

DAFTAR PUSTAKA

- Adegoke, O.A., 2011, Analytical, Biochemical and Synthetic Applications of *Para*-Dimethylaminobenzaldehyde, *Int. J. Pharm. Sc. Rev. Res.*, 11, 17-29.
- Adenia, A.P., 2016, Penghambatan Senyawa Metabolit Sekunder Daun Kelor (*Moringa oleifera*) terhadap Aktivitas Enzim α -Glukosidase yang Diisolasi dari Beras Lapuk, *Skripsi*, Departemen Kimia FMIPA UGM, Yogyakarta.
- Agarwal, P. and Gupta, R., 2016, Alpha-Amylase Inhibition Can Treat Diabetes Mellitus, *J. Med. and Health Sci.*, 5(4), 2319-2327.
- Ali, H., Houghton, P.J. and Soumyanath, A., 2006, α -Amylase Inhibitory Activity of Some Malaysian Plants Used to Treat Diabetes; with Particular Reference to *Phyllanthus amarus*, *J. Ethnopharmacol.*, 107, 449-455.
- Bhandari, M.R., Anurakkun, N.J., Hong, G. and Kawabata, J., 2008, α -Glucosidase and α -Amylase Inhibitory Activities of Nepalese Medicinal Herb Pakhanbhed (*Bergenia ciliate*, Haw.), *Food Chem.*, 106, 247-252.
- Bhullar, K.S., Jha, A., Youssef D. and Rupasinghe, H.P.V., 2013, Curcumin and Its Carbocyclic Analogs: Structure-Activity in Relation to Antioxidant and Selected Biological Properties, *Molecules*, 18, 5389-5404.
- Bhutkar, M.A. and Bhise, S.B., 2012, In Vitro Assay of Alpha Amylase Inhibitory Activity of Some Indigenous Plants, *Int. J. Chem. Sci.*, 10, 457-462.
- Blat, Y., 2010, Non-Competitive Inhibition by Active Site Binders, *Chem. Biol. Drug*, 75, 535-540.
- Cade, C.H., 2008. Clinical tools for the assessment of pain in sedated critically ill adults, *Nursing in Critical Care*, 13, 288-297
- Chattopadhyay, I., Biswas, K., Bandyopadhyay, U. and Banerjee, R.K., 2004, Turmeric and Curcumin: Biological Actions and Medicinal Applications, *Curr. Sci. Ind.*, 87, 44-53.
- Chen, M-J., Cheng, Y-M., Lai, P-H, Wu, J-F. and Hsu, Y-C., 2012, In vitro Biocompatibility of Thermally Gelling Liquid Mucoadhesive Loaded Curcuminoids in Colorectal Cancer Chemoprevention, *Int. J. Colorectal. Dis.*, 27, 869-878.
- Chuengsamarn, S., Rattanamongkolgul, S., Luechapudiporn, R., Phisalaphong, C. and Jirawatnotai, S., 2012, Curcumin Extract for Prevention of Type 2 Diabetes, *Diabetes Care*, 35, 2121-2127.
- Copeland, R., 2000, *Enzymes: A Practical Introduction to Structure, Mechanism and Data Analysis*, A John Wiley & Sons, Inc., Publication, New York.
- Das, K.K., Asl, N.R., Tikare, S.N., Santo, R.D., Costi, R., Messori, A., Pescatori, L., Crucitti, G.C., Jargar, J.G., Dhundasi, S.A. and Saso, L., 2015,

- Hypoglycemic Activity of Curcumin Synthetic Analogues in Alloxan-Induced Diabetic Rats, *J. Enzyme Inhib. Med. Chem.*, 31(1), 99-105.
- Du, Z.Y., Liu, R.R., Shao, W.Y., Mao, X.P., Ma, L. and Gu, L.Q., 2006, α -Glucosidase Inhibition of Natural Curcuminoids and Curcumin Analogs, *Eur. J. Med. Chem.*, 41, 213-218.
- Eiselein, L., Schwartz, H.J. and Rutledge, J.C., 2004, The Challenge of Type 1 Diabetes Mellitus, *ILAR J.*, 45, 231-236.
- Elberry, A.A., Harraz, F.M., Ghareib, S.A., Gabr, S.A., Nagy, A.A. and Sattar, E. A., 2015, Methanolic Extract of *Marrubium Vulgare* Ameliorates Hyperglycemia and Dyslipidemia in Streptozotocin-Induced Diabetic Rats, *Int. J. Diabetes Mellit.*, 3, 37-44.
- Funk, J. L., Oyarzo, J.N., Frye, J.B., Chen, G., Lantz, R.C., Jolad, S.D., Sólyom, A.M. and Barbara, 2006, Timmermann Turmeric Extracts Containing Curcuminoids Prevent Experimental Rheumatoid Arthritis, *J. Nat. Prod.*, 69(3), 351-355.
- Gao, H., Huang, Y.-N., Gao, B., Xu, P.-Y., Inagaki, C. and Kawabata, J., 2008, α -Glucosidase Inhibitory Effect by The Flower Buds of *Tussilago Farfara* L, *Food Chem.*, 106, 1195-1201.
- Gayathri, N., Gopalakrishnan, M. and Sekar, T., 2016, Phytochemical Screening and Antimicrobial Activity of *Capsicum Chinense* Jacq, *Int. J. Adv. Pharm.*, 5, 12-20.
- Giffith, A., Yilmazer, M., Alexandre J.M., Erick, S. and Batz., 2012, Inhibition α -Amylase and α -Glucosidase Activity by Tea and Grape Seed Extract and Their Constituent Cathecins, *J. Agric. Food Chem.*, 60, 8924-8929.
- Goel, A., Kunnumakkara A.B. and Aggarwal, B.B., 2008, Curcumin as 'Curecumin': From Kitchen to Clinic, *Biochemical Pharmacology*, 75(4), 787-809.
- Gong, L., Goswami, S., Giacomini, K.M., Altman, R.B. and Klein, T.E., 2012, Metformin Pathways: Pharmacokinetics and Pharmacodynamics, *Pharmacogenet Genomics.*, 22(11), 820-827.
- Gopinath, S.C.B., Anbu, P., Arshad, M.K., Lakshmi Priya, T., Voon, C.H., Hashim, U. and Chinni, S.V., 2017, Biotechnological Processes in Microbial Amylase Products, *Biomed. Res. Int.*, 127-196.
- Harahap, F., 2012, *Fisiologi Tumbuhan: Suatu Pengantar*, Unimed Press, Medan.
- Huda, M.B., 2020, Sintesis Analog Kurkumin Monoketon Berbahan Dasar Benziloksibenzaldehid dan Uji Aktivitasnya Sebagai Inhibitor Terhadap Enzim α -Amilase, *Tesis*, Jurusan Kimia FMIPA UGM, Yogyakarta.
- Huda, M.B., Astuti, E. and Raharjo, T.J., 2020, Synthesis of Mono-Ketone Curcumin Analogs from 3-Benzoyloxybenzaldehyde and Their Activity Assay

as Inhibitor of α -Amylase, *Key Eng. Mater.*, 884, 304-311.

- Jayanti, A.T., 2018, Sintesis Analog Kurkumin Monoketon Berbahan Dasar *p*-dimetilaminobenzaldehida dan Uji Aktivitasnya Sebagai Inhibitor Enzim α -Amilase, *Skripsi*, Jurusan Kimia FMIPA UGM, Yogyakarta.
- Lawhavinit, O-A., Kongkathip, N. and Kongkathip B., 2010, Antimicrobial Activity of Curcuminoids from *Curcuma longa* L. on Pathogenic Bacteria of Shrimp and Chicken, *Kasetsart Journal Natural Science*, 44(3), 364-371.
- Liang, R., Yuan, G., Xi, Q. and Zhou, 2008, Synthesis of Wheat Straw-G-Poly (Acrylic Acid) Superabsorbent Composites and Release of Urea from it, *Carbohydr. Polym.*, 77, 181-187.
- Li, Q., Chen, J., Luo, S., Xu, J., Huang, Q. and Liu, T., 2015, Synthesis and Assessment of The Antioxidant and Antitumor Properties of Asymmetric Curcumin Analogues, *Eur. J. Med. Chem.*, 93, 461-469.
- Li, Y., Zhou, F., Gao, F., Bian, J.S. and Shan F., 2009, Comparative Evaluation of Quercetin, Isoquercetin, and Rutin as Inhibitors of α -Glucosidase, *J. Agric. Food Chem.*, 57, 11463-11468.
- Lin, H., Hu, G.X., Guo, J., Ge, Y., Liang, G. and Lian, Q.Q., 2013, Mono-Carbonyl Curcumin Analogues As 11β -Hydroxysteroid Dehydrogenase 1 Inhibitors, *Bioorg. Med. Chem. Lett.*, 23, 4362-4366.
- Lutony, T.L. dan Rahmayati, Y., 2002, *Produksi dan Perdagangan Minyak Asiri*, Penerbit Penebar Swadaya, Jakarta.
- Manganti, A., 2012, *Panduan Hidup Sehat Bebas Diabetes*, Araska, Yogyakarta.
- Mancia, S.R., Garcia, M.C.L. and Chavveri, J.P., 2015, Experimental Evidence for Curcumin and Its Analogs for Management of Diabetes Mellitus and Its Associated Complications, *Eur. J. Pharm.*, 756, 30-37
- Marangoni, A.G., 2003, *Enzyme Kinetics A Modern Approach*, A John Wiley & Sons, New Jersey.
- Mealey, B.L. and Oates, T.W., 2006, Diabetes Mellitus and Periodontal Diseases, *J. Periodontol.*, 77(8).
- Meng, B., Li, J. and Cao, H., 2013, Antioxidant and Antiinflammatory Activities of Curcumin on Diabetes Mellitus and Its Complications, *Curr. Pharm. Des.*, 19(11), 2101-2113.
- Musa M.Y., Musa, A.M., Michels, A.J., Schneider, E. and Frei, B., 2015, Inhibition of α -Amylase and α -Glucosidase Activity by Tea and Grape Seed Extracts and their Constituent Catechins, *J Agric. Food Chem.*, 60(36), 8924-8929.
- Nawaz, Sarfraz A., Muhammad A., Wolfgang B., Ludger A.W. and Bernhard W., 2011, Cation- π and π - π stacking interactions allow selective inhibition of

- butyrylcholinesterase by modified quinine and cinchonidine alkaloids, *Biochemical and Biophysical Research Communications*, 404, 935-940.
- Nurrochmad, A., 2004, Pandangan Baru Kurkumin dan Aktivitasnya sebagai Antikanker, *Biofarmasi*, 2(2), 75-80.
- Kuppusamy, A., Muthusamy, U., Thirumalaisamy, S.A., Ramasamy, K. and Ramanathan, S., 2011, In vitro (α -Glucosidase and α -Amylase Inhibition) and In Vivo Antidiabetic property of Phytic Acid (IP₆) in Streptozotocin-Nicotinamide-Induced Type 2 Diabetes Mellitus (NIDDM) in Rats, *J. Complemen. Integr. Med.*, 8(1), 9.
- Lee, S.-L., Huang, W.-J., Lin, W.W., Lee, S.-S. and Chen, C.-H., 2005, Preparation and Anti-Inflammatory Activities of Diarylheptanoid and Diarylheptylamine Analogs, *Bioorg. Med. Chem.*, 13, 6175-6181.
- McMurry, J., 2008, *Organic Chemistry*, 7th edition, Graphic World Inc.p, New York.
- Mikawlawng, K., 2016, *Aspergillus* in Biomedical Research. In, New and Future Developments in Microbial Biotechnology And Bioengineering, *Elsevier*, 13, 229-242.
- Mishra, S., Karmodiya, K., Surolia, N. and Surolia, A., 2008, Synthesis and Exploration of Novel Curcumin Analogues as Anti-Malarial Agents, *Bioorganic Med. Chem.*, 16, 2894-2902.
- Nagja, T., Kumar, V., and Sanjeev, A., 2017, Anti-Diabetic Activity of A Polyherbal Formulation in Streptozotocin Induced Type 2 Diabetic Rats, *J. Nat. Remedies.*, 16, 148.
- Nampoothiri, S.V., Prathapan, A., Cherian, O.L., Raghu, K.G., Venugopalan, V.V. and Sundaresan, A., 2011, In Vitro Antioxidant and Inhibitory Potential of *Terminalia Bellerica* and *Embllica Officinalis* Fruits Against LDL Oxidation and Key Enzymes Linked To Type 2 Diabetes, *Food Chem. Toxicol.*, 49, 125-131.
- Nelson, D.L. and Cox, M.M., 2012, *Lehninger Principles of Biochemistry*, 6th Ed., W. H. Freeman, New York.
- Oktabri, T., 2016, Sintesis Analog Kurkumin Monoketon Berbahan Dasar 4-Hidroksibenzaldehid dan Uji Aktivitasnya sebagai Inhibitor pada Kerja Enzim Alfa Glukosidase Hasil Isolasi dari Beras Lapuk, *Tesis*, Jurusan Kimia FMIPA UGM, Yogyakarta.
- Olokoba, A.B., Obatero, O.A. and Olokoba, L.B., 2012, Type 2 Diabetes Mellitus: A Review of Current Trends, *Oman Med. J.*, 27, 269-273.
- Oudjeriout, N., Moreau, T., Santimone, M., Suenssone, Mouren, G.Y. and Desseaux, V., 2003, On The Mechanism of α -Amylase, Acarbose and Cyclodextrin Inhibition of Barley Amylase Isoztm, *Eur. J. Biochem.*, 270,

3871-3879.

- Padmaja S. and Raju T.N., 2004. Antioxidant effect of curcumin in selenium induced cataract in Wistar rat, *Indian J. Exp. Biol.*, 42, 601-603.
- Patil, C.B., Mahajan, S.K. and Katti, S.A., 2009, Chalcone: A Versatile Molecule, *J. Pharm. Sci. & Res.*, 1(3), 11-22.
- Patrick, D., 2005, *Medicine At A Glance*, Alih Bahasa: Rahmalia, Erlangga, Jakarta.
- Pavia, D.L., Lampman, G.M. and Kriz, G.S., 2001, *Spectroscopy Pavia Third Edition*, Thomson Brooks/Cole, San Fransisco.
- Park, S.Y. and Kim, D., 2002, Discovery of Natural Products from *Curcuma longa* that Protects Cells from Beta-Amyloid Insult: Drug Discovery Effort against Alzheimer's Disease, *J. of Natural Products*, 65(9), 1227-1231.
- Parkeni, 2011, *Konsensus Pengendalian dan Pencegahan Diabetes Melitus Tipe 2 di Indonesia*, Parkeni, Jakarta.
- Pishdad, R., Parisa, P. and Gholam, R., 2020, Acarbose versus Repaglinide in Diabetes Treatment: A New Appraisal of Two Old Rivals, *Am. J. Med. Sci.*, 359(4), 212-217.
- Prasad, S., Gupta, S.C., Tyagi, A.K. and Aggarwal, B.B., 2014, Curcumin, A Component of Golden Spice: From Bedside to Bench and Back, *Biotech. Adv.*, 32, 1053-1064.
- Pratley, R.E., 2013, The Early Treatment of Type 2 Diabetes, *The American Journal of Medicine*, pp. s2-s9.
- Ramya, P.V.S., Guntuku, L., Angapelly, S., Karri, S., Digwal, C. S., Babu, B. N., Naidu, V.G.M. and Kamal, A., 2018, Curcumin Inspired 2- Chloro/Phenoxy Quinoline Analogues: Synthesis and Biological Evaluation as Potential Anticancer Agents, *Bioorg. Med. Chem. Lett.*, 28, 892-898.
- Ren, S., Xu, D., Pan, Z., Gao, Y., Jiang, Z. and Gao, Q., 2011, Two Flavanone Compounds From Litchi (*Litchi Chinensis Sonn.*) Seeds, One Previously Unreported, and Appraisal of Their α -Glucosidase Inhibitory Activities, *Food Chem.*, 127, 1760-1763.
- Ritmaleni, 2016, Synthesis of Curcumin Analogs, *Int. J. Pharm. Sci. Rev. Res.*, 37, 236-241.
- Riyaphan, J., Jhong, C.H., Tsai, M.J., Lee, D.N., Leong, M.K. and Weng, C.F., 2017, Potent Natural Inhibitors of Alpha Glucosidase and Alpha Amylase Against Hyperglycemia *In Vitro* and *In Vivo*, *Preprints*, 1-20.
- Robinson, T.P., Ehler, T., Hubbard, R.B., Iv, Bai, X., Arbiser, J.L., Goldsmith, D.J. and Bowen, J.P., 2003, Design, Synthesis and Biological Evaluation of Angiogenesis Inhibitors: Aromatic Enone and Dienone Analogues of

- Curcumin, *Bioorg. Med. Chem. Let.*, 13(1), 115-117.
- Rosemond, M.J., Williams, L., Yamaguchi, T., Fujishita T. and Walsh, J.S., 2004, Enzymology of a Carbonyl Reduction Clearance Pathway for the HIV Integrase Inhibitor, S-1360: Role of Human Liver Cytosolic Aldo-keto Reductases, *Chem. Biol. Interact.*, 147(2), 129-39.
- Salehi, B., Zorica S.R., Jelena M., Mehdi S., Nanjangud V.A.K., Natalia M. and Javad S., 2018, The therapeutic potential of curcumin: A review of clinical trials, *European Journal of Medicinal Chemistry*, 163, 527-545.
- Samson, S.L. and Garber, A.J., 2016, Prevention of Type 2 Diabetes Mellitus: Potential of Pharmacological Agents, *Best Pract. Res. Clin. Endocrinol. Metab.*, 30, 357-371.
- Sardjiman S.S., Reksohadiprodjo M.S., Hakim L., Van G.H. and Timmerman H., 2000, 1,5-Diphenyl-1,4-pentadiene-3-ones and Cyclic Analogues as Antioxidative Agents. Synthesis and structure-activity relationship, *Eur. J. Med. Chem.*, 32, 625-630.
- Sastrohamidjojo, H., 2005, *Kimia Organik: Stereokimia, Karbohidrat, Lemak, dan Protein*, Gadjah Mada University Press, Yogyakarta.
- Seo, K.I., Choi, M.S. and Jung, U.J., 2008, Effect of Curcumin Supplementation on Blood Glucose, Plasma Insulin, and Glucose Homeostasis Related Enzyme Activities in Diabetic db/db Mice, *Molecular Nutrition and Food Research*, 52(9), 995-1004.
- Shaw, J.E., Sicree, R.A. and Zimmet, P.Z., 2014, Global Estimates of The Prevalence of Diabetes for 2013 and 2035, *Diabetes Clin. Prac.*, 87, 4-14.
- Shodehinde, S.A., Ademiluyi, A.O., Oboh, G. and Akindahunsi, A.A., 2015, Contribution of *Musa Paradisiaca* in The Inhibition of α -Amylase, α -Glucosidase and Angiotensin-I Converting Enzyme in Streptozotocin Induced Rats, *Life Sci.*, 133, 8-14.
- Sohilait, M.R., Pranowo, H.D. and Haryadi, W., 2017, Molecular Docking Analysis of Curcumin Analogues with COX-2, *Bioinformation*, 13, 356-359.
- Souza, P.M. and Magalhaes, P.O., 2010, Application of Microbial α -Amylase in Industry-A Review, *Braz. J. Microbiol.*, 41, 850-861.
- Siboro, P.A., 1998, *Diabetes: Terapi dan Pencegahannya* (diterjemahkan dari Johnson, M., 1997, Sickeningly Sweet, Phillipine Publishing House), Indonesia Publishing House, Bandung.
- Silverstein, R.M., Webster, F.X., Kiemle, D.J. and Byrce, D.L., 2005, *Spectrometric Identification of Organic Compounds*, Eight Edition, John Wiley and Sons, Inc., New York
- Singh, R., Kapoor, V. and Kumar, V., 2012, Utilization of Agroindustrial Wastes

- for The Simultaneous Production of Amylase and Xynalase by Thermophilic Actynomycetes, *Braz. J. Microbiol.*, 1545-1552.
- Soendoro, R., 1997, *Prinsip-Prinsip Biokimia* (diterjemahkan dari Page, D. S., 1981, Principles of Biological Chemistry, Willard Grant Press), Erlangga, Jakarta.
- Soegondo, S., 2004, *Penatalaksanaan Diabetes Melitus Terpadu*, Balai Penerbit FKUI, Jakarta.
- Souza, P.M. and Magalhaes, P.O., 2010, Application of Microbial α -Amylase in Industry-A Review, *Braz. J. Microbiol.*, 41, 850-861.
- Stephanie, L. N. and Alicia, O., 2020, Diagnostic Approach to Differentiating Diabetes Types, *Physician Assist. Clin.*, 5, 109-120.
- Straganz, G.D., Glieder, A., Brecker, L., Ribbons, D.W. and Steiner W., 2003, Acetylacetone-cleaving Enzyme Dkel: a Novel C-C-bondcleaving Enzyme from *Acinetobacter johnsonii*, *Biochem. J.*, 369(3), 573-81.
- Suiraoaka, I., 2012, *Penyakit Degeneratif: Mengenal, Mencegah dan Mengurangi Faktor Risiko 9 Penyakit Degeneratif (Pertama)*, Yogyakarta: Nuha Medika.
- Supardjan, A.M., Jennie, U.A., Samhoedi, M., Timmerman, H. and Goot, V.H., 1997, *Synthesis and Hydroxyl Radical Scavenging Activity of Some 4-Alkylcurcumin Derivatives, in Recent Development in Curcumin Pharmacochemistry*, Aditya Media, Yogyakarta.
- Surya, S., Salam, A.D., Tomy, D.V., Carla, B., Kumar, R.A. and Sunil, C., 2014, Diabetes Mellitus and Medicinal Plants-A Review, *Asian Pacific J. Trop. Dis.*, 4, 337-347.
- Tonnesen, H.H. and Karlsen, J., 1985, Studies on Curcumin and Curcuminoids: V. Alkaline Degradation of Curcumin, *Lebenum Uniers Forch.*, 180, 132-134.
- Wahyuntari, B., 2011, Penghambat α -Amilase: Jenis, Sumber dan Potensi Pemanfaatannya dalam Kesehatan, *Jurnal Teknologi dan Indusri Pangan*, 22(2).
- Wang, Z.S., Chen, L.Z., Zhou, H.P., Liu, X.H. and Chen, F.H., 2017, Diarylpentadienone Derivatives (Curcumin Analogues): Synthesis and Anti-Inflammatory Activity, *Bioorg. Med. Chem. Lett.*, 27, 1803-1807.
- Xiao, Z., Storms, R. and Tsang, A., 2006, A Quantitative Starch Iodine Method for Measuring Alpha-Amylase and Glucoamylase Activities, *Anal. Biochem.*, 362, 146-148.
- Yallapu, M.M., Nagesh, P.K.B., Jaggi, M., Chauhan, S.C., Zebib, B. and Mouloungui, Z., 2015, Differential Effect of Soil And Environment on

- Metabolic Expression of Turmeric (*Curcuma Longa* Cv.Roma), *Indian J. Exp. Biol.*, 53, 406-411.
- Yousefi, A., Yousefi, R., Panahi, F., Sarikhani, S., Zolghadr, A., Bahaoddini, A. and Nezhad, A.K., 2015, Nover Curcumin-Based Pyrano[2,3- d]Pyrimidine Anti-Oxidant Inhibitors for α -Amylase and α -Glucosidase: Implications for Their Pleiotropic Effects Against Diabetes Complications, *Int. J. Biol. Macromol.*, 78, 46-55.
- Yuan, X., Li, H., Bai, H., Su, Z., Xiang, Q. and Wang, C., 2014, Synthesis of Novel Curcumin Analogues for Inhibition of Properties, *Eur. J. Med. Chem.*, 77, 223-230.
- Zaccardi, F., Webb, D.R., Yates, T. and Davies, M.J., 2015, Pathophysiology of Type 1 and Type 2 Diabetes Mellitus: a 90-year Perspective, *Postgrad. Med. J.*, 1-7.
- Zetterström S., 2012, Isolation and synthesis of curcumin, *Thesis*, Department of Physics, Chemistry and Biology, Linköping University, Linköping.
- Zhang, Y., Wu, L., Ma, Z., Cheng, J. and Liu, J., 2016, Anti-Diabetic, Anti-Oxidant and Anti-Hyperlipidemic Activities of Flavonoids from Corn Silk on STZ-Induced Diabetic Mice, *Molecules.*, 21, 188-194.