DAFTAR PUSTAKA

Alzheimer's Disease International. 2022. World Alzheimer's Report: Life after diagnosis, navigating treatment, care and support. World Alzheimer's Report: London.

Calabrò, M., Rinaldi, C., Santoro, G., dan Crisafulli, C., 2021. The biological pathways of Alzheimer disease: a review. *AIMS Neuroscience*, *8*(1): 86–132. https://doi.org/10.3934/Neuroscience.2021005.

Chen, Z. R., Huang, J. B., Yang, S. L., dan Hong, F. F., 2022. Role of Cholinergic Signaling in Alzheimer's Disease. *Molecules*, *27*(6): 1–23. https://doi.org/10.3390/molecules27061816.

Cheng, A., Sun, W., Xing, M., Zhang, S., dan Gao, Y., 2020. The hygroscopicity of polymer microneedles on the performance of dissolving behavior for transdermal delivery. *International Journal of Polymeric Materials and Polymeric Biomaterials*, 71(1): 72–78. https://doi.org/10.1080/00914037.2020.1798442.

Elim, D., Maqhfirah, A., Fitri, N., Alif, M., Afika, N., Aisha, N., Sultan, F., Meidianto, R., dan Dian, A., 2023. Colloids and Surfaces B : Biointerfaces Hydrogel forming microneedle-mediated transdermal delivery of sildenafil citrate from polyethylene glycol reservoir : An ex vivo proof of concept study. *Colloids and Surfaces B: Biointerfaces*, 222: 113018. https://doi.org/10.1016/j.colsurfb.2022.113018.

Eum, J., Kim, Y., Um, D. J., Shin, J., Yang, H., dan Jung, H., 2021. Solvent-Free Polycaprolactone Dissolving Microneedles Generated via the Thermal Melting Method for the Sustained Release of Capsaicin. *Micromachines*, 12(167): 1-14. https://doi.org/10.3390/mi12020167.

Guimarães, T. M. T., Moniz, T., Nunes, C., Zaharieva, M. M., Kaleva, M., Yoncheva, K., Najdenski, H., Costa Lima, S. A., dan Reis, S., 2022. Polymeric Microneedles for Transdermal Delivery of Rivastigmine: Design and Application in Skin Mimetic Model. *Pharmaceutics*, 14(4): 1-22. https://doi.org/10.3390/pharmaceutics14040752.

Huo, P., Han, X., Zhang, W., Zhang, J., Kumar, P., dan Liu, B., 2021. Electrospun Nanofibers of Polycaprolactone / Collagen as a Sustained-Release Drug Delivery System for Artemisinin.*Pharmaceutics,* 13(1228): 1-14. https://doi.org/10.3390/pharmaceutics13081228.

..., Senanarong, V., Looi, I., Ampil, E., Park, K. W., Karanam, E., Park, K. W., Karanam, A. K., Christopher, S., Ampil, E., K., 2022. Clinical Interventions in Aging acetylcholinesterase olinesterase and its role in subcortical vascular dementia and

Parkinson ' s disease dementia Rivastigmine : the advantages of dual inhibition of acetylcholinesterase and butyrylcholinester. *Clinical Interventions in Aging,* 12: 697-707. https://doi.org/10.2147/CIA.S129145.

Kitagawa, R., Le, H., Kiritsy, P., dan Chuong, M. C., 2020. Formulation of Rivastigmine, a Liquid Drug Substance, for Use in a Simulating Study of Hollow Microstructured Transdermal Delivery System. *Journal of Pharmacology & Pharmaceutical Research*, *3*(3): 1–6. https://doi.org/10.31038/jppr.2020333.

Koly, H. K., Sutradhar, K., dan Rahman, M. S., 2023. Acetylcholinesterase inhibition of Alzheimer's disease: identification of potential phytochemicals and designing more effective derivatives to manage disease condition. *Journal of Biomolecular Structure and Dynamics*, 41(22): 12532–12544. https://doi.org/10.1080/07391102.2023.2166992.

Li, M., Vora, L. K., Peng, K., dan Donnelly, R. F., 2022. Trilayer microneedle array assisted transdermal and intradermal delivery of dexamethasone. *International Journal of Pharmaceutics*, 612(121295): 1-11. https://doi.org/10.1016/j.ijpharm.2021.121295.

Mangang, K. N., Thakran, P., Halder, J., Yadav, K. S., Ghosh, G., Pradhan, D., Rath, G., dan Rai, V. K., 2023. PVP-microneedle array for drug delivery: mechanical insight, biodegradation, and recent advances. *Journal of Biomaterials Science, Polymer Edition*, 34(7): 986–1017. https://doi.org/10.1080/09205063.2022.2155778.

Marisa, T., & Guimarães, T., 2021. *Alginate-derived microneedle devices for transdermal delivery of rivastigmine - application in skin mimetic model*. Universidade do Porto: Portugis.

Nguyen, K., Hoffman, H., dan Chakkamparambil, B., 2024. Evaluation of rivastigmine in Alzheimer ' s disease. *Neurodegenerative Disease Management*. 11(1): 1-14. https://doi.org/10.2217/nmt-2020-0052.

Paredes, A. J., Volpe-zanutto, F., Dian, A., Murphy, A. J., Picco, C. J., Vora, L. K., Coulter, J. A., dan Donnelly, R. F., 2021. Novel tip-loaded dissolving and implantable microneedle array patches for sustained release of finasteride. *International Journal of Pharmaceutics*, *606*(120885): 1-12. https://doi.org/10.1016/j.ijpharm.2021.120885.

Permana, A.D., Paredes, A. J., Volpe-zanutto, F., Kurnia, Q., Utomo, E., dan [illegible] F., 2020. European Journal of Pharmaceutics and [illegible]utics Dissolving microneedle-mediated dermal delivery of [illegible]anocrystals for improved treatment of cutaneous candidiasis. *[illegible]rnal of Pharmaceutics and Biopharmaceutics*, 154: 50–61. [illegible]10.1016/j.ejpb.2020.06.025.

Sianturi, A. G. M. 2021. Stadium, Diagnosis, dan Tatalaksana Penyakit Alzheimer. *Majalah Kesehatan Indonesia*, *2*(2): 39–44. https://doi.org/10.47679/makein.202132.

Syafika, N., Binti, S., Azis, A., Enggi, C. K., Qonita, H. A., Resky, T., Mahmud, A., Abizart, A., Asri, R. M., dan Permana, A. D., 2023. Glucose-Responsive Microparticle-Loaded Dissolving Microneedles for Selective Delivery of Metformin : A Proof-of-Concept Study. *Molecular Pharmaceutics.* https://doi.org/10.1021/acs.molpharmaceut.2c00936.

Tiwari, S., Venkata, A., Kaushik, A., Adriana, Y., dan Nair, M., 2019. Alzheimer ' s Disease Diagnostics And Therapeutics Market. *Int J Nanomedicine .* 14: 5541–5554. http://doi.org/10.2147/IJN.S200490.

Vora, L. K., Moffatt, K., Tekko, I. A., Paredes, A. J., Volpe-zanutto, F., Mishra, D., Peng, K., Raj, R., Thakur, S., dan Donnelly, R. F., 2021. Microneedle array systems for long-acting drug delivery. *European Journal of Pharmaceutics and Biopharmaceutics*, 159: 44–76. https://doi.org/10.1016/j.ejpb.2020.12.006.

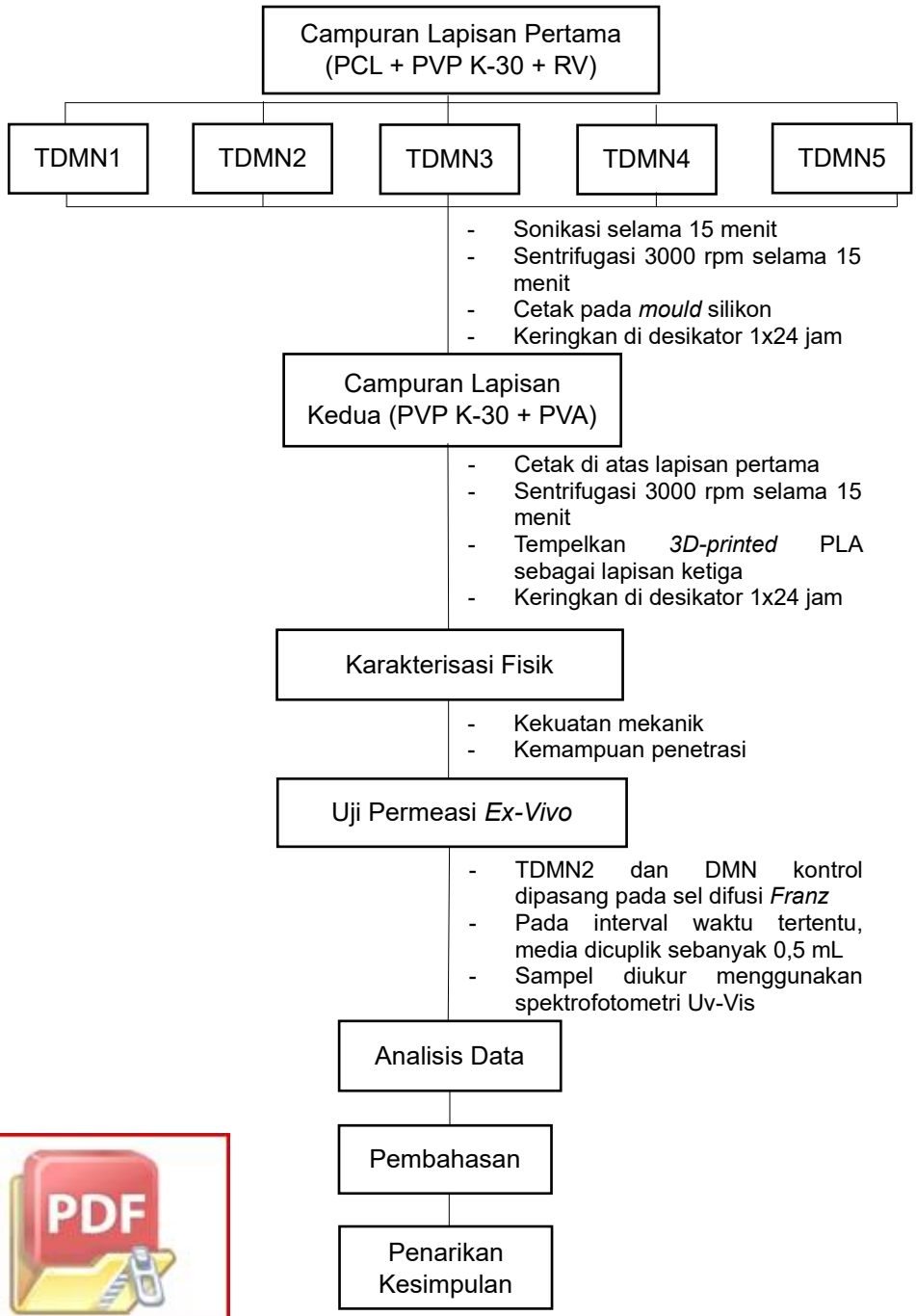
Yan, Q., Wang, W., Weng, J., Zhang, Z., Yin, L., Guo, F., Wang, X., Chen, F., Yang, G., Yan, Q., Wang, W., Weng, J., Zhang, Z., dan Yin, L., 2020. Dissolving microneedles for transdermal delivery of huperzine A for the treatment of Alzheimer ' s disease treatment of Alzheimer ' s disease. *Drug Delivery*, *27*(1) 1147–1155. https://doi.org/10.1080/10717544.2020.1797240.

Yang, L., Yang, Y., Chen, H., Mei, L., dan Zeng, X., 2022. Polymeric microneedle-mediated sustained release systems : Design strategies and promising applications for drug delivery. *Asian Journal of Pharmaceutical Sciences*, *17*(1): 70–86. https://doi.org/10.1016/j.ajps.2021.07.002.

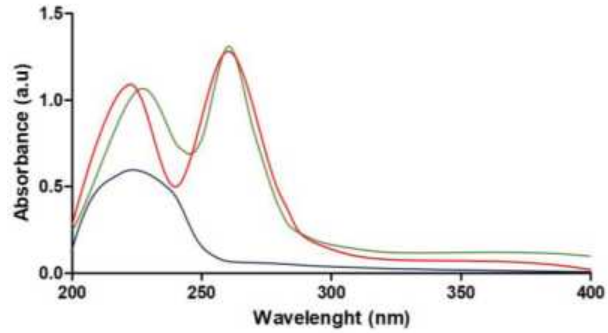
Zhao, Z. Q., Liang, L., Hu, L. F., He, Y. T., Jing, L. Y., Liu, Y., dan Chen, B. Z., 2022. Subcutaneous Implantable Microneedle System for the Treatment of Alzheimer ' s Disease by Delivering Donepezil. *Biomacromolecules*, 23: 5330-5339. https://doi.org/10.1021/acs.biomac.2c01155.

LAMPIRAN

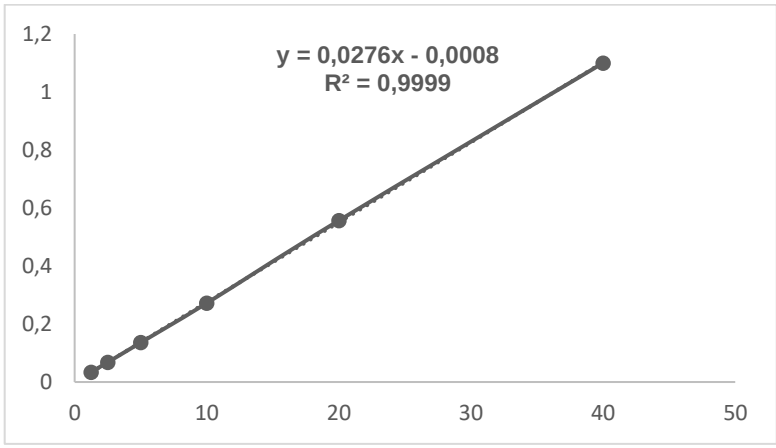
Lampiran 1. Skema Kerja Penelitian



Lampiran 2. Panjang Gelombang Maksimum dan Kurva Baku RV



Gambar 11. Panjang gelombang maksimum RV



Gambar 12. Kurva baku RV

Lampiran 3. Perhitungan

a. Uji Kekuatan Mekanik

$$\% \text{ Reduksi} = \frac{\text{Tinggi jarum sebelum uji-tinggi jarum setelah uji}}{\text{Tinggi jarum sebelum uji}} \times 100\%$$

- **TDMN1**

Replikasi 1: $\% \text{ Reduksi} = \frac{705\ \mu m - 517\ \mu m}{517\ \mu m} \times 100\% = \frac{188\ \mu m}{517\ \mu m} \times 100\% = 36{,}36\%$

$\text{uksi} = \frac{699\ \mu m - 524\ \mu m}{524\ \mu m} \times 100\% = \frac{175\ \mu m}{524\ \mu m} \times 100\% = 33{,}39\%$

$\text{uksi} = \frac{700\ \mu m - 502\ \mu m}{502\ \mu m} \times 100\% = \frac{198\ \mu m}{502\ \mu m} \times 100\% = 39{,}44\%$

- **TDMN2**

Replikasi 1: % Reduksi = $\frac{703\ \mu m - 651\ \mu m}{651\ \mu m}$ x 100% = $\frac{52\ \mu m}{651\ \mu m}$ x 100% = 7,98%

Replikasi 2: % Reduksi = $\frac{702\ \mu m - 627\ \mu m}{627\ \mu m}$ x 100% = $\frac{75\ \mu m}{627\ \mu m}$ x 100% = 11,96%

Replikasi 3: % Reduksi = $\frac{699\ \mu m - 661\ \mu m}{661\ \mu m}$ x 100% = $\frac{38\ \mu m}{661\ \mu m}$ x 100% = 5,74%

- **TDMN3**

Replikasi 1: % Reduksi = $\frac{702\ \mu m - 664\ \mu m}{664\ \mu m}$ x 100% = $\frac{38\ \mu m}{664\ \mu m}$ x 100% = 5,72%

Replikasi 2: % Reduksi = $\frac{697\ \mu m - 637\ \mu m}{637\ \mu m}$ x 100% = $\frac{60\ \mu m}{637\ \mu m}$ x 100% = 9,41%

Replikasi 3: % Reduksi = $\frac{700\ \mu m - 625\ \mu m}{625\ \mu m}$ x 100% = $\frac{75\ \mu m}{625\ \mu m}$ x 100% = 12%

- **TDMN4**

Replikasi 1: % Reduksi = $\frac{705\ \mu m - 597\ \mu m}{597\ \mu m}$ x 100% = $\frac{108\ \mu m}{597\ \mu m}$ x 100% = 18,09%

Replikasi 2: % Reduksi = $\frac{699\ \mu m - 607\ \mu m}{607\ \mu m}$ x 100% = $\frac{92\ \mu m}{607\ \mu m}$ x 100% = 15,15%

Replikasi 3: % Reduksi = $\frac{704\ \mu m - 609\ \mu m}{609\ \mu m}$ x 100% = $\frac{95\ \mu m}{609\ \mu m}$ x 100% = 15,59%

- **TDMN5**

Replikasi 1: % Reduksi = $\frac{700\ \mu m - 496\ \mu m}{496\ \mu m}$ x 100% = $\frac{204\ \mu m}{496\ \mu m}$ x 100% = 41,12%

Replikasi 2: % Reduksi = $\frac{704\ \mu m - 487\ \mu m}{487\ \mu m}$ x 100% = $\frac{217\ \mu m}{487\ \mu m}$ x 100% = 44,55%

Replikasi 3: % Reduksi = $\frac{704\ \mu m - 481\ \mu m}{481\ \mu m}$ x 100% = $\frac{223\ \mu m}{481\ \mu m}$ x 100% = 46,36%

b. Uji Kemampuan Penetrasi

$$\% \text{ Penetrasi} = \frac{\text{Jumlah lubang yang diamati}}{\text{Jumlah lubang keseluruhan}} \times 100\%$$

bisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

bisan 2 : % Penetrasi = $\frac{73}{100}$ x 100% = 73%

Lapisan 3 : % Penetrasi = $\frac{26}{100}$ x 100% = 26%

Replikasi 2: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{68}{100}$ x 100% = 68%

Lapisan 3 : % Penetrasi = $\frac{33}{100}$ x 100% = 33%

Replikasi 3: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{46}{100}$ x 100% = 46%

Lapisan 3 : % Penetrasi = $\frac{26}{100}$ x 100% = 26%

- **TDMN2**

Replikasi 1: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 3 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 4 : % Penetrasi = $\frac{82}{100}$ x 100% = 82%

Replikasi 2: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 3 : % Penetrasi = $\frac{98}{100}$ x 100% = 98%

Lapisan 4 : % Penetrasi = $\frac{84}{100}$ x 100% = 84%

Replikasi 3: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

pisan 3 : % Penetrasi = $\frac{96}{100}$ x 100% = 96%

pisan 4 : % Penetrasi = $\frac{83}{100}$ x 100% = 83%

- **TDMN3**

Replikasi 1: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 3 : % Penetrasi = $\frac{84}{100}$ x 100% = 84%

Lapisan 4 : % Penetrasi = $\frac{25}{100}$ x 100% = 25%

Replikasi 2: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 3 : % Penetrasi = $\frac{59}{100}$ x 100% = 59%

Lapisan 4 : % Penetrasi = $\frac{17}{100}$ x 100% = 17%

Replikasi 3: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 3 : % Penetrasi = $\frac{72}{100}$ x 100% = 72%

Lapisan 4 : % Penetrasi = $\frac{22}{100}$ x 100% = 22%

- **TDMN4**

Replikasi 1: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{58}{100}$ x 100% = 58%

Lapisan 3 : % Penetrasi = $\frac{47}{100}$ x 100% = 47%

Replikasi 2: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

bisan 2 : % Penetrasi = $\frac{75}{100}$ x 100% = 75%

bisan 3 : % Penetrasi = $\frac{70}{100}$ x 100% = 70%

bisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{76}{100}$ x 100% = 76%

Lapisan 3 : % Penetrasi = $\frac{63}{100}$ x 100% = 63%

- **TDMN5**

Replikasi 1: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{81}{100}$ x 100% = 81%

Lapisan 3 : % Penetrasi = $\frac{31}{100}$ x 100% = 31%

Replikasi 2: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{71}{100}$ x 100% = 71%

Lapisan 3 : % Penetrasi = $\frac{31}{100}$ x 100% = 31%

Replikasi 3: Lapisan 1 : % Penetrasi = $\frac{100}{100}$ x 100% = 100%

Lapisan 2 : % Penetrasi = $\frac{81}{100}$ x 100% = 81%

Lapisan 3 : % Penetrasi = $\frac{43}{100}$ x 100% = 43%

c. Uji Permeasi *Ex-Vivo*

Persamaan: y = 0,0276x - 0,0008
Keterangan:
Y = serapan
X = konsentrasi
TDMN2 replikasi 1 jam ke-8 diperoleh serapan = 0,016. Sehingga, untuk mendapatkan konsentrasi:
0,016 = 0,0276x - 0,0008
x = $\frac{0,016 + 0,0008}{0,0276}$ = 0, 608 µg/mL
Konsentrasi dalam 1 mL= 0, 608 µg/mL x 1 mL
= 0, 608 µg
28 mL = 0, 608 µg/mL x 1 x 28 mL
= 17,02 µg
onsentrasi jam sebelumnya / 1000 + faktor koreksi jam sebelumnya
580/000 + 0,0027387

= 0,0033187 µg

Jumlah terpermeasi = konsentrasi dalam 28 mL + faktor koreksi
= 17,02 µg + 0,0033187 µg
= 17,0233187 µg

Konsentrasi perunit area = 17,0233187 µg / 1,6
= 10,62540 µg/cm^2

Lampiran 4. Tabel Hasil Evaluasi

Lampiran 4.1 Tabel Tinggi Jarum

Tabel 2. Hasil pengukuran tinggi jarum

Replikasi	Tinggi Jarum (µm)				
	TDMN1	TDMN2	TDMN3	TDMN4	TDMN5
1	705	703	702	705	700
2	699	702	697	699	704
3	700	699	700	704	704
Rata-Rata	701	701	699	702	702
SD	3,21	2,08	3,21	3,21	2,30

Lampiran 4.2 Tabel Uji Kekuatan Mekanik

Tabel 3. Hasil uji kekuatan mekanik

Formula	Tinggi sebelum kompresi (µm)	Tinggi setelah kompresi (µm)	% Kompresi	Rata-rata	SD
TDMN1	705	517	36,36	36,40	3,03
	699	524	33,39		
	700	502	39,44		
TDMN2	703	651	7,98	8,56	3,15
	702	627	11,96		
	699	661	5,74		
TDMN3	702	664	5,72	9,04	3,16
	697	637	9,41		
	700	625	12		
TDMN4	705	597	18,09	16,28	1,59
	699	607	15,15		
	704	609	15,59		
	00	498	41,12	44,01	2,66
	04	487	44,55		
	04	481	46,36		

Lampiran 4.3 Tabel Uji Kemampuan Penetrasi

Tabel 4. Hasil uji kemampuan penetrasi

Lapisan Parafilm®	%Penetrasi				
	TDMN1	TDMN2	TDMN3	TDMN4	TDMN5
1	100	100	100	100	100
2	62	100	100	69	77
3	28	98	71	60	35
4	0	83	21	0	0
5	0	0	0	0	0
6	0	0	0	0	0
7	0	0	0	0	0
8	0	0	0	0	0

Lampiran 4.4. Tabel Uji Permeasi *Ex-Vivo*

Tabel 5. Hasil uji permeasi *ex- vivo* TDMN2

Waktu (jam)	Absorbansi	Konsentrasi (µg/mL)	Faktor pengenceran	Dalam 28 mL (µg)	Faktor koreksi	RV yang terpermeasi (µg)	Konsentrasi per unit area (µg/cm^2)	Rata-rata (µg)	SD
0,5	0,005	0,21	1	5,98	0,00	5,98	3,71	3,44	0,24
	0,005	0,19	1	5,38	0,00	5,38	3,34		
	0,004	0,19	1	5,26	0,00	5,26	3,26		
1	0,005	0,22	1	6,10	0,00	6,10	3,79	4,26	0,41
	0,006	0,26	1	7,18	0,00	7,18	4,46		
	0,006	0,26	1	7,30	0,00	7,30	4,53		
2	0,009	0,37	1	10,31	0,00	10,31	6,40	5,82	0,56
	0,008	0,30	1	8,51	0,00	8,51	5,28		
	0,008	0,33	1	9,35	0,00	9,35	5,80		
3	0,011	0,41	1	11,51	0,00	11,51	7,14	6,99	0,54
	0,009	0,37	1	10,31	0,00	10,31	6,40		
	0,011	0,43	1	11,99	0,00	11,99	7,44		
		0,45	1	12,60	0,00	12,60	7,81	7,72	0,53
		0,47	1	13,20	0,00	13,20	8,19		
		0,41	1	11,51	0,00	11,51	7,14		
		0,47	1	13,26	0,00	13,26	8,23	8,31	0,72
		0,52	1	14,62	0,00	14,62	9,07		

	0,011	0,44	1	12,30	0,00	12,30	7,63		
	0,016	0,60	1	16,92	0,00	16,92	10,50		
6	0,013	0,49	1	13,68	0,00	13,68	8,49	9,35	1,04
	0,014	0,52	1	14,62	0,00	14,62	9,07		
	0,015	0,58	1	16,17	0,00	16,17	10,03		
7	0,014	0,54	1	15,23	0,00	15,24	9,45	9,86	0,35
	0,015	0,58	1	16,27	0,00	16,27	10,10		
	0,016	0,61	1	17,04	0,00	17,05	10,65		
8	0,014	0,54	1	15,23	0,00	15,24	9,45	10,63	1,16
	0,018	0,68	1	18,97	0,00	18,97	11,77		

Tabel 6. Hasil uji permeasi *ex- vivo* kontrol DMN

Waktu (jam)	Absorbansi	Konsentrasi (µg/mL)	Faktor pengenceran	Dalam 28 mL (µg)	Faktor koreksi	RV yang terpermeasi (µg)	Konsentrasi per unit area (µg/cm^2)	Rata-rata (µg)	SD
	0,025	0,95	1	26,66	0,00	26,66	16,54		
0,5	0,023	0,84	1	23,66	0,00	23,66	14,68	15,17	1,20
	0,022	0,82	1	23,06	0,00	23,06	14,30		
	0,034	1,26	1	35,20	0,00	35,20	21,84		
1	0,041	1,51	1	42,23	0,00	42,24	26,20	24,91	2,67
	0,042	1,54	1	43,02	0,00	43,02	26,69		
	0,079	2,90	1	81,08	0,00	81,08	50,30		
2	0,064	2,35	1	65,84	0,00	65,84	40,85	45,47	4,73
	0,071	2,61	1	72,95	0,00	72,95	45,26		
	0,116	4,23	1	118,37	0,01	118,37	73,44		
3	0,103	3,76	1	105,16	0,00	105,16	65,24	71,80	5,91
	0,121	4,42	1	123,65	0,00	123,66	76,71		
	0,166	6,04	1	169,09	0,01	169,10	104,91		
		6,35	1	177,67	0,01	177,68	110,23	103,49	7,56
		5,49	1	153,63	0,01	153,64	95,32		
		6,38	1	178,58	0,02	178,60	110,80		
		7,07	1	198,00	0,01	198,02	122,85	111,97	10,34
		5,89	1	164,84	0,01	164,85	102,27		

	0,227	8,25	1	230,87	0,02	230,89	143,24		
6	0,181	6,59	1	184,56	0,02	184,58	114,51	126,87	14,78
	0,194	7,07	1	198,00	0,02	198,02	122,85		
	0,216	7,86	1	220,09	0,03	220,12	136,56		
7	0,203	7,38	1	206,76	0,03	206,79	128,29	134,11	5,06
	0,218	7,91	1	221,57	0,03	221,60	137,48		
	0,232	8,43	1	236,17	0,04	236,21	147,63		
8	0,203	7,38	1	206,76	0,04	206,79	128,29	145,77	16,62
	0,256	9,29	1	260,10	0,04	260,13	161,38		

Lampiran 5. Data Hasil Analisis Statistika

Lampiran 5.1 Uji Kekuatan Mekanik

Tabel 7. Data analisis statistik uji kekuatan mekanik

ANOVA

Kekuatan_mekanik

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3207.883	4	801.971	103.791	.000
Within Groups	77.268	10	7.727		
Total	3285.151	14			

Post Hoc Tests
Multiple Comparisons

Dependent Variable: Kekuatan_mekanik

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TDMN1	TDMN2	27.83667*	2.26963	.000	20.3671	35.3062
	TDMN3	27.35333*	2.26963	.000	19.8838	34.8229
	TDMN4	20.12000*	2.26963	.000	12.6505	27.5895
	TDMN5	-7.61333*	2.26963	.045	-15.0829	-.1438
TDMN2	TDMN1	-27.83667*	2.26963	.000	-35.3062	-20.3671
	TDMN3	-.48333	2.26963	.999	-7.9529	6.9862
	TDMN4	-7.71667*	2.26963	.042	-15.1862	-.2471
	TDMN5	-35.45000*	2.26963	.000	-42.9195	-27.9805
	TDMN1	-27.35333*	2.26963	.000	-34.8229	-19.8838
	TDMN2	.48333	2.26963	.999	-6.9862	7.9529
[illegible]	[illegible]4	-7.23333	2.26963	.059	-14.7029	.2362
	[illegible]5	-34.96667*	2.26963	.000	-42.4362	-27.4971
	[illegible]1	-20.12000*	2.26963	.000	-27.5895	-12.6505
	[illegible]2	7.71667*	2.26963	.042	.2471	15.1862

TDMN5	TDMN3	7.23333	2.26963	.059	-.2362	14.7029
	TDMN5	-27.73333*	2.26963	.000	-35.2029	-20.2638
	TDMN1	7.61333*	2.26963	.045	.1438	15.0829
	TDMN2	35.45000*	2.26963	.000	27.9805	42.9195
	TDMN3	34.96667*	2.26963	.000	27.4971	42.4362
	TDMN4	27.73333*	2.26963	.000	20.2638	35.2029

*. *The mean difference is significant at the 0.05 level.*

Lampiran 5.2 Uji Kemampuan Penetrasi

Tabel 8. Data analisis statistik uji kemampuan penetrasi

ANOVA

Kemampuan_penetrasi

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	15501.067	4	3875.267	1117.865	.000
Within Groups	34.667	10	3.467		
Total	15535.733	14			

Post Hoc Tests
Multiple Comparisons

Dependent Variable: Kemampuan_Penetrasi
Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
TDMN1	TDMN2	-83.00000*	1.52023	.000	-88.0032	-77.9968
	TDMN3	-21.33333*	1.52023	.000	-26.3365	-16.3301
	TDMN4	.00000	1.52023	1.000	-5.0032	5.0032
	N5	.00000	1.52023	1.000	-5.0032	5.0032
	N1	83.00000*	1.52023	.000	77.9968	88.0032
	N3	61.66667*	1.52023	.000	56.6635	66.6699

	TDMN4	83.00000*	1.52023	.000	77.9968	88.0032
	TDMN5	83.00000*	1.52023	.000	77.9968	88.0032
TDMN3	TDMN1	21.33333*	1.52023	.000	16.3301	26.3365
	TDMN2	-61.66667*	1.52023	.000	-66.6699	-56.6635
	TDMN4	21.33333*	1.52023	.000	16.3301	26.3365
	TDMN5	21.33333*	1.52023	.000	16.3301	26.3365
	TDMN1	.00000	1.52023	1.000	-5.0032	5.0032
TDMN4	TDMN2	-83.00000*	1.52023	.000	-88.0032	-77.9968
	TDMN3	-21.33333*	1.52023	.000	-26.3365	-16.3301
	TDMN5	.00000	1.52023	1.000	-5.0032	5.0032
	TDMN1	.00000	1.52023	1.000	-5.0032	5.0032
TDMN5	TDMN2	-83.00000*	1.52023	.000	-88.0032	-77.9968
	TDMN3	-21.33333*	1.52023	.000	-26.3365	-16.3301
	TDMN4	.00000	1.52023	1.000	-5.0032	5.0032

**. The mean difference is significant at the 0.05 level.*

Lampiran 5.3 Permeasi *Ex-Vivo*

Tabel 9. Data analisis statistik permeasi *ex-vivo*

Independent T-Test

Permeasi *ex-vivo*

Group Statistics

	Formula	N	Mean	Std. Deviation	Std. Error Mean
Permeasi	TDMN2	3	10.6167	1.16006	.66976
	DMN kontrol	3	66.9633	7.63364	4.40728

a. *Liliefors Significance Correction*

Independent Samples Test

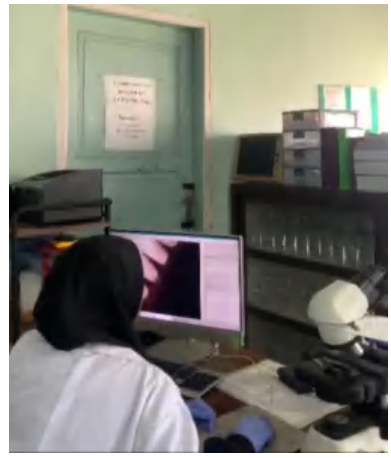
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Permeasi	Equal variances assumed	3.481	.135	-12.640	4	.000	-56.34667	4.45788	-68.72373	-43.96960
	Equal variances not assumed			-12.640	2.092	.005	-56.34667	4.45788	-74.73872	-37.95461

Lampiran 6. Dokumentasi Penelitian

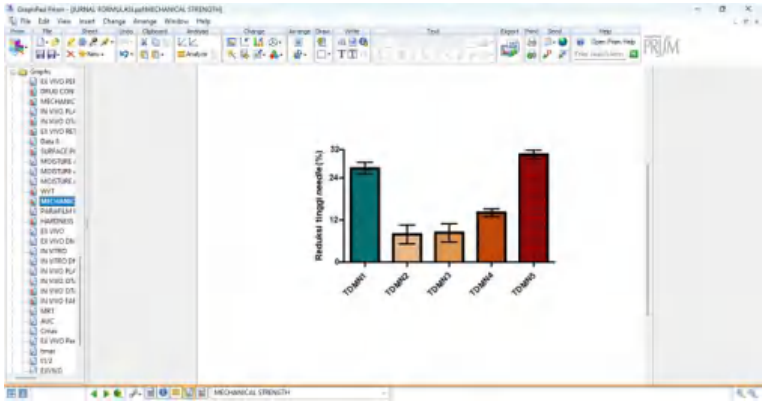
Gambar 13. Proses analisis RV

Gambar 14. Proses penimbangan bahan untuk formulasi TDMN

Gambar 15. Proses pencetakan TDMN



Gambar 16. Proses karakterisasi fisik TDMN



Gambar 17. Pembuatan grafik hasil menggunakan aplikasi *GraphPad Prism*®

Multiple Comparisons

Dependent Variable: Kekuatan_Mekanik

Tukey HSD

(I) Formula	(J) Formula	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
F1	F2	-1967589871	1820720371	.812	-7959730167	4024550424
	F3	-2364680242	1820720371	.698	-8356820538	3627460053
	F4	1267100657	1820720371	.953	-4725039639	7259240953
	F5	-388490360	1820720371	.999	-6380630656	5603649936
F2	F1	1967589871	1820720371	.812	-4024550424	7959730167
	F3	-397090371	1820720371	.999	-6389230667	5595049925
	F4	3234690528	1820720371	.436	-2757449767	9226830824
	F5	1579099511	1820720371	.902	-4413040784	7571239807
F3	F1	2364680242	1820720371	.698	-3627460053	8356820538
	F2	397090371.0	1820720371	.999	-5595049925	6389230667
	F4	3631780899	1820720371	.334	-2360359396	9623921195
	F5	1976189882	1820720371	.810	-4015950413	7968330178
F4	F1	-1267100657	1820720371	.953	-7259240953	4725039639
	F2	-3234690528	1820720371	.436	-9226830824	2757449767
	F3	-3631780899	1820720371	.334	-9623921195	2360359396
	F5	-1655591017	1820720371	.887	-7647731313	4336549279
F5	F1	388490360.0	1820720371	.999	-5603649936	6380630656
	F2	-1579099511	1820720371	.902	-7571239807	4413040784
	F3	-1976189882	1820720371	.810	-7968330178	4015950413
	F4	1655591017	1820720371	.887	-4336549279	7647731313

Gambar 18. Pengolahan data hasil penelitian menggunakan aplikasi *IBS SPSS Statistic*®