

DAFTAR PUSTAKA

- Akhmedova D.B. Tursunov B.F. (2025). COMPREHENSIVE DIAGNOSTIC EVALUATION OF OBESITY. *International Conference on Modern Science and Scientific Studies*, 194–200.
- Anzano, A., Ammar, M., Papaianni, M., Grauso, L., Sabbah, M., Capparelli, R., & Lanzotti, V. (2021). Moringa oleifera lam.: A phytochemical and pharmacological overview. *Horticulturae*, 7(10), 1–25. <https://doi.org/10.3390/horticulturae7100409>
- Baek, S. U., & Yoon, J. H. (2024). Systemic Inflammation Across Metabolic Obesity Phenotypes: A Cross-Sectional Study of Korean Adults Using High-Sensitivity C-Reactive Protein as a Biomarker. *International Journal of Molecular Sciences*, 25(21). <https://doi.org/10.3390/ijms252111540>
- Baik, I. (2025). Prospective Associations of Dietary Antioxidant Vitamin Intake and 8-Year Risk of Elevated Serum C -Reactive Protein Levels. *Nutrients*, 17(Cvd), 1–12. <https://doi.org/https://doi.org/10.3390/nu17061020>
- BPOM. (2021). Peraturan badan pengawas obat dan makanan nomor 18 tahun 2021 tentang pedoman uji farmakodinamik praklinik obat tradisional. *Badan Pengawas Obat Dan Makanan RI*, 1, 15–24.
- BPOM RI. (2023). Pedoman Penyiapan Bahan Baku Obat Bahan Alam Berbasis Ekstrak / Fraksi. *Badan Pengawas Obat Dan Makanan RI*, November, 45.
- Busebee, B., Ghusn, W., Cifuentes, L., & Acosta, A. (2023). Obesity: A Review of Pathophysiology and Classification. *Mayo Clinic Proceedings*, 98(12), 1842–1857. <https://doi.org/10.1016/j.mayocp.2023.05.026>

- Camilleri, E., & Blundell, R. (2024). A comprehensive review of the phytochemicals, health benefits, pharmacological safety and medicinal prospects of *Moringa oleifera*. *Heliyon*, *10*(6), e27807. <https://doi.org/10.1016/j.heliyon.2024.e27807>
- Chen, J. (2023). *Effect of High Fat Diet on Disease Development of Polycystic*. 1–14.
- Chiş, A., Noubissi, P. A., Pop, O. L., Mureşan, C. I., Fokam Tagne, M. A., Kamgang, R., Fodor, A., Sitar-Tăut, A. V., Cozma, A., Orăşan, O. H., Hegheş, S. C., Vulturar, R., & Suharoschi, R. (2024). Bioactive Compounds in *Moringa oleifera*: Mechanisms of Action, Focus on Their Anti-Inflammatory Properties. *Plants*, *13*(1). <https://doi.org/10.3390/plants13010020>
- Cucoreanu, C., Tigu, A., Nistor, M., Moldovan, R., Pralea, I., Iacobescu, M., Iuga, C., Szabo, R., Dindelegan, G., & Ciuce, C. (2024). Epigenetic and Molecular Alterations in Obesity: Linking CRP and DNA Methylation to Systemic Inflammation. *Current Issues in Molecular Biology*, 7430–7446.
- Devina, M., Charles, S., Siahaan, P. T., Roro, R., Arisanti, S., & Adrianto, H. (2024). *CRP Levels in PCOS-IR Rat Models (Rattus norvegicus) After Administration of Moringa oleifera Extract*. *5*(6), 171–173.
- Ding, Z., Wei, Y., Peng, J., Wang, S., Chen, G., & Sun, J. (2023). The Potential Role of C-Reactive Protein in Metabolic-Dysfunction-Associated Fatty Liver Disease and Aging. *Disease, Metabolic-Dysfunction-Associated Fatty Liver*. <https://doi.org/https://doi.org/10.3390/biomedicines11102711>
- Doseděl, M., Jirkovský, E., Macáková, K., Krčmová, L. K., Javorská, L., Pourová, J., Mercolini, L., Remião, F., Nováková, L., & Mladěnka, P. (2021). Vitamin

- c—sources, physiological role, kinetics, deficiency, use, toxicity, and determination. *Nutrients*, 13(2), 1–36. <https://doi.org/10.3390/nu13020615>
- Effendi, I. (2023). Pengaruh Jus Bawang Bombai Merah (*Allium cepa* L.) terhadap kadar C-Reactive Protein (CRP) Studi Eksperimental Terapi Arthritis Gout Pada Mencit Jantan Galur Balb/C yang Diinduksi Kristal Monosodium Urat (MSU). *Repository.Unissula.Ac.Id*, VIII(I), 26–30.
- Ellulu, M. S., Rahmat, A., Patimah, I., & Abed, Y. (2015). Effect of vitamin C on inflammation and metabolic markers in hypertensive and / or diabetic obese adults: a randomized controlled trial. *Drug Design, Development and Therapy*, 3405–3412. <https://doi.org/doi:10.2147/DDDT.S83144>. PMID: 26170625
- Emelda, E., Nugraeni, R., & Damayanti, K. (2023). Review: Exploration of Indonesian Herbal Plants for Anti Inflammatory. *INPHARNMED Journal (Indonesian Pharmacy and Natural Medicine Journal)*, 6(2), 58. <https://doi.org/10.21927/inpharmed.v6i2.1938>
- F, K., A, Y., R, S., & WH, N. (2021). IDENTIFIKASI SENYAWA BIOAKTIF Moringa oleifera SEBAGAI ANTIINFLAMASI MELALUI LIGAN PADA TOLL-LIKE RECEPTOR SIGNALING PATHWAY UNTUK PREDIKSI. *Prosiding Semnas Biologi Ke-9*, 285–290.
- Fard, M. T., Arulsevan, P., Karthivashan, G., & Adam, S. K. (2015). Bioactive Extract from Moringa oleifera Inhibits the Pro - inflammatory Mediators in Lipopolysaccharide Stimulated Macrophages. *Pharmacogn. Mag.*
- Fitch, A. K., & Bays, H. E. (2022). Obesity definition, diagnosis, bias, standard operating procedures (SOPs), and telehealth: An Obesity Medicine

- Association (OMA) Clinical Practice Statement (CPS) 2022. *Obesity Pillars*, 1(December 2021), 100004. <https://doi.org/10.1016/j.obpill.2021.100004>
- George, T. T., Obilana, A. O., Oyenih, A. B., & Rautenbach, F. G. (2021). Moringa oleifera through the years: a bibliometric analysis of scientific research (2000-2020). *South African Journal of Botany*, 141, 12–24. <https://doi.org/10.1016/j.sajb.2021.04.025>
- Gigih Andy Putra, A., & Louisa, M. (2023). A Review of Mechanism of Action of Moringa oleifera as an Inhibitor of Adipogenesis in Obesity. *Pharmaceutical Journal of Indonesia*, 9(1), 56–64. <https://doi.org/10.21776/ub.pji.2023.009.01.9>
- Goel, A., Reddy, S., & Goel, P. (2024). Causes, Consequences, and Preventive Strategies for Childhood Obesity: A Narrative Review. *Cureus*, 16(7). <https://doi.org/10.7759/cureus.64985>
- Grzęda, E., Matuszewska, J., Ziarniak, K., Gertig-Kolasa, A., Krzyśko- Pieczka, I., Skowrońska, B., & Sliwowska, J. H. (2022). Animal Foetal Models of Obesity and Diabetes – From Laboratory to Clinical Settings. *Frontiers in Endocrinology*, 13(February), 1–24. <https://doi.org/10.3389/fendo.2022.785674>
- Guo, Z., Dai, C., Xie, J., & Liu, J. (2025). Functional activities and biosynthesis of isothiocyanates in Moringa oleifera Lam . and Brassicaceae : an update. *Food & Medicine Homology*, 6867. <https://doi.org/https://doi.org/10.26599/FMH.2025.9420060>

- Hartono, A. (2023a). Pengaruh Ekstrak Moringa Oleifera Dan Aktivitas Fisik Terhadap Kadar Mda Jaringan Hipokampus, Mda Serum, Hs-Crp Serum, Fungsi Kognitif Pada Mencit Model Geriatri. *Digilib.Uns.Ac.Id*, 25–36.
- Hartono, A. (2023b). Pengaruh Ekstrak Moringa Oleifera Dan Aktivitas Fisik Terhadap Kadar Mda Jaringan Hipokampus, Mda Serum, Hs-Crp Serum, Fungsi Kognitif Pada Mencit Model Geriatri. *Digilib.Uns.Ac.Id*, 25–36.
- Hong, J. S. et al. (2024). Application of Enzyme-Linked Immunosorbent Assay to Detect Antimicrobial Peptides in Human Intestinal Lumen. *J Immunol Method*, 2. <https://doi.org/10.1016/j.jim.2023.113599>. Application
- Hsieh, C. T., Wang, J., & Chien, K. L. (2021). Association between dietary flavonoid intakes and C-reactive protein levels: A cross-sectional study in Taiwan. *Journal of Nutritional Science*, 10, 1–9. <https://doi.org/10.1017/jns.2021.8>
- Hsu, W., Hsieh, Y., Chen, W., Chien, M., Luo, W., & Chang, J. (2023). High-fat diet induces C-reactive protein secretion , promoting lung adenocarcinoma via immune microenvironment modulation. *Disease Models & Mechanisms*, 1–13. <https://doi.org/10.1242/dmm.050360>
- Hunthayung, K., & Bhawamai, S. (2024). Polyphenol compounds of freeze-dried Moringa oleifera Lam pods and their anti-inflammatory effects on RAW 264.7 macrophages stimulated with lipopolysaccharide. *Bioactive Compounds in Health and Disease*, 7(4), 185–198. <https://doi.org/10.31989/bchd.v7i4.1356>
- Ibrahim, N. A., Buabeid, M. A., Arafa, E.-S. A., & Murtaza, G. (2024). “Regulation of Obesity and Fatty Liver by Moringa oleifera: Insights into Inflammatory

Pathways.” *BioRxiv*, 1–19.

<https://doi.org/https://doi.org/10.1101/2024.04.28.591562>

Islam, Z., Islam, S. M. R., Hossen, F., Mahtab-Ul-Islam, K., Hasan, M. R., & Karim, R. (2021). Moringa oleifera is a Prominent Source of Nutrients with Potential Health Benefits. *International Journal of Food Science*, 2021(July 2015). <https://doi.org/10.1155/2021/6627265>

Ji, S.-R., Zhang, S.-H., Chang, Y., Li, H.-Y., Wang, M.-Y., Lv, J.-M., Zhu, L., Tang, P. M. K., & Wu, Y. (2023). C-Reactive Protein: The Most Familiar Stranger. *The Journal of Immunology*, 210(6), 699–707. <https://doi.org/10.4049/jimmunol.2200831>

Jin, X., Qiu, T., Li, L., Yu, R., Chen, X., Li, C., Proud, C. G., & Jiang, T. (2023a). Pathophysiology of obesity and its associated diseases. *Acta Pharmaceutica Sinica B*, 13(6), 2403–2424. <https://doi.org/10.1016/j.apsb.2023.01.012>

Jin, X., Qiu, T., Li, L., Yu, R., Chen, X., Li, C., Proud, C. G., & Jiang, T. (2023b). Pathophysiology of obesity and its associated diseases. *Acta Pharmaceutica Sinica B*, 13(6), 2403–2424. <https://doi.org/10.1016/j.apsb.2023.01.012>

Juliana, D., Simanjuntak, K., Susantiningsih, T., & Purwaningsih, D. (2025). Literatur Review : Tumbuhan Kelor (Moringa oleifera) sebagai Salah Satu Tumbuhan Obat dengan Aktivitas. *Jurnal Medical Laboratory*, 4(2).

Kartinah, N. T., Komara, N., Noviati, N. D., Dewi, S., Yolanda, S., Radhina, A., Heriyanto, H., & Sianipar, I. R. (2022). Potential of Hibiscus sabdariffa Linn. in managing FGF21 resistance in diet-induced-obesity rats via miR-34a regulation. *Veterinary Medicine and Science*, 8(1), 309–317. <https://doi.org/10.1002/vms3.653>

- Kawai, T., Autieri, M. V., & Scalia, R. (2021). Adipose tissue inflammation and metabolic dysfunction in obesity. *American Journal of Physiology - Cell Physiology*, 320(3), C375–C391. <https://doi.org/10.1152/ajpcell.00379.2020>
- Kemenkes. (2021). FactSheet_Obesitas_Kit_Informasi_Obesitas.pdf. In *Epidemi Obesity* (pp. 1–8).
- Kemenkes. (2023). *Daftar Frequently Asked Questions (Faq) pertanyaan yang sering ditanyakan seputar hasil SKI 2023*. 29.
- Khanna, D., Khanna, S., Khanna, P., Kahar, P., & Patel, B. M. (2022). Obesity: A Chronic Low-Grade Inflammation and Its Markers. *Cureus*, 14(2). <https://doi.org/10.7759/cureus.22711>
- Khateeb, S., Arabia, S., & Division, B. (2023). Review on High Fat Diet-Induced Obesity and Natural Compounds' Role in the Management of Obesity. *Journal of Chemistry*. *Egyptian Journal of Chemistry*, 66(May), 763–774. <https://doi.org/10.21608/EJCHEM.2023.185352.7420>
- Kilany, O. E., Abdelrazek, H. M. A., Saleh, T., Abdo, S., & Mahmoud, M. M. A. (2020). Saudi Journal of Biological Sciences Anti-obesity potential of Moringa olifera seed extract and lycopene on high fat diet induced obesity in male Sprague Dawely rats. *Saudi Journal of Biological Sciences*, 27(10), 2733–2746. <https://doi.org/10.1016/j.sjbs.2020.06.026>
- Klimek-Szczykutowicz, M., Gaweł-Bęben, K., Rutka, A., Blicharska, E., Tatarczak-Michalewska, M., Kulik-Siarek, K., Kukula-Koch, W., Malinowska, M. A., & Szopa, A. (2024). Moringa oleifera (drumstick tree)—nutraceutical, cosmetological and medicinal importance: a review. *Frontiers*

in *Pharmacology*, 15(February), 1–44.

<https://doi.org/10.3389/fphar.2024.1288382>

Konmy, B., Olounlade, P. A., Adjobimey, T., Dansou, C. C., Carine, A., Adoho, C., Tchétan, E., Virgile, E., Azando, B., & Baba-moussa, L. (2023). In vivo anticoccidial activity and immune response of *Moringa oleifera* and *Vernonia amygdalina* leaves against *Eimeria magna* and *Eimeria media* in rabbits. *Frontiers in Cellular and Infection Microbiology*, May, 1–12. <https://doi.org/10.3389/fcimb.2023.1173138>

Krisanti, S., Darwinata, A. E., & Jawi, I. M. (2023). *Oral Administration of Ethanol Extract of Moringa Leaves (Moringa oleifera) Reduces F2-Isoprostane and Monocyte Chemoattractant Protein (MCP-1) Levels in Wistar Rats (Rattus norvegicus) as an Obesity Model*. 10(July), 12–18.

Lalus, F. N., Pareira, L. A. M., Pkim, M., Arvinda,) ;, Lalang, C., Pd, M., Alumni,), Program, D., Pendidikan, S., Fkip Undana, K., Pengajar, S., Studi, P., Kimia, P., & Undana, F. (2021). Analisis Kandungan Flavanoid Total Pada Ekstrak Etanol Buah Kelor (*Moringa oleifera* Lamk) dengan Menggunakan Metode Spektrofotometer Uv-Vis. *Jurnal Matematika Dan Ilmu Pengetahuan Alam*, 21(1), 66–70.

Lam, B. C. C., Lim, A. Y. L., Chan, S. L., Yum, M. P. S., Koh, N. S. Y., & Finkelstein, E. A. (2023). The impact of obesity: a narrative review. *Singapore Medical Journal*, 64(3), 163–171. <https://doi.org/10.4103/singaporemedj.SMJ-2022-232>

- Leo, R., & Daulay, A. S. (2022). Penentuan Kadar Vitamin C Pada Minuman Bervitamin Yang Disimpan Pada Berbagai Waktu Dengan Metode Spektrofotometri UV. *Journal of Health and Medical Science*, 1(2), 105–115.
- Li, C., Zhu, Z., Jiang, S., Feng, X., Yang, L., Gao, K., Ni, J., & Li, T. (2024). The relationship between serum vitamin C levels and high- sensitivity C-reactive protein in children. *Scientific Reports*, 1–11. <https://doi.org/https://doi.org/10.1038/s41598-024-81751-x> 4
- Liqiang, S., Fang-hui, L., Minghui, Q., Yanan, Y., & Haichun, C. (2023). Free fatty acids and peripheral blood mononuclear cells (PBMC) are correlated with chronic inflammation in obesity. *Lipids in Health and Disease*, 1–9.
- Luo, X., Ng, C., He, J., Yang, M., Luo, X., Herbert, T. P., & Whitehead, J. P. (2022). Molecular and Cellular Endocrinology Vitamin C protects against hypoxia , inflammation , and ER stress in primary human preadipocytes and adipocytes. *Molecular and Cellular Endocrinology*, 556(December 2021), 111740. <https://doi.org/10.1016/j.mce.2022.111740>
- Luqman, S., Srivastava, S., Kumar, R., Maurya, A. K., & Chanda, D. (2012). Experimental assessment of Moringa oleifera leaf and fruit for its antistress, antioxidant, and scavenging potential using in vitro and in vivo assays. *Evidence-Based Complementary and Alternative Medicine*, 2012. <https://doi.org/10.1155/2012/519084>
- Masood, B., & Moorthy, M. (2023). Causes of obesity: a review. *Clinical Medicine, Journal of the Royal College of Physicians of London*, 23(4), 284–291. <https://doi.org/10.7861/clinmed.2023-0168>

- Mohain Ud Din, R., Eman, S., Zafar, M. H., Chong, Z., & Saleh, A. A. (2025). Moringa oleifera as a multifunctional feed additive : synergistic nutritional and immunomodulatory mechanisms in livestock production. *Frontiers in Nutrition, June*, 1–15. <https://doi.org/10.3389/fnut.2025.1615349>
- Mohajan, D., & Mohajan, H. K. (2023). Obesity and Its Related Diseases: A New Escalating Alarming in Global Health. In *Journal of Innovations in Medical Research* (Vol. 2, Issue 3). <https://doi.org/10.56397/jimr/2023.03.04>
- Moore, A., & Khanna, D. (2023). The Role of Vitamin C in Human Immunity and Its Treatment Potential Against COVID-19: A Review Article. *Cureus, 15*(1), 1–9. <https://doi.org/10.7759/cureus.33740>
- Muhammad Arif Husein, Dono Indarto, & B. W. (2024). Male Sprague Dawley Rats with Type 2 Diabetes Mellitus and Obesity on Body Weight, Body Mass Index, and Fat Content as Affected by Alkaloid Fraction of Litsea Glutinosa Leaves (AFLG). *Jurnal Ilmu Kedokteran Dan Kesehatan*, 5 (4), 20-24, 5, 20–24. <https://doi.org/10.32996/jmhs>
- Murdaningsih, E., & Juliaty, A. (2023). Hs-CRP Levels In Adolescents With Obesity And Non-Obesity. *Jurnal Eduhealt, 14*(04), 216–223.
- Mutiarahmi, C. N., Hartady, T., & Lesmana, R. (2021). Use of Mice As Experimental Animals in Laboratories That Refer To the Principles of Animal Welfare: a Literature Review. *Indonesia Medicus Veterinus, 10*(1), 134–145. <https://doi.org/10.19087/imv.2020.10.1.134>
- Naomi, R., Teoh, S. H., Embong, H., Balan, S. S., Othman, F., Bahari, H., & Yazid, M. D. (2023). The Role of Oxidative Stress and Inflammation in Obesity and

Its Impact on Cognitive Impairments — A Narrative Review. *Antioxidants*, 1–20.

Ning, D., Zhao, Z., Ju, L., & Keng, L. (2023). The cross-sectional relationship between vitamin C and high-sensitivity C-reactive protein levels: insights from NHANES database. *Front. Nutr.* 10:1290749, November. <https://doi.org/10.3389/fnut.2023.1290749>

Noor, S. M., Dharmayanti, N. L. P. I., Wahyuwardani, S., & Muharsini, S. (2022). Penanganan Rodensia dalam Penelitian Sesuai Kaidah Kesejahteraan Hewan. In *IAARD Press*.

Nugrahaningsih WH, S. I. A. (2022). Farmakokinetika Flavonoid Ekstrak Daun Tin pada Plasma Darah Tikus. *Life Science*, 11(2), 192–205.

Nurasiah, C., Sudaryati, E., & Lubis, Z. (2024). *The impact of diet, physical activity, and sleep habits on obesity risk among female teachers in Lhokseumawe City*. Pengaruh pola makan, aktivitas fisik, pola tidur terhadap risiko obesitas pada guru wanita di Kota Lhokseumawe Abstrak. 5741(3), 587–596.

Olson, M. E., Hornick, M. G., Stefanski, A., Albanna, H. R., Gjoni, A., Hall, G. D., Hart, P. C., Rajab, I. M., & Potempa, L. A. (2023). A biofunctional review of C-reactive protein (CRP) as a mediator of inflammatory and immune responses: differentiating pentameric and modified CRP isoform effects. *Frontiers in Immunology*, 14(September), 1–11. <https://doi.org/10.3389/fimmu.2023.1264383>

Pareek, A., Pant, M., Gupta, M. M., Kashania, P., Ratan, Y., Jain, V., Pareek, A., & Chuturgoon, A. A. (2023). Moringa oleifera: An Updated Comprehensive Review of Its Pharmacological Activities, Ethnomedicinal,

- Phytopharmaceutical Formulation, Clinical, Phytochemical, and Toxicological Aspects. *International Journal of Molecular Sciences*, 24(3). <https://doi.org/10.3390/ijms24032098>
- Pawarti, N., Iqbal, M., Ramdini, D. A., Yuliyanda, C., Kedokteran, F., Lampung, U., Farmakologi, B., Kedokteran, F., & Lampung, U. (2023). Pengaruh Metode Ekstraksi Terhadap Persen Rendemen dan Kadar Fenolik Ekstrak Tanaman yang Berpotensi sebagai Antioksidan The Effect of Extraction Methods on Percent Yield and Phenolic Content of Plant Extracts Potentially as Antioxidants. *Medula*, 13(April), 590–593.
- Pennings, N., Golden, L., Yashi, K., Tondt, J., & Bays, H. E. (2022). Sleep-disordered breathing, sleep apnea, and other obesity-related sleep disorders: An Obesity Medicine Association (OMA) Clinical Practice Statement (CPS) 2022. *Obesity Pillars*, 4(November), 100043. <https://doi.org/10.1016/j.obpill.2022.100043>
- Podeanu, M. A., Turcu-Stiolica, A., Subțirelu, M. S., Stepan, M. D., Ionele, C. M., Gheonea, D. I., Vintilescu, B. Ștefănița, & Sandu, R. E. (2023). C-Reactive Protein as a Marker of Inflammation in Children and Adolescents with Metabolic Syndrome: A Systematic Review and Meta-Analysis. *Biomedicines*, 11(11), 1–19. <https://doi.org/10.3390/biomedicines11112961>
- Prabowo, N. A., Nurudhin, A., Werdiningsih, Y., Putranto, W., & Kusumo, T. (2024). Moringa oleifera extract in decreasing disease activity for patients with rheumatoid arthritis. *Journal of Pharmacy & Pharmacognosy Research*, 12, 80–84. https://doi.org/10.56499/jppres23.1771_12.s1.80 Short

- Rahma, S., Wiratmini, N. I., & Sudatri, N. W. (2022). Uji Efektivitas Vitamin C sebagai Neuroprotektor pada Mencit (*Mus musculus*) yang Diinduksi Akrilamida. *Metamorfosa: Journal of Biological Sciences*, *9*(1), 79. <https://doi.org/10.24843/metamorfosa.2022.v09.i01.p08>
- Rode, S. B., Dadmal, A., & Salankar, H. V. (2022a). Nature's Gold (*Moringa Oleifera*): Miracle Properties. *Cureus*, *14*(7), 7–12. <https://doi.org/10.7759/cureus.26640>
- Rode, S. B., Dadmal, A., & Salankar, H. V. (2022b). Nature's Gold (*Moringa Oleifera*): Miracle Properties. *Cureus*, *14*(7), 7–12. <https://doi.org/10.7759/cureus.26640>
- Sadie-Van Gijsen, H., & Kotzé-Hörstmann, L. (2023). Rat models of diet-induced obesity and metabolic dysregulation: Current trends, shortcomings and considerations for future research. *Obesity Research and Clinical Practice*, *17*(6), 449–457. <https://doi.org/10.1016/j.orcp.2023.09.010>
- Safabakhsh, M., Emami, M., Zeinali, K. M., Asbaghi, O., Khodayari, S., Khorshidi, M., Alizadeh, S., & Viri, E. (2020). Vitamin C supplementation and C-reactive protein levels: Findings from a systematic review and meta-analysis of clinical trials. *J Complement Integr Med*, 32229693. <https://doi.org/10.1515/jcim-2019-0151>.
- Salazar, J., Martínez, M. S., Chávez-Castillo, M., Núñez, V., Añez, R., Torres, Y., Toledo, A., Chacín, M., Silva, C., Pacheco, E., Rojas, J., & Bermúdez, V. (2014). C-Reactive Protein: An In-Depth Look into Structure, Function, and Regulation. *International Scholarly Research Notices*, *2014*, 1–11. <https://doi.org/10.1155/2014/653045>

- Salsabila, R. S. (2021). PENGARUH PEMBERIAN EKSTRAK DAUN KELOR (MORINGA OLEIFERA) TERHADAP KADAR C-Reactive Protein (CRP) (Studi Eksperimental Terapi Adjuvan Sinusitis Akut Bakterial terhadap Tikus Putih Jantan Galur Sprague Dawley yang diinduksi Staphylococcus aureus. *Universitas Islam Sultan Agung*.
- Saprasetya, A., Laksana, D., Notopuro, H., & Mustika, A. (2022). Ameliorative Effects of Moringa (Moringa Oleifera Lam .) Leaves Extract on Lead-Induced Oxidative Stress , Hecpidin and δ -Alad Levels in Rat ' s Blood. *Pharmacogn J.*, 14(6), 856–862. <https://doi.org/10.5530/pj.2022.14.179>
- Savulescu-fiedler, I., Mihalcea, R., Dragosloveanu, S., & Scheau, C. (2024). The Interplay between Obesity and Inflammation. *Life*, 14, 856.
- Septiyanti, & Seniwati. (2020). Obesitas dan Obesitas Sentral pada Masyarakat Usia Dewasa di Daerah Perkotaan Indonesia. *Jurnal Ilmiah Kesehatan (JIKA)*, 2(3), 118–127.
- She, Y., Mangat, R., Tsai, S., Proctor, S. D., & Richard, C. (2022). The Interplay of Obesity, Dyslipidemia and Immune Dysfunction: A Brief Overview on Pathophysiology, Animal Models, and Nutritional Modulation. *Frontiers in Nutrition*, 9(February), 1–10. <https://doi.org/10.3389/fnut.2022.840209>
- Singh, S., & Prasad, E. M. (2023). Is the C-Reactive Protein (CRP) Test a Worthy Indicator of Inflammation? *London Journal of Medical and Health Research*, 23(8).
- Solehah, N. Z., Prayitno, A., & Pamungkasari, E. P. (2022). The Effect of Red Dragon Fruit (Hylocereus polyrhizus) on ROS Plasma of Overweight Sprague

- Dawley Rats. *Media Gizi Indonesia*, 17(2), 144–150.
<https://doi.org/10.20473/mgi.v17i2.144-150>
- Srivastava, S., Kumar, V., Dash, K. K., Dayal, D., Wal, P., Debnath, B., Singh, R., & Hussain, A. (2023). Dynamic bioactive properties of nutritional superfood *Moringa oleifera* : A comprehensive review. *Journal of Agriculture and Food Research*, 14(November), 100860. <https://doi.org/10.1016/j.jafr.2023.100860>
- Stefan, L., Morgovan, C. M., Duteanu, N., Frent, O., Marian, E., Vicas, L., & Manole, F. (2024a). A Systematic Review : Quercetin — Secondary Metabolite of the Flavonol Class , with Multiple Health Benefits and Low Bioavailability. *Int. J. Mol. Sci*, 1–47.
- Stefan, L., Morgovan, C. M., Duteanu, N., Frent, O., Marian, E., Vicas, L., & Manole, F. (2024b). A Systematic Review : Quercetin — Secondary Metabolite of the Flavonol Class , with Multiple Health Benefits and Low Bioavailability. *Int. J. Mol. Sci*, 1–47.
<https://doi.org/https://doi.org/10.3390/ijms252212091>
- Su, X., Lu, G., Ye, L., Shi, R., Zhu, M., Yu, X., Li, Z., Jia, X., & Feng, L. (2023). *Moringa oleifera* Lam.: a comprehensive review on active components, health benefits and application. *RSC Advances*, 13(35), 24353–24384.
<https://doi.org/10.1039/d3ra03584k>
- Su, Z., Efremov, L., & Mikolajczyk, R. (2024). Nutrition , Metabolism & Cardiovascular Diseases Differences in the levels of in fl ammatory markers between metabolically healthy obese and other obesity phenotypes in adults : A systematic review and meta-analysis. *Nutrition, Metabolism and*

Cardiovascular Diseases, 34(2), 251–269.

<https://doi.org/10.1016/j.numecd.2023.09.002>

Su, Z., Zeng, C., Huang, J., Luo, S., Guo, J., Fu, J., & Zhang, W. (2024).

Association of Dietary Patterns , C -Reactive Protein , and Risk of Obesity Among Children Aged 9 – 17 Years in Guangzhou , China : A Cross-Sectional

Mediation Study. *Nutrients*, 1–15. [https://doi.org/https://](https://doi.org/https://doi.org/10.3390/nu16223835)

doi.org/10.3390/nu16223835

Susanti, A., & Nurman, M. (2022). Manfaat Kelor (*Moringa Oleifera*) Bagi

Kesehatan. *Jurnal Kesehatan Tambusai*, 3(3), 509–513.

<https://doi.org/10.31004/jkt.v3i3.7287>

Thadeus, M. S., Susantiningsih, T., Muktamiroh, H., Fauziah, C., Citrawati, M.,

Irmarahayu, A., Wahyuningsih, S., Harjono Hadiwardjo, Y., Yusmaini, H.,

Bahar, M., Zulfa, F., Agustini, D., & Chairani, A. (2024a). Moringa oleifera

fruit extract as a potential antioxidant against liver injury by 2-Nitropropane

induction in obese male mice model: pre-clinical study. *F1000Research*, 12,

300. <https://doi.org/10.12688/f1000research.121695.2>

Thadeus, M. S., Susantiningsih, T., Muktamiroh, H., Fauziah, C., Citrawati, M.,

Irmarahayu, A., Wahyuningsih, S., Harjono Hadiwardjo, Y., Yusmaini, H.,

Bahar, M., Zulfa, F., Agustini, D., & Chairani, A. (2024b). Moringa oleifera

fruit extract as a potential antioxidant against liver injury by 2-Nitropropane

induction in obese male mice model: pre-clinical study. *F1000Research*, 12,

300. <https://doi.org/10.12688/f1000research.121695.2>

Tham, K. W., Abdul Ghani, R., Cua, S. C., Deerochanawong, C., Fojas, M.,

Hocking, S., Lee, J., Nam, T. Q., Pathan, F., Saboo, B., Soegondo, S.,

- Somasundaram, N., Yong, A. M. L., Ashkenas, J., Webster, N., & Oldfield, B. (2023). Obesity in South and Southeast Asia—A new consensus on care and management. *Obesity Reviews*, *24*(2). <https://doi.org/10.1111/obr.13520>
- Thanikachalam, P. V., Ramesh, K., Hydar, M. I., Varshini, V., & Devaraji, M. (2025). Therapeutic potential of *Moringa oleifera* Lam . in metabolic disorders : A molecular overview. *Asian Pacific Journal of Tropical Biomedicine*, *15*(July), 263–284. <https://doi.org/10.4103/apjtb.apjtb>
- Vajravelu, M. E., Tas, E., & Arslanian, S. (2023). Pediatric Obesity: Complications and Current Day Management. *Life*, *13*(7). <https://doi.org/10.3390/life13071591>
- Varra, F. N., Varras, M., Varra, V. K., & Theodosis-Nobelos, P. (2024). Molecular and pathophysiological relationship between obesity and chronic inflammation in the manifestation of metabolic dysfunctions and their inflammation-mediating treatment options (Review). *Molecular Medicine Reports*, *29*(6). <https://doi.org/10.3892/mmr.2024.13219>
- Viggiano, E., Mollica, M., Lionetti, L., Cavaliere, G., Trinchese, G., Filippo, C., Chieffi, S., Gaita, M., Barletta, A., Luca, B., Crispino, M., & Monda, M. (2016). Effects of an high-fat diet enriched in lard or in fish oil on the hypothalamic amp-activated protein kinase and inflammatory mediators. *Frontiers in Cellular Neuroscience*, *10*(JUN), 1–8. <https://doi.org/10.3389/fncel.2016.00150>
- Villegas-vazquez, E. Y., Gómez-cansino, R., Marcelino-pérez, G., Jiménez-lópez, D., & Quintas-granados, L. I. (2025). Unveiling the Miracle Tree : Therapeutic Potential of *Moringa oleifera* in Chronic Disease Management and Beyond.

Biomedicines, 1–46.

<https://doi.org/https://doi.org/10.3390/biomedicines13030634>

Wahyuningsih, S., & Dkk. (2024). *Buku Ekstraksi Bahan Alam Edisi 2024* (Issue March).

Wati, D. P., & Ilyas, S. (2024). *Prinsip Dasar Tikus* (Issue February).

Welsh, A., Hammad, M., Piña, I. L., & Kulinski, J. (2024). Obesity and cardiovascular health. *European Journal of Preventive Cardiology*, 31(8), 1026–1035. <https://doi.org/10.1093/eurjpc/zwae025>

World Health Organization. (2024, June 9). <https://www.who.int/news-room/fact-sheets/detail/obesity-and-overweight>. In *Media centre obesity and overweight*.

Xiao, N., Ding, Y., Cui, B., Li, R. R., Qu, X. R., Zhou, H., Au, K. H., Fan, X. De, Xie, J. C., Huang, Y., Zhang, S. M., Du, H. Y., Wu, Y. F., Wang, P., Hu, X. F., Wang, Y. F., Zhao, J. J., Yang, W., Wang, Y., ... Feng, X. (2024). Navigating obesity: A comprehensive review of epidemiology, pathophysiology, complications and management strategies. *Innovation Medicine*, 2(3). <https://doi.org/10.59717/j.xinn-med.2024.100090>

Xu, Y., Zheng, H., Slabu, I., Liehn, E. A., & Rusu, M. (2025). Vitamin C in Cardiovascular Disease : From Molecular Mechanisms to Clinical Evidence and Therapeutic Applications. *Antioxidants*, *Mi*, 1–25. <https://doi.org/https://doi.org/10.3390/antiox14050506>

Zimmerman, B., Kundu, P., & Rooney, W. D. (2021). *The Effect of High Fat Diet on Cerebrovascular Health and Pathology : A Species Comparative Review*. 1–21.

Zou, Y., Zhang, R., Huang, L., Zhao, D., Su, D., Meng, J., & Fang, Y. (2022). Serum levels of vitamin D, retinol, zinc, and CRP in relation to obesity among children and adolescents. *European Journal of Medical Research*, 27(1), 1–6. <https://doi.org/10.1186/s40001-022-00670-7>