

Formulasi dan Evaluasi Fisik Ekstrak Gel Etanol Buah Okra (*Abelmoschus esculentus* L. Moench) Asal Kota Parepare

*Formulation and Physical Evaluation of Ethanol Gel Extract of Okra Fruit (*Abelmoschus esculentus* L. Moench) From Parepare City*

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Abstrak

Penggunaan tanaman herbal sebagai bahan aktif alternatif dalam sediaan farmasi topikal semakin berkembang, seiring dengan meningkatnya tren penggunaan obat-obatan berbahan dasar alam. Buah okra (*Abelmoschus esculentus* L. Moench) diketahui mengandung senyawa aktif seperti flavonoid, alkaloid, dan fenol yang memiliki aktivitas antioksidan dan antiinflamasi, sehingga berpotensi untuk digunakan dalam formulasi gel topikal. Penelitian ini bertujuan untuk memformulasikan sediaan gel dari ekstrak etanol buah okra asal Kota Parepare dan mengevaluasi karakteristik fisiknya, meliputi uji organoleptik, pH, homogenitas, dan daya sebar. Ekstrak diperoleh melalui metode refluks menggunakan etanol 70% dan diformulasikan dalam empat variasi konsentrasi: 0%, 5%, 10%, dan 15%. Evaluasi fisik dilakukan selama empat siklus penyimpanan suhu ekstrem. Hasil penelitian menunjukkan bahwa semua formula memiliki stabilitas organoleptik yang baik, dengan perubahan bentuk, warna, dan aroma yang minimal. Nilai pH berada dalam rentang fisiologis kulit, meskipun terdapat sedikit penurunan pada konsentrasi ekstrak yang lebih tinggi. Formula dengan konsentrasi 5% menunjukkan stabilitas terbaik dalam hal pH, homogenitas, dan daya sebar, sehingga dapat dianggap sebagai formula optimal untuk pengembangan gel topikal berbasis herbal.

Kata Kunci: Buah Okra, Gel topikal, Ekstrak etanol, Formulasi, Evaluasi fisik

Abstract

The use of herbal plants as alternative active ingredients in topical pharmaceutical preparations is growing, along with the increasing trend of using natural-based medicines. Okra fruit (*Abelmoschus esculentus* L. Moench) is known to contain active compounds such as flavonoids, alkaloids, and phenols that have antioxidant and anti-inflammatory activities, so it has the potential to be used in topical gel formulations. This study aims to formulate a gel preparation from ethanol extract of okra fruit from Parepare City and evaluate its physical characteristics, including organoleptic tests, pH, homogeneity, and spreadability. The extract was obtained through the reflux method using 70% ethanol and formulated in four concentration variations: 0%, 5%, 10%, and 15%. Physical evaluation was carried out during four cycles of extreme temperature storage. The results showed that all formulas had good organoleptic stability, with minimal changes in shape, color, and aroma. The pH value was within the physiological range of the skin, although there was a slight decrease at higher extract concentrations. The formula with a concentration of 5% showed the best stability in terms of pH, homogeneity, and spreadability, so it can be considered as the optimal formula for the development of herbal-based topical gels.

Keywords: Okra Fruit, Topical gel, Ethanol extract, Formulation, Physical evaluation

BACKGROUND

The use of medicinal plants as an alternative to traditional medicine has become a global trend, including in Indonesia, which boasts a rich biodiversity. Amidst advances in science and technology, people are beginning to turn again to natural ingredients for treatment, in line with the back-to-nature

movement that encourages the development of herbal-based pharmaceutical preparations. One plant with significant potential in the pharmaceutical field is okra (*Abelmoschus esculentus* L. Moench). Okra is widely known as a vegetable, but it also contains bioactive compounds with therapeutic benefits.

Okra fruit contains active compounds such as flavonoids, alkaloids, terpenoids, and phenols, which are known to have antioxidant, antidiabetic, and anti-inflammatory activities. Flavonoids, one of the main components, can ward off free radicals and play a role in wound healing and the prevention of chronic diseases (Andry & Satra Winata, 2022). Other contents such as fiber, pectin, epigallocatechin, and quercetin also support the pharmacological effects of this fruit (Panca Bayu Chandra et al., 2022). However, this potential has not been fully utilized in the form of modern pharmaceutical preparations that are practical and effective.

One commonly used topical dosage form is gel, due to its advantages such as high stability, non-stickiness, ease of application, and aesthetic appeal. Gels are also capable of efficiently delivering active ingredients to the skin's surface. pembentuk gel, seperti karbopol dan HPMC, The physical characteristics of the formulation are crucial. Carbopol was chosen for this formulatin because it has high viscosity, good stability, is non-irritating, and is suitable for polar active ingredients such as flavonoids in okra (Idrus et al., 2023).

Various previous studies have discussed gel formulations based on medicinal plants, but few have specifically examined the potential of okra fruit, particularly from specific regions such as Pinanong Village, Sidrap Regency. Physical evaluation of the gel is crucial to ensure the quality and stability of the preparation, including parameters such as organoleptic properties, pH, homogeneity, viscosity, and spreadability (Binti Kasman Bokti & Amelia Saputri, 2018). This study aims to address this gap and encourage the use of local plants in the development of herbal-based health products.

The novelty of this study lies in the use of ethanol extract of okra fruit from Parepare City and the comprehensive evaluation of the resulting product's physical parameters. The problem addressed is how to formulate an okra fruit ethanol extract gel and meet physical quality standards. Therefore, the aim of this study was to formulate an ethanol extract gel from okra fruit from Parepare City, as well as to evaluate its physical characteristics.

METHODS

This is a laboratory experimental study aimed at formulating a gel preparation based on ethanol extract of okra (*Abelmoschus esculentus* L. Moench) from Parepare City and evaluating its physical characteristics. Fresh okra samples were obtained from Parepare City, South Sulawesi. The samples were thoroughly washed with running water, cut into small pieces, and dried in direct sunlight until completely dry. Next, 320 grams of the dried sample was weighed and extracted using the reflux method with 70% ethanol as the solvent. The reflux process was carried out in three cycles, each lasting four hours. The refluxed product was filtered to separate the pulp from the solvent. The filtrate was then evaporated using a rotary evaporator to obtain a thick extract.

The gel preparation was formulated using four variations in extract concentration: 0%, 5%, 10%, and 15%. Other ingredients used in the formulation include carbopol 940 as a gelling agent, methylparaben as a preservative, propylene glycol as a humectant, α -tocopherol as an antioxidant, and triethanolamine (TEA) as a pH regulator. The formulation composition is shown in Table 1

Table 1. Formula for Okra Fruit Ethanol Extract Gel Preparation

Bahan	F0 (0%)	F1 (5%)	F2 (10%)	F3 (15%)	Fungsi
Ekstrak buah okra	0	1	2	3	Active ingredient
Carbopol 940	0.7	0.3	0.3	0.3	Gelling agent
Metil paraben	0.04	0.04	0.04	0.04	Preservative
Propilenglikol	2	2	2	2	Humectant
α -tokoferol	0.02	0.01	0.01	0.02	Antioxidant
TEA	0.7	0.7	0.7	0.7	pH adjuster
Akuades	ad 15	ad 15	ad 15	ad 15	Solvent

The gel-making process is carried out by weighing all ingredients according to the formula. Carbopol 940 is dissolved in hot water to form a base gel. Okra fruit extract with a certain concentration is then added to

the base gel and stirred until evenly distributed (mixture 1). Meanwhile, propylene glycol is dissolved in a small amount of hot water, then methyl paraben, α -tocopherol, and TEA are added, then stirred until homogeneous (mixture 2). Mixtures 1 and 2 are then combined and distilled water is added to reach 20 grams. The final mixture is stirred quickly to form a homogeneous gel and placed in a closed container. Physical evaluation of the gel preparation included organoleptic tests, pH, homogeneity, and spreadability. The evaluation was conducted over four cycles of extreme temperature storage over eight days. Each cycle consisted of storing the gel at 4°C for 24 hours, followed by storage at 40°C for another 24 hours.

Organoleptic testing was performed by observing changes in color, shape, and odor of the preparation during each cycle. pH measurements were performed using a pH meter to ensure the preparation's pH stability within the skin pH range (4.5–6.5). Homogeneity was tested by applying a small amount of the gel preparation to a glass slide and visually observing the particle distribution. Spreadability was tested by placing 1 gram of gel between two glass plates and applying a 125-gram load. The diameter of the spread was then measured after 1 minute.

RESULTS AND DISCUSSION

In this study, four types of topical gels were formulated with varying concentrations of okra (*Abelmoschus esculentus* L. Moench) ethanol extract: F0 (0%), F1 (5%), F2 (10%), and F3 (15%). Evaluation of the preparations was based on organoleptic, pH, homogeneity, and spreadability tests. Testing was conducted before and after accelerated storage for four extreme temperature cycles (4°C and 40°C for 24 hours each).

1. Organoleptic Test

Table 1. Organoleptic Test Results

Formula	Form (beginning)	Form (final)	Color (beginning)	Color (final)	Aroma (beginning)	Aroma (final)
F0	Semi solid	Semi solid	White	White	Typical gel	Typical gel
F1	Semi solid	Semi solid	Orange	Orange	Typical okra	Typical okra
F2	Semi solid	Semi solid	Yellow young	Yellow young	Typical okra	Typical okra
F3	Semi solid	Semi solid	Brick red	Brick red	Typical okra	Typical okra

Description: Organoleptic stability is observed from changes in shape, color, and aroma during extreme storage

2. pH Test

Table 2. pH Test Result

Formula	pH (beginning)	pH (final)	Skin pH Standards
F0	6,9	5,2	4,5 – 7,0 (Santoso, 2021)
F1	5,0	4,5	
F2	4,8	4,4	
F3	4,5	4,2	

Description: Initial observation: After gel preparation Final observation: After storage for 4 cycles (8 days)

3. Homogeneity Test

Table 3. Results of Homogeneity Test

Formula	Homogeneity (beginning)	Homogeneity (final)	Homogeneity Standard
F0	Homogen	Homogen	No coarse grains (Santoso,2021)
F1	Homogen	Homogen	
F2	Homogen	Homogen	
F3	Not homogen	Homogen	

Description : Initial Observation : After gel preparation

1. The ethanol extract of okra fruit from Parepare City was successfully formulated into a topical gel preparation at concentrations of 5%, 10%, and 15% using a Carbopol 940 base.
2. The results of the physical evaluation showed that all formulas had stable organoleptic characteristics in terms of color, aroma, and form, with no significant changes after accelerated storage. The pH test indicated that Formulation 1 (5%) had the most stable pH within the physiological skin range (4.6), while F2 and F3 experienced a decrease below the lower limit of physiological pH. The homogeneity test showed that formulas F0, F1, and F2 were homogeneous before and after storage, while F3 exhibited improved homogeneity after storage. The spreadability test demonstrated that all formulas remained within the ideal range (5–7 cm), although a slight decrease was observed after storage.
3. Formula I (5% okra fruit extract) demonstrated the best balance in terms of physical stability, pH, homogeneity, and spreadability, and therefore can be recommended as the most suitable formula for further development as a natural-based topical gel preparation.

SUGGESTION

It is recommended that future research conduct pharmacological tests, such as wound healing effectiveness, toxicity, and skin irritation tests, to ensure the overall safety and efficacy of the gel formulation.

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