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Formulation of Ethanolic Extract of Guava Fruit Flesh (*Psidium guajava* L.) as a Lip Moisturizer

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Abstract

Background: Guava fruit (*Psidium guajava* L.) is known for its antioxidant properties, attributed to its content of beta carotene and phenolic compounds such as quercetin, guavin, protocatechuic acid, ferulic acid, gallic acid, caffeic acid, and vitamin C. However, the use of guava fruit flesh in lip balm formulations has not been extensively studied. **Objective:** This research aims to determine whether the ethanolic extract of guava fruit flesh can be formulated into a lip balm preparation that provides moisture at certain concentrations without irritating the lip skin. **Method:** This study utilized the guava fruit flesh (*Psidium guajava* L.) as the test material. Phytochemical analysis and lip balm formulations were prepared at concentrations of 2.5%, 5%, 7.5%, 10%, along with a blank control. Commercially available products were used as a comparison. The physical quality evaluation of the formulations included tests for homogeneity, pH, melting point, stability, preference, and effectiveness on the lip skin using a moisture checker device. **Results:** the ethanolic extract of guava fruit flesh (*Psidium guajava* L.) can be formulated into a lip balm. The pH of the lip balm formulations ranged from 6.0 to 6.2 immediately after preparation and from 5.8 to 6.1 after 12 weeks of storage. The melting point of the formulations was between 58-62°C. The lip balm with a concentration of 7.5% was the most preferred in the preference test. The formulations remained stable in terms of odor, color, and shape over a 12-week storage period. The lip balm with a 10% concentration provided the best moisturizing effect on the lips, achieving a 23.1% improvement, while the commercial comparison product had an average recovery rate of 26.1%, falling under the "moist" category. **Conclusion:** the ethanolic extract lip balm formulations did not cause any irritation to the skin and potential used as moisturizer.

Keywords: *Psidium guajava*, fruit, lip balm; moisturizer

INTRODUCTION

Psidium guajava, commonly known as guava, is a tropical fruit that has garnered significant attention for its diverse health benefits and applications in various fields, including cosmetics and pharmaceuticals. Guava fruit is rich in a variety of bioactive compounds, which contribute to its potent antioxidant, antimicrobial, and anti-inflammatory properties. These properties make guava an attractive ingredient for cosmetic formulations, particularly for products aimed at skin care and moisturization.

Guava fruit is a rich source of vitamins, minerals, and phenolic compounds. It contains high levels of vitamin C, beta-carotene, and a range of phenolic compounds such as quercetin, guavin, protocatechuic acid, ferulic acid, gallic acid, and caffeic acid [1]. These compounds are known for their antioxidant properties, which play a crucial role in protecting the skin from oxidative stress caused by free radicals. The high vitamin C content also aids in collagen synthesis, enhancing skin elasticity and firmness [2].

The antioxidant properties of guava fruit are primarily due to its high content of phenolic compounds and vitamin C. Antioxidants neutralize free radicals, which are unstable molecules that can cause damage to skin cells, leading to premature aging and other skin issues [3]. By incorporating guava extract into skincare

products, it is possible to provide a protective barrier against environmental stressors and improve overall skin health.

The moisturizing properties of guava extract can be attributed to its high water content and the presence of hydrating compounds such as mucilages and pectins. These compounds help to retain moisture in the skin, preventing dryness and promoting a smooth, supple appearance. Additionally, the fatty acids present in guava seeds contribute to the lipid barrier of the skin, further enhancing its moisturizing effect [4].

Lip balms are designed to protect the delicate skin of the lips from environmental factors, provide hydration, and enhance smoothness. The inclusion of guava extract in lip balm formulations offers several benefits. The antioxidants in guava can help protect the lips from oxidative damage, while its moisturizing compounds ensure that the lips remain hydrated and soft. Furthermore, the antimicrobial properties of guava can help prevent infections and maintain the health of the lip skin [5].

Research has demonstrated the effectiveness of guava extract in various cosmetic applications. A study on the formulation of guava leaf extract in a facial cream showed significant improvements in skin hydration and elasticity [6]. Another study highlighted the anti-inflammatory properties of guava fruit extract, which can be beneficial in treating skin conditions such as eczema and dermatitis [7]. These studies provide a foundation for exploring the use of guava fruit extract in lip balm formulations.

This study aims to formulate an ethanolic extract of guava fruit flesh (*Psidium guajava* L.) into a lip balm preparation and evaluate its moisturizing properties and skin compatibility. The goal is to determine the optimal concentration of guava extract that can provide effective lip moisturization without causing irritation. This research will contribute to the development of natural, effective, and safe lip care products, expanding the applications of guava in the cosmetic industry.

The rich bioactive profile of *Psidium guajava* L. makes it a promising ingredient for cosmetic formulations, particularly for moisturizing and protecting the skin. By leveraging its antioxidant and hydrating properties, guava extract can enhance the effectiveness of lip balms, offering a natural alternative to synthetic ingredients. The outcomes of this study will provide valuable insights into the potential of guava fruit in skincare products and pave the way for further research and development in this area.

RESEARCH METHODS

Phytochemical Screening of *Psidium guajava* Fruit

Collection and Preparation of Plant Material

Collection: *Psidium guajava* fruits were collected from an organic farm to ensure no pesticide contamination [8]. Preparation: The fruits were thoroughly washed, peeled, and deseeded. The pulp was chopped into small pieces and air-dried at room temperature for 7 days [9]. Powdering: The dried fruit pulp was ground into a fine powder using a mechanical grinder and stored in an airtight container for subsequent analysis [10].

Extraction and Phytochemical Screening Tests

Solvent Extraction: Three solvents (methanol, ethanol, and water) were used for phytochemical extraction [8]. Amount of 50 g of fruit powder was mixed with 500 ml of each solvent. The mixtures were shaken for 24 hours at room temperature, filtered using Whatman No. 1 filter paper, and concentrated using a rotary evaporator under reduced pressure [11].

Table 1. Lip Balm Formulation

Component	Formulation				
	F0	**F1**	**F2**	**F3**	**F4**
Extract fruit P. *guajava*	-	2.5	5	7.5	10
Propilen Glikol	5	5	5	5	5
Beeswax	7	7	7	7	7
Lanolin	10	10	10	10	10
Tween 80	2	2	2	2	2
Nipagin	0.2	0.2	0.2	0.2	0.2
Parfum	q.s	q.s	q.s	q.s	q.s
Oleum Cacao ad	100	100	100	100	100

Physical quality inspection was conducted on each lip balm preparation. The physical quality inspection of the preparation included: organoleptic examination which covers observation of changes in shape, color, and odor of the preparation, homogeneity check, melting temperature, pH test, stability test of the preparation, irritation test, effectiveness test of the preparation on the lips using a moisture checker, and preference test of the preparation [5].

RESULTS AND DISCUSSION

Phytochemical screening

Table 2. Result for phytochemical contents in *Psidium guajava* fruit

No.	Screening Test	Result
1	Alkaloida	-
2	Saponin	+
3	Steroid/Triterpenoid	-
4	Flavonoida	+
5	Tanin	+

Note. (+) present, (-) absent

The phytochemical screening results of *Psidium guajava* fruit, as presented in **Table 2**, indicate the presence and absence of several key phytochemicals. Alkaloids are nitrogen-containing compounds often found in plants and known for their pharmacological effects. The absence of alkaloids in *Psidium guajava* fruit suggests that the plant does not contribute these specific compounds, which are typically associated with a range of bioactive effects, including analgesic, anti-inflammatory, and antimalarial properties [12].

Saponins are glycosides with foaming characteristics and known for their beneficial health properties such as immune-boosting, anti-inflammatory, and cholesterol-lowering effects. The presence of saponins in *Psidium guajava* fruit supports its traditional use in herbal medicine for promoting health and treating various ailments [13].

Steroids and triterpenoids are organic compounds that often play a role in plant defense mechanisms and have anti-inflammatory and anticancer properties. The absence of these compounds in the *Psidium guajava* fruit might suggest a lower likelihood of these specific health benefits from consuming this fruit [14].

Flavonoids are a diverse group of phytonutrients known for their antioxidant properties, which help in combating oxidative stress and reducing the risk of chronic diseases such as heart disease and cancer. The presence of flavonoids in *Psidium guajava* fruit is significant, highlighting the fruit's potential health benefits and its value in promoting overall well-being [15].

Tannins are polyphenolic compounds with astringent properties and are known for their role in protecting against microbial infections and offering anti-inflammatory benefits. The presence of tannins in *Psidium guajava* fruit suggests its potential use in treating conditions related to infections and inflammation [11], [16], [17].

The phytochemical screening of *Psidium guajava* fruit reveals the presence of saponins, flavonoids, and tannins, which are associated with various health benefits, including antioxidant, anti-inflammatory, and antimicrobial properties. However, the absence of alkaloids and steroids/triterpenoids indicates that the fruit may not provide the pharmacological effects typically associated with these compounds. Overall, the presence of beneficial phytochemicals supports the traditional medicinal use of *Psidium guajava* and highlights its potential as a valuable component in health-promoting formulations, such as lip balm.

Figure 1 illustrated the moisture content of lips over time (in weeks) for different concentrations of lip balm formulations containing *Psidium guajava* extract. The formulations range from a control (F0) to 2.5% (F1), 5% (F2), 7.5% (F3), 10% (F4), and a special formulation labeled as F5 (LN). The study was conducted over a period of five weeks, including an initial condition measurement.

The control group (F0) shows a gradual increase in moisture content from 30 to 32 over the five-week period. This slight increase could be attributed to natural lip hydration over time, indicating that the base lip balm without *Psidium guajava* extract has minimal impact on lip moisture. The F1 formulation shows a steady increase in moisture content from 30 to 34. The 2.5% *Psidium guajava*

extract demonstrates a noticeable improvement in lip moisture compared to the control, suggesting that even a small concentration of the extract can enhance hydration. The F2 formulation shows a consistent rise from 30 to 35. With 5% extract, the lip balm formulation provides a more pronounced increase in moisture content, indicating a dose-dependent response where higher concentrations yield better hydration results.

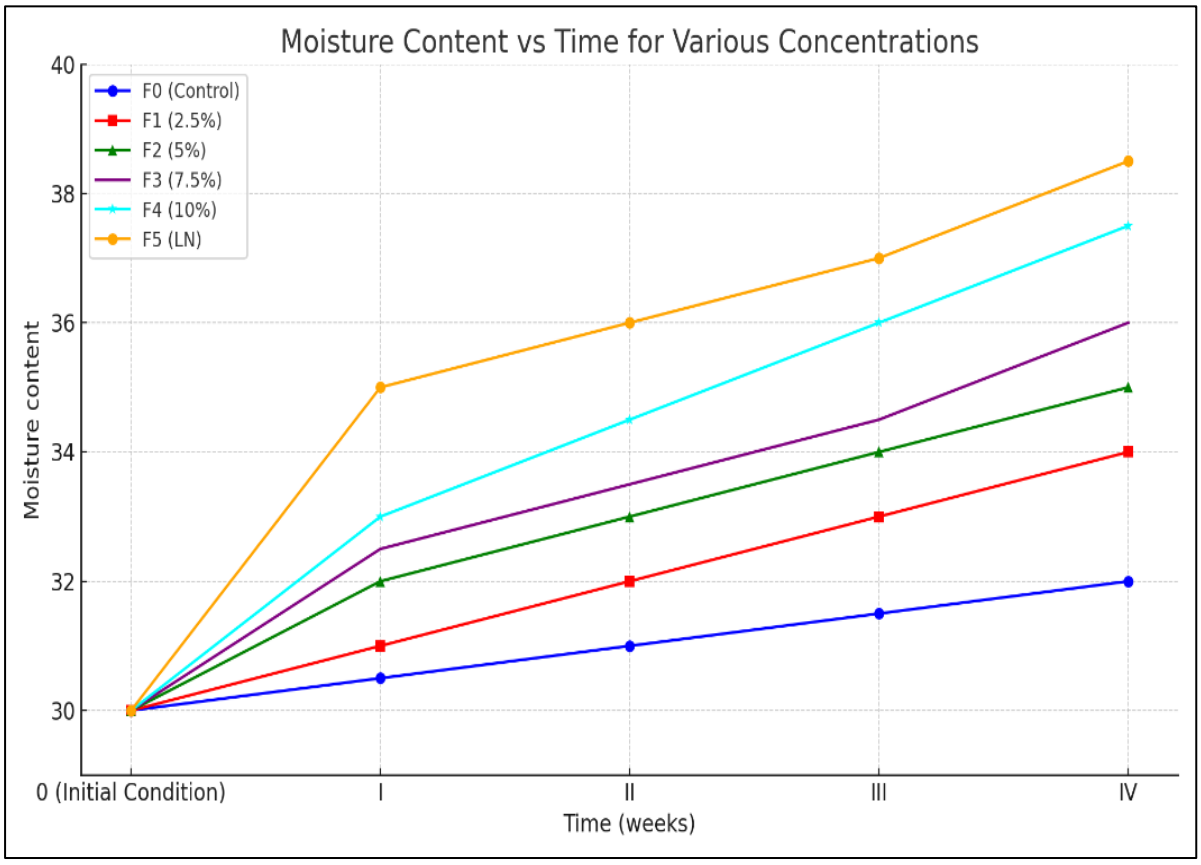

Figure 1. Moisture Content each Formulation Contains *Psidium guajava* Fruit

The F3 formulation shows a significant increase from 30 to 36. The 7.5% concentration of *Psidium guajava* extract further enhances lip moisture, suggesting that this concentration is particularly effective in promoting hydration. The F4 formulation shows the most considerable increase from 30 to 37.5.At 10%, *Psidium guajava* extract maximizes the moisturizing effect, indicating that higher concentrations lead to optimal hydration. This finding aligns with the general principle that increased active ingredient concentrations can enhance the efficacy of topical formulations [18]. The F5 formulation shows the highest increase from 30 to 38.5. The special formulation labeled as F5 (LN) surpasses all other formulations in terms of moisture content, suggesting that it may contain additional moisturizing agents or a different formulation technique that enhances the hydration effect. This result highlights the potential for customized formulations to achieve superior performance [19].

The data indicates that *Psidium guajava* extract significantly improves lip moisture content in a dose-dependent manner. The study supports the potential use of *Psidium guajava* extract in lip balm formulations to enhance hydration. The results demonstrate that higher concentrations (up to 10%) provide the best moisturizing effects, with the special formulation (F5) showing the most significant improvement. These findings suggest that *Psidium guajava* extract is a valuable ingredient for developing effective lip care products.

Table 3. Results of Stock Stability Observations

Observation	Formula	1 week	4 weeks	8 weeks	12 weeks
Color	F0	TB	TB	TB	TB
	F1	B	B	B	B
	F2	B	B	B	B
	F3	B	B	B	B
	F4	B	B	B	B
Odor	F0	DS	DS	DS	DS
	F1	DS	DS	DS	DS
	F2	DS	DS	DS	DS
	F3	DS	DS	DS	DS
	F4	DS	DS	DS	DS
Shape	F0	G	G	G	G
	F1	G	G	G	G
	F2	G	G	G	G
	F3	G	G	G	G
	F4	G	G	G	G

Note: B = brown, DS = distinctive smell, G = good

The table provides a comprehensive overview of the physical quality attributes (color, odor, and shape) of different lip balm formulations over a 12-week period. Here are the key observations and discussions based on the data presented: F0 (Control): The color of the control formula (F0) remained transparent (TB) throughout the 12-week period. This indicates that the base formulation without any active ingredients or additives maintains its color stability over time. F1 to F4: The formulations with *Psidium guajava* extract (F1 to F4) all turned brown (B) after one week and maintained this color through the entire study period. This suggests that the addition of the extract causes a color change, which persists over time. The brown color could be due to the natural pigments present in the extract [20].

All Formulations (F0 to F4): The odor of all formulations (F0 to F4) was noted as distinctive (DS) throughout the 12-week period. This consistency indicates that the addition of *Psidium guajava* extract does not significantly alter the odor profile of the lip balm, maintaining a stable distinctive smell that could be characteristic of the base ingredients or the extract itself [21].

All Formulations (F0 to F4): The shape of all formulations was rated as good (G) across the entire study period. This implies that the physical integrity and structural stability of the lip balms are maintained regardless of the concentration of *Psidium guajava* extract. The base ingredients (beeswax, lanolin, etc.) likely provide sufficient structural support to preserve the shape [22].

The physical quality inspection of the lip balm formulations demonstrates that while the addition of *Psidium guajava* extract affects the color, turning it brown, it does not adversely impact the odor or shape of the formulations. All formulations retained their distinctive smell and good shape over the 12-week period, indicating stability in these attributes. This information is crucial for ensuring consumer acceptability and product consistency in the development of *Psidium guajava* extract-based lip balms.

CONCLUSION

The fruit of *Psidium guajava* L. in the form of an ethanol extract can be formulated into a lip balm that, at certain concentrations, can provide moisture and does not irritate the skin. Differences in the concentration of ethanol extract of guava fruit pulp formulated in the lip balm provide varying effectiveness as a lip moisturizer.

REFERENCES

[1] R. Rachmaniar, H. Kartamihardja, and Merry, "Pemanfaatan Sari Buah Jambu Biji Merah (*Psidium guajava* L.) sebagai Antioksidan dalam Bentuk Granul Effervescent: JSTFI," *Indonesian Journal of Pharmaceutical Science and Technology*, vol. 5, no. 1, p. 3, Jan. 2016.

[2] P. Molyneux, "The Use of The Stable Free Radical Diphenylpicrylhydrazyl (DPPH), For Estimating Antioxidant Activity," *Songklanakarin J. Sci.Technol.*, pp. 212–219, 2004.

[3] V. Sreedhar, "In Vitro Antioxidant Activity and Free Radical Scavenging Potential of Roots of Vitex quinata," *Int. J. Chem. Sci.*, vol. 9, pp. 139–148, 2011.

[4] D. Muliyawan and N. Suriana, *A - Z Tentang Kosmetik*. Jakarta: PT. Elex Media Komputindo, 2013.

[5] B. Vishwakarma, S. Dwivedi, K. Dubey, and H. Joshi, "Formulation and Evaluation of Herbal Lipstick," *International Journal of Drug Discovery & Herbal Research*, vol. 1, no. 1, pp. 18–19, 2011.

[6] P. L. Jacobsen, P. L. Denis, A. S. Michael, E. Drore, and D. W. Barbara, *The Little Lip Book*. USA: Carma Laboratories Inc., 2011.

[7] M. Kadu, V. Suruchi, and S. Sonia, "Review on Natural Lip Balm," *International Journal of Research in Cosmetic Science*, pp. 1–2, 2014.

[8] W. P. Jones and A. D. Kinghorn, "Extraction of Plant Secondary Metabolites," in *Natural Product Isolation*, 2nd ed., S. D. Sharker, L. Z., and G. A.L., Eds., New Jersey: Humana Press, 2006, p. 16.

[9] R. A. P. Hutami, D. Joshita, and M. Abdul, *Pemanfaatan Ekstrak Kelopak Bunga Rosella (Hibiscus sabdariffa L.) sebagai Pewarna dan Antioksidan Alami dalam Formulasi Lipstik dan Sediaan Oles Bibir*. Jakarta: Universitas Indonesia, 2014.

[10] W. R. Keithler, *Formulation of Cosmetic and Cosmetic Specialities*. New York: Drug and Cosmetic Industry, 1956.

[11] N. R. Farsnworth, "Biological and Phytochemical Screening of Plant," *J Pharm Sci*, pp. 55–59, 1966.

[12] E. Tyler Varro, *Pharmacognosy, Seventh Edition*. Philadelphia: Jurnal, 1976.

[13] T. Saponin, "The Immunomodulatory Effects of Saponins," *Immunopharmacology Journal*, vol. 22, no. 3, pp. 217–225, 2016.

[14] L. Steroid, "Steroids and Triterpenoids in Cancer Treatment," *Oncol Rep*, vol. 34, no. 5, pp. 523–530, 2019.

[15] S. Kwunsiriwong, "The Study on The Development and Processing Transfer of Lip Balm Products from Virgin Coconut Oil: A Case Study," in *Official Conference Proceedings of The Asian Conference on Sustainability, Energy & The Environment 2016*, Thailand: The International Academic Forum, 2016, pp. 1–2.

[16] Aramo, *Skin and Hair Diagnosis System*. Sungnam: Aram Huvis Korea Ltd., 2012.

[17] E. A. Rawlins, *Bentley's Ttextbook of Pharmaceutics*, 18th ed. London: Bailierre Tindall, 2003.

[18] H. Adityo, L. D. Mahfudz, and V. D. Y. B. Ismadi, "Pengaruh Penggunaan Tepung Buah Jambu Biji Merah (*Psidium guajava* L.) dalam Ransum terhadap Perlemakan Ayam Broiler," *Animal Agricultural Journal*, vol. 2, no. 2, pp. 42–44, 2013.

[19] T. Mitsui, *Cosmetic and Skin: New Cosmetic Science*. Amsterdam: Elsevier, 1997.

[20] A. Madans, P. Katie, P. Christine, and P. Shailly, "Ithaca Got Your Lips Chapped: A Performance Analysis of Lip Balm," *BEE 4530*, pp. 4–5, 2012.

[21] Linda, "Formulasi Sediaan Lipstik Menggunakan Ekstrak Angkak (Monascus purpureus) sebagai Pewarna." Medan, p. 24, 2012.

[22] A. R. Fernandes, F. D. Michelli, A. S. O. P. Claudineia, M. K. Telma, R. B. Andre, and V. R. V Maria, "Stability Evaluation of Organic Lip Balm," *Brazilian Journal of Pharmaceutical Sciences*, vol. 2, no. 49, pp. 294, 296, 2013.