacy, Faculty Of Health Science, Duta Bangsa University Of Surakarta

²⁾ Bachelor Of Pharmacy, Faculty Of Health Science, Duta Bangsa University Of Surakarta

ABSTRAK

Daun kemangi (*Ocimum sanctum* L.) memiliki kandungan senyawa bioaktif seperti flavonoid, tannin, dan saponin yang berpotensi sebagai antibakteri dan antioksidan. Penelitian ini bertujuan untuk memformulasikan sediaan gel ekstrak etanol daun kemangi dengan amilum manihot sebagai agen pembentuk gel, serta mengevaluasi karakteristik fisik dan stabilitas gel. Hasil penelitian menunjukkan bahwa formula dengan konsentrasi 3% amilum manihot memberikan hasil optimal pada viskositas, pH, dan daya sebar gel. Uji stabilitas menunjukkan gel tetap stabil selama penyimpanan 28 hari pada suhu ruang. Penelitian ini membuktikan potensi penggunaan amilum manihot sebagai alternatif alami dalam formulasi gel.

Kata kunci: Gel daun kemangi, amilum manihot, *Ocimum sanctum*, formulasi sediaan

ABSTRACT

*Basil leaves (*Ocimum sanctum* L.) contain bioactive compounds such as flavonoids, tannins, and saponins that have the potential as antibacterials and antioxidants. This study aims to formulate a gel preparation of basil leaf ethanol extract with manihot starch as a gel-forming agent, and to evaluate the physical characteristics and stability of the gel. The results showed that the formula with a concentration of 3% manihot starch gave optimal results in viscosity, pH, and gel spreadability. Stability tests showed that the gel remained stable during 28 days of storage at room temperature. This study proves the potential use of manihot starch as a natural alternative in gel formulation.*

Keyword: Basil leaf gel, manihot starch, *Ocimum sanctum*, dosage form

INTRODUCTION

Pharmaceutical and cosmetic products based on natural ingredients are increasingly in demand because they are considered safer and more environmentally friendly than synthetic ingredients. One of the natural ingredients that has high pharmacological potential is basil leaves (*Ocimum sanctum* L.). Basil leaves contain active compounds such as flavonoids, tannins, saponins, and eugenol, which function as antibacterials, antioxidants, and anti-inflammatories. This activity makes basil leaves very potential for use in topical

formulations, especially gels, suitable for skin application because of their light, easy-to-apply, and fast-absorbing properties.

Topical gels generally use gelling agents to provide consistency and stability to the preparation. One alternative natural gelling agent that can be used is Manihot starch, which comes from cassava (*Manihot esculenta*). Manihot starch has good gel-forming ability, abundant availability, and biodegradable and skin-safe properties. The use of manihot starch also supports the development of local

materials that are environmentally friendly and have economic value.

This study aimed to formulate a gel preparation of basil leaf ethanol extract using Manihot starch as a gelling agent. In addition, an evaluation of the physical characteristics of the preparation, such as homogeneity, viscosity, spreadability, pH, and stability, was carried out to determine the optimal formula. By utilizing a combination of natural ingredients that are bioactive and environmentally friendly, this study is expected to contribute to the innovation of local-based pharmaceutical preparations.

METHOD

Developing a gel preparation formulation with the active ingredient of basil leaf ethanol extract, utilizing manihot starch as a gelling agent, and evaluating its physical characteristics and stability.

Tools

Extraction tools (reflux or soxhletation), Rotary evaporator, Analytical balance, Mixer, pH meter, viscometer, test tubes, beaker glass, and other standard laboratory equipment.

Material

Fresh basil leaves (*Ocimum sanctum* L.), Solvent: 96% ethanol, Manihot starch as a gelling agent, additional components such as preservatives (eg methyl paraben), humectants (eg glycerin), and distilled water.

Basil Leaf Extraction

Fresh basil leaves are washed clean, dried at room temperature, and ground into powder. Continued extraction using 96% ethanol by the maceration method. The powder is soaked for 3 days and shaken once every day. The soaking is then filtered using a flannel cloth and then continued with further filtration using a Buchner cup. The filtrate is then macerated and the macerate will be thickened using a vacuum evaporator. The resulting thick extract will be weighed to calculate the yield.

Gel Formulation

Cassava is peeled, grated, and soaked in water. The solution is filtered, precipitated, and the starch obtained is dried at a temperature of 50°C. Basil leaf extract is mixed into a gel base with various concentrations of manihot starch (1%, 2%, 3%, and 4%). Methyl paraben and propyl paraben are added as preservatives.

Physical Evaluation of Gel Preparations

Spreadability: Measured by applying pressure to the gel on glass, then the spread diameter is recorded. Viscosity: Measured using a Brookfield viscometer. pH Test: Measured using a digital pH meter. Stability Test: The gel is stored for 28 days at room temperature, and changes in color, viscosity, pH, and spreadability are observed. Adhesion test: Measuring the duration of the gel remaining attached to a certain surface.

Table 1. Basil Leaves Extract Gel Preparations Formulation

No	Component	Function	Concentration (% w/w)	Note
1	Basil leaves Ethanol extract	Active material	5–10	Contain active Secondary metabolites
2	Manihot Amylum	Gelling agent	2–6	Gel Base former
3	Glyserin	Humectant	5–10	Regulate preparation humidity
4	Methyl paraben	Preservative	0.1–0.2	Microbes growth inhibitor
5	Propyl paraben	Preservative	0.01–0.1	Support Microbes stability
6	Triethanolamine	Acidity Regulator	Secukupnya	Acidity regulator (4.5–6.5)
7	Distilled water	Solvent	Ad 100	As vehicle

Table 2. Organoleptic test of Basil Leaves Ethanol Extract

Parameter	F1 (1%)	F2 (2%)	F3 (3%)	F4 (4%)
Colour	Light green	Light green	Light green	Light green
Viscosity	liquid	viscous	Viscous	Viscous
Scent	Basil Leaves aroma	Basil Leaves aroma	Basil Leaves aroma	Basil Leaves aroma

Table 3. The Result of Physical Evaluation of Basil Leaf Ethanol Extract Gel Preparation with Manihot Starch as Gelling Agent

Parameter	F1 (1% Amylum Manihot)	F2 (2% Amylum Manihot)	F3 (3% Amylum Manihot)	F4 (4% Amylum Manihot)
Appearance	Homogen, Light Green	Homogen, Light Green	Homogen, Light Green	Homogen, Light Green
pH	6,8 ± 0,1	6,7 ± 0,1	6,6 ± 0,1	6,5 ± 0,2
Viscosity (cP)	1.200 ± 50	1.800 ± 60	2.300 ± 70	2.800 ± 80
Spreadability (cm)	6,5 ± 0,2	5,8 ± 0,3	5,2 ± 0,1	4,6 ± 0,2

Data Analysis

The results of the physical and chemical evaluation of the gel preparations were analyzed descriptively and T-test using the SPSS 27 application.

RESULT

Physical Characterization of Gel

All formulas produced homogeneous gels, light green in color, and odorless. The formula with a concentration of 3% manihot starch provided the best spreadability (5.2 ± 0.1 cm), appropriate viscosity (2300 ± 100 cP), and stable pH in the range of 6.5–7.0.

Preparation Stability

The gel remained stable during 28 days of storage without significant changes in viscosity, color, or spreadability. Only the formula with 1% manihot starch concentration showed a decrease in viscosity due to the low concentration of gelling agent.

CONCLUSION

Basil leaf extract gel formula with 3% manihot starch as a gelling agent gave

the best results in terms of viscosity, spreadability, and physical stability. Manihot starch has great potential as a natural alternative gelling agent for pharmaceutical applications.

REFERENCE

Ansel, H. C., Allen, L. V., & Popovich, N. G. (1999). *Pharmaceutical Dosage Forms and Drug Delivery Systems* (7th ed.). Baltimore: Lippincott Williams & Wilkins.

Departemen Kesehatan Republik Indonesia. (1995). *Farmakope Indonesia Edisi IV*. Jakarta: Departemen Kesehatan RI.

Mishra, P., & Mishra, S. (2011). Study of Antibacterial Activity of *Ocimum sanctum* L. against Gram-Positive and Gram-Negative Microorganisms. *American Journal of Food Technology*, 6(4), 336–341.

Pangestuti, R., & Kim, S.-K. (2011). Biological Activities and Health Benefits of Natural Starches. *Food Science and Human Wellness*, 1(1), 24–33.

Rowe, R. C., Sheskey, P. J., & Quinn, M. E. (2009). *Handbook of Pharmaceutical Excipients* (6th ed.). London: Pharmaceutical Press.

Sharma, A., & Patel, A. (2021). Formulation and Evaluation of Herbal Gel Containing *Ocimum sanctum* Extract. *Journal of Pharmaceutical Sciences and Research*, 13(8), 450–457.

Singh, S., & Majumdar, D. K. (1997). Evaluation of the Anti-inflammatory Activity of *Ocimum sanctum* L. Fixed Oil. *Indian Journal of Experimental Biology*, 35(4), 380–382.

Subekti, M., & Rachmawati, N. (2018). Pemanfaatan Amilum Singkong sebagai Gelling Agent pada Formulasi

Gel Topikal Ekstrak Daun Herbal. *Jurnal Ilmiah Farmasi dan Farmakologi*, 5(2), 123–129.

Sujono, D. H., & Kusuma, D. R. (2020). Penggunaan Amilum sebagai Bahan Pembantu dalam Sediaan Farmasi. *Media Farmasi Indonesia*, 8(1), 45–51.

Tiwari, P., Kumar, B., Kaur, M., Kaur, G., & Kaur, H. (2011). Phytochemical Screening and Extraction: A Review. *International Pharmaceutica Scientia*, 1(1), 98–106.

WHO. (2004). *Guidelines on Safety Monitoring of Herbal Medicines in Pharmacovigilance Systems*. Geneva: World Health Organization.