

***REVIEW: UJI AKTIVITAS ANTIINFLAMASI ISOLAT DAN
EKSTRAK KURKUMIN, PIPERIN, DAN MANGOSTIN
MENGUNAKAN METODE WESTERN BLOT***

SKRIPSI

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YAYASAN HAZANAH
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Sebagai salah satu syarat untuk memperoleh gelar Sarjana Farmasi

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Kutipan atau saduran baik sebagian ataupun seluruh naskah, harus menyebut nama pengarang dan sumber aslinya, yaitu Sekolah Tinggi Farmasi Indonesia.

Tugas akhir ini saya persembahkan
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ABSTRAK

Melalui pendekatan ilmiah modern, berbagai jenis tanaman obat telah dikenal dan dipelajari baik ekstrak hingga isolat, salah satunya adalah mangostin, piperin serta kurkumin. Tujuan penelitian ini adalah untuk mengetahui aktivitas farmakologi serta potensi Antiinflamasi dari ekstrak dan isolat mangostin, piperin, dan kurkumin dari berbagai jurnal penelitian untuk dikembangkan dalam proses penelitian selanjutnya. Metode yang digunakan secara kualitatif yaitu mengkaji jurnal-jurnal penelitian pada lama *Google Scholar* dan mengelompokan berdasarkan jenis isolat dan ekstrak, metode isolasi dan ekstraksi, metode uji aktivitas menggunakan metode analisis *Western Blot*, dosis, serta aktivitas farmakologi. Hasil dari kajian pustaka ini menunjukkan bahwa isolat dan ekstrak Mangostin, Piperin, dan Kurkumin memiliki potensi aktivitas farmakologi Antiinflamasi dengan berbagai jenis mekanisme antiinflamasi.

Kata kunci: Mangostin, Piperin, Kurkumin, Antiinflamasi, Analisis *Western Blot*

ABSTRACT

Through a modern scientific approach, various types of medicinal plants have been known and studied both extracts and isolates, one of which is mangostin, piperine and curcumin. The purpose of this study was to determine the pharmacological activity and anti-inflammatory potential of extracts and isolates of mangostin, piperine, and curcumin from various research journals to be developed for further research. The method used qualitatively is the study of research journals on Google Scholar length and grouping them based on the type of isolate and extract, the isolation and extraction method, the activity test method using the Western Blot analysis method, the dose, and pharmacological activity. The results of this literature review show that isolates and extracts of Mangostin, Piperine, and Curcumin have potential anti-inflammatory pharmacological activity with various types of anti-inflammatory mechanisms.

Keywords: *Mangostin, Piperine, Curcumin, Antiinflammatory, Western Blot Analysis*

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DAFTAR PUSTAKA

- Akhmad Husen, Saikhu et al. 2018. "Antioxidant Activity Assay of Alpha-Mangostin for Amelioration of Kidney Structure and Function in Diabetic Mice." *Icpsuas* (98): 84–88.
- Aldi, Yufri, Sri Oktavia, and Sirda YenniB. 2016. "Uji Efek Immunomodulator Dari Ekstrak Daun Manggis (*Garcinia Mangostana* L .) Dengan Metode Carbon Clearance Dan Menghitung Jumlah Sel Leukosit Pada Mencit Putih Jantan." *Jurnal Farmasi Higea* 8(1): 20–31.
- Bang JS, Oh da H, Choi HM, Sur BJ, Lim SJ, Kim JY, et al. 2009. "Anti-inflammatory and antiarthritic effects of piperine in human interleukin 1beta-stimulated fibroblast-like synoviocytes and in rat arthritis models". *Arthritis Res Ther* (11):R49.
- Chengfeng Miao *et al.* 2021. "Curcumin and its analog alleviate diabetes-induced damages by regulating infammation and oxidative stress in brain of diabetic rats". *Diabetology & Metabolic Syndrome*: 13-21
- Chiu, Yen-Shuo *et al.*2020. "Mangostin isolated from *Garcinia mangostana* L. suppresses inflammation and alleviates symptoms of osteoarthritis via modulating". *Signaling. Aging* (120): 103003
- Dong Y, Huihui Z, Chengzhang L. 2015. "Piperine inhibit inflammation, alveolar bone loss and collagen fibers breakdown in a rat periodontitis model". *J Periodont Res* (2015)
- Godara, R *et al.* 2018. "In vitro acaricidal activity of *Piper nigrum* and *Piper longum* fruit extracts and their active components against *Rhipicephalus* (*Boophilus*) *microplus* ticks". *Exp. Appl. Acarol*: 75, 333–343.
- Hae Young Chung *et al.* 2019. "Anti-inflammatory and antioxidant activities of piperine on t-BHP-induced in Ac2F cells". *SDRP Journal of Food Science & Technology* 4(4): 777-787
- Hariyanti, Hadi Sunaryo, and Sari Nurlaily. 2015. "Efek Immunomodulator Fraksi Etanol Dari Ekstrak Etanol 70% Kulit Buah Manggis (*Garcinia Mangostana* L.) Berdasarkan Peningkatan Aktivitas Dan Kapasitas Fagositosis Sel Makrofag Poriteneum Mencit Secara in Vitro." *Pharmacy* 12(1): 58–69.
- Herrera-Aco, Diana Rocio et al. 2019. "Alpha-Mangostin: Anti-Inflammatory and Antioxidant Effects on Established Collagen-Induced Arthritis in DBA/1J Mice." *Food and Chemical Toxicology* (124): 300–315.
- Hikal, Dalia M. 2018. "Antibacterial Activity of Piperine and Black Pepper Oil." *Biosciences Biotechnology Research Asia* 15(4): 877–80.
- Hou, X.F *et al.* 2015. "Suppresses the Expression of CXCL8 in Lipopolysaccharide-Activated SW480 and HT-29 Cells via Downregulating the Mitogen-Activated Protein Kinase Pathways". *Inflammation*: 38, 1093–1102.

- Hui Lu, *et al.* 2023. "Piperine ameliorates psoriatic skin inflammation by inhibiting the phosphorylation of STAT3", *International Immunopharmacology*, (119): 33-41
- Izui, Shusuke *et al.* 2016. "Antibacterial Activity of Curcumin Against Periodontopathic Bacteria." *Journal of Periodontology* 87(1): 83–90.
- Jittiporn, Kanjana *et al.* 2014. "Anti-Angiogenic Actions of the Mangosteen Polyphenolic Xanthone Derivative α -Mangostin." *Microvascular Research* 93: 72–79.
- Kasemwattanaroj, Pimolkan *et al.* 2013. "Immunomodulatory Activities of α -Mangostin on Peripheral Blood Mononuclear Cells." *Natural Product Communications* 8(9): 1257–60.
- L Hadisoewignyo *et al.* 2018. "Evaluation of anti-inflammatory activity and biocompatibility of curcumin loaded mesoporous silica nanoparticles as an oral drug delivery system". *Adv. Nat. Sci.: Nanosci. Nanotechnol.* 9 (2018) 035007
- Lazarus, Gilbert *et al.* 2020. "Antioxidative Activities of Alpha-Mangostin in High-Fat/High-Glucose Diet and Streptozotocin-Induced Insulin-Resistant Rodents." *Journal of Applied Pharmaceutical Science* 10(11): 035–039.
- Meilina, Rulia, and Rasmadin Mukhtar. 2019. "Efek Antiinflamasi Ekstrak Etanol Rimpang Kunyit (*Curcuma Domestica* Val.) Pada Tikus Putih Yang Diinduksi Karagenan." *Journal of Healthcare Technology and Medicine* 4(1): 111.
- Meng, Bo, Jun Li, and Hong Cao. 2013. "Antioxidant and Antiinflammatory Activities of Curcumin on Diabetes Mellitus and Its Complications." *Current Pharmaceutical Design* 19(11): 2101–13.
- Mujumdar AM, Dhuley JN, Deshmukh VK, Raman PH, Naik SR. 1990. "Anti-inflammatory activity of piperine". *Jpn J Med Sci Biol* (43):95–100.
- Nguyen, P.H *et al.* 2015. "Isolation of benzoic and cinnamic acid derivatives from the grains of *Sorghum bicolor* and their inhibition of lipopolysaccharide-induced nitric oxide production in RAW 264.7 cells". *Food Chem*: 168, 512–519.
- Nicholas, Nicholas, Fiska Maya Wardhani, Erny Tandanu, and Rico Alexander. 2022. "Acute Toxicity Test of White Turmeric (*Curcuma Zedoaria*) Extract on Histopathological Analysis of the Heart Muscle." *Jambura Journal of Health Sciences and Research* 4(3): 642–47.
- Ovalle-Magallanes, Berenice, Dianelena Eugenio-Pérez, and José Pedraza-Chaverri. 2017. "Medicinal Properties of Mangosteen (*Garcinia Mangostana* L.): A Comprehensive Update." *Food and Chemical Toxicology* 109: 102–22.
- Peng, Xiaofei. 2018. "Piperine ameliorated lupus nephritis by targeting AMPK-mediated activation of NLRP3 inflammasome". *International Immunopharmacology*: 65, 448–457.

- Pillai-Kastoori *et al.* 2020. “A systematic approach to quantitative Western blot analysis”. *Analytical Biochemistr*: (593), 113608.
- Rongrong Li *et al.* 2021. “The effects and mechanism of α -mangostin on chemosensitivity of gastric cancer cells”. *Kaohsung journal of Medical science*: 709-717
- Sabina, Evan Prince, Aayesha Nasreen, Mahima Vedi, and Mahaboobkhan Rasool. 2013. “Analgesic, Antipyretic and Ulcerogenic Effects of Piperine: An Active Ingredient of Pepper.” *Journal of Pharmaceutical Sciences and Research* 5(10): 203–6.
- Schwartz ZVI, Goultshin J, Dean DD, Boyan BD. 1997. “Mechanisms of alveolar bone destruction in periodontitis”. *Periodontol 2000* (14):158–172.
- Srinivasan, K. 2007. “Black Pepper and its pungent principle-piperine: a review of diverse physiological effects.” *Crit Rev Food Sci Nutr* (47):735–48.
- Stohr JR, Xiao PG, Bauer R. 2001. “Constituents of Chinese Piper species and their inhibitory activity on prostaglandin and leukotriene biosynthesis in vitro”. *J Ethnopharmacol* (75):133–9.
- Thakre, Archana *et al.* 2021. “Oxidative Stress Induced by Piperine Leads to Apoptosis in Candida Albicans.” *Medical Mycology* 59(4): 366–78.
- Thiengsusuk, Artitaya, Phunuch Muhamad, Wanna Chaijaroenkul, and Kesara Na-Bangchang. 2018. “Antimalarial Activity of Piperine.” *Journal of Tropical Medicine*.
- Umadevi, Parimi, Kolli Deepti, and Durvasula V.R. Venugopal. 2013. “Synthesis, Anticancer and Antibacterial Activities of Piperine Analogs.” *Medicinal Chemistry Research* 22(11): 5466–71.
- Wang, Qirui *et al.* 2019. “Curcumin attenuates collagen-induced rat arthritis via anti-inflammatory and apoptotic effects”. *International Immunopharmacology*: 72, 292–300.
- Widowati, W., Darsono, L., Suherman, J., Fauziah, N., Maesaroh, M., and Erawijantari, Pande Putu. 2016. “Anti-inflammatory Effect of Mangosteen (*Garcinia mangostana* L.) Peel Extract and its Compounds in LPS-induced RAW264.7 Cells”. *Natural Product Sciences* 22(3) : 147-153
- Y. Jaisin, P. Ratanachamnong, O. Wongsawatkul, *et al.*, 2018. “Antioxidant and anti-inflammatory effects of piperine on UV-B-irradiated human HaCaT keratinocyte cells”. *Life Sciences* (2018)
- Yang, Aihong *et al.* 2021. “A Review on α -Mangostin as a Potential Multi-Target Directed Ligand for Alzheimer’s Disease.” *European Journal of Pharmacology* (897): 173950.
- Yangyang yu *et al.* 2018. “Anti-inflflammatory Effects of Curcumin in Microglial Cell”. *Frontiers in Neuroscience*: (9) 386

- Yanting Yuan *et al.* 2021. “Piperine protects against pancreatic β -cell dysfunction by alleviating macrophage inflammation in obese mice”. *Life Sciences*, : 11-12
- YongYue Gao *et al.* 2019. “Curcumin Mitigates Neuro-Inflammation by Modulating Microglia Polarization Through Inhibiting TLR4 Axis Signaling Pathway Following Experimental Subarachnoid Hemorrhage”. *Frontiers in Neuroscience*: (13) 12223
- Zhang *et al.* 2022. “Piperine attenuates the inflammation, oxidative stress, and pyroptosis to facilitate recovery from spinal cord injury via autophagy enhancement”. *Phytotherapy Research*: 38:45
- Zhang *et al.* 2022. “ α -Mangostin inhibits LPS-induced bone resorption by restricting osteoclastogenesis via NF- κ B and MAPK”. *signaling Chinese Medicine* (202): 17:34
- Zuo, Jian *et al.* 2018. “Inhibition of NF- κ B pathway in fibroblast-like synoviocytes by α -mangostin implicated in protective effects on joints in rats suffering from adjuvant-induced arthritis”. *International Immunopharmacology*, 56, 188189.
- Zuo, Wenshu *et al.* 2018. “A Novel Biological Role of α -Mangostin via TAK1 NF- κ B Pathway against Inflammatory”. *International Immunopharmacology*, 56, 103–112