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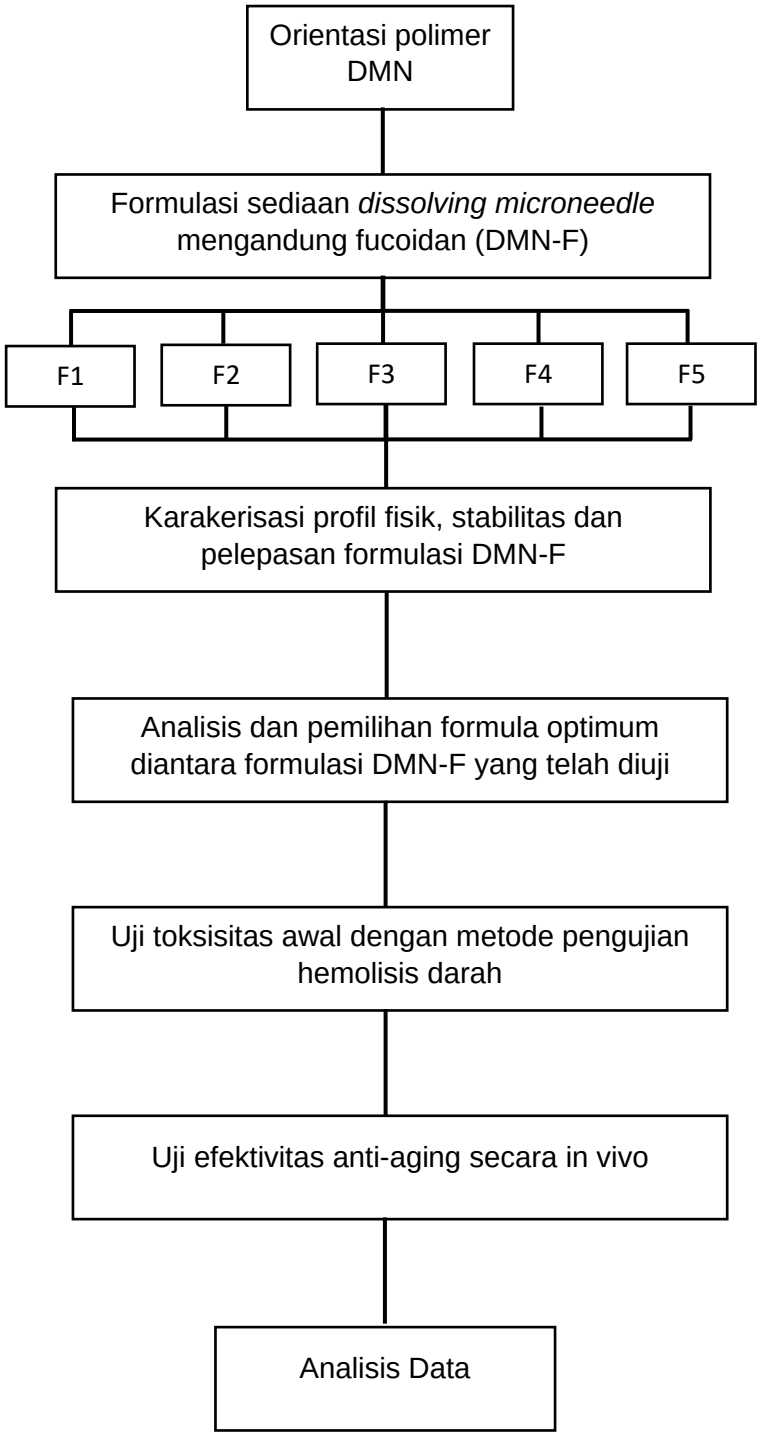
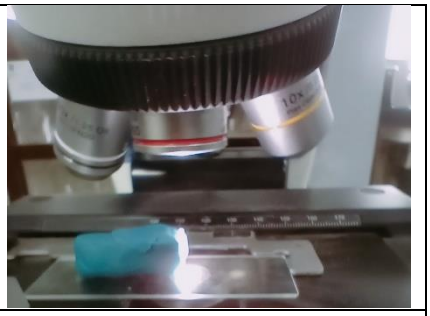
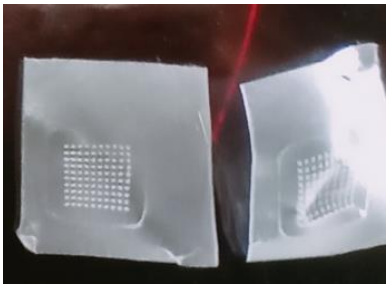
LAMPIRAN

Lampiran 1. Alur Penelitian.



Lampiran 2. Dokumentasi Penelitian.

			
	Penyiapan dan formulasi DMN-F		Karakterisasi DMN-F
			
			Pengujian pH
			
	Pengujian WVT		Pembuatan Kurva baku
			
	Induksi dan penyiapan in vivo		Treatment Hewan Coba

Lampiran 3. Data Statistik.

Uji kekuatan mekanik dan kemampuan penetrasi

Number of values	1	1	1	1	1
Minimum	11.19	25.13	32.68	1.260	5.090
25% Percentile	11.19	25.13	32.68	1.260	5.090
Median	11.19	25.13	32.68	1.260	5.090
75% Percentile	11.19	25.13	32.68	1.260	5.090
Maximum	11.19	25.13	32.68	1.260	5.090
Mean	11.19	25.13	32.68	1.260	5.090
Std. Deviation	2.710	2.090	2.300	1.180	1.160
Std. Error	1.565	1.207	1.328	0.6813	0.6697
Lower 95% CI	4.458	19.94	26.97	-1.671	2.208
Upper 95% CI	17.92	30.32	38.39	4.191	7.972

P value	< 0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	5		
F	136.1		
R square	0.9820		
ANOVA Table	SS	df	MS
Treatment (between columns)	2150	4	537.5
Residual (within columns)	39.48	10	3.948
Total	2190	14	

Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? P < 0.05?	Summary	95% CI of diff
F1 vs F2	-13.94	12.15	Yes	***	-19.28 to -8.601
F1 vs F3	-21.49	18.73	Yes	***	-26.83 to -16.15
F1 vs F4	9.930	8.656	Yes	***	4.591 to 15.27
F1 vs F5	6.100	5.317	Yes	*	0.7610 to 11.44
F2 vs F3	-7.550	6.581	Yes	**	-12.89 to -2.211
F2 vs F4	23.87	20.81	Yes	***	18.53 to 29.21
F2 vs F5	20.04	17.47	Yes	***	14.70 to 25.38
F3 vs F4	31.42	27.39	Yes	***	26.08 to 36.76
F3 vs F5	27.59	24.05	Yes	***	22.25 to 32.93
F4 vs F5	-3.830	3.339	No	ns	-9.169 to 1.509

Water Loss On drying

R square	0.5886				
ANOVA Table	SS	df	MS		
Treatment (between columns)	106.2	4	26.56		
Residual (within columns)	74.24	10	7.424		
Total	180.5	14			
Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? F	Summary	95% CI of diff
F1 vs F2	0.3089	0.1963	No	ns	-7.012 to 7.630
F1 vs F3	5.414	3.442	No	ns	-1.907 to 12.74
F1 vs F4	1.708	1.086	No	ns	-5.614 to 9.029
F1 vs F5	6.453	4.102	No	ns	-0.8685 to 13.77
F2 vs F3	5.105	3.245	No	ns	-2.216 to 12.43
F2 vs F4	1.399	0.8892	No	ns	-5.922 to 8.720
F2 vs F5	6.144	3.906	No	ns	-1.177 to 13.47
F3 vs F4	-3.706	2.356	No	ns	-11.03 to 3.615
F3 vs F5	1.039	0.6603	No	ns	-6.282 to 8.360
F4 vs F5	4.745	3.016	No	ns	-2.576 to 12.07

Surface pH

ANOVA Table	SS	df	MS		
Treatment (between columns)	2.332	4	0.5829		
Residual (within columns)	0.2052	10	0.02052		
Total	2.537	14			
Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? F	Summary	95% CI of diff
F1 vs F2	0.4289	5.186	Yes	*	0.04400 to 0.8138
F1 vs F3	1.074	12.99	Yes	***	0.6896 to 1.459
F1 vs F4	0.7300	8.827	Yes	***	0.3451 to 1.115
F1 vs F5	0.9956	12.04	Yes	***	0.6107 to 1.380
F2 vs F3	0.6456	7.806	Yes	**	0.2607 to 1.030
F2 vs F4	0.3011	3.641	No	ns	-0.08377 to 0.6860
F2 vs F5	0.5667	6.852	Yes	**	0.1818 to 0.9516
F3 vs F4	-0.3444	4.165	No	ns	-0.7293 to 0.04044
F3 vs F5	-0.07889	0.9539	No	ns	-0.4638 to 0.3060
F4 vs F5	0.2656	3.211	No	ns	-0.1193 to 0.6504

Uji permeasi dan retensi secar Ex vivo

Bartlett's test for equal variances					
Bartlett's statistic (corrected)	13.57				
P value	0.0088				
P value summary	**				
Do the variances differ signif. (P < 0.05)	Yes				
ANOVA Table	SS	df	MS		
Treatment (between columns)	13670	4	3417		
Residual (within columns)	26332	60	438.9		
Total	40002	64			
Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? F	Summary	95% CI of diff
F1 vs F2	6.612	1.138	No	ns	-16.50 to 29.72
F1 vs F3	13.96	2.402	No	ns	-9.149 to 37.07
F1 vs F4	-28.68	4.937	Yes	**	-51.79 to -5.576
F1 vs F5	-4.918	0.8464	No	ns	-28.02 to 18.19
F2 vs F3	7.346	1.264	No	ns	-15.76 to 30.45
F2 vs F4	-35.30	6.075	Yes	***	-58.40 to -12.19
F2 vs F5	-11.53	1.984	No	ns	-34.64 to 11.58
F3 vs F4	-42.64	7.339	Yes	***	-65.75 to -19.53
F3 vs F5	-18.88	3.249	No	ns	-41.98 to 4.231
F4 vs F5	23.77	4.090	Yes	*	0.6584 to 46.87

Table Analyzed	dosis Retensi		
One-way analysis of variance			
P value	< 0.0001		
P value summary	***		
Are means signif. different? (P < 0.05)	Yes		
Number of groups	5		
F	62658		
R square	0.9941		
Bartlett's test for equal variances			
Bartlett's statistic (corrected)	452.5		
P value	< 0.0001		
P value summary	***		
Do the variances differ signif. (P < 0.05)	Yes		
ANOVA Table	SS	df	MS
Treatment (between columns)	16027	4	4007
Residual (within columns)	95.60	1495	0.06395
Total	16123	1499	

Tukey's Multiple Comparison Test	Mean Diff.	q	Significant? P	Summary	95% CI of diff
F1 vs F2	-3.317	227.2	Yes	***	-3.374 to -3.260
F1 vs F3	-9.271	635.0	Yes	***	-9.328 to -9.214
F1 vs F4	-0.6824	46.74	Yes	***	-0.7392 to -0.6257
F1 vs F5	-3.124	214.0	Yes	***	-3.181 to -3.067
F2 vs F3	-5.954	407.8	Yes	***	-6.011 to -5.897
F2 vs F4	2.635	180.5	Yes	***	2.578 to 2.691
F2 vs F5	0.1930	13.22	Yes	***	0.1362 to 0.2498
F3 vs F4	8.589	588.3	Yes	***	8.532 to 8.645
F3 vs F5	6.147	421.0	Yes	***	6.090 to 6.204
F4 vs F5	-2.442	167.2	Yes	***	-2.498 to -2.385

Lampiran 4. Perhitungan.

Pembuatan kurva baku Fucoidan

Sebanyak 1 mg fucoidan ditimbang seksama kemudian larutkan menggunakan labu tentukur 10 mL dan dicukupkan dengan akuades hingga tanda batas untuk menghasilkan konsentrasi akhir sebesar 100 ppm. Larutan baku ini kemudian diencerkan menjadi seri pengenceran 1,25, 2,5, 5, 10, 20, 40, dan 80 ppm.

Untuk pengenceran 80 ppm, dilakukan dengan labu tentukur 5 mL

V1N1=V2N2

80 ppm x 5ml = 100 ppm x N2

400/100 = N2

N2 = 4 ml

Jadi 4 ml dicuplik dari larutan baku 100 ppm kemudian dicukupkan hingga tanda batas pada labu tentukur 5 ml.

Pengukuran kadar Aktual Fucoidan dalam sistem DMN-F

Setelah melarutkan DMN-F dengan 13 ml aquadest, sebanyak 1ml dicuplik dan diukur. Data absorbansi hasil pengukuran dapat dilihat pada lampiran tabel 5D.

y=0,0114x + 0,0436

0.1525 - 0.0436 = 0,0114x

0.1089 / 0.0144 = x

x = 9,55 ug/ml

13ml * 9,55 ug/ml = 124,19 ug

Penentuan Kandungan Fucoidan dalam sistem DMN

Microneedle dikeruk kemudian diukur dengan spektrofotmetri UV-VIS, hasil pengukuran kemudian dibandingakan dengan kandungan teoritis.

$$\%Dosis\ muat = \frac{konsentrasi\ hasil\ pengukuran}{Jumlah\ Teoritis} \times 100$$

$$\%Dosis\ muat = \frac{117,06}{120,596} \times 100$$

$$\%Dosis\ muat = \frac{117,06}{120,596} \times 100$$

= 97%

Jadi efisiensi peng-inkorporasian fucoidan dalam sistem DMN-F untuk F1 yaitu sebesar 97 % dari dosis awal/teoritisnya.

Perhitungan uji permeasi dan retensi

Perhitungan kadar permeasi fucoidan dalam sistem DMN-F menggunakan persamaan yang dari hasil pembuatan kurva baku yang dapat dilihat pada lampiran 5F.

y=0.0114x+0.0436

-Permeasi F1 jam ke-0,25

1 ml sampel diukur asil pengukuran diperoleh abs= 0,422.

0,0623−0,0436=0,0114x

0.0252=0,0114x

x= 1,640 µg/ml

karena total cairan dalam sistem sel difusi franz sebanyak 13 ml, kemudian ditambahkan dengan faktor koreksi (fc) hasil pencuplikan interval waktu sebelumnya maka

(1,640 µg x 13) + 0 = 21,32 µg

Konsentrasi yang diperoleh kemudian dihitung dengan menggunakan persamaan dibawah ini.

$$Permeasi(\%) = \frac{Hasil\ pengukuran\ waktu\ ke-n}{kadar\ aktual\ fucoidan\ dalam\ DMN} * 100$$

$$Permeasi(\%) = \frac{21,32\ \mu g}{119,32\ ug} * 100$$

$$Permeasi(\%) = 17{,}86\%$$

Perhitungan kadar Fucoidan yang teretensi dalam jaringan kulit dilakukan dengan menggunakan rumus seperti diatas. 2 g jaringan kulit yang telah dihaluskan dan diekstraksi dengan 2ml PBS.

Hasil F1:

$$0{,}0521-0{,}0436=0{,}0114x$$

$$0{,}0085=0{,}0114x$$

$$x= 0{,}7456\ \mu g$$

selanjutnya konsentrasi di bagi dengan jumlah sampling kulit

$$\text{Retensi} = 0{,}7456\ \mu g / 2\ cm^2 = 0{,}372$$

Hemolisis darah

$$Hemolysis(\%) = \frac{Abs\ (Test\ sample) - Abs\ (Negative\ control)}{Abs\ (positive\ control) - \ Abs\ (Negative\ control)} * 100$$

Hasil uji menggunakan spektrofotometer UV-Vis diketahui:

Kontrol positif	Kontrol negatif	5 ppm	50 ppm	500 ppm
1,973	0,0973	0,102	0,112	0,117
		0,109	0,113	0,138
		0,110	0,111	0,141
Rata-rata		0,107	0,112	0,132

- 5 ppm

$$Hemolysis(\%) = \frac{0.107\ - 0{,}0973}{1{,}973 - \ 0{,}0973} * 100$$
$$Hemolysis(\%) = 0.515$$

- 50 ppm

$$Hemolysis(\%) = \frac{0{,}112\ - 0{,}0973}{1{,}973 - \ 0{,}0973} * 100$$

$$Hemolysis(\%) = 0.781$$

- 500 ppm

$$Hemolysis(\%) = \frac{0.132\ - 0{,}0973}{1{,}973 - \ 0{,}0973} * 100$$

$$Hemolysis(\%) = 1.848$$

Perhitungan dosis fucoidan sebagai anti-aging untuk pengujian in-vivo.

Pada F4 DMN-F mengandung 115.80 µg yang terukur pada instrument spektrofotometer. Untuk pengaplikasian DMN-F pada punggung kulit tikus akan diberikan sebanyak 2 patch DMN-F agar mampu memberikan efek pada area yang lebih luas sehingga total dosis yang diterima setiap hewan uji setap hari adalah

115,80 x 2 = 231,6 µg

Lampiran 5. Tabel Data.

A. Uji kekuatan mekanik

Formula	Tinggi awal (*µ*m)	Tinggi akhir(*µ*m)	Height Reduction (%)
F1	631,77 ± 1,57	566,90 ± 4,02	11,19 ± 2,71
F2	708,09 ± 3,98	533,35 ± 3,64	25,13 ± 2,09
F3	660,96 ± 1,37	442,09 ± 3,61	32,68 ± 2,30
F4	682,04 ± 0,80	673,43 ± 1,43	1,26 ± 1,18
F5	645,62 ± 4,10	612,94 ± 5,0	5,09 ± 1,16

B. Uji Kelarutan

Formula	Time (menit)				
	0	2	4	6	8
F1	0	40,42 ± 1,97	71,69 ± 2,76	88,02 ± 5,04	100
F2	0	38,47 ± 1,96	70,61 ± 3,50	86,14 ± 5,91	100
F3	0	34,04 ± 1,66	70,29 ± 1,32	86,75 ± 4,45	100
F4	0	40,89 ± 1,89	68,10 ± 4,73	84,99 ± 4,84	100
F5	0	32,51 ± 1,38	62,06 ± 3,24	88,76 ± 3,78	100

C. Water loss on drying dan bobot teoritis fucoidan

Formula	Bobot awal (g)	Bobot akhir (g)	%LOD	Kandungan toritis fucoidan (µg)

F1	0,5029 ± 0,0079	0,2251 ± 0,0148	55,24 ± 3,31	120,60 ± 22,62
F2	0,5049 ± 0,0030	0,2275 ± 0,0013	54,93 ± 0,08	217,94 ± 34,51
F3	0,5047 ± 0,0043	0,2532 ± 0,0052	49,83 ±0,68	276,21 ± 39,66
F4	0,5029 ± 0,0002	0,2336 ± 0,0184	53,53 ± 3,66	116,59 ± 26,66
F5	0,4989 ± 0,0055	0,2553 ± 0,0153	48,79 ± 3,50	196,06 ± 32,72

D. Tabel konsentrasi fucoidan yang diukur menggunakan spektrofotometer UV-Vis

Formula	absorbansi	Kons (µg/ml)	13 ml	rata-rata	SD
F1	0,1525	9,55	124,19	119,24	4,45
	0,1430	8,72	113,40		
	0,1489	9,24	120,12		
F2	0,2163	15,15	196,96	211,86	10,92
	0,2328	16,60	215,80		
	0,2390	17,13	222,81		
F3	0,2682	19,70	256,12	262,47	20,98
	0,2545	18,50	240,55		
	0,2986	22,36	290,75		
F4	0,1410	8,54	111,12	115,80	5,05
	0,1431	8,72	113,46		
	0,1513	9,44	122,81		
F5	0,1949	13,26	172,49	188,63	12,80
	0,2099	14,58	189,60		
	0,2223	15,67	203,80		

E. Water Vapor Transmission

Formula	WVT (g/cm^2d)	Rata-rata	SD
F1	0,107924	0,134974	0,020014
	0,141281		
	0,155716		
F2	0,127274	0,122897	0,003135
	0,121319		
	0,120097		
F3	0,127715	0,127174	0,001936
	0,129228		
	0,12458		
F4	0,122978	0,11487	0,006726
	0,115125		
	0,106508		
F5	0,117411	0,111078	0,015423
	0,089835		
	0,125987		

F. Surface pH

Formula	pH	Rata-rata	SD
F1	6,58	6,40	0,21
	6,46		
	6,16		
F2	6,95	6,83	0,11
	6,73		
	6,81		
F3	5,90	5,75	0,14
	5,75		
	5,61		
F4	6,23	6,10	0,15
	6,13		
	5,93		
F5	5,87	5,83	0,04
	5,85		
	5,79		

G. MAA

Tabel MAA RH 33%

Formula		Waktu (hari)							
		0	**2**	**4**	**6**	**8**	**10**	**12**	**14**
F1	**Rata-rata**	0	1,1335	1,3447	1,8501	2,0197	2,1278	2,2010	2,3390
	SD	0	0,1374	0,2152	0,1749	0,0502	0,0185	0,1375	0,1124
F2	**Rata-rata**	0	2,6794	3,0315	3,3081	3,4451	3,6339	3,7692	3,8526
	SD	0	0,1734	0,1953	0,1863	0,1828	0,1999	0,2094	0,2071
F3	**Rata-rata**	0	5,2596	5,6506	6,0126	6,1010	6,2185	6,4424	6,5308
	SD	0	0,2486	0,2853	0,2712	0,3194	0,3226	0,3707	0,3761
F4	**Rata-rata**	0	0,7902	1,0713	1,4379	1,4662	1,6021	1,6589	1,8706
	SD	0	0,2434	0,1924	0,4267	0,0700	0,1692	0,1399	0,3244
F5	**Rata-rata**	0	1,7068	2,1440	2,6007	2,7572	2,9304	3,1008	3,3522
	SD	0	0,1685	0,1606	0,1872	0,1913	0,2096	0,2103	0,1496

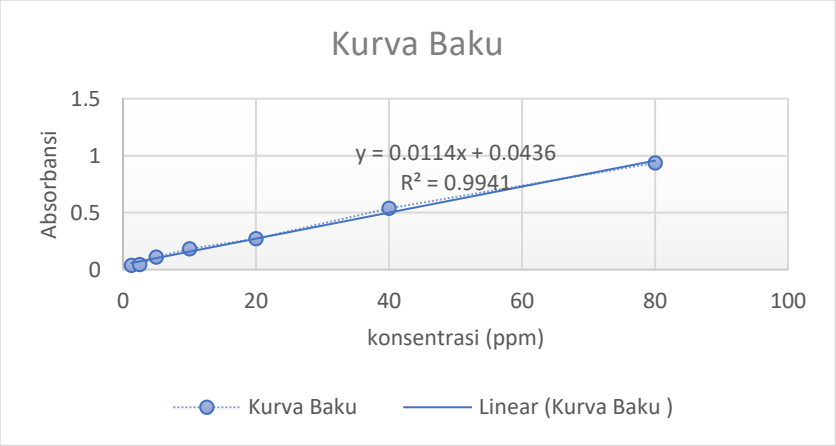
Tabel MAA RH 65%

Formula		Waktu (hari)							
		0	2	4	6	8	10	12	14
F1	Rata-rata	0	5,8576	7,7346	8,5874	9,5834	9,5881	10,3269	11,5998
	SD	0	0,4037	0,3518	0,2836	0,5522	0,2593	0,3116	0,3677
F2	Rata-rata	0	6,5160	7,0570	7,9170	8,9979	9,2389	10,3344	11,4860
	SD	0	0,1738	0,1940	0,3052	0,4545	0,4022	0,0987	0,8064
F3	Rata-rata	0	4,3355	5,3764	6,2931	7,1715	7,2196	7,9831	9,3350
	SD	0	0,6997	0,5377	0,3140	0,4383	0,3989	0,6743	0,6876
F4	Rata-rata	0	5,7833	6,5397	8,2643	8,6698	8,8067	9,1804	10,0943
	SD	0	0,4884	0,5874	0,7180	0,3442	0,1394	0,3109	0,1505
F5	Rata-rata	0	6,3480	6,6116	7,5057	8,4089	8,4329	9,1733	10,6111
	SD	0	0,7684	0,7669	0,7896	0,9130	0,6804	0,7715	0,7442

H. Penyiapan Kurva Baku

Konsentrasi (ppm)	Absorbansi			
	1	2	3	Rata-rata
1,25	0,0360	0,0370	0,0380	0,0370
2,5	0,0430	0,0430	0,0430	0,0430
5	0,1080	0,1090	0,1140	0,1103
10	0,1800	0,1830	0,1850	0,1827
20	0,2710	0,2710	0,2710	0,2710
40	0,5370	0,5370	0,5380	0,5373
80	0,9350	0,9360	0,9370	0,9360

Persamaan kurva baku dari hasil pengukuran menggunakan spektrofotometer UV-Vis yaitu y=0.0114x+0.0436, dimana kurva nya dapat dilihat pada gambar dibawah ini.



I. Permeasi dan retensi

Tabel data Permeasi F1

Waktu (jam)	abs	Kons (µg/ml)	13 ml (µg)	FK	Kons. total (µg)	rata-rata (µg)	permeasi (%)	rata-rata (%)	SD
0.25	0,0623	1,6404	21,3246	0,0000	21,3246	17,9795	17,8852	15,06	5,37
	0,0566	1,1404	14,8246	0,0000	14,8246		12,4336		
	0,0592	1,3684	17,7895	0,0000	17,7895		14,9203		
0.50	0,0745	2,7105	35,2368	1,6404	36,8772	32,1687	30,9295	26,98	2,76
	0,0693	2,2535	29,2956	1,1404	30,4360		25,5271		
	0,0680	2,1404	27,8246	1,3684	29,1930		24,4846		
0.75	0,0696	2,2807	29,6491	4,3509	34,0000	35,4909	28,5163	29,75	1,84
	0,0690	2,2281	28,9649	3,3939	32,3588		27,1398		
	0,0757	2,8158	36,6053	3,5088	40,1140		33,6442		
1	0,0709	2,3947	31,1316	4,3532	35,4847	39,4846	29,7616	33,11	3,34
	0,0750	2,7544	35,8070	3,3961	39,2031		32,8802		
	0,0789	3,0965	40,2544	3,5116	43,7660		36,7072		
2	0,0800	3,1930	41,5088	6,7479	48,2567	48,4785	40,4736	40,66	3,33
	0,0781	3,0289	39,3763	6,1505	45,5268		38,1840		
	0,0831	3,4649	45,0439	6,6081	51,6519		43,3213		
3	0,0834	3,4912	45,3860	9,9409	55,3268	54,8396	46,4035	45,96	1,65
	0,0808	3,2632	42,4211	9,1794	51,6005		43,2781		
	0,0853	3,6553	47,5184	10,0730	57,5914		48,3028		
4	0,0832	3,4737	45,1579	13,4321	58,5900	59,5752	49,1403	49,39	7,02
	0,0831	3,4649	45,0439	12,4426	57,4864		48,214		
	0,0865	3,7632	48,9211	13,7283	62,6493		52,5449		

5	0,0831	3,4649	45,0439	16,9058	61,9496	64,8530	51,9581	55,94	2,45
	0,0859	3,7105	48,2368	15,9075	64,1443		53,7988		
	0,0883	3,9211	50,9737	17,914	68,4651		57,4227		
6	0,0811	3,2895	42,7632	20,3707	63,1339	66,6893	52,9513	55,9333	7,74
	0,0829	3,4474	44,8158	19,6180	64,4338		54,0416		
	0,0884	3,9298	51,0877	21,4125	72,5002		60,8070		
7	0,0794	3,1404	40,8246	23,6602	64,4847	67,1165	54,0843	56,29	7,76
	0,0812	3,2939	42,8202	23,0654	65,8856		55,2592		
	0,0836	3,5105	45,6368	25,3423	70,9791		59,5313		
8	0,0790	3,1053	40,3684	26,8005	67,1689	69,1504	56,3356	57,99	4,80
	0,0816	3,3333	43,3333	26,3592	69,6926		58,4522		
	0,0802	3,2105	41,7368	28,8528	70,5897		59,2046		
24	0,0760	2,8421	36,9474	29,9058	66,8532	70,0481	56,0708	58,75	4,30
	0,0778	3,0000	39,0000	29,6926	68,6926		57,6135		
	0,0809	3,2719	42,5351	32,0633	74,5984		62,5668		

Tabel Retensi

FORMULA	ABSORBANSI	Kons (µg)	RATA-RATA	SD
F1	0,0453	0,1491	0,3596	0,1571
	0,0482	0,4035		
	0,0496	0,5263		
F2	0,0810	3,2807	3,6784	0,3413
	0,0905	4,1140		
	0,0851	3,6404		
F3	0,1512	9,4386	9,6316	0,2251
	0,1570	9,9474		
	0,1520	9,5088		
F4	0,0548	0,9825	1,0380	0,3069
	0,0600	1,4386		
	0,0515	0,6930		
F5	0,0848	3,6140	3,4854	0,1075
	0,0834	3,4912		
	0,0818	3,3509		

J. Jumlah kerutan

Kelompok	Replikasi			Rata-rata	SD
	I	II	III		
Kontrol Sehat (G1)	6	4	4	4,67	0,94
Kontrol Positif (G2)	6	7	7	6,67	0,47
Treatment DMN-F (G3)	7	9	10	8,67	1,25
MN Blank (G4)	21	15	17	17,67	2,49
Kontrol Negatif (G5)	18	28	22	22,67	4,11

K. Elastisitas Kulit

Kelompok	Replikasi			Rata-rata	SD
	I	II	III		
Kontrol Sehat (G1)	6,89	4,07	5,76	5,57	1,16
Kontrol Positif (G2)	4,14	7,13	6,39	5,89	1,27
Treatment DMN-F (G3)	9,5	5,79	7,99	7,76	1,52
MN Blank (G4)	19,97	14,19	15,89	16,68	2,43
Kontrol Negatif (G5)	19,21	15,29	16,76	17,09	1,62

L. Tingkat Kelembaban Kulit

Kelompok	Replikasi			Rata-rata	SD
	I	II	III		
Kontrol Sehat (G1)	49,3	57,7	56,5	54,50	4,54
Kontrol Positif (G2)	56,0	58,6	52,6	55,73	3,01
Treatment DMN-F (G3)	53,6	54,8	54,4	54,27	0,61
MN Blank (G4)	45,4	46,9	41,3	44,53	2,90
Kontrol Negatif (G5)	43,3	41,3	36,6	40,40	3,44

Lampiran 6. Izin Kode Etik Penelitian.

KEMENTERIAN PENDIDIKAN, KEBUDAYAAN, RISET DAN TEKNOLOGI
UNIVERSITAS HASANUDDIN FAKULTAS KEDOKTERAN
KOMITE ETIK PENELITIAN UNIVERSITAS HASANUDDIN
RSPTN UNIVERSITAS HASANUDDIN
RSUP Dr. WAHIDIN SUDIROHUSODO MAKASSAR
Sekretariat : Lantai 2 Gedung Laboratorium Terpadu
JL.PERINTIS KEMERDEKAAN KAMPUS TAMALANREA KM.10 MAKASSAR 90245.
Contact Person: dr. Agussalim Bukhari..MMed.PhD, SpGK TELP. 081241850858, 0411 5780103, Fax : 0411-581431

REKOMENDASI PERSETUJUAN ETIK

Nomor : 549/UN4.6.4.5.31/ PP36/ 2023

Tanggal: 7 Agustus 2023

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

No Protokol	UH23050314	No Sponsor	
Peneliti Utama	**apt Alghifary Anas Achmad, S.Si**	Sponsor	
Judul Peneliti	UJI AKTIVITAS FUCOIDAN SEBAGAI ANTI-AGING DALAM FORMULASI PENGHANTARAN TRANSDERMAL DISSOLVING MICRONEEDLES		
No Versi Protokol	**2**	Tanggal Versi	**7 Agustus 2023**
No Versi PSP		Tanggal Versi	
Tempat Penelitian	Fakultas Farmasi Universitas Hasanuddin Makassar		
Jenis Review	[ ] Exempted [x] Expedited [ ] Fullboard Tanggal	Masa Berlaku **7 Agustus 2023** sampai **7 Agustus 2024**	Frekuensi review lanjutan
Ketua KEP Universitas Hasanuddin	Nama **Prof.Dr.dr. Suryani As'ad, M.Sc.,Sp.GK (K)**	Tanda tangan	
Sekretaris KEP Universitas Hasanuddin	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 prokol yang disetujui (protocol deviation / violation)
- Mematuhi semua peraturan yang ditentukan