

Research Article

Formulation and Testing of SPF (Sun Protection Factor) Values of Nanoemulsion-Based Sunscreen Lotion from Raspberry (*Rubus rosifolius* Sm.) Fruit Extract

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Abstract: Excessive exposure to ultraviolet radiation can cause skin damage, making the use of sunscreen necessary. Raspberry fruit (*Rubus rosifolius* Sm.) contains phenolic compounds, anthocyanins, and vitamin C, which have potential as natural antioxidants and active ingredients in sunscreen formulations. This study aimed to formulate raspberry fruit extract into a nanoemulsion, incorporate it into a sunscreen lotion formulation, and analyze the effect of different extract concentrations on SPF values. This experimental study used raspberry fruit extract obtained through maceration with 96% ethanol. The extract was formulated into a nanoemulsion using VCO, Tween 80, and PEG 400, and subsequently incorporated into lotion formulations at concentrations of 0% (F0), 10% (F1), 12.5% (F2), and 15% (F3). The nanoemulsion was evaluated based on organoleptic characteristics and particle size, while the lotion was evaluated for organoleptic characteristics, homogeneity, pH, spreadability, adhesion, viscosity, hedonic properties, and SPF value. The results showed that raspberry fruit extract was successfully formulated into a nanoemulsion with particle sizes ranging from 13.54 to 21.70 nm. All lotion formulations meet the physical quality requirements during four weeks of storage. The mean SPF values were 17,126 for F0, 17,666 for F1, 18,520 for F2, and 19,980 for F3. Statistical analysis showed that increasing the extract concentration had a significant effect on SPF values ($p < 0.001$). All formulations were classified as providing ultra protection, with F3 (15%) producing the highest SPF value and the most optimal UV protection.

Keywords: Nanoemulsion; Raspberry Fruit; SPF; Sunscreen Lotion; *Rubus rosifolius* Sm.

1. Background

Countries whose geographical location is crossed by the line Equatorial countries like Indonesia have a tropical climate with direct exposure to very hot sunlight and make the air temperature feel hot. Outdoor activities expose us to sunlight which can emit ultraviolet (UV) radiation. Ultraviolet radiation is divided into UV-A, UV-B, and UV-C. UV-C radiation cannot reach the earth's surface because it is completely absorbed by the ozone layer. However, UV-A and UV-B radiation can reach the earth's surface and be absorbed by the skin, causing various skin damage. (Riska Nafiah *et al.*, 2024).

The skin functions to protect the body from external influences. Skin damage can occur when exposed to sunlight for too long. Short-term skin damage is characterized by sunburn, which is a condition where the skin feels sore and warm, and tanning, which is a change in skin color to darker due to exposure to UV rays. Long-term skin damage is characterized by premature aging, dry skin, sagging skin, rough skin, and the formation of dark spots (Riska Nafiah *et al.*, 2024). To overcome this, skin protection from UV rays is needed, such as the use of sunscreen.

Sunscreen protects the skin from UV exposure by absorbing, reflecting, and scattering UV rays emitted by the sun. Its effectiveness is measured by the SPF (Sun Protection Factor) value; the higher the SPF value, the greater the sunscreen's protective capability (Nurmalasari *et al.*, 2023). Sunscreens are categorized into two types: chemical sunscreens, which protect

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the skin by absorbing solar radiation and converting it into heat energy, and physical sunscreens, which protect the skin by reflecting solar radiation (Rachmawati et al., 2021). Sunscreens are frequently formulated with synthetic ingredients that carry a risk of side effects; to minimize such adverse effects, natural ingredients with similar properties such as the raspberry (**Rubus rosifolius** Sm.) can be utilized.

Raspberries (*Rubus Rosifolius* Sm.) are a type of fruit that can be consumed directly or processed. Raspberries (*Rubus Rosifolius* Sm.) contain many secondary metabolites such as phenolic compounds, anthocyanins, organic acids, minerals, and others. The anthocyanin content of raspberries (*Rubus Rosifolius* Sm.) include cyanidin-3-0-sophoroside, cyanidin-3-0-glucoside, and cyanidin-3-0-rutinoside. This fruit has a fairly high vitamin C content and is rich in antioxidant compounds. These compounds play a role in helping fight pathogens, supporting the immune system, and reducing the effects of free radical exposure (Fanshuri et al., 2021). Compounds from raspberries can be delivered well to the skin layer using the right base by utilizing nanotechnology such as nanoemulsions.

Nanoemulsions can be used as a delivery system for active ingredients because they have good compatibility and can increase the solubility of lipophilic compounds. Furthermore, this system can help protect active ingredients from enzymatic degradation and hydrolysis. Nanoemulsions are a delivery system consisting of an oil phase dispersed in an aqueous phase in the form of droplets measuring approximately 20–500 nm. The advantage of nanoemulsions is their relatively small size, which allows the system to interact with the skin surface and helps increase the penetration of active ingredients into the skin. Furthermore, nanoemulsions have flexibility in preparation development, allowing them to be formulated in various forms, including creams, liquid preparations, sprays, and lotions. (Ermawati et al., 2023).

Lotion in cosmetics is one of the skin care products used with the aim of maintaining healthy skin, moisturizing the skin and protecting the skin from damage due to exposure to UV rays. Lotion is a semi-solid topical preparation that contains more water so it has many advantages including being easy to use, can spread evenly on the skin, does not leave an oily feeling, and can work directly on skin tissue (Iskandar et al., 2021).

Based on the problems in the background above, the author is interested in conducting research to develop nanotechnology in the manufacture of lotion preparations with the title "Formulation and Test of SPF (Sun Protection Factor) Values of Nanoemulsion - Based Sunscreen Lotion Preparations from Raspberry Fruit Extract (*Rubus rosifolius* Sm.)"

2. Research Methods

This research is an experimental research conducted in the Pharmaceutical Laboratory, Phytochemistry Laboratory, and Chemistry Laboratory of Al-Fatah Bengkulu Health College from March to August 2026. The research began with plant verification to ensure the accuracy of the sample identity, then continued with the collection of raspberry fruit (*Rubus rosifolius* Sm.) obtained from Curup, Bengkulu City. 2 kg of raspberry fruit was sorted, washed, chopped, dried using a *dehydrator* at a temperature of 50°C, then mashed into *simplicia*. The *simplicia* was then extracted using the maceration method with 96% ethanol, followed by remaceration and concentration using a *rotary evaporator* and *water bath*. The extract obtained was then subjected to phytochemical screening to identify the content of flavonoids, tannins, saponins, and alkaloids.

Raspberry fruit extract was then formulated into a nanoemulsion preparation using a low-energy emulsification method using VCO as the oil phase, Tween 80 as a surfactant, PEG 400 as a cosurfactant, and distilled water as a solvent. Nanoemulsions were made in four formulas, namely F0 without active ingredients, F1 with an extract concentration of 10%, F2 at 12.5%, and F3 at 15%, then organoleptic and particle size evaluations were carried out using a *Particle Size Analyzer*. Nanoemulsions were then used as active ingredients in *lotion formulations* which were also made in four formulas with variations in the same concentration of active ingredients. The *lotion preparations* were evaluated through organoleptic, homogeneity, pH, spreadability, adhesion, viscosity, and hedonic tests. Determination of the *Sun Protection Factor* (SPF) value was carried out using a UV-Vis spectrophotometer at a wavelength of 290–320 nm and calculated using the Mansur method. Data on nanoemulsion characteristics and the physical quality of the *lotion* were analyzed descriptively, while the SPF value was analyzed using *One Way ANOVA*.

3. Results and Discussion

Evaluation Results of Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Organoleptic Test

Table 1. Organoleptic Test Results of Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Organoleptic	Week 4			
		1	2	3	4
F0	Color	White	White	White	White
	Smell	Odorless	Odorless	Odorless	Odorless
	Texture	A bit runny	A bit runny	A bit runny	A bit runny
F1	Color	White with a slight yellowish tinge	White with a slight yellowish tinge	White with a slight yellowish tinge	White with a slight yellowish tinge
	Smell	Raspberry Special	Raspberry Special	Raspberry Special	Raspberry Special
	Texture	A bit thick	A bit thick	A bit thick	A bit thick
F2	Color	White with a slight yellowish tinge	White with a slight yellowish tinge	White with a slight yellowish tinge	White with a slight yellowish tinge
	Smell	Raspberry Special	Raspberry Special	Raspberry Special	Raspberry Special
	Texture	A bit thick	A bit thick	A bit thick	A bit thick
F3	Color	Yellowish white	Yellowish white	Yellowish white	Yellowish white
	Smell	Raspberry Special	Raspberry Special	Raspberry Special	Raspberry Special
	Texture	Thick	Thick	Thick	Thick

The results of the observation showed that differences in the concentration of raspberry fruit extract (*Rubus rosifolius* Sm.) affected the color, aroma, and texture of the *lotion preparation*. Formula 0 which did not contain the extract remained white and had no distinctive odor, while formulas 1, 2, and 3 were yellowish white and had a distinctive raspberry aroma with increasing intensity as the extract concentration increased. The texture of the preparation also showed an increase in viscosity, with formula 0 being the most liquid and formula 3 being the thickest. During four weeks of storage, no changes in odor such as rancid odor or loss of distinctive aroma were found, indicating the stability of the preparation. The use of methyl paraben and propyl paraben as preservatives also supported the stability of the preparation by inhibiting the growth of microorganisms during storage.

Homogeneity Test

Table 2. Results of the Homogeneity Test of Nanoemulsion Sunscreen Lotion from Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Observation 1	Observation 2	Observation 3	Observation 4
F0	Homogeneous	Homogeneous	Homogeneous	Homogeneous
F1	Homogeneous	Homogeneous	Homogeneous	Homogeneous
F2	Homogeneous	Homogeneous	Homogeneous	Homogeneous
F3	Homogeneous	Homogeneous	Homogeneous	Homogeneous

The results of the homogeneity test for four weeks showed that all *lotion formulas* remained homogeneous, did not experience changes or phase separation, and had an even color. The addition of raspberry fruit extract (*Rubus rosifolius* Sm.) at various concentrations did not affect the homogeneity of the preparation, which indicates that the nanoemulsion system is able to disperse the active ingredients evenly in the lotion base. This condition

indicates good physical stability of the preparation and supports the uniform distribution of active ingredients at each use.

Spread Power Test

Table 3. Results of the Spreadability Test of Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Week 4 (Cm)				Mean $\pm$ SD	Spread Power Requirements
	1	2	3	4		
F0	6.35	6.42	6.48	6.54	6.45 ± 0.080	5-7 cm
F1	6.14	6.18	6.26	6.33	6.23 ± 0.083	
F2	5.96	6.00	6.12	6.20	6.07 ± 0.105	
F3	5.84	5.90	5.98	6.11	5.96 ± 0.117	

The results of the four-week test showed that the average spreadability of formulas F0, F1, F2, and F3 was 6.45 ± 0.080 cm; 6.23 ± 0.083 cm; 6.07 ± 0.105 cm; and 5.96 ± 0.117 cm, respectively. The spreadability tended to decrease with increasing concentration of raspberry (*Rubus rosifolius* Sm.) extract due to the increasing viscosity of the preparation, while during storage there was a slight increase in spreadability due to a decrease in viscosity. However, all formulas remained within the spreadability range of 5–7 cm, thus meeting the physical criteria and demonstrating the stability of the preparation during four weeks of storage.

Adhesion Test

Table 4. Results of the adhesion test of the Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Week (seconds)				Mean $\pm$ SD	Adhesion Requirements
	1	2	3	4		
F0	7.29	7.26	7.20	7.13	7.22 ± 0.07	>4 seconds
F1	7.57	7.52	7.48	7.45	7.51 ± 0.05	
F2	7.68	7.66	7.61	7.58	7.63 ± 0.05	
F3	7.82	7.79	7.78	7.74	7.74 ± 0.03	

The test results showed that increasing the concentration of raspberry fruit extract (*Rubus rosifolius* Sm.) increased the adhesive power of the preparation, with an average F0 of 7.22 ± 0.07 seconds, F1 of 7.51 ± 0.05 seconds, F2 of 7.63 ± 0.05 seconds, and F3 of 7.74 ± 0.03 seconds. All formulas met the adhesive power requirements for topical preparations, which were more than 4 seconds. During four weeks of storage, there was a slight decrease in adhesive power in all formulas, but the change was still within stable limits with a low standard deviation value, thus indicating the consistency and physical stability of the preparation during storage.

Viscosity Test

Table 5. Viscosity Test Results of Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Week 4 (Cp)				Mean $\pm$ SD	Viscosity Requirements
	1	2	3	4		
F0	9,600	9,600	8,800	8,800	$9,200 \pm 282.84$	2,000 – 50,000 CP
F1	10,800	10,400	10,400	10,000	$10,400 \pm 326.60$	
F2	11,600	11,600	11,200	10,800	$11,500 \pm 173.21$	
F3	12,800	12,800	12,400	12,400	$12,600 \pm 141.42$	

The results of viscosity testing using a Brookfield Viscometer with spindle No. 7 at a speed of 50 rpm showed that all lotion formulas F0–F3 met the requirements of SNI 16-4399-1996, namely 2,000–50,000 cP. The average viscosity of F0, F1, F2, and F3 was $9,200 \pm 282.84$ cP; $10,400 \pm 326.60$ cP; $11,500 \pm 173.21$ cP; and $12,600 \pm 141.42$ cP, respectively. Increasing the concentration of raspberry (*Rubus rosifolius* Sm.) extract caused an increase in viscosity due to the increase in dissolved and suspended components in the preparation. During four weeks of storage, there was a slight decrease in viscosity, but it was still within reasonable limits so that all formulas showed good viscosity stability.

Hedonic Test

Table 6. Hedonic Test Results of Nanoemulsion Sunscreen Lotion with Raspberry Fruit Extract (*Rubus rosifolius* Sm.)

Formula	Average Score Value			Overall Value
	Color	Aroma	Texture	
F0	3.85	4.05	4.15	4.02
F1	4.05	4.25	4.15	4.15
F2	4.35	4.5	4.5	4.45
F3	4.85	4.75	4.65	4.75

The results of the hedonic test showed that increasing the concentration of raspberry (*Rubus rosifolius* Sm.) extract tended to increase the panelists' level of preference for the *lotion preparation*. In the color parameter, the F0, F1, F2, and F3 scores were 3.85; 4.05; 4.35; and 4.85, respectively, while the aroma scores were 4.05; 4.25; 4.50; and 4.75, respectively. The texture parameter obtained scores of 4.15; 4.15; 4.50; and 4.65. Overall, the level of preference increased from F0 of 4.02, F1 of 4.15, F2 of 4.45, to F3 of 4.75. These results indicate that the addition of raspberry extract provided color, aroma, and texture characteristics that were increasingly preferred by the panelists, with F3 obtaining the highest overall acceptance score.

SPSS Analysis

Table 7. One-Way ANOVA Test Results.

ANOVA					
SPF_Value	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	23,245	3	7,748	263,410	.000
Within Groups	.471	16	.029		
Total	23,715	19			

The *One-Way ANOVA* analysis showed that the *Sum of Squares* value between groups was 23.245 with *df* 3 and *Mean Square* 7.748, while within the group the *Sum of Squares* was 0.471 with *df* 16 and *Mean Square* 0.029. The test results produced an F value of 263.410 with a significance of 0.000 ($p < 0.05$), thus indicating a significant difference in SPF values between formulas F0, F1, F2, and F3. Thus, the difference in raspberry extract concentration in *lotion preparations* has a significant effect on the SPF value.

Post Hoc Test

This was done to determine which groups had specific differences in SPF values. The results of the Post Hoc test are as follows:

Table 8. Post Hoc Test Results.

Formula (I)	Formula (J)	Mean Difference (I - J)	Std. Error	p-value	95% CI Lower Bound	95% CI Upper Bound
Formula 0	Formula 1	-0.54000*	0.10847	0.001	-0.8503	-0.2297
Formula 0	Formula 2	-1.39400*	0.10847	<0.001	-1.7043	-1.0837
Formula 0	Formula 3	-2.85400*	0.10847	<0.001	-3.1643	-2.5437
Formula 1	Formula 0	0.54000*	0.10847	0.001	0.2297	0.8503
Formula 1	Formula 2	-0.85400*	0.10847	<0.001	-1.1643	-0.5437
Formula 1	Formula 3	-2.31400*	0.10847	<0.001	-2.6243	-2.0037
Formula 2	Formula 0	1.39400*	0.10847	<0.001	1.0837	1.7043
Formula 2	Formula 1	0.85400*	0.10847	<0.001	0.5437	1.1643
Formula 2	Formula 3	-1.46000*	0.10847	<0.001	-1.7703	-1.1497
Formula 3	Formula 0	2.85400*	0.10847	<0.001	2.5437	3.1643
Formula 3	Formula 1	2.31400*	0.10847	<0.001	2.0037	2.6243
Formula 3	Formula 2	1.46000*	0.10847	<0.001	1.1497	1.7703

Based on the results above, it was found that the comparison between Formula 0 and Formula 1 showed a significance value of 0.001 ($p < 0.05$) with an average difference of -0.5400. This shows that the SPF value between Formula 0 and Formula 1 is significantly different. Comparison of Formula 0 with Formula 2 ($p = 0.000$, difference -1.3940) and Formula 3 ($p = 0.000$, difference -2.8540) also showed a very significant difference. Formula 1 showed a significant difference when compared again with Formula 2 ($p = 0.000$, difference -0.8540) and Formula 3 ($p = 0.000$, difference -2.3140). Likewise, the comparison between Formula 2 and Formula 3 produced a significance value of 0.000 with an average difference of -1.4600, which means that both are significantly different. Since all pairs of formula groups have significance values less than 0.05 ($p < 0.05$) it can be concluded that each formula (F0, F1, F2, and F3) produces SPF values that are significantly different from each other.

4. Conclusion

Based on the results of research and discussion regarding the formulation and SPF value test of nanoemulsion-based sunscreen lotion preparations from raspberry fruit extract (*Rubus rosifolius* Sm.), the following conclusions can be drawn: 1) Raspberry fruit extract (*Rubus rosifolius* Sm.) was successfully formulated into a nanoemulsion preparation using a combination of VCO oil phase, surfactant of Tween 80, and cosurfactant of PEG 400. The evaluation results showed a clear preparation with particle sizes ranging from 13.54 nm to 21.70 nm (< 100 nm) and a homogeneous polydispersity index (0.059 - 0.392). 2) Nanoemulsion of raspberry fruit extract (*Rubus Rosifolius* Sm.) can be used optimally as a base in sunscreen lotion formulation. All lotion formulas (F0, F1, F2, F3) meet the physical quality requirements of topical preparations for 4 weeks of storage. 3) Increasing the concentration of raspberry extract significantly increased the Sun Protection Factor (SPF) values of the preparations linearly ($p < 0.001$). The average SPF values obtained were F0 (17.126 ± 0.101), F1 (17.666 ± 0.092), F2 (18.520 ± 0.181), and F3 (19.980 ± 0.257). All formulas were classified as Ultra/Very High Protection (SPF > 15) based on FDA standards, with Formula 3 (15% extract concentration) providing the most optimal level of UV protection.

References

- Adha, MA, Saranani, S., & Andriani, R. (2025). Review Article: Liposome Ceramide Cream Formulation, Nyamplung, VCO and Glutathione as Sunscreen Moisturizer. Jurnal Mandala Pharmacon Indonesia (Jmpi), 11(1), 1–13.
- Adhisa, S., & Megasari, DS (2020). Study of the Application of the True or False Type Cooperative Learning Model to Basic Competencies in Skin Disorders and Diseases. 09, 82–90.
- Agustin, P. (2024). Nanoemulsion Formulation of a Combination of Sungkai Leaf Extract (*Peronema Canescens* Jack) and Cinnamon (*Cinnamomum Burmannii* (Nees & Th Nees) Blume) as an Antioxidant and Skin Protection Factor Agent.
- Anwar, E. (2012). Excipients in Pharmaceutical Preparations : Characterization and Application. Dian Rakyat, Jakarta.
- Arsyad, R., Amin, A., & Waris, R. (2023). Manufacturing Technique and Value of Simplicia and Ethanol Extract of Bagore Seeds (*Caesalpinia Crist A L.*) from Polewali Mandar. Makassar Natural Product Journal, 1(3), 138–147.
- Athania, T., Purwati, E., Puspadina, V., & Safitri, CINH (2021). Formulation and Physical Quality Test of Pear Skin Extract Body Lotion (*Pyrus Bretschneideri*). 416–422.
- Audrey, SI (2023). Utilization of Ethanol Extract of Secang Wood (*Caesalpinia Sappan L.*) and Strawberry Fruit (*Fragaria Ananassa*) as Sheet Mask Preparations.
- Diah, Nurlaeli, L., & Nian, RB (2023). Formulation and Determination of SPF (Sun Protection Factor) Value of Torch Ginger Leaf Extract Lotion Preparation (*Etlingera Elatior*) In Vitro Using UV-Vis Spectrophotometry Method. Indonesian Scientific Journal of Pharmacy, 01(02), 12–22.
- Dienilah, A. (2022). Formulation of Nanoemulsion Preparation of Strawberry Fruit Extract (*Fragaria Sp*) as an Active Ingredient in Making Antioxidant Serum.

- Ermawati, DE, Rohmani, S., & Beandrade, MU (2023). Monograph Book of Nanoemulsion Systems for Cosmetic Preparations. Pt. Pena Persada Kerta Utama Editorial.
- Fanshuri, B., Agustina, D., Triasih, U., & Honestin, T. (2021). Indohits_Raspberry. In Researchgate (pp. 191–193).
- Fathin, S., Qonitah, F., Ahwan, & Ariastuti, R. (2025). Test of the SPF (Sun Protection Factor) Value of Hand and Body Lotion Preparations with Ethanol Extract of Moringa Leaves. *Pharmacy Medical Journal*, 8(1), 31–39.
- Fi Edition III. (1979). Department of Health of the Republic of Indonesia.
- Fikri, MN, Bagiana, IK, & Cahyani, IM (2025). Formulation and Activity Test of SPF Value of Rambutan Leaf Ethanol Extract Lotion (*Nephelium Lappaceum* L.).
- Halim, WCI, Mazidah, EN, Ghaliyah, TSR, & Najih, YA (2024). Formulation and Characterization of Nanoemulsion of 96% Ethanol Extract of Squid (*Loligo* Sp) and Virgin Coconut Oil. *Journal of Herbal, Clinical and Pharmaceutical Sciences*, 06(02).
- Iskandar, B., Eni Sidabutar, SB, & Leny. (2021). Formulation And Evaluation Of Avocado Extract Lotion (*Persea Americana*) As A Skin Moisturizer. *J. Islamic Pharm.*, 6(1), 14–21.
- Jannah, SRN, Zubaydah, WOS, & Almunawarah, AAA (2025). Optimization of Kojic Acid Dipalmitate Nanoemulsion Preparation Using a Combination of Tween 80 and Peg 400 with Design-Expert. *Lansau: Journal of Pharmaceutical Sciences (Ljik)*, 3(2), 102–115. <https://doi.org/10.33772/Lansau.V3i2.47>
- Khairurrozikin, M. (2023). Formulation and Physical Evaluation of Blush On Stick from Ethanol Extract of Red Dragon Fruit (*Hylocereus Polyrhizus*).
- Lanas, AF, Baharyati, D., & Meinisasti, R. (2024). Formulation of Sunscreen Hand Body Lotion from Ethanol Extract of Red Ginger Rhizome (*Zingiber Officinale* Var *Rubrum* Rhizoma) and SPF Value Test. *Jurnal Pharmacopoeia*, 3(1), 55–67.
- Maslahah, N. (2024). Standards for Medicinal Plant Simplicia as Herbal Preparation Ingredients. 2(2), 1–4.
- Maula, ADR, Fauziah, DT, Purwanti, A., & Agustin, AT (2025). Formulation and Evaluation of Hand Body Lotion Preparations from Avocado Seed Extract (*Persea Americana* Mill.). *Journal of Pharmacy and Halal Studies (Jphs)*, 3(1), 11–22. <https://doi.org/10.70608/6hahad10>
- Mubarok, F. (2021). Spectrophotometer Principles and How It Works. June.
- Nurmalasari, DR, Yunita, RN, & Siddiq, HBHF (2023). Optimization of Ethanol Extract Concentration of Red Rose Flowers (*Rosa Hybrida* Hort.) on the Physical Properties of Sunscreen Lotion. *Scientific Journal of Pharmacy, Academy of Pharmacy*, 6(2), 8–15.
- Pawarti, N., Iqbal, M., Ramdini, DA, & Yuliyanda, C. (2023). The Effect of Extraction Method on Percentage Yield and Phenolic Content of Plant Extracts with Potential as Antioxidants. 13(April), 590–593.
- Qamariah, N., Handayani, R., & Mahendra, AI (2022). Hedonic Test and Storage Test of Ethanol Extract of Liver of Tanah Tubers Ointment. *Surya Medika Journal (Jsm)*, 7(2), 124–131.
- Rachmawati, P., Sagala, RJ, & Kambira, PFA (2021). Literature Review of Natural Sunscreen Dosage Forms, Safety and Effectiveness of Sunscreens. *Review Article*. 13, 25–39.
- Raharjeng, SW, & Purwati, E. (2025). Formulation and Physical Quality Test of Body Lotion from Rambutan (*Nephelium Lappaceum* L.) Peel Extract. 7(1), 61–69.
- Rahmasiaih, Hadiq, S., & Yulianti, T. (2023). Phytochemical Screening of Methanol Extract of Pandanus *Amarillyfolius* Roxb Leaves. 1(1), 33–39.
- Riska Nafiah, S., Fitraneti, E., Rizal, Y., Primawati, I., & Hamama, DA (2024). The Effect of Ultraviolet Ray Exposure on Skin Health and Prevention Efforts. *Scientific Journal*, 3(3), 188–192. <http://Journal.Scientic.Id/Index.Php/Sciena/Issue/View/19>
- Riyanto, & Haryanto, Y. (2023). The Effect of Extract Storage Length on Pinostrobin Levels in Temukunci (*Kaemferia Pandurata*, Roxb) Ethanol Extract. 2, 174–184.
- Sari, EY, Mutia, C., Fitri, ZS, Sakhi, RATN, Maharini, I., & Elisma. (2025). Formulation of Nanoemulgel Preparation from Jernang Resin Extract (*Daemonorops Draco* (Wild.)) for Healing Burn Wounds in Male White Rats (*Rattus Norvegicus*). *Jurnal Farmasimed (Jfm)*, 7(2), 371–380.

- Sari, NT, Azkia, A., Prastyka, D., Tempati, JG, Syahjiah, L., Hasanah, M., Nadila, & Nita, RS (2025). Review Article: Comparison of Hot Extraction and Cold Extraction Methods. *Journal of Innovation Research and Knowledge*, 5(3), 3515–3528.
- Taufiq, & Andriawan, AI (2025). Preparation and Physical Quality Testing of Jicama Starch (*Pachyrhizus Erosus* L.) Body Lotion Preparations. *Yamasi Makassar Health Journal*, 9(1), 123–131.
- Ulfa, AM, Nofita, & Putri, AA (2025). Determination of the SPF Value of Butterfly Pea Flower Lotion (*Clitoria Ternatea* L.) Variation of VCO and Carrageenan as Sunscreen. *Jurnal Medika Malahayati*, 9(2).
- Wiyati, EP, Alfitroh, I., Hardini, T., & Medianah, A. (2025). Screening of Flavonoids from Raspberry Juice (*Rubus Idaeus* L.) Using the Color Test Method. *Journal of Education and Teaching Review*, 8, 6764–6769.
- Yuniarsih, N., Dinanti, D., Susanti, E.I., Latif, M.Z., Irma, R., Rades, R.A., Buana, U., Karawang, P., & Barat, J. (2023). Review Article: Body Lotion From Various Plant Extracts Review Article : Body Lotion From Various Plant Extracts. 6(2), 810 – 815.