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Formulation and Evaluation of Avocado Leaf Extract Cream Preparation (*Persea americana* Mill.)

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Abstract

As the outermost organ of the body, the skin is vulnerable to disorders such as inflammation, infection, and irritation, necessitating the use of effective and safe topical preparations. Avocado leaves (*Persea americana* Mill.) contain bioactive compounds such as flavonoids and polyphenols with known antioxidant and anti-inflammatory properties. This study aimed to formulate and evaluate a cream preparation containing ethanolic extract of avocado leaves as a natural active ingredient. The extract was obtained by maceration using 96% ethanol and formulated into three concentrations: 10% (F1), 15% (F2), and 20% (F3). Evaluations included organoleptic properties, homogeneity, pH, spreadability, and physical stability. The results showed that all formulations had a homogeneous appearance, characteristic color according to extract concentration, were odorless and tasteless. The pH values ranged within a safe range for skin application (4.83–4.90), and the best spreadability was observed in formulation F2. Increasing extract concentration tended to decrease spreadability due to increased viscosity. All formulations demonstrated good physical stability during cyclic stability testing. Based on these findings, it can be concluded that avocado leaf ethanolic extract can be effectively formulated into a stable, safe, and physically acceptable cream suitable for topical use

Keywords: Topical cream, avocado leaf, *Persea americana*, ethanolic extract, formulation

Abstrak

Sebagai organ terluar tubuh, kulit rentan terhadap berbagai gangguan seperti peradangan, infeksi, dan iritasi, sehingga memerlukan sediaan topikal yang efektif dan aman. Daun alpukat (Persea americana Mill.) mengandung senyawa bioaktif seperti flavonoid dan polifenol yang diketahui memiliki aktivitas antioksidan dan antiinflamasi. Penelitian ini bertujuan untuk merumuskan dan mengevaluasi sediaan krim topikal yang mengandung ekstrak etanol daun alpukat sebagai bahan aktif alami. Ekstrak diperoleh melalui metode maserasi menggunakan etanol 96% dan diformulasikan dalam tiga konsentrasi: 10% (F1), 15% (F2), dan 20% (F3). Evaluasi yang dilakukan meliputi sifat organoleptik, homogenitas, pH, daya sebar, dan stabilitas fisik. Hasil menunjukkan bahwa semua formula memiliki tampilan homogen, warna yang sesuai dengan konsentrasi ekstrak, serta tidak berbau dan tidak berasa. Nilai pH berada dalam rentang aman untuk aplikasi pada kulit (4,83–4,90), dengan daya sebar terbaik terdapat pada formula F2. Peningkatan konsentrasi ekstrak cenderung menurunkan daya sebar akibat peningkatan viskositas. Semua formula menunjukkan stabilitas fisik yang baik selama uji stabilitas siklik. Berdasarkan hasil tersebut, dapat disimpulkan bahwa ekstrak etanol daun alpukat dapat diformulasikan secara efektif menjadi krim topikal yang stabil, aman, dan dapat diterima secara fisik untuk penggunaan luar.

Kata kunci: *Krim topikal, daun alpukat, Persea americana, ekstrak etanol, formulasi*

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INTRODUCTION

The skin is the largest organ of the human body and serves as the primary barrier against physical, chemical, and biological insults. Therefore, maintaining skin health and integrity is crucial[1]. Skin disorders such as inflammation, microbial infections, irritation, and dryness can impair the skin's physiological functions and reduce quality of life[2]. In both traditional medicine and modern topical product development, cream formulations have become highly preferred due to their ease of application, ability to spread uniformly across the skin surface, and better cosmetic acceptability compared to other semisolid dosage forms[3].

The selection of cream as the dosage form in this study is based on its emollient properties, skin-moisturizing effects, and capacity to effectively deliver active compounds into the skin layers[4]. Creams offer advantages in terms of physical stability, viscosity, and user comfort,

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making them ideal for dermatological and cosmetic preparations. Moreover, creams are versatile systems that can incorporate both hydrophilic and lipophilic active ingredients depending on the emulsion type (oil-in-water or water-in-oil), allowing broad flexibility in formulation development[5].

Avocado leaves (*Persea americana* Mill.) are rich in secondary metabolites such as flavonoids, saponins, tannins, and polyphenols, which exhibit antioxidant, anti-inflammatory, and antimicrobial activities[6]. Several studies have reported the therapeutic potential of avocado leaf extract as a wound-healing agent, a skin protectant against oxidative stress, and a natural ingredient for managing skin disorders. However, the utilization of avocado leaf extract in topical cream formulations remains underexplored, particularly in formulations that have been scientifically evaluated for their physicochemical properties and stability[7,8].

This research is also driven by the growing trend toward natural ingredients in skincare products, reflecting public concern over the potential side effects of synthetic chemicals. Therefore, the development of a scientifically validated topical formulation based on avocado leaf extract is expected to offer an effective, safe, and economical alternative. In addition, such development can enhance the added value of locally sourced plant materials with high potential for sustainable application.

METHODOLOGY

Tools and Material

The equipment used in this study included glassware (Pyrex), a mortar and pestle, a stirring rod, and an evaporating dish. The materials used for the cream formulation were avocado leaves, glycerin, cetyl alcohol, stearic acid, EDTA XNA, glycerin, propylene glycol, 1% CMC, methylparaben, and distilled water.

Making Avocado Leaf Extract

Fresh avocado leaves were collected, washed, and dried. The leaves were then oven-dried at 40°C until completely dry. A total of 500 grams of finely powdered avocado leaves were extracted using 96% ethanol by maceration for 72 hours. The resulting extract was filtered and evaporated using a rotary evaporator to obtain a thick extract. This extract was then incorporated into the cream base[6].

Avocado Leaf Ethanol Extract Cream Formula

The formula of the ethanol extract cream preparation is made by mixing the oil phase with the water phase. The formula of the avocado leaf ethanol extract cream preparation can be seen in the table 1. The cream formulation was prepared by separately heating the oil and aqueous phases. The oil phase consisted of cetyl alcohol, stearic acid, and avocado leaf ethanol extract, which were weighed accurately and heated in a beaker until fully melted at a temperature of approximately 70–75°C. Simultaneously, the aqueous phase was prepared by dissolving glycerin, propylene glycol, EDTA ZNA, CMC, and methylparaben in a sufficient amount of distilled water. This mixture was also heated to around 70°C with constant stirring until all ingredients were completely dissolved and the solution appeared clear [9].

Once both phases reached the same temperature, the hot aqueous phase was

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slowly added to the oil phase with continuous stirring using a homogenizer or mechanical stirrer. The emulsification process was maintained until a uniform and homogeneous cream base was formed. Stirring was continued as the mixture gradually cooled to room temperature to ensure consistency and stability of the cream. Additional distilled water was added to adjust the total weight to 100 g. The final cream was then transferred into a suitable container and stored at room temperature for further evaluation [10].

Table 1. Formulation of Avocado Leaf Ethanol Extract Cream

Material	Formulation		
	F1	F2	F3
Avocado Leaf Ethanol Extract	10	15	20
Glycerin	2	2	2
Cetyl alcohol	4	4	4
EDTA ZNA	0.1	0.1	0.1
Stearic acid	2	2	2
Propilenglycol	5	5	5
CMC	2.5	2.5	2.5
Methylparaben	2.5	2.5	2.5
Aquadest	ad 100	ad 100	ad 100

Evaluation Avocado Leaf Ethanol Extract Cream Formula

Organoleptic

Examination for organoleptic tests includes aroma, color, and texture. Testing is done by replicating each formula three times [11].

Homogeneity Test

A total of 1 gram of cream is applied to a transparent glass. Then an observation is made, the preparation must show uniformity in its composition and no grains should be visible. The test is carried out by repeating three times for each formula [11].

pH Test

A pH test is performed to ensure that the cream product is safe to use and does not cause skin irritation. A total of 1 gram of cream extract is weighed and mixed with 10 ml of distilled water. For an ideal preparation, the appropriate pH is between 4.5 to 6.5, such as the pH of the skin [11].

Spreadability Test

Weigh 0.5 grams of cream, then place it in the middle of the petri dish in an inverted position, leave it for 1 minute and add a load starting from 50 grams to 250 grams every 1 minute. The standard for spreading the cream is between 5 cm and 7 cm [12] .

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RESULT AND DISCUSSION

Organoleptic

Organoleptic evaluation was performed to assess the physical appearance of the cream formulations, including color, odor, and texture. These parameters are crucial in determining user acceptability, especially for topical formulations such as creams, where aesthetic and sensory properties influence patient compliance. The results of organoleptic testing of the avocado leaf ethanol extract cream preparation can be seen in Table 2.

Table 2. Organoleptic and Homogenity Cream Extract Ethanol Avocado Leaf.

Parameters	F1	F2	F3
Smell	Odorless	Odorless	Odorless
Color	Light Brown	Dark Brown	Dark Brown
Taste	Tasteless	Tasteless	Tasteless
Homogeneity	Homogen	Homogen	Homogen

Description:
F1: EEDA Cream 10%
F2: EEDA Cream 15%
F3: EEDA Cream 20%

Based on Table 2, all three formulations (F1, F2, and F3) were odorless. The absence of unpleasant or strong scents suggests that the cream base effectively masked any inherent smell from the ethanol extract of avocado leaves (EEDA). This is favorable for topical application, as strong or unpleasant odors may reduce user compliance.

In terms of color, differences were observed with increasing concentrations of the avocado leaf extract. F1 (10% EEDA) appeared light brown, while F2 (15%) and F3 (20%) exhibited a darker brown color. The darkening of color with higher extract concentration is consistent with the increased presence of pigmented phytochemical constituents such as polyphenols and flavonoids, which are abundant in avocado leaves. This change in color intensity can be a visual indicator of active compound concentration but should also be considered in terms of patient acceptability for cosmetic use. All formulations were tasteless, although taste is not a primary concern for topical creams. The absence of taste, however, supports the conclusion that the formulations do not possess any unpleasant residues or components that might affect overall quality if accidentally ingested in trace amounts [13]

pH Test

The pH test of the cream formulation was carried out to ensure compatibility with the skin's natural pH, which typically ranges from 4.5 to 6.5. Maintaining a formulation within this range is crucial to avoid irritation, maintain the skin barrier function, and ensure user comfort. pH test results can be seen in table 3. Based on Table 3, the pH values for all three formulations (F1, F2, and F3) were consistent across three replicates, showing good reproducibility. F1

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had a pH of 4.83, F2 showed a slightly higher pH of 4.86, and F3 had the highest value at 4.90. These values indicate a slight increase in pH with increasing concentrations of avocado leaf ethanol extract, which may be attributed to the inherent chemical properties of the extract [14].

Despite the variation, all pH values remained within the safe range for skin application. The results confirm that the addition of up to 20% extract does not raise the pH to a level that would compromise skin compatibility.

Spreadability Test

Spreadability is one of the important physical parameters of a topical formulation, as it reflects the ease with which the product can be applied to the skin. An ideal cream should have good spreadability to ensure uniform distribution over the application area without requiring excessive force. This characteristic also influences patient compliance and the therapeutic efficacy of the active ingredient [10]. The results of the spreadability test of the preparation can be seen in Table 4

Table 3. pH Test

Parameters	I	II	III
F1	4.83	4.83	4.83
F2	4.86	4.86	4.86
F3	4.9	4.9	4.9

Table 4. Spreadability Test

Parameters	F1	F2	F3
50 gram	5 cm	6 cm	5 cm
100 gram	6 cm	6.1 cm	5.8 cm
150 gram	7 cm	7 cm	5.7 cm

Based on Table 4, formulation F2 consistently showed the highest spreadability at all weight levels, with diameters of 6 cm, 6.1 cm, and 7 cm respectively. F1 followed closely with 5 cm, 6 cm, and 7 cm. In contrast, F3 exhibited the lowest spreadability, with spread diameters of 5 cm, 5.8 cm, and 5.7 cm under increasing weights. These results suggest that higher concentrations of avocado leaf ethanol extract, as seen in F3 (20%), may slightly increase the viscosity of the cream, thus reducing its spreadability.

Interestingly, although F1 and F2 had similar final spread diameters at 150 g (7 cm), F2 achieved greater spread at lower weights, indicating slightly better softness and flow properties. This implies that the formulation with 15% extract (F2) has the optimal balance between extract content and cream base composition in terms of spreadability performance.

CONCLUSION

The cream formulations containing ethanol extract of avocado leaves (*Persea americana* Mill.) at concentrations of 10%,

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15%, and 20% showed good physical characteristics, including homogeneous texture, acceptable color, odorless scent, skin-compatible pH (4.83–4.90), and adequate spreadability. Among them, the 15% formulation (F2) demonstrated optimal balance in texture and spreadability. These findings suggest that avocado leaf extract is suitable for development as a natural active ingredient in topical cream preparations.

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REFERENCES

1. Tottoli, E. M. *et al.* Skin wound healing process and new emerging technologies for skin wound care and regeneration. *Pharmaceutics* **12**, 735 (2020).
2. Vera, V. E. K. & Silalahi, J. Testing Of The Cream Formula Turmina Right Extract Against The Inhibition Of The Development Of Melanoma Cells. *Int. J. Sci. Technol. Manag.* **3**, 525–529 (2022).
3. Ridwanto, R. *et al.* TOXICITY TEST OF VANAME SHRIMP (Litopenaeus vannamei) SKIN CHITOSAN USING BRINE SHRIMP LETHALITY TEST (BSLT) METHOD. *Rasayan J. Chem.* **16**, (2023).
4. Paudilah, P., Raviah, N., Lestari, D., Lestari, S. & Parliana, P. Comparison of the Effectiveness of Taro Leaf Stalk Extract (Colocasia Esculenta) with Gentamicin Sulfate Cream in the Wound Healing Process in White Rats. *Enrich. J. Multidiscip. Res. Dev.* **1**, 1–13 (2023).
5. Couillaud, B. M., Espeau, P., Mignet, N. & Corvis, Y. State of the art of pharmaceutical solid forms: from crystal property issues to nanocrystals formulation. *ChemMedChem* **14**, 8–23 (2019).
6. Nasri, N. *et al.* Antibacterial Potential of Ethanolic Extract of Avocado Leaves (*Persea americana* mill.) against Clinical Isolate of Klebsiella pneumoniae and Proteus mirabilis. *Trends Sci.* **21**, 7821–7821 (2024).
7. Kaban, V. E. *et al.* Formulasi Sediaan Gel dari Ekstrak Metanol Biji Alpukat (*Persea americana* Mill.) Sebagai Penyembuh Luka Sayat Pada Tikus Jantan (Rattus norvegicus). *Herb. Med. J.* **5**, 48–54 (2022).
8. Nasri, N., Kaban, V. E., Syahputra, H. D. & Satria, D. Aktivitas Antibakteri Ekstrak Etanol Daun Alpukat (*Persea americana* Mill) Terhadap Escherichia coli, Salmonella typhi, dan Pseudomonas aeruginosa. *Herb. Med. J.* **5**, 13–19 (2022).
9. Kaban, V. E. Uji Formula Krim Ekstrak VCO Kunyit dari Rimpang Kunyit (*Curcuma domestica* Val.) Terhadap Penghambatan Perkembangan Sel Melanoma. (Universitas Sumatera Utara, 2021).
10. Naeimifar, A. *et al.* Preparation and evaluation of anti-wrinkle cream containing saffron extract and avocado oil. *J. Cosmet. Dermatol.* **19**, 2366–2373 (2020).
11. Ordu, J. I. & Jaja, G. O. Evaluation of Pulp Oil *Persea americana* (Avocado Fruit) in Pharmaceutical Cream Formulation. *Int. J. Adv. Sci. Res. Eng.* **4**, 14–25 (2018).
12. Chow, K. T., Chan, L. W. & Heng, P. W. Characterization of spreadability of nonaqueous ethylcellulose gel matrices using dynamic contact angle. *J. Pharm. Sci.* **97**, 3467–3482 (2008).
13. Verda, V., Leonardo, W., Prismawan, D. & Notario, D. Optimization of Sunscreen Cream Formulation Containing Ethanolic Extract of Avocado Leaves (*Persea americana* Mill.) or Mangosteen Rind (Garcinia mangostana L.) combined with Octyl Methoxycinnamate. *J. Farm. Galen. Galen. J. Pharm.* **9**, 165–179 (2023).
14. Ramdhan, B. & Yusuf, A. L. Formulation and Evaluation of Avocado Leaf Extract (*Persea americana* Mill.) Cream Based on Variations Stearic Acid Concentration. *Ad-Dawaa J. Pharm.* **1**, 78–86 (2023).