



REFERENCES

- Abdel-Moneim, A., Abd El-Twab, S.M., Yousef, A.I., Ashour, M.B., Reheim, E.S.A., dan Hamed, M.A.A., 2022. New insights into the in vitro, in situ and in vivo antihyperglycemic mechanisms of gallic acid and p-coumaric acid. *Archives of Physiology and Biochemistry*, **128**: 1188–1194.
- Addepalli, V. dan Suryavanshi, S.V., 2018. Catechin attenuates diabetic autonomic neuropathy in streptozotocin induced diabetic rats. *Biomedicine & Pharmacotherapy*, **108**: 1517–1523.
- Akar, Z., Küçük, M., dan Doğan, H., 2017. A new colorimetric DPPH• scavenging activity method with no need for a spectrophotometer applied on synthetic and natural antioxidants and medicinal herbs. *Journal of Enzyme Inhibition and Medicinal Chemistry*, **32**: 640–647.
- Akhtar, S., Nasir, J.A., Ali, A., Asghar, M., Majeed, R., dan Sarwar, A., 2022. Prevalence of type-2 diabetes and prediabetes in Malaysia: A systematic review and meta-analysis. *PLOS ONE*, **17**: e0263139.
- Akpoveso, O.-O.P., Ubah, E.E., dan Obasanmi, G., 2023. Antioxidant Phytochemicals as Potential Therapy for Diabetic Complications. *Antioxidants*, **12**: 123.
- AL-Ishaq, R.K., Abotaleb, M., Kubatka, P., Kajo, K., dan Büsselberg, D., 2019. Flavonoids and their anti-diabetic effects: Cellular mechanisms and effects to improve blood sugar levels. *Biomolecules*, **9**: 430–465.
- Al-Madhagy, S.A., Mostafa, N.M., Youssef, F.S., Awad, G.E.A., Eldahshan, O.A., dan Singab, A.N.B., 2019. Metabolic profiling of a polyphenolic-rich fraction of *Coccinia grandis* leaves using LC-ESI-MS/MS and in vivo validation of its antimicrobial and wound healing activities. *Food & Function*, **10**: 6267–6275.
- Al-Mamary, M.A. dan Moussa, Z., 2021. Antioxidant activity: The presence and impact of hydroxyl groups in small molecules of natural and synthetic origin, dalam: *Antioxidants - Benefits, Sources, Mechanisms of Action*. IntechOpen, London.
- Apovian, C.M., Okemah, J., dan O'Neil, P.M., 2019. Body weight considerations in the management of type 2 diabetes. *Advances in Therapy*, **36**: 44–58.
- Arumugam, G., Manjula, P., dan Paari, N., 2013. A review: Anti diabetic medicinal plants used for diabetes mellitus. *Journal of Acute Disease*, **2**: 196–200.
- Arunvanan, M., Sasi, S.K., Mubarak, H., dan Kanagarajan, A., 2013. An overview on antidiabetic activity of Siddha medicinal plants. *Asian Journal of Pharmaceutical and Clinical Research*, **6**: 46–50.
- Atangwho, I.J., Ebong, P.E., Eyong, E.U., Asmawi, M.Z., dan Ahmad, M., 2012. Synergistic antidiabetic activity of *Vernonia amygdalina* and *Azadirachta indica*: biochemical effects and possible mechanism. *Journal of ethnopharmacology*, **141**: 878–887.
- Attanayake, A.P., Jayatilaka, K.A.P.W., Mudduwa, L.K.B., dan Pathirana, C., 2016. In vivo antihyperlipidemic, antioxidative effects of *Coccinia grandis* (L.) Voigt (Cucurbitaceae) leaf extract: An approach to scrutinize the therapeutic Benefits of traditional Sri Lankan medicines against diabetic



complications. *International Journal of Pharmaceutical Sciences and Research*, **7**: 3949–3958.

- Attanayake, A.P., Jayatilaka, K.A.P.W., Mudduwa, L.K.B., dan Pathirana, C., 2018. Biochemical and histological evaluation of three selected medicinal plant extracts of Sri Lankan origin on dyslipidemia and oxidative stress in alloxan induced diabetic rats. *Journal of Botany*, **2018**: 1–8.
- Attanayake, A.P., Jayatilaka, K.A.P.W., Mudduwa, L.K.B., dan Pathirana, C., 2019. β -cell regenerative potential of selected herbal extracts in alloxan induced diabetic rats. *Current Drug Discovery Technologies*, **16**: 278–284.
- Attanayake, A.P., Jayatilaka, K.A.P.W., Pathirana, C., dan Mudduwa, L.K.B., 2015. Antihyperglycemic activity of *Coccinia grandis* (L.) Voigt in streptozotocin induced diabetic rats **14**: 376–381.
- Bardy, G., Virsolvy, A., Quignard, J.F., Ravier, M.A., Bertrand, G., Dalle, S., et al., 2013. Quercetin induces insulin secretion by direct activation of L-type calcium channels in pancreatic beta cells. *British Journal of Pharmacology*, **169**: 1102–1113.
- Basavarajappa, G.M., Nanjundan, P.K., Alabdulsalam, A., Asif, A.H., Shekharappa, H.T., Anwer, Md.K., et al., 2020. Improved Renoprotection in Diabetes with Combination Therapy of *Coccinia indica* Leaf Extract and Low-Dose Pioglitazone. *Separations*, **7**: 58.
- Bedekar, A., Shah, K., dan Koffas, M., 2010. Chapter 2 - Natural Products for Type II Diabetes Treatment, dalam: *Advances in Applied Microbiology, Advances in Applied Microbiology*. Academic Press, hal. 21–73.
- Bell, D.S.H., 2013. Combine and conquer: advantages and disadvantages of fixed-dose combination therapy. *Diabetes, Obesity and Metabolism*, **15**: 291–300.
- Bezerra, A.N.S., Massing, L.T., de Oliveira, R.B., dan Mourão, R.H.V., 2017. Standardization and anti-inflammatory activity of aqueous extract of *Psittacanthus plagiophyllus* Eichl. (Loranthaceae). *Journal of Ethnopharmacology*, **202**: 234–240.
- Bhatti, M.Z., Ali, A., Ahmad, A., Saeed, A., dan Malik, S.A., 2015. Antioxidant and phytochemical analysis of *Ranunculus arvensis* L. extracts. *BMC Research Notes*, **8**: 1–8.
- Bilia, A.R., 2014. Science meets regulation. *Journal of Ethnopharmacology*, , Regulation of herbal and traditional medicinal products – European and global strategies (International Symposium TradReg2013) **158**: 487–494.
- Burgos-Morón, Abad-Jiménez, Marañón, Iannantuoni, Escribano-López, López-Domènech, et al., 2019. Relationship between oxidative stress, ER stress, and inflammation in type 2 diabetes: The battle continues. *Journal of Clinical Medicine*, **8**: 1385.
- Caesar, L.K. dan Cech, N.B., 2019. Synergy and antagonism in natural product extracts: when 1 + 1 does not equal 2. *Natural product reports*, **36**: 869–888.
- Cantley, J. dan Ashcroft, F.M., 2015. Q&A: insulin secretion and type 2 diabetes: why do β -cells fail? *BMC Biology*, **13**: 33.
- Cass, J.D., Varma, S., Day, A.G., Sangrar, W., Rajput, A.B., Raptis, L.H., et al., 2012. Automated quantitative analysis of p53, cyclin D1, Ki67 and pERK



- expression in breast carcinoma does not differ from expert pathologist scoring and correlates with clinico-pathological characteristics. *Cancers*, **4**: 725–742.
- Chaudhry, Z.Z., Morris, D.L., Moss, D.R., Sims, E.K., Chiong, Y., Kono, T., et al., 2013. Streptozotocin is equally diabetogenic whether administered to fed or fasted mice. *Laboratory Animals*, **47**: 257–265.
- Chen, H.-W., Yang, M.-Y., Hung, T.-W., Chang, Y.-C., dan Wang, C.-J., 2019. *Nelumbo nucifera* leaves extract attenuate the pathological progression of diabetic nephropathy in high-fat diet-fed and streptozotocin-induced diabetic rats. *Journal of Food and Drug Analysis*, **27**: 736–748.
- Chen, R., Ovbiagele, B., dan Feng, W., 2016. Diabetes and stroke: Epidemiology, pathophysiology, pharmaceuticals and outcomes. *The American journal of the medical sciences*, **351**: 380–386.
- Chou, T.-C., 2006. Theoretical basis, experimental design, and computerized simulation of synergism and antagonism in drug combination studies. *Pharmacological Reviews*, **58**: 621–681.
- Chou, T.-C. dan Talalay, P., 1984. Quantitative analysis of dose-effect relationships: the combined effects of multiple drugs or enzyme inhibitors. *Advances in Enzyme Regulation*, **22**: 27–55.
- Cornell, S., 2015. Continual evolution of type 2 diabetes: an update on pathophysiology and emerging treatment options. *Therapeutics and Clinical Risk Management*, **11**: 621–632.
- Crespo, Y.A., Bravo Sánchez, L.R., Quintana, Y.G., Cabrera, A.S.T., Bermúdez del Sol, A., dan Mayancha, D.M.G., 2019. Evaluation of the synergistic effects of antioxidant activity on mixtures of the essential oil from *Apium graveolens* L., *Thymus vulgaris* L. and *Coriandrum sativum* L. using simplex-lattice design. *Heliyon*, **5**: 1–6.
- Cruz, P.L., Moraes-Silva, I.C., Ribeiro, A.A., Machi, J.F., de Melo, M.D.T., dos Santos, F., et al., 2021. Nicotinamide attenuates streptozotocin-induced diabetes complications and increases survival rate in rats: role of autonomic nervous system. *BMC Endocrine Disorders*, **21**: 133.
- Dao, N.L.A., Phu, T.M., Douny, C., Quentin-Leclercq, J., Hue, B.T.B., Bach, L.T., et al., 2020. Screening and comparative study of in vitro antioxidant and antimicrobial activities of ethanolic extracts of selected Vietnamese plants. *International Journal of Food Properties*, **23**: 481–496.
- Darfiah, D., Kasmiatyi, K., dan Latama, G., 2021. Antibacterial activity and identification of active compounds of seaweed extract *Sargassum* sp., *Halimeda opuntia* and *Halymenia* sp. from Lae-Lae Island of South Sulawesi. *International Journal of Environment, Agriculture and Biotechnology*, **6**: 187–195.
- Davargaon, R.S., Sambe, A.D., dan Muthangi V V, S., 2019. Trolox prevents high glucose-induced apoptosis in rat myocardial H9c2 cells by regulating GLUT-4 and antioxidant defense mechanism. *IUBMB Life*, **71**: 1876–1895.
- de Araújo, F.F., de Paulo Farias, D., Neri-Numa, I.A., dan Pastore, G.M., 2021. Polyphenols and their applications: An approach in food chemistry and innovation potential. *Food Chemistry*, **338**: 127535.



- Deokate, U.A. dan Khadabadi, S.S., 2011. Pharmacology and phytochemistry of *Coccinia indica*. *Journal of Pharmacognosy and Phytotherapy*, **3**: 155–159.
- Depkes RI, 2008. *Farmakope Herbal Indonesia*, 1st ed. Departemen Kesehatan Republik Indonesia.
- Depkes RI, 2017. *Farmakope Herbal Indonesia*, II. ed. Kementrian Kesehatan Republik Indonesia, Jakarta.
- Dhanya, R. dan Kartha, C.C., 2021. Quercetin improves oxidative stress-induced pancreatic beta cell alterations via mTOR-signaling. *Molecular and Cellular Biochemistry*, **476**: 3879–3887.
- Ediriweera, E.R.H.S.S. dan Ratnasooriya, W.D., 2009. A review on herbs used in treatment of diabetes mellitus by Sri Lankan ayurvedic and traditional physicians. *Ayu*, **30**: 373–391.
- Edirs, S., Turak, A., Numonov, S., Xin, X., dan Aisa, H.A., 2017. Optimization of extraction process for antidiabetic and antioxidant activities of Kursi Wufarikun Ziyabit using response surface methodology and quantitative analysis of main components. *Evidence-Based Complementary and Alternative Medicine*, **2017**: 1–14.
- Eleazu, C.O., Eleazu, K.C., Chukwuma, S., dan Essien, U.N., 2013. Review of the mechanism of cell death resulting from streptozotocin challenge in experimental animals, its practical use and potential risk to humans. *Journal of Diabetes & Metabolic Disorders*, **12**: 60.
- Eliza, J. dan Usha, P.T.A., 2011. Interaction of *Coccinia indica* with glibenclamide in alloxan induced diabetic rats. *Indian Journal of Veterinary Research*, **20**: 1–7.
- Elsayed, R.H., Kamel, E.M., Mahmoud, A.M., El-Bassuony, A.A., Bin-Jumah, M., Lamsabhi, A.M., et al., 2020. Rumex dentatus L. phenolics ameliorate hyperglycemia by modulating hepatic key enzymes of carbohydrate metabolism, oxidative stress and PPAR γ in diabetic rats. *Food and Chemical Toxicology*, **138**: 111202.
- Eriadi, A. dan Alfiah, S., 2019. Uji toksisitas sub akut ekstrak etanol daun sembung (*Blumea balsamifera* L. DC) terhadap fungsi hati dan ginjal pada mencit putih jantan **11**: 9.
- Eshrat, M.H., 2003. Effect of *Coccinia indica* (L.) and *Abroma augusta* (L.) on glycemia, lipid profile and on indicators of end-organ damage in streptozotocin induced diabetic rats. *Indian Journal of Clinical Biochemistry*, **18**: 45–63.
- Fakhruddin, S., Alanazi, W., dan Jackson, K.E., 2017. Diabetes-induced reactive oxygen species: mechanism of their generation and role in renal injury. *Journal of Diabetes Research*, **2017**: 1–30.
- Fan, J., Johnson, M.H., Lila, M.A., Yousef, G., dan de Mejia, E.G., 2013. Berry and citrus phenolic compounds inhibit dipeptidyl peptidase iv: Implications in diabetes management. *Evidence-Based Complementary and Alternative Medicine*, **2013**: 1–13.
- Farooq, S. dan Sehgal, A., 2019. Synergistic antioxidant interactions between green tea and *Ocimum gratissimum*. *Asian Pacific Journal of Tropical Biomedicine*, **9**: 333–338.



- Fazakerley, D.J., Krycer, J.R., Kearney, A.L., Hocking, S.L., dan James, D.E., 2019. Muscle and adipose tissue insulin resistance: malady without mechanism? *Journal of Lipid Research*, **60**: 1720–1732.
- Fettach, S., Mrabti, H.N., Sayah, K., Bouyahya, A., Salhi, N., Cherrah, Y., et al., 2019. Phenolic content, acute toxicity of *Ajuga iva* extracts and assessment of their antioxidant and carbohydrate digestive enzyme inhibitory effects. *South African Journal of Botany*, **125**: 381–385.
- Foucquier, J. dan Guedj, M., 2015. Analysis of drug combinations: current methodological landscape. *Pharmacology Research & Perspectives*, **3**: e00149.
- Fujii, J., Homma, T., dan Osaki, T., 2022. Superoxide radicals in the execution of cell death. *Antioxidants*, **11**: 501.
- Furman, B.L., 2021. Streptozotocin-induced diabetic models in mice and rats. *Current Protocols*, **1**: 1–21.
- Galicia-Garcia, U., Benito-Vicente, A., Jebari, S., Larrea-Sebal, A., Siddiqi, H., Uribe, K.B., et al., 2020. Pathophysiology of type 2 diabetes mellitus. *International Journal of Molecular Sciences*, **21**: 6275.
- Ghorbani, A., Rashidi, R., dan Shafiee-Nick, R., 2019. Flavonoids for preserving pancreatic beta cell survival and function: A mechanistic review. *Biomedicine & Pharmacotherapy*, **111**: 947–957.
- Guo, L., Chen, Z., Amarnath, V., dan Davies, S.S., 2012. Identification of novel bioactive aldehyde-modified phosphatidylethanolamines formed by lipid peroxidation. *Free Radical Biology & Medicine*, **53**: 1226–1238.
- Guo, X., Wang, Y., Wang, K., Ji, B., dan Zhou, F., 2018. Stability of a type 2 diabetes rat model induced by high-fat diet feeding with low-dose streptozotocin injection. *Journal of Zhejiang University. Science. B*, **19**: 559–569.
- Gupta, D., 2015. Methods for determination of antioxidant capacity: A review. *International Journal of Pharmaceutical Sciences and Research*, **6**: 546–566.
- Gupta, R.C., Chang, D., Nammi, S., Bensoussan, A., Bilinski, K., dan Roufogalis, B.D., 2017. Interactions between antidiabetic drugs and herbs: an overview of mechanisms of action and clinical implications. *Diabetology & Metabolic Syndrome*, **9**: 59.
- Haida, Z. dan Hakiman, M., 2019. A comprehensive review on the determination of enzymatic assay and nonenzymatic antioxidant activities. *Food Science & Nutrition*, **7**: 1555–1563.
- Hatting, M., Tavares, C.D.J., Sharabi, K., Rines, A.K., dan Puigserver, P., 2018. Insulin regulation of gluconeogenesis. *Annals of the New York Academy of Sciences*, **1411**: 21–35.
- Heit, C., Marshall, S., Singh, S., Yu, X., Charkoftaki, G., Zhao, H., et al., 2017. Catalase deletion promotes prediabetic phenotype in mice. *Free radical biology & medicine*, **103**: 48–56.
- Hossain, Sk.A., Uddin, Sr.N., Salim, Md.A., dan Haque, R., 2014. Phytochemical and pharmacological screening of *Coccinia grandis* Linn. *Journal of Scientific and Innovative Research*, **3**: 65–71.



- Huang, P.-K., Lin, S.-R., Chang, C.-H., Tsai, M.-J., Lee, D.-N., dan Weng, C.-F., 2019. Natural phenolic compounds potentiate hypoglycemia via inhibition of Dipeptidyl peptidase IV. *Scientific Reports*, **9**: 15585.
- Huang, Y.L., Zhao, Z.G., dan Wen, Y.X., 2006. Determination of total flavonoid in different sections of *Blumea balsamifera*. *Guiaia*, **26**: 453–455.
- Hulett, N.A., Scalzo, R.L., dan Reusch, J.E.B., 2022. Glucose uptake by skeletal muscle within the contexts of type 2 diabetes and exercise: An integrated approach. *Nutrients*, **14**: 647.
- International Diabetes Federation, 2021. *IDF Diabetes Atlas*, 10th ed. International Diabetes Federation, Brussels, Belgium.
- Islam, M.S., Parvin, S., Uddin, M.N., dan Mazid, M.A., 2015. Antidiabetic and Antioxidant Activities of Decoctions of *Coccinia grandis* Linn. and *Centella asiatica* (L.) on Alloxan-induced Diabetic rats. *Bangladesh Pharmaceutical Journal*, **17**: 86–91.
- Ismail, Z., Ismail, N., dan Jaafar, L., 1999. *Malaysian Herbal Monograph*. Malaysian Monograph Committee, Kuala Lumpur.
- Jaiboon, V., Boonyanupaphap, J., Suwansri, S., Ratanatratiwong, P., dan Hansawasdi, C., 2010. Alpha amylase inhibition and roasting time of local vegetables and herbs prepared for diabetes risk reduction chili paste. *Asian Journal of Food and Agro-Industry*, **3**: 1–12.
- Jamwal, A. dan Kumar, S., 2016. Screening of antidiabetic activity and toxicity studies of *Cephalandra indica* Naud. *International Journal of Toxicological and Pharmacological Research*, **8**: 256–260.
- Katsarou, A., Gudbjörnsdóttir, S., Rawshani, A., Dabelea, D., Bonifacio, E., Anderson, B.J., et al., 2017. Type 1 diabetes mellitus. *Nature Reviews Disease Primers*, **3**: 1–17.
- Keharom, S., Mahachai, R., dan Chanthai, S., 2016. The optimization study of α -amylase activity based on central composite design-response surface methodology by dinitrosalicylic acid method. *International Food Research Journal*, **23**: 10–17.
- Keshari, A.K., Kumar, G., Kushwaha, P.S., Bhardwaj, M., Kumar, P., Rawat, A., et al., 2016. Isolated flavonoids from *Ficus racemosa* stem bark possess antidiabetic, hypolipidemic and protective effects in albino Wistar rats. *Journal of Ethnopharmacology*, **181**: 252–262.
- Kewcharoenwong, C., Rinchai, D., Utispan, K., Suwannasaen, D., Bancroft, G.J., Ato, M., et al., 2013. Glibenclamide reduces pro-inflammatory cytokine production by neutrophils of diabetes patients in response to bacterial infection. *Scientific Reports*, **3**: 3363.
- Khan, R.A., Khan, M.R., Sahreen, S., dan Ahmed, M., 2012. Assessment of flavonoids contents and in vitro antioxidant activity of *Launaea procumbens*. *Chemistry Central Journal*, **6**: 1–11.
- Kharroubi, A.T. dan Darwish, H.M., 2015. Diabetes mellitus: The epidemic of the century. *World Journal of Diabetes*, **6**: 850–867.
- Khatun, S., Pervin, F., Karim, M.R., Ashraduzzaman, M., dan Rosma, A., 2012. Phytochemical screening and antimicrobial activity of *Coccinia cordifolia* L. plant. *Pakistan Journal of Pharmaceutical Sciences*, **25**: 757–761.



- Kim, K.-H., Lee, I.-S., Park, J.Y., Kim, Y., An, E.-J., dan Jang, H.-J., 2018. Cucurbitacin B induces hypoglycemic effect in diabetic mice by regulation of AMP-activated protein kinase alpha and glucagon-like peptide-1 via bitter taste receptor signaling. *Frontiers in Pharmacology*, **9**: .
- Kittl, M., Beyreis, M., Tumurkhuu, M., Fürst, J., Helm, K., Pitschmann, A., et al., 2016. Quercetin stimulates insulin secretion and reduces the viability of rat INS-1 beta-cells. *Cellular Physiology and Biochemistry*, **39**: 278–293.
- Kohli, S. dan Kumar, P.N., 2014. Combined effect of *Coccinia indica* leaf extract with acarbose in type II diabetes induced neuropathy in rats. *Journal of Innovations in Pharmaceuticals and Biological Sciences*, **1**: 77–87.
- Kondhare, D. dan Lade, H., 2017. Phytochemical profile, aldose reductase inhibitory, and antioxidant activities of Indian traditional medicinal *Coccinia grandis* (L.) fruit extract. *3 Biotech*, **7**: 378–388.
- Krishnasamy, G., Muthusamy, K., Chellappan, D.R., dan Subbiah, N., 2016. Antidiabetic, antihyperlipidaemic, and antioxidant activity of *Syzygium densiflorum* fruits in streptozotocin and nicotinamide-induced diabetic rats. *Pharmaceutical Biology*, **54**: 1716–1726.
- Kumar, M., Alok, S., Chanchal, D.K., Bijauliya, R.K., Yadav, R.D., dan Sabharwal, M., 2018. An updated pharmacological activity of *Coccinia indica* (wight & Arn.). *International Journal of Pharmaceutical Sciences and Research*, **9**: 456–465.
- Kunle, O.F., Egharevba, H.O., dan Ahmadu, P.O., 2012. Standardization of herbal medicines - A review. *International Journal of Biodiversity and Conservation*, **4**: 101–112.
- Lawal, N., Akuyam, S.A., dan Ahmad, M.B., 2022. Relationship between serum Malondialdehyde (MDA) levels and cardiovascular risk factors in diabetic patients in Zaria, Kaduna State, Nigeria. *Bayero Journal of Medical Laboratory Science*, **7**: 41–50.
- Lee, K.J., Oh, Y.C., Cho, W.K., dan Ma, J.Y., 2015. Antioxidant and anti-inflammatory activity determination of one hundred kinds of pure chemical compounds using offline and online screening HPLC assay. *Evidence-Based Complementary and Alternative Medicine*, **2015**: 1–13.
- Li, D., Yang, Y., Sun, L., Fang, Z., Chen, L., Zhao, P., et al., 2020. Effect of young apple (*Malus domestica* Borkh. cv. Red Fuji) polyphenols on alleviating insulin resistance. *Food Bioscience*, **36**: 100637.
- Li, H., Park, H.-M., Ji, H.-S., Han, J., Kim, S.-K., Park, H.-Y., et al., 2020. Phenolic-enriched blueberry-leaf extract attenuates glucose homeostasis, pancreatic β-cell function, and insulin sensitivity in high-fat diet-induced diabetic mice. *Nutrition Research*, **73**: 83–96.
- Li, J.-M., Wang, W., Fan, C.-Y., Wang, M.-X., Zhang, X., Hu, Q.-H., et al., 2013. Quercetin preserves β-cell mass and function in fructose-induced hyperinsulinemia through modulating pancreatic Akt/FoxO1 activation. *Evidence-Based Complementary and Alternative Medicine*, **2013**: 1–12.
- Li, M., Chi, X., Wang, Y., Setrerrahmane, S., Xie, W., dan Xu, H., 2022. Trends in insulin resistance: insights into mechanisms and therapeutic strategy. *Signal Transduction and Targeted Therapy*, **7**: 1–25.



- Li, S., Han, Q., Qiao, C., Song, J., Lung Cheng, C., dan Xu, H., 2008. Chemical markers for the quality control of herbal medicines: an overview. *Chinese Medicine*, **3**: 7.
- Luo, G., Xiao, L., Wang, D., Wang, N., Luo, C., Yang, X., et al., 2020. Resveratrol protects against ethanol-induced impairment of insulin secretion in INS-1 cells through SIRT1-UCP2 axis. *Toxicology in Vitro*, **65**: 104808.
- Mahendra, V.P., Haware, D.J., dan Kumar, R., 2019. cAMP-PKA dependent ERK1/2 activation is necessary for vanillic acid potentiated glucose-stimulated insulin secretion in pancreatic β -cells. *Journal of Functional Foods*, **56**: 110–118.
- Mahmoodnia, L., Aghadavod, E., Beigrezaei, S., dan Rafieian-Kopaei, M., 2017. An update on diabetic kidney disease, oxidative stress and antioxidant agents. *Journal of Renal Injury Prevention*, **6**: 153–157.
- Manjula, S. dan Ragavan, B., 2007. Hypoglycemic and hypolipidemic effect of *Coccinia indica* Wight & Arn in alloxan induced diabetic rats. *Ancient Science of Life*, **27**: 34–37.
- Martemucci, G., Costagliola, C., Mariano, M., D'andrea, L., Napolitano, P., dan D'Alessandro, A.G., 2022. Free radical properties, source and targets, antioxidant consumption and health. *Oxygen*, **2**: 48–78.
- Masaenah, E., Elya, B., Setiawan, H., Fadhilah, Z., Wediasari, F., Nugroho, G.A., et al., 2021. Antidiabetic activity and acute toxicity of combined extract of *Andrographis paniculata*, *Syzygium cumini*, and *Caesalpinia sappan*. *Helijon*, **7**: e08561.
- Masyudi, M., Hanafiah, M., Rinidar, R., Usman, S., dan Marlina, M., 2022. Phytochemical screening and GC-MS analysis of bioactive compounds of *Blumea balsamifera* leaf extracts from South Aceh, Indonesia. *Biodiversitas Journal of Biological Diversity*, **23**:
- Matough, F.A., Budin, S.B., Hamid, Z.A., dan Alwahaibi, N., 2012. The role of oxidative stress and antioxidants in diabetic complications. *Sultan Qaboos University medical journal*, **12**: 5–18.
- Matsabisa, M.G., Chukwuma, C.I., Chaudhary, S.K., Kumar, C.S., Baleni, R., Javu, M., et al., 2020. *Dicoma anomala* (Sond.) abates glycation and DPP-IV activity and modulates glucose utilization in Chang liver cells and 3T3-L1 adipocytes. *South African Journal of Botany*, **128**: 182–188.
- McClelland, A.D., Herman-Edelstein, M., Komers, R., Jha, J.C., Winbanks, C.E., Hagiwara, S., et al., 2015. miR-21 promotes renal fibrosis in diabetic nephropathy by targeting PTEN and SMAD7. *Clinical Science*, **129**: 1237–1249.
- Meenatchi, P., Purushothaman, A., dan Maneemagalai, S., 2017. Antioxidant, antiglycation and insulinotropic properties of *Coccinia grandis* (L.) in vitro: Possible role in prevention of diabetic complications. *Journal of Traditional and Complementary Medicine*, **7**: 54–64.
- Miao, M., Jiang, B., Jiang, H., Zhang, T., dan Li, X., 2015. Interaction mechanism between green tea extract and human α -amylase for reducing starch digestion. *Food Chemistry*, **186**: 20–25.



- Mihailović, M., Dinić, S., Arambašić Jovanović, J., Uskoković, A., Grdović, N., dan Vidaković, M., 2021. The influence of plant extracts and phytoconstituents on antioxidant enzymes activity and gene expression in the prevention and treatment of impaired glucose homeostasis and diabetes complications. *Antioxidants*, **10**: 480–505.
- Modak, M., Dixit, P., Londhe, J., Ghaskadbi, S., dan Devasagayam, T.P.A., 2007. Indian herbs and herbal drugs used for the treatment of diabetes. *Journal of Clinical Biochemistry and Nutrition*, **40**: 163–173.
- Mohammed, S.I., Chopda, M.Z., Patil, R.H., Vishwakarma, K.S., dan Maheshwari, V.L., 2016. In vivo antidiabetic and antioxidant activities of *Coccinia grandis* leaf extract against streptozotocin induced diabetes in experimental rats. *Asian Pacific Journal of Tropical Disease*, **6**: 298–304.
- Mohan, R., Jo, S., Da Sol Chung, E., Oribamise, E., Lockridge, A., Abrahante-Lloréns, J.E., et al., 2021. Pancreatic β -cell O-GlcNAc transferase overexpression increases susceptibility to metabolic stressors in female mice. *Cells*, **10**: 2801.
- Monalisa, M.N., Al-Nahain, A., dan Rahmatullah, M., 2014. *Coccinia grandis*: A plant with multiple ethnomedicinal uses. *World Journal of Pharmacy and Pharmaceutical Sciences*, **3**: 1382–1394.
- Moukette, B.M., Ama Moor, V.J., Biapa Nya, C.P., Nanfack, P., Nzufu, F.T., Kenfack, M.A., et al., 2017. Antioxidant and synergistic antidiabetic activities of a three-plant preparation used in Cameroon folk medicine. *International Scholarly Research Notices*, **2017**: 1–7.
- Mukherjee, P.K., Singha, S., Kar, A., Chanda, J., Banerjee, S., Dasgupta, B., et al., 2022. Therapeutic importance of Cucurbitaceae: A medicinally important family. *Journal of Ethnopharmacology*, **282**: 114599.
- Mukhopadhyay, P. dan Prajapati, A.K., 2015. Quercetin in anti-diabetic research and strategies for improved quercetin bioavailability using polymer-based carriers – a review. *RSC Advances*, **5**: 97547–97562.
- Nahdi, A.M.T.A., John, A., dan Raza, H., 2017. Elucidation of molecular mechanisms of streptozotocin-induced oxidative stress, apoptosis, and mitochondrial dysfunction in Rin-5F pancreatic β -cells. *Oxidative Medicine and Cellular Longevity*, **2017**: e7054272.
- Namchaiw, P., Jaisin, Y., Niwaspragrit, C., Malaniyom, K., Auvuchanon, A., dan Ratanachamnong, P., 2021. The leaf extract of *Coccinia grandis* (L.) Voigt accelerated in vitro wound healing by reducing oxidative stress injury. *Oxidative Medicine and Cellular Longevity*, **2021**: 1–10.
- Nandi, A., Yan, L.-J., Jana, C.K., dan Das, N., 2019. Role of catalase in oxidative stress- and age-associated degenerative diseases. *Oxidative Medicine and Cellular Longevity*, **2019**: 9613090.
- Nelson, R.W., 2015. Chapter 6 - Canine Diabetes Mellitus, dalam: Feldman, E.C., Nelson, R.W., Reusch, C.E., dan Scott-Moncrieff, J.C.R. (Editor), *Canine and Feline Endocrinology (Fourth Edition)*. W.B. Saunders, St. Louis, hal. 213–257.
- Nurrochmad, A., Wirasti, W., Dirman, A., Lukitaningsih, E., Rahmawati, A., dan Fakhrudin, N., 2018. Effects of antioxidant, anti-collagenase, anti-elastase,



- anti-tyrosinase of the extract and fraction from *Turbinaria decurrens* Bory. *Indonesian Journal of Pharmacy*, **29**: 188–197.
- Obafemi, T.O., Olaleye, M.T., dan Akinnmoladun, A.C., 2019. Antidiabetic property of miracle fruit plant (*Synsepalum dulcificum* Shumach. & Thonn. Daniell) leaf extracts in fructose-fed streptozotocin-injected rats via anti-inflammatory activity and inhibition of carbohydrate metabolizing enzymes. *Journal of Ethnopharmacology*, **244**: 112124.
- Olszowy-Tomczyk, M., 2020. Synergistic, antagonistic and additive antioxidant effects in the binary mixtures. *Phytochemistry Reviews*, **19**: 63–103.
- Panda, S.P., Sarangi, A.K., dan Panigrahy, U.P., 2018. Isolation of cucurbitacin-B from *Cucumis callosus* and its hypoglycemic effect in isolated rat enterocytes. *International Journal of Pharmacy and Pharmaceutical Sciences*, **10**: 123–129.
- Pang, Y., Wang, D., Fan, Z., Chen, X., Yu, F., Hu, X., et al., 2014. *Blumea balsamifera*—A Phytochemical and Pharmacological Review. *Molecules*, **19**: 9453–9477.
- Papa, F.R., 2012. Endoplasmic reticulum stress, pancreatic β-cell degeneration, and diabetes. *Cold Spring Harbor Perspectives in Medicine*, **2**: a007666.
- Patra, J.C. dan Chua, B.H., 2011. Artificial neural network-based drug design for diabetes mellitus using flavonoids. *Journal of Computational Chemistry*, **32**: 555–567.
- Pekamwar, S.S., Kalyankar, T.M., dan Kokate, S.S., 2013. Pharmacological activities of *Coccinia grandis*: Review. *Journal of Applied Pharmaceutical Science*, **3**: 114–119.
- Perumal, N., Nallappan, M., Shohaimi, S., Kassim, N.K., Tee, T.T., dan Cheah, Y.H., 2021. Synergistic antidiabetic activity of *Taraxacum officinale* (L.) Weber ex F.H.Wigg and *Momordica charantia* L. polyherbal combination. *Biomedicine & pharmacotherapy = Biomedecine & pharmacotherapie*, **145**: 112401.
- Peyrat-Maillard, M.N., Cuvelier, M.E., dan Berset, C., 2003. Antioxidant activity of phenolic compounds in 2,2'-azobis (2-amidinopropane) dihydrochloride (AAPH)-induced oxidation: Synergistic and antagonistic effects. *Journal of the American Oil Chemists' Society*, **80**: 1007–1012.
- Phaniendra, A., Jestadi, D.B., dan Periyasamy, L., 2015. Free Radicals: Properties, Sources, Targets, and Their Implication in Various Diseases. *Indian Journal of Clinical Biochemistry*, **30**: 11–26.
- Pizzino, G., Irrera, N., Cucinotta, M., Pallio, G., Mannino, F., Arcoraci, V., et al., 2017. Oxidative stress: Harms and benefits for human health. *Oxidative Medicine and Cellular Longevity*, **2017**: 1–13.
- Platzer, M., Kiese, S., Tybussek, T., Herfellner, T., Schneider, F., Schweiggert-Weisz, U., et al., 2022. Radical scavenging mechanisms of phenolic compounds: A quantitative structure-property relationship (QSPR) study. *Frontiers in Nutrition*, **9**: 1–12.
- Pottathil, S., Nain, P., Morsy, M.A., Kaur, J., Al-Dhubiab, B.E., Jaiswal, S., et al., 2020. Mechanisms of antidiabetic activity of methanolic extract of *punica*



- granatum leaves in nicotinamide/streptozotocin-induced type 2 diabetes in rats. *Plants*, **9**: 1609.
- Prasath, G.S., Sundaram, C.S., dan Subramanian, S.P., 2013. Fisetin averts oxidative stress in pancreatic tissues of streptozotocin-induced diabetic rats. *Endocrine*, **44**: 359–368.
- Pratoomsoot, C., Wongkattiya, N., dan Sanguansermsri, D., 2020. Synergistic antimicrobial and antioxidant properties of *Coccinia grandis* (L.) Voigt, *Clerodendrum inerme* (L.) Gaertn. and *Acanthus ebracteatus* Vahl. extracts and their potential as a treatment for xerosis cutis. *Complementary Medicine Research*, **27**: 410–420.
- Pulbutr, P., Saweeram, N., Ittisan, T., Intrama, H., Jaruchotik, A., dan Cushnie, B., 2017. In vitro α -amylase and α -glucosidase Inhibitory Activities of *Coccinia grandis* Aqueous Leaf and Stem Extracts. *Journal of Biological Sciences*, **17**: 61–68.
- Putra, I.M.W.A., Fakhrudin, N., Kusumawati, I.G.A.W., Nurrochmad, A., dan Wahyuono, S., 2022a. Antioxidant properties of extract combination of *Coccinia grandis* and *Blumea balsamifera*: An in vitro synergistic effect. *Journal of Herbmed Pharmacology*, **11**: 55–62.
- Putra, I.M.W.A., Fakhrudin, N., Nurrochmad, A., dan Wahyuono, S., 2022b. Antidiabetic activity of *Coccinia grandis* (L.) Voigt: Bioactive constituents, mechanisms of action, and synergistic effects. *Journal of Applied Pharmaceutical Science*, **12**: 041–054.
- Rahimifard, M., Baeeri, M., Bahadar, H., Moini-Nodeh, S., Khalid, M., Hagh-Aminjan, H., et al., 2020. Therapeutic effects of gallic acid in regulating senescence and diabetes; An in vitro study. *Molecules*, **25**: 5875.
- Rambiritch, V., Maharaj, B., dan Naidoo, P., 2014. Glibenclamide in patients with poorly controlled type 2 diabetes: a 12-week, prospective, single-center, open-label, dose-escalation study. *Clinical Pharmacology: Advances and Applications*, **6**: 63–69.
- Randhawa, K., Kumar, D., Jamwal, A., dan Kumar, S., 2015. Screening of antidepressant activity and estimation of quercetin from *Coccinia indica* using TLC densitometry. *Pharmaceutical Biology*, **53**: 1867–1874.
- Rani, R., Dahiya, S., Dhingra, D., Dilbaghi, N., Kaushik, A., Kim, K.-H., et al., 2019. Antidiabetic activity enhancement in streptozotocin + nicotinamide-induced diabetic rats through combinational polymeric nanoformulation. *International Journal of Nanomedicine*, **14**: 4383–4395.
- Rascón-Careaga, A., Corella-Madueño, M.A.G., Pérez-Martínez, C.J., García-Rojas, A.M., Souflé-Vásquez, S.Z., García-Moroyoqui, M.T., et al., 2021. Validation and estimation of uncertainty for a glucose determination method GOD-PAP using a multi-calibrator as reference. *MAPAN*, **36**: 269–278.
- Rasoanaivo, P., Wright, C.W., Willcox, M.L., dan Gilbert, B., 2011. Whole plant extracts versus single compounds for the treatment of malaria: synergy and positive interactions. *Malaria Journal*, **10**: 1–12.
- Rifaai, R.A., El-Tahawy, N.F., dan Ali Saber, E., 2012. Effect of quercetin on the endocrine pancreas of the experimentally induced diabetes in male albino



rats: A histological and immunohistochemical study. *Journal of Diabetes & Metabolism*, **3**: 1–11.

- Rodrigues, M.J., Oliveira, M., Neves, V., Ovelheiro, A., Pereira, C.A., Neng, N.R., et al., 2019. Coupling sea lavender (*Limonium algarvense* Erben) and green tea (*Camellia sinensis* (L.) Kuntze) to produce an innovative herbal beverage with enhanced enzymatic inhibitory properties. *South African Journal of Botany*, **120**: 87–94.
- Roell, K.R., Reif, D.M., dan Motsinger-Reif, A.A., 2017. An introduction to terminology and methodology of chemical synergy—Perspectives from across disciplines. *Frontiers in Pharmacology*, **8**: 158.
- Roep, B.O., Thomaidou, S., van Tienhoven, R., dan Zaldumbide, A., 2021. Type 1 diabetes mellitus as a disease of the β -cell (do not blame the immune system?). *Nature Reviews Endocrinology*, **17**: 150–161.
- Roheem, F.O., Ahmed, Q.U., Mat So'ad, S.Z., Shah, S.A.A., Latip, J., Alhassan, A.M., et al., 2020. Assessment of free radical scavenging and digestive enzyme inhibitory activities of extract, fractions and isolated compounds from *Tetracera macrophylla* leaves. *Journal of Herbal Medicine*, **22**: 100351.
- Rouse, M., Younès, A., dan Egan, J.M., 2014. Resveratrol and curcumin enhance pancreatic β -cell function by inhibiting phosphodiesterase activity. *Journal of Endocrinology*, **223**: 107–117.
- Roy, K., Saha, S., Biswas, S., Ahmed, W., dan Mariappan, G., 2013. In vivo assessment of antidiabetic and antioxidant activities of *Blumea balsamifera* in streptozotocin-diabetic rats. *Research Journal of Medicinal Plants*, **7**: 48–57.
- Roy, S., Pawar, S., dan Chowdhary, A., 2016. Evaluation of in vitro cytotoxic and antioxidant activity of *Datura metel* Linn. and *Cynodon dactylon* Linn. extracts. *Pharmacognosy Research*, **8**: 123–127.
- Saisho, Y., 2015. β -cell dysfunction: Its critical role in prevention and management of type 2 diabetes. *World Journal of Diabetes*, **6**: 109–124.
- Saji, N., Francis, N., Schwarz, L.J., Blanchard, C.L., dan Santhakumar, A.B., 2020. Rice bran phenolic extracts modulate insulin secretion and gene expression associated with β -cell function. *Nutrients*, **12**: 1889.
- Saklani, A., Parcha, V., Dhulia, I., dan Kumar, D., 2012. Combined effect of *Coccinia indica* (wight & am) and *Salvadora oleoides* (decne) on blood glucose level and other risk factors associated with type 2 diabetes mellitus in alloxan induced diabetic rats. *International Journal of Pharmacy and Pharmaceutical Sciences*, **4**: 79–84.
- Samsu, N., 2021. Diabetic nephropathy: challenges in pathogenesis, diagnosis, and treatment. *BioMed Research International*, **2021**: 1–17.
- Sancho, R.A.S. dan Pastore, G.M., 2012. Evaluation of the effects of anthocyanins in type 2 diabetes. *Food Research International*, **46**: 378–386.
- Sari, M., Ulfa, R.N., Marpaung, M.P., dan Purnama, 2021. Penentuan Aktivitas Antioksidan dan Kandungan Flavonoid Total Ekstrak Daun Papasan (*Coccinia grandis* L.) Berdasarkan Perbedaan Pelarut Polar : KOVALEN: *Jurnal Riset Kimia*, **7**: 30–41.



- Sari, N.M., Aryani, F., Wartomo, W., Hernandi, M.F., Rositah, E., dan Prayitno, J., 2023. Phytochemical and Antioxidant Activity of *Blumea balsamifera* and *Cordyline fruticosa* Based on Ethnopharmacology Knowledge of Muara Tae Tribe, East Kalimantan. *Biology, Medicine, & Natural Product Chemistry*, **12**: 273–280.
- Saxton, R.A. dan Sabatini, D.M., 2017. mTOR signaling in growth, metabolism, and disease. *Cell*, **168**: 960–976.
- Sayeli, V.K. dan Shenoy, A.K., 2021. Antidiabetic effect of bio-enhanced preparation of turmeric in streptozotocin-nicotinamide induced type 2 diabetic Wistar rats. *Journal of Ayurveda and integrative medicine*, **12**: 474–479.
- Sekar, V., Mani, S., Malarvizhi, R., Nithya, P., dan Vasanthi, H.R., 2019. Antidiabetic effect of mangiferin in combination with oral hypoglycemic agents metformin and gliclazide. *Phytomedicine*, **59**: 152901.
- Sekhon-Loodu, S. dan Rupasinghe, H.P.V., 2019. Evaluation of antioxidant, antidiabetic and antiobesity potential of selected traditional medicinal plants. *Frontiers in Nutrition*, **6**: 1–11.
- Sharifi-Rad, M., Anil Kumar, N.V., Zucca, P., Varoni, E.M., Dini, L., Panzarini, E., et al., 2020. Lifestyle, oxidative stress, and antioxidants: Back and forth in the pathophysiology of chronic diseases. *Frontiers in Physiology*, **11**: .
- Sharma, A.K., Kanawat, D.S., Mishra, A., Dhakad, P.K., Sharma, P., Srivastava, V., et al., 2014. Dual therapy of vildagliptin and telmisartan on diabetic nephropathy in experimentally induced type 2 diabetes mellitus rats. *Journal of the Renin-Angiotensin-Aldosterone System*, **15**: 410–418.
- Sharma, M., Gupta, S., Singh, K., Mehndiratta, M., Gautam, A., Kalra, O.P., et al., 2016. Association of glutathione-S-transferase with patients of type 2 diabetes mellitus with and without nephropathy. *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, **10**: 194–197.
- Shibib, B.A., Khan, L.A., dan Rahman, R., 1993. Hypoglycaemic activity of *Coccinia indica* and *Momordica charantia* in diabetic rats: depression of the hepatic gluconeogenic enzymes glucose-6-phosphatase and fructose-1,6-bisphosphatase and elevation of both liver and red-cell shunt enzyme glucose-6-phosphate dehydrogenase. *Biochemical Journal*, **292**: 267–270.
- Singh, V.K. dan Seed, T.M., 2021. How necessary are animal models for modern drug discovery? *Expert Opinion on Drug Discovery*, **16**: 1391–1397.
- Sinha, S. dan Haque, M., 2022. Insulin resistance and type 2 diabetes mellitus: An ultimatum to renal physiology. *Cureus*, **14**: e28944.
- Sonam, K.S. dan Guleria, S., 2017. Synergistic antioxidant activity of natural products. *Annals of Pharmacology and Pharmaceutics*, **2**: 1–6.
- Souza, S.P. de, Pereira, L.L.S., Souza, A.A., dan Santos, C.D. dos, 2011. Inhibition of pancreatic lipase by extracts of *Baccharis trimera* (Less.) DC., Asteraceae: evaluation of antinutrients and effect on glycosidases. *Revista Brasileira de Farmacognosia*, **21**: 450–455.
- Spínola, V., Llorent-Martínez, E.J., dan Castilho, P.C., 2020. Inhibition of α -amylase, α -glucosidase and pancreatic lipase by phenolic compounds of *Rumex maderensis* (Madeira sorrel). Influence of simulated gastrointestinal



- digestion on hyperglycaemia-related damage linked with aldose reductase activity and protein glycation. *LWT*, **118**: 108727.
- Sunarti dan Pramukantoro, G.E., 2017. Activity test of ethanolic extract from sembung's root (*Blumea balsamifera* [L]/DC) on increasing appetite of wistar female mice. *Asian Journal of Pharmaceutical and Clinical Research*, 116–118.
- Syukri, Y., Purwati, R., Hazami, N., Anshory Tahmid, H., dan Fitria, A., 2020. Standardization of specific and non-specific parameters of propolis extract as raw material for herbal product. *EKSAKTA: Journal of Sciences and Data Analysis*, 36–43.
- Szkudelski, T., 2012. Streptozotocin–nicotinamide-induced diabetes in the rat. Characteristics of the experimental model. *Experimental Biology and Medicine*, **237**: 481–490.
- Tambunan, A.P., Bahtiar, A., dan Tjandrawinata, R.R., 2017. Influence of extraction parameters on the yield, phytochemical, TLC-densitometric quantification of quercetin, and LC-MS profile, and how to standardize different batches for long term from *Ageratum conyoides* L. Leaves. *Pharmacognosy Journal*, **9**: 767–774.
- Tan, Y. dan Chang, S.K.C., 2017. Digestive enzyme inhibition activity of the phenolic substances in selected fruits, vegetables and tea as compared to black legumes. *Journal of Functional Foods*, **38**: 644–655.
- Tavadyan, L.A. dan Minasyan, S.H., 2019. Synergistic and antagonistic co-antioxidant effects of flavonoids with trolox or ascorbic acid in a binary mixture. *Journal of Chemical Sciences*, **131**: 1–10.
- Thach, B.D., Dao, V.Q., Giang, T.T.L., Cang, D.T., Linh, L.N.T., Ben, T., et al., 2017. Antioxidant and antityrosinase activities of flavonoid from *Blumea balsamifera* (L.) DC. leaves extract. *European Journal of Research in Medical Sciences*, **5**: 1–6.
- Thongphichai, W., Uttarawichien, T., Chanvorachote, P., Pitiporn, S., Charoename, T., Kwankhao, P., et al., 2022. Standardization of the ethanolic extract of *Crinum latifolium* leaves by two bioactive markers with antiproliferative activity against TGF-β-promoted prostate stromal cells (WPMY-1). *BMC Complementary Medicine and Therapies*, **22**: 139.
- Tungmannithum, D., Thongboonyou, A., Pholboon, A., dan Yangsabai, A., 2018. Flavonoids and other phenolic compounds from medicinal plants for pharmaceutical and medical aspects: An overview. *Medicines*, **5**: 1–16.
- Ullah, A., Khan, A., dan Khan, I., 2016. Diabetes mellitus and oxidative stress—A concise review. *Saudi Pharmaceutical Journal*, **24**: 547–553.
- Upadhyay, J., Polyzos, S.A., Perakakis, N., Thakkar, B., Paschou, S.A., Katsiki, N., et al., 2018. Pharmacotherapy of Type 2 Diabetes: An Update. *Metabolism Clinical and Experimental*, **78**: 13–42.
- Utami, Y.P., Taebi, B., dan Fatmawati, 2016. Standardisasi parameter spesifik dan non spesifik ekstrak etanol daun murbei (*Morus alba* L.) asal Kabupaten Soppeng Provinsi Sulawesi Selatan. *Journal of Pharmaceutical and Medicinal Sciences*, **1**: 48–52.



- Utami, Y.P., Umar, A.H., Syahruni, R., dan Kadullah, I., 2017. Standardisasi simplisia dan ekstrak etanol daun leilem (*Clerodendrum minahassae* Teisjm. & Binn.). *Journal of Pharmaceutical and Medicinal Sciences*, **2**: 32–39.
- Venkateswaran, S. dan Pari, L., 2002. Effect of *Coccinia indica* on blood glucose, insulin and key hepatic enzymes in experimental diabetes. *Pharmaceutical Biology*, **40**: 165–170.
- Vijayalakshmi, G., Adinarayana, M., dan Rao, P.J., 2014. A synergistic approach to kinetic and mechanistic studies of regeneration of β-carotene from tert-butoxyl radical induced β-carotene radical cation by chlorogenic acid. *International journal of pharmaceutical sciences and research*, **5**: 942–950.
- Wahjuni, S., Hafsa, N., dan Bogoriani, N.W., 2020. Uji antihiperglikemia ekstrak etanol daun sembung (*Blumea balsamifera* L.) terhadap tikus wistar jantan (*Rattus norvegicus*). *Intisari Sains Medis*, **11**: 582–589.
- Waisundara, V.Y., Watawana, M.I., dan Jayawardena, N., 2015. Costus speciosus and *Coccinia grandis* : Traditional medicinal remedies for diabetes. *South African Journal of Botany*, **98**: 1–5.
- Wang, S. dan Zhu, F., 2017. Dietary antioxidant synergy in chemical and biological systems. *Critical Reviews in Food Science and Nutrition*, **57**: 2343–2357.
- Wang, Y., Branicky, R., Noë, A., dan Hekimi, S., 2018. Superoxide dismutases: Dual roles in controlling ROS damage and regulating ROS signaling. *The Journal of Cell Biology*, **217**: 1915–1928.
- Weir, G.C., Gaglia, J., dan Joslin, S.B.-W., 2020. Inadequate β-cell mass is essential for the pathogenesis of type 2 diabetes. *The lancet. Diabetes & endocrinology*, **8**: 249–256.
- WHO, 2011. *Quality Control Methods for Herbal Materials*, Updated edition of Quality control methods for medicinal plant materials, 1998. ed. World Health Organization, Geneva.
- Widhiantara, I.G., Permatasari, A.A.A.P., Rosiana, I.W., Wiradana, P.A., Widiaستینی, L.P., dan Jawi, I.M., 2021. Antihypercholesterolemic and antioxidant effects of *Blumea balsamifera* L. leaf Extracts to maintain luteinizing hormone secretion in rats induced by high-cholesterol diets. *The Indonesian Biomedical Journal*, **13**: 396–402.
- Wszola, M., Klak, M., Kosowska, A., Tymicki, G., Berman, A., Adamok-Ostrowska, A., et al., 2021. Streptozotocin-induced diabetes in a mouse model (BALB/c) is not an effective model for research on transplantation procedures in the treatment of type 1 diabetes. *Biomedicines*, **9**: 1790.
- Xia, T., Duan, W., Zhang, Z., Fang, B., Zhang, B., Xu, B., et al., 2021. Polyphenol-rich extract of Zhenjiang aromatic vinegar ameliorates high glucose-induced insulin resistance by regulating JNK-IRS-1 and PI3K/Akt signaling pathways. *Food Chemistry*, **335**: 127513.
- Xia, Y., Zuo, J., Li, X., dan Chen, J., 2014. Antihyperglycemic effect of various fractions from residues of *Blumea balsamifera*. *Chinese Herbal Medicines*, **6**: 136–139.
- Xu, X., Li, F., Zhang, Xin, Li, P., Zhang, Xing, Wu, Z., et al., 2014. In vitro synergistic antioxidant activity and identification of antioxidant



- components from *Astragalus membranaceus* and *Paeonia lactiflora*. *PLoS ONE*, **9**: 1–9.
- Yang, Y., Zhang, Z., Li, S., Ye, X., Li, X., dan He, K., 2014. Synergy effects of herb extracts: Pharmacokinetics and pharmacodynamic basis. *Fitoterapia*, **92**: 133–147.
- Zafar, M. dan Naqvi, S.N.-H., 2010. Effects of STZ-induced diabetes on the relative weights of kidney, liver and pancreas in albino rats: A comparative study. *International Journal of Morphology*, **28**: .
- Zainab, Gunanti, F., Witasari, H.A., Edityaningrum, C.A., Mustofa, dan Murukmihadi, M., 2016. 'Penetapan parameter standarisasi non spesifik ekstrak etanol daun belimbing wuluh (*Averrhoa bilimbi* L.)', , dalam: *Rakernas dan PIT Ikatan Apoteker Indonesia*. Dipresentasikan pada Rakernas dan Pertemuan Ilmiah Tahunan Ikatan Apoteker Indonesia 2016, Ikatan Apoteker Indonesia, Yogyakarta, hal. 210–214.
- Zakharova, O.D., Frolova, T.S., Yushkova, Y.V., Chernyak, E.I., Pokrovsky, A.G., Pokrovsky, M.A., et al., 2016. Antioxidant and antitumor activity of trolox, trolox succinate, and α -tocopheryl succinate conjugates with nitroxides. *European Journal of Medicinal Chemistry*, **122**: 127–137.
- Zeeshan, H.M.A., Lee, G.H., Kim, H.-R., dan Chae, H.-J., 2016. Endoplasmic reticulum stress and associated ROS. *International Journal of Molecular Sciences*, **17**: 327.
- Zhong, Y. dan Shahidi, F., 2015. Methods for the assessment of antioxidant activity in foods11This chapter is reproduced to a large extent from an article in press by the authors in the Journal of Functional Foods., dalam: Shahidi, Fereidoon (Editor), *Handbook of Antioxidants for Food Preservation, Woodhead Publishing Series in Food Science, Technology and Nutrition*. Woodhead Publishing, hal. 287–333.
- Zhuang, M., Qiu, H., Li, P., Hu, L., Wang, Y., dan Rao, L., 2018. Islet protection and amelioration of type 2 diabetes mellitus by treatment with quercetin from the flowers of *Edgeworthia gardneri*. *Drug Design, Development and Therapy*, **12**: 955–966.