BAB 5
KESIMPULAN DAN SARAN

5.1 Kesimpulan

1. Konsentrasi *carnauba wax* dan *paraffin wax* berpengaruh signifikan terhadap mutu fisik dan efektivitas masker *clay stick* ekstrak kental kulit jeruk lemon yang meliputi daya oles, kekerasan, waktu kering, dan aktivitas antioksidan.
2. Formula optimum masker *clay stick* ekstrak kental kulit jeruk lemon dapat diperoleh dengan menggunakan kombinasi konsentrasi *carnauba wax* 8,153% dan konsentrasi *paraffin wax* 9,156% telah memenuhi persyaratan mutu fisik dan efektivitas dengan daya oles sebesar 2x; kekerasan sebesar 3,4 N; waktu kering sebesar 7,52 menit dan aktivitas antioksidan (IC_{50}) sebesar 134,32 ppm
3. Formulasi sediaan masker *clay stick* ekstrak kental kulit jeruk lemon berpengaruh pada formula optimum terhadap aktivitas antioksidan ekstrak kental kulit jeruk lemon.

5.2 Saran

Pada penelitian selanjutnya disarankan untuk mengembangkan sediaan *clay stick mask* ini menjadi produk yang dapat dijual di pasaran dan melakukan pengujian klinis untuk memastikan bahwa sediaan aman digunakan dan tidak menimbulkan iritasi saat diaplikasikan pada kulit.

DAFTAR PUSTAKA

Abubakar, A. and Haque, M. 2020, Preparation of medicinal plants: basic extraction and fractionation procedures for experimental purposes, *Journal of Pharmacy and Bioallied Sciences*, **12(1)**: 1.

Akshatha, R.S., Reddy, M.C., Suresh, R. and Thanushree, H.R. 2023, Formulation and evaluation of antibacterial herbal deodorant stick, *World Journal of Biology Pharmacy and Health Sciences*, **16(2)**: 29-34.

Alexander, I., Sodri, A. and Mizuno, K. 2023, The effect of different natural waxes to hydrophobic properties of starch-based biodegradable foams, *Journal of Environmental Science and Sustainable Development*, **6(1)**: 86-101.

Allen Jr, L.V. 2020, *The Art, Science, and Technology of Pharmaceutical Compounding*, 6th ed, American Pharmacists Association, Washington DC.

Altiokka, İ. and Üner, M. 2022, Safety in cosmetics and cosmetovigilance, current regulations in Türkiye, *Turkish Journal of Pharmaceutical Sciences*, **19(5)**: 610–617.

Bitwell, C., Indra, S.S., Luke, C. and Kakoma, M.K. 2023, A review of modern and conventional extraction techniques and their applications for extracting phytochemicals from plants, *Scientific African*, **19**: 01585.

Burnett, C.L. 2022, *Amended Safety Assessment of Naturally-Sourced Clays as Used in Cosmetics*, Cosmetic Ingredient Review, Washington DC.

Chakraborty, N., Juglan, K.C. and Kumar, H. 2021, Temperature-dependent thermodynamic and physicochemical studies of glycols in aqueous biotin solutions, *Journal of Molecular Liquids*, **337**: 116605.

Chaudhary, P., Janmeda, P., Docea, A.O., Yeskaliyeva, B., Razis, A.F.A., Modu, B., Calina, D. and Sharifi-Rad, J. 2023, Oxidative stress, free radicals and antioxidants: potential crosstalk in the pathophysiology of human diseases, *Frontiers in Chemistry*, **11**: 1-24.

Chen, J., Liu, Y., Zhao, Z. and Qiu, J. 2021, Oxidative stress in the skin: impact and related protection, *International Journal of Cosmetic* Science, **43**: 495–509.

Chuberre, B., Araviiskaia, E., Bieber, T. and Barbaud, A. 2019, Mineral oils and waxes in cosmetics: an overview mainly based on the current European regulations and the safety profile of these compounds, *European Academy of Dermatology and Venereology*, **33(7)**: 5-14.

Clermont-Gallerande, H., Daquin, C., Malvezin, C., Lesbros, C., Nagahiro, C., Bertron, E., Slaim, N., Sanchez, M.A., Pichoutou, O. and Guarillof, P. 2022, Substitution of synthetic waxes by plant-based waxes in lipsticks, *OCL*, **29**:19.

Darsono, F.L, Sugianto, L. dan Jessica, M.A. 2022, study efektivitas ekstrak kental kulit buah jeruk purut terstandar (*Citrushystrix*) sebagai antioksidan dan antijerawat, *Pharmaceutical Journal Of Indonesia*, **8(1)**: 59-69.

Departemen Kesehatan RI. 1995, Materia Medika Indonesia VI, Departemen Kesehatan Republik Indonesia, Jakarta.

Departemen Kesahatan RI. 2017, Farmakope Herbal Indonesia VI, Departemen Kesehatan Republik Indonesia, Jakarta.

Dev, K., Gupta, A.K. and Misra, S.K. A comprehensive review on skincare cosmeceuticals, *Acta Scientific Pharmaceutical Sciences*, **6(1)**: 90-100.

Dewanti, D.A.P.S.I., Ernawati, D.K., Indrayani, A.W., Dewi, N.W.S. and Jawi, I.M. 2020, Protective effect of lemon (*Citrus limon* L.) ethanol extract cream as an antioxidant against exposure to ultraviolet b rays in the skin of male wistar (*Rattus norvegicus*) rats, *Jurnal Epidemiologi Kesehatan Komunitas*, **5(1)**: 8–14.

Dhruv, D. 2023, The study of sodium lauryl sulfate (SLS) toxicity. *Jounal of Clinical Toxicology*, **13**: 542.

Ditjen POM. 2000, Parameter Standar Umum Ekstrak Tumbuhan Obat, Departemen Kesehatan RI, Jakarta.

Erba, O., Atomsa, D., Chimdessa, M and Gonfa, T. 2020, Determination of flavonoid contents and evaluation of in vitro antioxidant activities of the extract of selected citrus fruit peel, *International Journal of Secondary Metabolite*, **7(1)**: 8-18.

Fonmboh, D.J., Abah, E.R., Fokunang, T.E., Herve, B., Teke, G.N., Rose, N.M., Borgia, N.N., Fokunang, L.B., Andrew, B.N., Kaba, N., Bathelemy, N. and Ntungwen, F.N. 2020, An overview of methods of extraction, isolation and characterization of natural medicinal

plant products in improved traditional medicine research, *Asian Journal of Research in Medical and Pharmaceutical Sciences*, **9(2)**: 31–57.

García-Nicolás, M., Ledesma-Escobar, C.A. and Priego-Capote, F. 2023, Spatial distribution and antioxidant activity of extracts from citrus fruits, *Antioxidants*, **12(4)**: 1–12.

Gawande, A.S., Bajad, M.N.E., Deshmukh, S. and Kadam, A. 2023, Review on formulation, evaluation and comparative study of herbal solid perfume stick, *International Journal of Advanced Research in Science, Communication and Technology*, **3(3)**: 340-348.

Gomes, C., Rautureau, M. and Poustis, J. 2021, Benefits and risks of clays and clay minerals to human health from ancestral to current times: a synoptic overview, *Clays and Clay Minerals*, **69**: 612–632.

Gulcin, İ. and Alwasel, S.H. 2023, DPPH radical scavenging assay, *Processes*, **11(8)**: 2248.

Hiremath, V., Kartik, A., Sagare, P., Deshpande, P., Rao, P. and Pratima, S. 2022, Design of miconazole derma sticks for the treatment of skin infections, *World Journal Of Pharmaceutical And Medical Research*, **8(7)**: 123-131

Hoang, H.T., Moon, J.-Y. and Lee, Y.-C. 2021, Natural antioxidants from plant extracts in skincare cosmetics: recent applications, challenges and perspectives, *Cosmetics*, **8(4)**: 106.

Indriastuti, D., Dewi, M.L. dan Priani, S.E. 2022, *Literature review* formulasi sediaan masker *clay* antioksidan, *Bandung Conference Series: Pharmacy*, **2(2)**: 1129-1135.

Isa, R.M., Man, S., Rahman, N.N.A. and Aziz, A. 2023, Determinants of consumer adoption of halal cosmetics: a systematic literature review, *Journal of Cosmetic Dermatology*, **22(3)**: 752–762.

Juma'at, N., Rahmat, N.A., Hamidi, S.A. and Adnan, N. 2021, The production and stability evaluation of natural lipstick, *Multidisciplinary Applied Research and Innovation*, **2(2)**: 220-225.

Junio, E.J.M.R., Stephen, J.R.V., Muthuvel, M., Roy, A., Rodrigue, P,A,m Filho, M.J.A.M., Teixera, R.A., Barbosa, A.D. and Benjamin, S.R. 2022, Chemistry, biological activities, and uses of carnauba wax, *Gums, Resins and Latexes of Plant Origin*, 1-23.

Kadubal, K. J. 2023, An overview on thin layer chromatography, *International Journal of Creative Research Thoughts*, **11(3)**: 510-517.

Kamila, R.A. 2021, Kaolin in pharmaceutical preparations: a review, *Jurnal Ilmiah Farmasi*, **17(2)**: 145–159.

Karim, P.L., Aryani, I.A. and Nopriyanti. 2021, Anatomy and histologic of intrinsic aging skin, *Bioscientia Medicina : Journal of Biomedicine and Translational Research*, **5(11)**: 1065-1077.

Klimek-Szczykutowicz, M., Szopa, A. and Ekiert, H. 2020, *Citrus limon* (Lemon) phenomenon—a review of the chemistry, pharmacological properties, applications in the modern pharmaceutical, food, and cosmetics industries, and biotechnological studies, *Plants*, **9(1)**: 119.

Kotha, R.R., Tareq, F.S., Yildiz, E. and Luthria, D.L. Oxidative stress and antioxidants—a critical review on in vitro antioxidant assays, *Antioxidants*, **11(12)**: 2388.

Krutmann, J., Schikowski, T., Morita, A and Berneburg, M. 2021, Environmentally-induced (extrinsic) skin aging: exposomal factors and underlying mechanisms, *Journal of Investigative Dermatology*, **141(4)**: 1096-1103.

Lee, H., Hong, Y. and Kim, M. 2021, Structural and functional changes and possible molecular mechanisms in aged skin, *International Journal of Molecular Sciences*, **22(22):** 12489.

Li, P., Yao, X., Zhou, Q., Meng, X., Zhou, T. and Gu, Q. 2022, Citrus peel flavonoid extracts: health-beneficial bioactivities and regulation of intestinal microecology in vitro, *Frontiers in Nutrition*, **9:** 1-13.

Lim, K.M. 2021, Skin epidermis and barrier function, *International Journal of Molecular Sciences*, **22(6)**: 3035

Londhe, S.S., Joshi, A.A., Sapkale, G.N. and Bhosale, M.G. 2022, Formulation and evaluation of clay face pack, *International Journal of Pharmaceutical Investigation*, **11(4)**: 437-440.

Lukić, M., Pantelić, I and Savić, S.D. 2021, Towards optimal ph of the skin and topical formulations: from the current state of the art to tailored products, *Cosmetics*, **8(3)**: 69.

Mahakal, M.M., Kunjir, V.V., Solunke, R.S., Deshmukh, M.T. and Shete, R. 2021, Formulation and evaluation of an antiacne dermal sticks, *International Journal of Creative Research Thoughts*, **9(4)**: 1317-

1324.

Marjoni, R. dan Saifuddin, I.R. 2022, *Konsep-Konsep Dasar Farmakognosi & Fitokimia*, Pustaka Baru Press, Yogyakarta.

Martins, T.E.A., Pinto, C.A.S.O., Oliveira, A.C., Velasco, M.V.R., Guitiérrez, A.R.G., Rafael, M.F.C., Tarazona, J.P.H. and Figueroa, M.G.R. 2020, Contribution of topical antioxidants to maintain healthy skin—a review, *Scientia Pharmaceutica*, **88(2)**: 27.

Mas-Capdevila, A., Teichenne, J., Domenech-Coca, C., Caimari, A., Bas, J.M.D., Escoté, X. and Crescenti, A. 2020, Effect of hesperidin on cardiovascular disease risk factors: the role of intestinal microbiota on hesperidin bioavailability, *Nutrients*, **12(5)**: 1488.

Mawazi, S.M., Redzal, N.A.B.A., Othman, N. and Alolayan, S.O. 2022, Lipsticks history, formulations, and production: a narrative review, *Cosmetics*, **9(1)**: 1-19.

Meneguzzo, F., Ciriminna, R., Zabini, F. and Pagliaro, M. 2020, Review of evidence available on hesperidin-rich products as potential tools against COVID-19 and hydrodynamic cavitation-based extraction as a method of increasing their production, *Processes*, **8(5)**: 549.

Michalak, M. 2022, Plant-derived antioxidants: significance in skin health and the ageing process, *Internation Journal of Molecular Sciences*, **23(2)**: 585.

Misina, S.M., Tretjakova, R., Kodors, S. and Zavorins. A. 2020, Lake zeiļu clay application induced changes in human skin hydration, elasticity, transepidermal water loss and ph in healthy individuals, *Cosmetics*, **7(3)**: 51.

Najmi, A., Sadasivam, B. and Ray, A. 2021, How to choose and interpret a statistical test, an update for budding researchers, *Journal of Family Medicine and Primary Care*, **10(8):** 2763.

Nareswari, T.L., Syafitri, E. and Nurjannah, O. 2022, Sunscreen lip balm stick formulation contains a combination of virgin voconut oil and crude palm oil, *Pharmacy Reports*, **2(2)**: 48.

Nortjie, E., basitere, M., Moyo, D. and Nyamukamba, P. 2022, Extraction methods, quantitative and qualitative phytochemical screening of medicinal plants for antimicrobial textiles: a review, *Plants*, **11(15)**: 2011.

Novotná, R., Škařupová, D., Hanyk, J., Ulrichová, J., Křen, V., Bojarová, P., Brodsky, K., Vostálová, J. and Franková, J. 2023, Hesperidin, hesperetin, rutinose, and rhamnose act as skin anti-aging agents, *Molecules*, **28(4)**: 1728.

Paat, S.F., Fatimawali and Antasionasti, I. 2022, Antioxidant activity test of ethanol of lemon peel (*Citrus limon* L.) by DPPH Method (*1.1-Diphenil-2-Picrylhdarzyl*), *Pharmacon Jurnal Ilmiah Farmasi*, **11(1)**: 1315–1320.

Paendong, A.R.M., Fatimawali dan Lebang, J. S. 2022, Characterization of ethanol extract of suanggi lemon peel (*Citrus limon* L.), *Pharmacon*, **11(1)**: 1302-1308.

Park, S. 2022, Biochemical, structural and physical changes in aging human skin, and their relationship, *Biogerontology*, **23(3)**: 275–288.

Pasi, N.I., Bratadireja, M.A. and Chaerunnisa, A.Y. 2020, Study of physicochemical characteristics of kaolin from belitung regency, *Indonesian Journal of Pharmaceutical Science and Technology*, **7(2)**: 38.

Pawarti, N., Iqbal, M., Ramdini, D.A. dan Yuliyanda, C. 2023, Pengaruh metode ekstraksi terhadap persen rendemen dan kadar fenolik ekstrak tanaman yang berpotensi sebagai antioksidan, *Medical Profession Journal of Lampung*, **13(4)**: 590-593.

Pujilestari, S., Carlusi, T. dan Azni, I.N. 2021, Pemanfataan kulit lemon pada pembuatan minuman rosella, *Seminar Nasional Pariwisata dan Kewirausahaan*, **2**: 625-635.

Pyrzynska, K. 2022, Hesperidin: a review on extraction methods, stability and biological activities, *Nutrients*, **14(12)**: 2387.

Racovita, A.D. 2022, Titanium dioxide: Structure, impact, and toxicity, *International Journal of Environmental Research and Public Health*, **19(9)**: 5681.

Rafique, S., Hassan, S.M., Mughal, S.S., Hassan, S.K., Shabbir, N., Perveiz, S., Mushtaq, M. and Farman, M. 2020, Biological attributes of lemon: a review, *Journal of Addiction Medicine and Therapeutic Science*, **6(1)**: 30–34.

Reshma, E.S., Nazeer, N., Blessy, A.B., Mol, S., Soumya U., Sreeklaksahmi and Vishnupriya, 2023, Formulation and evaluation of mucin loaded moisturizing stick, *International Journal of Creative Research*

Thoughts, **11(7)**: 751-756.

Rieger, M.M. 2000, *Harry's Cosmeticology*, 8th ed, Chemical Publishing Company, London.

Sa'Ayinzat, F., Bawa, E.K., Ogwu, D. and Ayo, J.O. 2021, Hesperidin-Sources, chemistry, extraction, measurement and biologic effects on reproduction in animals: A review, *International Journal of Veterinary Sciences and Animal Husbandry*, **6(4):** 1–8.

Saad, A.A., Rahmi., Fajar, D.R. and Sari, I.W. 2023, Evaluation of antioxidant activity in lemon juice (*Citrus limon*) marketed in Makassar City using the DPPH (2,2 diphenyl-1- picrylhydrazyl) method, *Jurnal Ilmiah Berkala: Sains dan Terapan Kimia*, **17(2)**: 38 - 42.

Setianingsih, S., Saputro, R.A., Fauziah, V.R., Wibowo, W.S. and Shabrina, A. 2023, Physical characterization and sunscreen activity of nutmeg oil nanoemulsion with isopropyl myristate variations, *Jurnal Farmasi Sains dan Praktis*, **9(2)**: 168–177.

Starek, M., Homa, K., Stępińska, J. and Dąbrowska, M. 2023, Development of thin-layer chromatography–densitometry for the quantification of lecithin in dietary supplements, *Journal of Planar Chromatography – Modern TLC*, **36(2–3):** 99–110.

Sopyan, I., Gozali, D., Sriwidodo and Guntina, R.K. 2022, Design-expert software (DOE): an application tool for optimization in pharmaceutical preparations formulation, *International Journal of Applied Pharmaceutics*, **14(2)**: 55-63.

Sparr, E., Björklund, S., Pham, Q.D., Mojumdar, E.H., Stenqvist, B., Gunnarsson, M. and Topgaard, D. 2023, The stratum corneum barrier – from molecular scale to macroscopic properties, *Current Opinion in Colloid and Interface Science*, **67**: 101725.

Spectrum Chemical, 2022, *Safety Data Sheet Lanolin*, Spectrum Chemical.

Suman, Sadam and Alok, S. 2023, An overview of herbal cosmetics and their application, *International Journal of Pharmaceutical Sciences and Research*, **14(5):** 2214-2226.

Surya, M. and Gunasekaran, S. 2021, A review on recent scenario of cosmetics, *International Journal of Pharmaceutical Sciences Review and Research*, **68(1)**: 190–197.

Talon, M., Caruso, M. and Gmitter jr, F.G. 2020, *The Genus Citrus*, Woodhead Publishing, Duxford.

Thapa, S., Poudel, K., Limbu, S.K., Dahal, G., and Pokhrel, S. 2022, Phytochemical screening, GC analysis and antibacterial activity of *citrus limon* peel extract and essential oil, *Journal of Nepal Chemical Society*, **43(1)**: 69–74.

Thomas, S., Ajitha, A.R., Chrirayil, C.J. and Thomas, B. 2023, *Handbook of Biopolymers*, Springer Nature Singapore, Singapore.

Tiwari, S. and Talreja, S. 2022, Thin layer chromatography (TLC) VS. paper chromatography: a review, *Acta Scientific Pharmaceutical Sciences*, **6(9)**: 05–09.

Uslu, E.K. and Yılmaz, E. 2021, Preparation and characterization of glycerol monostearate and polyglycerol stearate oleogels with selected amphiphiles, *Food Structure*, **28**: 100192.

Vishwakarma, D., Chaudary, R.P., Kumar, V., Shukla, N. and Gupta, V. 2022, Optimization technique in pharmaceutical formulation and processing – review article, *Internation Journal of Pharmacy & Pharmaceutical Research*, **24(2)**: 216-222.

Voigt, R. 2000, *Buku Pelajaran Teknologi Farmasi Edisi 5*, Gadjah Mada University Press, Yogyakarta.

Wirawan, S. 2023, *Metodologi Penelitian untuk Tenaga Kesehatan*, Thema Publishing, Yogyakarta.

Zareen, S.R., Ahmed, O., Reshma, Uddin, M.S. and Rasheed, A. 2023, Thin-layer chromatography: a research report, *World Journal of Pharmaceutical and Life Sciences*, **10(2)**: 75-77.

Zhang, X., Zhang, Z., Tao, H., He, X., Hsu, K., Wang, W., Fang, X. and Steel, A. 2023, Comprehensive assessment of the efficacy and safety of a clay mask in oily and acne skin, *Skin Research & Technology*, **29**: 1-7.