

DAFTAR PUSTAKA

- Aizat, W. M. et al. (2019) 'Recent updates on metabolite composition and medicinal benefits of mangosteen plant', *PeerJ*, 7. doi: 10.7717/peerj.6324.
- Altun, H. et al. (2018) 'Assessment of malondialdehyde levels, superoxide dismutase, and catalase activity in children with autism spectrum disorders', *Psychiatry and Clinical Psychopharmacology*, 28(4), pp. 408–415. doi: 10.1080/24750573.2018.1470360.
- Anggraeni, S., Setyaningrum, T. and Listiawan, Y. (2017) 'Perbedaan Kadar Malondialdehid (MDA) sebagai Petanda Stres Oksidatif pada Berbagai Derajat Akne Vulgaris', *Berkala Ilmu Kesehatan Kulit dan Kelamin – Periodical of Dermatology and Venereology*, 29(1), pp. 36–43.
- Bickers, D. R. and Athar, M. (2006) 'Oxidative stress in the pathogenesis of skin disease', *Journal of Investigative Dermatology*, 126(12), pp. 2565–2575. doi: 10.1038/sj.jid.5700340.
- Cwynar, A. et al. (2018) 'Investigation of oxidative stress in patients with alopecia areata by measuring the levels of malondialdehyde and ceruloplasmin in the blood', *Postepy Dermatologii i Alergologii*, 35(6), pp. 572–576. doi: 10.5114/pdia.2017.68047.
- EI-Kenawy, A. E. M., Hassan, S. M. A. and Osman, H. E. H. (2018)

Mangosteen (Garcinia mangostana L.), Nonvitamin and Nonmineral Nutritional Supplements. Elsevier Inc. doi: 10.1016/B978-0-12-812491-8.00045-X.

Glance, A. T. A. (2019) ‘Chapter 14 :: Skin Barrier :: Akiharu Kubo & Masayuki Amagai’, in *Fitzpatrick*, pp. 206–231.

Goud, N. S., Prasad, G. and Kumar, S. (2019) ‘Phytochemical Analysis, Antibacterial and Antioxidant Capacity of Acetone and Methanol Pericarp Extract of Mangosteen’, *International Journal of Pharmaceutical Science Invention ISSN*, 8(January), pp. 44–47.

Huang, H. et al. (2015) ‘Combination of 12-O-tetradecanoylphorbol-13-Acetate with diethyldithiocarbamate markedly inhibits pancreatic cancer cell growth in 3D culture and in immunodeficient mice’, *International Journal of Molecular Medicine*, 35(6), pp. 1617–1624. doi: 10.3892/ijmm.2015.2163.

Jaisupa, N. et al. (2018) ‘Mangosteen peel extract exhibits cellular antioxidant activity by induction of catalase and heme oxygenase-1 mRNA expression’, *Journal of Food Biochemistry*, 42(3), pp. 1–11. doi: 10.1111/jfbc.12511.

Khan, A. Q. et al. (2012) ‘Caffeic acid attenuates 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced NF-κB and COX-2 expression in mouse skin: Abrogation of oxidative stress, inflammatory responses and proinflammatory cytokine production’, *Food and Chemical*

Toxicology, 50(2), pp. 175–183. doi: 10.1016/j.fct.2011.10.043.

Khan, A. Q. et al. (2013) ‘Geraniol attenuates 12-O-tetradecanoylphorbol-13-acetate (TPA)-induced oxidative stress and inflammation in mouse skin: Possible role of p38 MAP Kinase and NF-κB’, *Experimental and Molecular Pathology*, 94(3), pp. 419–429. doi: 10.1016/j.yexmp.2013.01.006.

Kim, N. Y. et al. (2020) ‘Anti-inflammatory effects of ribes diacanthum pall mediated via regulation of nrf2/ho-1 and nf-κb signaling pathways in lps-stimulated raw 264.7 macrophages and a tpa-induced dermatitis animal model’, *Antioxidants*, 9(7), pp. 1–19. doi: 10.3390/antiox9070622.

Kolb, T. M. and Davis, M. A. (2004) ‘The tumor promoter 12-O-tetradecanoylphorbol 13-acetate (TPA) provokes a prolonged morphologic response and ERK activation in Tsc2-null renal tumor cells’, *Toxicological Sciences*, 81(1), pp. 233–242. doi: 10.1093/toxsci/kfh183.

Komalasari, D. N. (2020) *Efek Anti Inflamasi Krim Ekstrak Kulit Manggis (Garcinia Mangostana) Pada Mencit Albino Yang Diinduksi 12-O-Tetradecanoylphorbol-13-Acetat (Tpa) (Analisa Kadar Tnf-A)*. Hasanuddin.

Kuo, Y.-K. et al. (2019) ‘Dry Eye Disease: A Review of Epidemiology in Taiwan, and its Clinical Treatment and Merits’, *Journal of Clinical*

Medicine, 8(8), p. 1227. doi: 10.3390/jcm8081227.

Kusmayadi, A. (2021) 'The effect of storage duration on total xanthones and antioxidant activity of microencapsulation of mangosteen peel extract', *IOP Conference Series: Materials Science and Engineering*, 1034(1), p. 012137. doi: 10.1088/1757-899x/1034/1/012137.

Mohammad, N. A. et al. (2019) 'Optimization of the antioxidant-rich xanthone extract from mangosteen (*Garcinia mangostana* L.) pericarp via microwave-assisted extraction', *Helijon*, 5(10), p. e02571. doi: 10.1016/j.heliyon.2019.e02571.

Mokoagow, K. P. (2020) *Efek Anti Inflamasi Krim Ekstrak Kulit Garciana Mangostana pada Mecit Albino yang Diinduksi dengan 12-O-Tetradecanoylphorbol-13-Acetat (Analisa Kadar Cox-2 dan Histopatologi)*. Hasanuddin.

Mulianto, N. (2020) 'Malondialdehid sebagai Penanda Stres Oksidatif pada Berbagai Penyakit Kulit', *Cermin Dunia Kedokteran*, 47(1), pp. 39–44. Available at: <http://www.cdkjournal.com/index.php/CDK/article/view/341>.

Park, S. J. et al. (2021) 'Kaempferol blocks the skin fibroblastic interleukin 1 β expression and cytotoxicity induced by 12-o-tetradecanoylphorbol-13-acetate by suppressing c-jun n-terminal kinase', *Nutrients*, 13(9), pp. 1–13. doi: 10.3390/nu13093079.

Pizzino, G. et al. (2017) 'Oxidative Stress: Harms and Benefits for Human

Health', *Oxidative Medicine and Cellular Longevity*, 2017. doi: 10.1155/2017/8416763.

Singh, A. et al. (2019) 'Oxidative stress: A key modulator in neurodegenerative diseases', *Molecules*, 24(8), pp. 1–20. doi: 10.3390/molecules24081583.

Situmorang, N. and Zulham (2020) 'Malondialdehyde (mda)', 2(2).

Trüeb, R. M. (2021) 'Oxidative stress and its impact on skin, scalp and hair', *International Journal of Cosmetic Science*, 43(S1), pp. S9–S13. doi: 10.1111/ics.12736.

Yurista, S. R. et al. (2012) 'Effect of Extract from Pericarp of Mangosteen (Garcinia Mangostana Linn) as Anti-Inflammatory Agent in Rat Models with Atherosclerosis Efek Ekstrak Kulit Manggis (Garcinia Mangostana Linn) sebagai Anti Inflamasi pada Tikus Model Aterosklerotik', 33(1), pp. 4–9.

Zhu, G. et al. (2017) '12-O-Tetradecanoylphorbol-13-acetate (TPA) is anti-tumorigenic in liver cancer cells via inhibiting YAP through AMOT', *Scientific Reports*, 7(October 2016), pp. 1–11. doi: 10.1038/srep44940.

LAMPIRAN

Lampiran 1. Persetujuan Etik

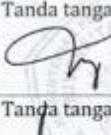


REKOMENDASI PERSETUJUAN ETIK

Nomor : 282/UN4.6.4.5.31 / PP36/ 2021

Tanggal: 26 April 2021

Dengan ini Menyatakan bahwa Protokol dan Dokumen yang Berhubungan Dengan Protokol berikut ini telah mendapatkan Persetujuan Etik :

No Protokol	UH21040217	No Sponsor Protokol	
Peneliti Utama	Dr.dr. Siswanto Wahab,SpKK	Sponsor	
Judul Penelitian	Efek Krim Ekstrak Garcinia Mangostana Dalam Menurunkan Infiltrasi Neutrofil, Ketebalan Epidermis, Edema, Permeabilitas Vaskuler, Kadar Tnf- α , dan Kadar MDA (Malondialdehid) Pada Inflamasi Kulit Mencit Albino Yang Diinduksi 12-O-Tetradecanoylphorbol-13-Ace		
No Versi Protokol	2	Tanggal Versi	23 April 2021
No Versi PSP		Tanggal Versi	
Tempat Penelitian	Laboratorium Hewan FKUH dan Laboratorium Fakultas Farmasi Universitas Hasanuddin Makassar		
Jenis Review	<input type="checkbox"/> Exempted <input checked="" type="checkbox"/> Expedited <input type="checkbox"/> Fullboard Tanggal	Masa Berlaku 26 April 2021 sampai 26 April 2022	Frekuensi review lanjutan
Ketua Komisi Etik Penelitian Kesehatan FKUH	Nama Prof.Dr.dr. Suryani As'ad, M.Sc.,Sp.GK (K)	Tanda tangan 	
Sekretaris Komisi Etik Penelitian Kesehatan FKUH	Nama dr. Agussalim Bukhari, M.Med.,Ph.D.,Sp.GK (K)	Tanda tangan 	

Kewajiban Peneliti Utama:

- Menyerahkan Amandemen Protokol untuk persetujuan sebelum di implementasikan
- Menyerahkan Laporan SAE ke Komisi Etik dalam 24 Jam dan dilengkapi dalam 7 hari dan Lapor SUSAR dalam 72 Jam setelah Peneliti Utama menerima laporan
- Menyerahkan Laporan Kemajuan (progress report) setiap 6 bulan untuk penelitian resiko tinggi dan setiap setahun untuk penelitian resiko rendah
- Menyerahkan laporan akhir setelah Penelitian berakhir
- Melaporkan penyimpangan dari protokol yang disetujui (protocol deviation / violation)
- Mematuhi semua peraturan yang ditentukan

Lampiran 2. Hasil Analisis

1. Hasil Analisis deskriptif Kadar MDA jaringan pada berbagai kelompok

Report

MDA

Kelompok	N	Minimu m	Maximu m	Mean	Std. Deviation
Tanpa perlakuan	5	.42	.67	.5765	.09842
TPA	5	.78	1.41	.9896	.24605
Base cream	5	.54	1.65	.8670	.44777
Hidrokortison	5	.44	.66	.5925	.09393
GM 2.5%	5	.56	1.32	.8810	.36807
GM 5%	5	.58	.81	.7274	.08677
GM 10%	5	.35	.64	.5481	.12597
Total	35	.35	1.65	.7403	.28037

Tests of Normality

	Kelompok	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
MDA	Tanpa perlakuan	.253	5	.200*	.899	5	.404
	TPA	.327	5	.086	.809	5	.096
	Base cream	.397	5	.010	.726	5	.018
	Hidrokortison	.305	5	.145	.820	5	.117
	GM 2.5%	.310	5	.130	.798	5	.077
	GM 5%	.332	5	.075	.829	5	.137
	GM 10%	.312	5	.127	.814	5	.105

*. This is a lower bound of the true significance.

a. Lilliefors Significance Correction

2. Hasil Uji Kruskal Wallis

Ranks

	Kelompok	N	Mean Rank
MDA	Tanpa perlakuan	5	7.60
	TPA	5	20.40
	Base cream	5	14.80
	Hidrokortison	5	7.80
	GM 2.5%	5	14.40
	Total	25	

Test Statistics^{a,b}

	MDA
Chi-Square	10.722
df	4
Asymp. Sig.	.030

a. Kruskal Wallis

Test

b. Grouping

Variable: Kelompok

3. Hasil Uji Mann Whitney

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	3.00	15.00
	TPA	5	8.00	40.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	.000
Wilcoxon W	15.000
Z	-2.611
Asymp. Sig. (2-tailed)	.009
Exact Sig. [2*(1-tailed Sig.)]	.008 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	4.00	20.00
	Base cream	5	7.00	35.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	5.000
Wilcoxon W	20.000
Z	-1.567
Asymp. Sig. (2-tailed)	.117
Exact Sig. [2*(1-tailed Sig.)]	.151 ^b

a. Grouping Variable: Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	5.40	27.00
	Hidrokortison	5	5.60	28.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	12.000
Wilcoxon W	27.000
Z	-.104
Asymp. Sig. (2-tailed)	.917
Exact Sig. [2*(1-tailed Sig.)]	1.000 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	4.20	21.00
	GM 2.5%	5	6.80	34.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	6.000
Wilcoxon W	21.000
Z	-1.358
Asymp. Sig. (2-tailed)	.175
Exact Sig. [2*(1-tailed Sig.)]	.222 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	3.40	17.00
	GM 5%	5	7.60	38.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	2.000
Wilcoxon W	17.000
Z	-2.193
Asymp. Sig. (2-tailed)	.028
Exact Sig. [2*(1-tailed Sig.)]	.032 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Tanpa perlakuan	5	6.00	30.00
	GM 10%	5	5.00	25.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	10.000
Wilcoxon W	25.000
Z	-.522
Asymp. Sig. (2-tailed)	.602
Exact Sig. [2*(1-tailed Sig.)]	.690 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	TPA	5	7.00	35.00
	Base cream	5	4.00	20.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	5.000
Wilcoxon W	20.000
Z	-1.567
Asymp. Sig. (2-tailed)	.117
Exact Sig. [2*(1-tailed Sig.)]	.151 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	TPA	5	8.00	40.00
	Hidrokortison	5	3.00	15.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	.000
Wilcoxon W	15.000
Z	-2.611
Asymp. Sig. (2-tailed)	.009
Exact Sig. [2*(1-tailed Sig.)]	.008 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	TPA	5	6.40	32.00
	GM 2.5%	5	4.60	23.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	8.000
Wilcoxon W	23.000
Z	-.940
Asymp. Sig. (2-tailed)	.347
Exact Sig. [2*(1-tailed Sig.)]	.421 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	TPA	5	7.80	39.00
	GM 5%	5	3.20	16.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	1.000
Wilcoxon W	16.000
Z	-2.402
Asymp. Sig. (2-tailed)	.016
Exact Sig. [2*(1-tailed Sig.)]	.016 ^b

- a. Grouping Variable:
Kelompok
b. Not corrected for ties.

Ranks				
	Kelompok	N	Mean Rank	Sum of Ranks
MDA	TPA	5	8.00	40.00
	GM 10%	5	3.00	15.00
	Total	10		

Test Statistics^a	
	MDA
Mann-Whitney U	.000
Wilcoxon W	15.000
Z	-2.611
Asymp. Sig. (2-tailed)	.009
Exact Sig. [2*(1-tailed Sig.)]	.008 ^b

- a. Grouping Variable:
Kelompok
b. Not corrected for ties.

Ranks				
	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Base cream	5	7.20	36.00
	Hidrokortison	5	3.80	19.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	4.000
Wilcoxon W	19.000
Z	-1.776
Asymp. Sig. (2-tailed)	.076
Exact Sig. [2*(1-tailed Sig.)]	.095 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Base cream	5	5.60	28.00
	GM 2.5%	5	5.40	27.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	12.000
Wilcoxon W	27.000
Z	-.104
Asymp. Sig. (2-tailed)	.917
Exact Sig. [2*(1-tailed Sig.)]	1.000 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Base cream	5	5.00	25.00
	GM 5%	5	6.00	30.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	10.000
Wilcoxon W	25.000
Z	-.522
Asymp. Sig. (2-tailed)	.602
Exact Sig. [2*(1-tailed Sig.)]	.690 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Base cream	5	7.40	37.00
	GM 10%	5	3.60	18.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	3.000
Wilcoxon W	18.000
Z	-1.984
Asymp. Sig. (2-tailed)	.047
Exact Sig. [2*(1-tailed Sig.)]	.056 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Hidrokortison	5	4.40	22.00
	GM 2.5%	5	6.60	33.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	7.000
Wilcoxon W	22.000
Z	-1.149
Asymp. Sig. (2-tailed)	.251
Exact Sig. [2*(1-tailed Sig.)]	.310 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Hidrokortison	5	3.60	18.00
	GM 5%	5	7.40	37.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	3.000
Wilcoxon W	18.000
Z	-1.984
Asymp. Sig. (2-tailed)	.047
Exact Sig. [2*(1-tailed Sig.)]	.056 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	Hidrokortison	5	6.60	33.00
	GM 10%	5	4.40	22.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	7.000
Wilcoxon W	22.000
Z	-1.149
Asymp. Sig. (2-tailed)	.251
Exact Sig. [2*(1-tailed Sig.)]	.310 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	GM 2.5%	5	5.40	27.00
	GM 5%	5	5.60	28.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	12.000
Wilcoxon W	27.000
Z	-.104
Asymp. Sig. (2-tailed)	.917
Exact Sig. [2*(1-tailed Sig.)]	1.000 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	GM 2.5%	5	6.80	34.00
	GM 10%	5	4.20	21.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	6.000
Wilcoxon W	21.000
Z	-1.358
Asymp. Sig. (2-tailed)	.175
Exact Sig. [2*(1-tailed Sig.)]	.222 ^b

a. Grouping Variable:

Kelompok

b. Not corrected for ties.

Ranks

	Kelompok	N	Mean Rank	Sum of Ranks
MDA	GM 5%	5	7.40	37.00
	GM 10%	5	3.60	18.00
	Total	10		

Test Statistics^a

	MDA
Mann-Whitney U	3.000
Wilcoxon W	18.000
Z	-1.984
Asymp. Sig. (2-tailed)	.047
Exact Sig. [2*(1-tailed Sig.)]	.056 ^b

- a. Grouping Variable:
Kelompok
b. Not corrected for ties.

Lampiran 3. Alat dan Bahan

1. TPA



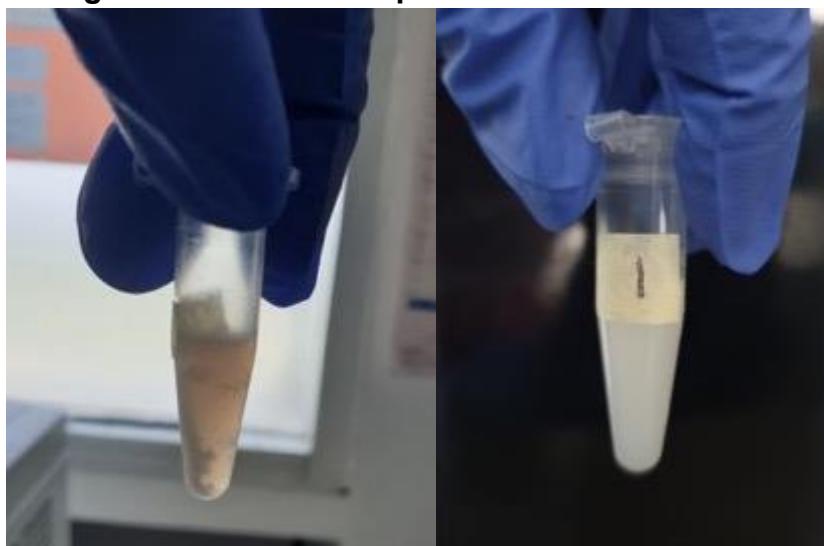
2. Kit ELISA MDA



3. Sonicator



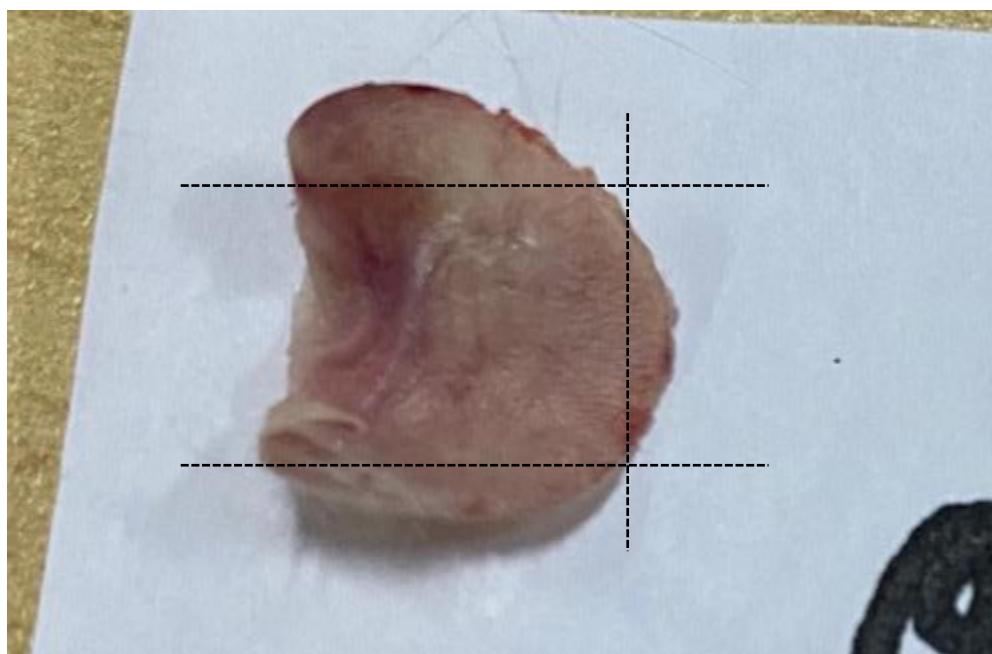
4. Jaringan tercacah dan Supernatant



5. Krim Ekstrak Kulit GM



6. Pembuatan Model Jaringan Biopsi



7. Sampel Penelitian

