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Formulation of Emulgel Preparation of Ethanol Extract of Sensitive Plant Leaves (Mimosa pudica L.)

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ABSTRACT

Medicinal plants are all types of plants that can be used as medicinal ingredients, either individually or in mixtures, which are believed to cure a disease or provide effects on health. The sensitive plant has potential for anti-inflammatory treatment due to its flavonoid content. This serves as the basis for the urgency of this study, namely testing parts of the plant to be used as medicinal ingredients in an emulgel preparation. The formulation of an emulgel preparation from ethanol extract of sensitive plant leaves is a series of processes for producing a medicinal preparation with the main ingredient being sensitive plant leaves (*Mimosa pudica* L.). The purpose of this study was to formulate an emulgel preparation from the ethanol extract of sensitive plant leaves (*Mimosa pudica* L.). The research method used in this study was a laboratory experimental method. The emulgel preparation was made with variations in the concentration of the gelling agent HPMC (3%, 5%, and 7%). Evaluation of the preparation included organoleptic tests, homogeneity, pH, spreadability, adhesiveness, and emulsion type. In conclusion, the ethanol extract of sensitive plant leaves (*Mimosa pudica* L.) can be formulated as an emulgel preparation.

INTRODUCTION

Indonesia is a large country renowned for its biodiversity, especially its plant diversity. In addition, Indonesia also has ethnic diversity with various forms of knowledge regarding traditional medicines that utilize plant-based materials. Medicinal plants represent the utilization of the biodiversity surrounding us, including both cultivated and wild plants (1). One of these medicinal plants is *Mimosa pudica* L. In Indonesia, *Mimosa pudica* L. is better known as the sensitive plant (2). The sensitive plant has potential for anti-inflammatory treatment due to its flavonoid content (3).

Sensitive plant leaves (*Mimosa pudica* L.) contain mimosine, pipecolic acid, tannins, alkaloids, and saponins. In addition, they also contain triterpenoids, sterols, polyphenols, and flavonoids. The flavonoid quercetin can be used as a natural antioxidant source with antiradical activity that may assist the wound healing process (4). This forms the basis for the urgency of research on the formulation of an emulgel preparation from sensitive plant leaf extract.

METHOD

Research Method

The method used was an experimental method aimed at producing an emulgel preparation from sensitive plant leaf samples (*Mimosa pudica* L.).

Research Location

The study was conducted in the Pharmaceutics Laboratory and Chemistry Laboratory of the Pharmacy Study Program, Universitas Perjuangan Tasikmalaya, from August to December 2025.

Research Variables

The independent variable in this study was the variation in HPMC concentration at 3%, 5%, and 7%. The dependent variables included organoleptic testing, homogeneity, pH, spreadability, adhesiveness, and emulsion type.

Research Instruments and Materials

The equipment used included laboratory glassware (Pyrex), water bath (Memmert), pH meter (Drawell), evaporating dish (Phtc), rotary evaporator (D-lab), magnetic stirrer (Wiggens), and stopwatch.

The materials used consisted of sensitive plant leaves, 96% ethanol, HPMC, propylene glycol, liquid paraffin, methyl paraben, propyl paraben, Tween 80, Span 80, fragrance, distilled water, concentrated sulfuric acid, Mayer reagent, Dragendorff reagent, Mg powder, concentrated HCl, 2N HCl, $FeCl_3$, 2N sulfuric acid, amyl alcohol, and acetic anhydride.

The sensitive plant leaf samples were collected from Padamulya Village, Ciamis Regency, West Java Province.

Research Procedure

Preparation of Simplicia

Leaves were collected directly from the plant. The selected sensitive plant leaves were green, neither too old nor too young, and harvested in the morning. The leaves then underwent wet sorting, washing, drying, and dry sorting to obtain simplicia.

Preparation of Extract

A total of 500 g of sensitive plant leaf powder was used. The extract was prepared using the maceration method with 5 liters of 96% ethanol as solvent. The leaf powder and ethanol solvent were placed in a macerator and stirred every 8 hours. Maceration was carried out for 3 × 24 hours with solvent replacement every 24 hours using a solvent-to-material ratio of 1:10. All macerates were collected and evaporated using a rotary evaporator at 50°C. When the

solvent no longer dripped into the receiving flask, the extract obtained was further evaporated using a water bath at 75°C to obtain a thick extract (5).

Phytochemical Screening

Qualitative testing was performed for secondary metabolites including alkaloids, flavonoids, saponins, and tannins.

Formula of Sensitive Plant Leaf Extract Emulgel

Table 1. Formula of Sensitive Plant Leaf Extract Emulgel

Material	Function	Substance Concentration (%)		
		F1	F2	F3
Sensitive plant leaf extract	Active ingredient	2,5	2,5	2,5
HPMC	*Geeling agent*	3	5	7
Propylene glycol	Humectant	5	5	5
Liquid paraffin	Emollient	10	10	10
Methyl paraben	Preservative	0,01	0,01	0,01
Propyl paraben	Preservative	0,03	0,03	0,03
Tween 80	*Emulsifer*	3,6	3,6	3,6
Span 80	*Emulsifer*	1,4	1,4	1,4
Essence	Fragrance	3 drops	3 drops	3 drops
Distilled water	Solvent	ad 100	ad 100	ad 100

Evaluation of Sensitive Plant Leaf Extract Emulgel

1. Organoleptic test by observing color, texture, and odor (6).
2. Homogeneity test was performed by spreading the sample on transparent glass and covering it with another glass. The preparation was considered homogeneous if no coarse particles were present (7).
3. pH test was conducted by dispersing 1 g of sample in 100 mL distilled water. The electrode was immersed in the solution and the pH value was recorded using a pH meter.
4. Spreadability test was carried out by placing 1 g of preparation on a glass plate and covering it with another glass plate. After standing for 1 minute, the spreading diameter was measured after adding a load and allowing it to stand for another minute (8).
5. Adhesiveness test was performed by placing 1 g of sample on a glass plate, covering it with another glass plate, and applying a 100 g load for 1 minute. Afterward, the two adhered glass plates were separated, and the separation time was recorded (9).
6. Emulsion type test was conducted by applying the emulgel onto a porcelain dish, adding methylene blue solution, and stirring until mixed. If methylene blue dissolved, the emulsion formed was oil-in-water (O/W); otherwise, it was water-in-oil (W/O) (10).

RESULTS AND DISCUSSION

Preparation of Simplicia

Sensitive plants were obtained from Padamulya Village, Ciamis Regency. The leaves used were selected in fresh condition, light green in color, and free from damage. A total of 10 kg of leaves were collected, and after drying and grinding, 650 g of sensitive plant leaf simplicia powder was obtained.

Preparation of Extract

The extraction of sensitive plant leaf powder was carried out using the maceration method because the equipment is simple and the process does not involve heating, thereby minimizing the possibility of compound degradation. A total of 500 g of simplicia powder was extracted using 5 L of 96% ethanol with a ratio of 1:10. The resulting thick extract weighed 70.2 g.

Phytochemical Screening

Phytochemical screening was conducted to identify the chemical constituents present in both the powder and extract of sensitive plant leaves.

Table 2. Phytochemical Screening

No.	Compound	Reagent	Result		Description
			Powder	Extract	
1.	Alkaloid	Dragendroff	+	+	Orange precipitate
		Wagner	+	+	White precipitate
		Mayer	+	+	White precipitate
2.	Flavonoids	Mg + HCl	+	+	Red solution
3.	Saponins	HCl	+	+	Foam formation
4.	Tannins	$FeCl_3$ 1% + Gelatin	+	+	Bluish-black color

Description:
(+) Contains tested compounds
(-) Does not contain tested compounds

Formulation of Sensitive Plant Leaf Extract Emulgel

The emulsion was prepared by heating the oil phase (liquid paraffin and Span 80) and the aqueous phase (Tween 80 and distilled water) separately at 70°C. The oil phase was then poured into the aqueous phase and homogenized for 20 minutes. During homogenization, sensitive plant leaf extract was added. HPMC was first dispersed in hot water (80–90°C) while stirring. Subsequently, the gel base was triturated with methyl paraben, propyl paraben, and propylene glycol, then mixed with the emulsion while continuously stirring until homogeneous.

Evaluation of Sensitive Plant Leaf Extract Emulgel

1.) Organoleptic Test Results

Table 3. Organoleptic Test

Formula	Test Result		
	Color	Odor	Form
F1	Green	Characteristic Green Tea	Semi Solid
F2	Green	Characteristic Green Tea	Semi Solid
F3	Green	Characteristic Green Tea	Semi Solid

Based on the table above, all three emulgel formulas exhibited a green color.

2.) Homogeneity Test Results

Table 4. Homogeneity Test Results

Formula	Homogeneity
F1	Homogeneous
F2	Homogeneous
F3	Homogeneous

The homogeneity test results showed that all emulgel formulas had uniform distribution when pressure was applied on the glass surface.

3.) pH Test Results

Table 5. pH Measurement Results

Formulation	pH
F1	5,0
F2	5,4
F3	5,9

The pH values met the requirements for a good emulgel preparation because they were within the safe skin pH range of 4.5–6.5.

4.) Spreadability Test Results

Table 6. Spreadability Test Results

Formulation	Spreadability
F1	6 cm
F2	5,8 cm
F3	5,3 cm

The emulgel preparations demonstrated good spreadability as they were within the acceptable range of 5–7 cm.

5.) Adhesiveness Test Results

Table 7. Adhesiveness Test Results

Formulation	Mean ± SD
F1	6,4
F2	7,1
F3	7,5

The emulgel preparations showed good adhesiveness because their adhesion time was greater than 4 seconds.

6.) Emulsion Type Test

Table 8. Emulsion Type Test Results

Replication	F1	F2	F3
1	M/A	M/A	M/A
2	M/A	M/A	M/A
3	M/A	M/A	M/A

The test results indicated that the preparations had an oil-in-water (O/W) emulsion type, as demonstrated by the uniform coloration of all emulgels with methylene blue. The resulting emulsion type was as expected, namely oil-in-water (O/W).

CONCLUSIONS AND RECOMMENDATIONS

The ethanol extract of sensitive plant leaves (*Mimosa pudica* L.) can be formulated into an emulgel preparation.

The addition of varying concentrations of the gelling agent HPMC in the emulgel preparation of ethanol extract of sensitive plant leaves (*Mimosa pudica* L.) produced evaluation results that met the requirements of a good emulgel preparation.

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