

DAFTAR PUSTAKA

- Alam, M.S., Rahman, S.M.M., and Lee, D.U., 2015, Synthesis, Biological Evaluation, Quantitative-SAR and Docking Studies of Novel Chalcone Derivatives as Antibacterial and Antioxidant Agents, *Chem. Pap.*, 69 (8), 1118-1129.
- Altintop, M.D., Ozdemir, A., Kaplancikli, Z.A., Zitouni, G.T., Temel, H.E., and Ciftci, G.A., 2013, Synthesis and Biological Evaluation of Some Pyrazoline Derivatives Bearing a Dithiocarbamate Moiety as New Cholinesterase Inhibitors, *Arch. Pharm. Chem. Life Sci.*, 346, 189-199.
- Amin, K.M., Eissa, A.A.M., Seri, S.M.A., Awadallah, F.M., and Hassan, G.S., 2013, Synthesis and Biological Evaluation of Novel Coumarin-Pyrazoline Hybrids Endowed With Phenylsulfonyl Moiety as Antitumor Agents, *Eur. J. Med. Chem.*, 60, 187-198.
- Anazi, M., 2023, Synthesis, Anticancer, and Docking of New Thiadiazolyl-Triazole Analogues Hybridized With Thiazolidinone/Thiophene, *J. Mol. Struct.*, 1278, 134864.
- Anonim, 2021, Cancer today. *International Agency for Research on Cancer*. <http://gco.iarc.fr/> - Diakses November 2021.
- Anonim, 2020, *World cancer report*, World Health Organization, Geneva.
- Arora, V., Arora, P., and Lamba, H.S., 2012, Synthesis and Biological Activities of Some 3,5-Disubstituted Pyrazoline Derivatives of 2-Acetyl Naphthalene, *Int. J. Pharm. Pharm. Sci.*, 4(4), 303-306.
- Asad, M., Khan, S.A., Arshad, M.N., Asiri, A.M., and Rehan, M., 2021, Design and Synthesis of Novel Pyrazoline Derivatives for Their Spectroscopic, Single Crystal X-Ray and Biological Studies, *J. Mol. Struct.*, 1234, 130131.
- Asirvatham, S., and Mahajan, S., 2015, Synthesis, Biological Evaluation and QSAR Studies of Newer Isoxazole Derivatives, *Antiinflamm. Antiallergy Agents Med. Chem.*, 14, 128-137.
- Bakaric, D., and Baranovic, G., 2019, The Conformational Equilibrium and Vibrational Properties of Chalcone, *J. Mol. Struct.*, 1196, 429-438.

- Balachandran, R.S., and Kipreos, E.T., 2017, Addressing a Weakness of Anticancer Therapy With Mitosis Inhibitors: Mitotic Slippage, *Mol. Cell. Oncol.*, 4(2), 1-6.
- Bhale, P.S., Chavan, H.V., Dongare, S.B., Shringare, S.N., Mule, Y.B., Nagane, S.S., and Bandkar, B.P., 2017, Synthesis of Extended Conjugated Indolyl Chalcones as Potent Anti-Breast Cancer, Anti-Inflammatory and Antioxidant Agents, *Bioorg. Med. Chem. Lett.*, 27, 1502-1507.
- Bhandare, R.R., Munikrishnappa, C.S., Kumar, G.V.S., Konidala, S.K., Sigalapalli, D.K., Vaishnav, Y., Chinnam, S., Yasin, H., Al-karmalawy, A.A., and Shahik, A.B., 2022, Multistep Synthesis and Screening of Heterocyclic Tetrads Containing Furan, Pyrazoline, Thiazole and Triazole (or Oxadiazole) as Antimicrobial and Anticancer Agents, *J. Saudi Chem. Soc.*, 26, 1-15.
- Bukhari, S.N.A., 2022, Synthesis and Evaluation of New Chalcone and Oxime as Anticancer Agents, *RSC Adv.*, 12, 10307.
- Bukhari, S.N.A., Jasmani, M., Jantan, I., and Ahmad, W., 2013, Review of Methods and Various Catalysts Used for Chalcone Synthesis, *Mini. Rev. Org. Chem.*, 10, 73-83.
- Calderon, M.G., Delgado, C.M.P., Balang, P.P., Betti, M., and Marquez, A.J., 2020, Flavonoids and Isoflavonoids Biosynthesis in the Model Legume Lotus japonicus; Connections to Nitrogen Metabolism and Photorespiration, *Plants*, 9, 774.
- Callaghan, R., Luk, F., and Bebawy, M., 2014, Inhibition of The Multidrug Resistance P-Glycoprotein: Time for a Change of Strategy?, *Drug. Metab. Dispos.*, 42(4), 623-631.
- Cheng, A.X., Han, X.J., Wu, Y.F., and Lou, H.X., 2014, The Function and Catalysis of 2-Oxoglutarate-Dependent Oxygenases Involved in Plant Flavonoid Biosynthesis, *Int. J. Mol. Sci.*, 15, 1080-1095.
- Dasari, S., and Tchounwou, P.B., 2014, Cisplatin in Cancer Therapy: Molecular Mechanisms of Action, *Eur. J. Pharmacol.*, 740, 364-378.
- Deng, H., Yu, Z.Y., Shi, G.Y., Chen, M.J., Tao, K., and Hou, T.P., 2015, Synthesis And *In Vitro* Antifungal Evaluation of 1,3,5-Trisubstituted-2-Pyrazoline Derivatives, *Chem. Biol. Drug Des.*, 79(3), 279-289.

- Ediriweera, M.K., Tennekoon, K.H., and Samarakoon, S.R., 2018, In Vitro Assays and Techniques Utilized in Anticancer Drug Discovery, *J. Appl. Toxicol.*, 1-34.
- Fard, S.G., Abak, A., Anamag, F.T., Shoorei, H., Fattahi, F., Javadinia, S.A., Basiri, A., and Taheri, M., 2021, 5-Fluorouracil: A Narrative Review on the Role of Regulatory Mechanisms in Driving Resistance to This Chemotherapeutic Agent, *Front. Oncol.*, 11, 1-21.
- Foti, M.C., Daquino, C., Dilabio, G.A., and Ingold, K.U., A Meta Effect in Nonphotochemical Processes: The Homolytic Chemistry of m-Methoxyphenol, *J. Org. Chem.*, 73(6), 2408-2411.
- Fu, Y., Liu, D., Zeng, H., Ren, X., Song, B., Hu, D., and Gan, X., 2020, New Chalcone Derivatives: Synthesis, Antiviral Activity and Mechanism of Action, *RSC Adv.*, 10(41), 24483-24490.
- Girisha, K.S., Balakrishna, K., Vijaya, N., and Padmashree, 2010, Synthesis and Pharmacological Study of 1-acetyl propyl-3-aryl-5-(5-chloro-3-methyl-1-phenyl-1H-pyrazol-4-yl)-2-pyrazoline, *Euro. J. Med. Chem.*, 45, 4640-4644.
- Goldfarb, D.S., 2014, Method for Altering The Lifespan of Eukaryotic Organisms, *Patent*, US8642660B2.
- Hassan, R.A., Emam, S.H., Hwang, D., Kim, G.D., Hassanin, S.O., Khalil, M.G., Abdou, A.M., and Sonousi, A., 2022, Design, Synthesis and Evaluation of Anticancer Activity of New Pyrazoline Derivatives by Down-Regulation of VEGF: Molecular Docking and Apoptosis Inducing Activity, *Bioorg. Chem.*, 118, 105487.
- Havrylyuk, D., Roman, O., and Lesyk, R., 2016, Synthetic Approaches, Structure Activity Relationship and Biological Applications for Pharmacologically Attractive Pyrazole/ Pyrazoline–Thiazolidine-Based Hybrids, *Eur. J. Med. Chem.*, 113, 145-166.
- Hbe, S., Ghaddar, S., Wahnou, H., Pinon, A., Kebbaj, R., Pouget, C., Sol, V., Liagre, B., Oudghiri, M., and Limami, Y., 2023, Natural Chalcones and Derivatives in Colon Cancer: Pre-Clinical Challenges and the Promise of Chalcone-Based Nanoparticles, *Pharmaceutics.*, 15, 2718.
- Hoepfner, A., Petzer, A., Petzer, J.P., Pretorius, J., and Cloete, T.T., 2023, *In Vitro* and *In Silico* Antibacterial Evaluation of Nitrocatechol Chalcone and Pyrazoline Derivatives, *Results Chem.*, 6, 101194.

- Jasril, Teruna, H.Y., Aisyah, Nurlaili, and Hendra, R., 2019, Microwave Assisted Synthesis and Evaluation of Toxicity and Antioxidant Activity of Pyrazoline Derivatives, *Indones. J. Chem.*, 19(3), 583-591.
- Jung, H., Ahn, S., Park, M., Yoon, H., Noh, H.J., Kim, S.Y., Yoo, J.S., Koh, D., and Lim, Y., 2014, ^1H and ^{13}C NMR Spectral Assignments of 18 Novel Polymethoxylated Naphthochalcones Bearing Pyrazoline-1-Carbothioamide Groups, *Magn. Reson. Chem.*, 53, 383-390.
- Jung, J.C., Lee, Y., Min, D., Jung, M., and Oh, S., 2017, Practical Synthesis of Chalcone Derivatives and Their Biological Activities, *Molecules*, 22, 1872.
- Kadi, I., Sekerci, G., Boulebd, H., Zebbiche, Z., Tekin, S., Kucukbay, H., Kucukbay, F., and Boumoud, T., 2023, Synthesis, *In Vitro*, and *In Silico* Studies of Novel Poly-Heterocyclic Compounds Bearing Pyridine and Furan Moieties as Potential Anticancer Agents, *J. Mol. Struct.*, 1271, 134054.
- Karaman, I., Gezgen, H., Gurdere, M.B., Dingil, A., and Ceylan, M., 2010, Screening of Biological Activities of a Series of Chalcone Derivatives against Human Pathogenic Microorganisms, *Chem. Biodiversity*, 7, 400-408.
- Kostopoulou, I., Diassakou, A., Kavetsou, E., Kritisi, E., Zoumpoulakis, P., Pontiki, E., Litina, D.H., and Detsi, A., 2020, Novel Quinolinone–Pyrazoline Hybrids: Synthesis and Evaluation of Antioxidant and Lipxygenase Inhibitory Activity, *Mol. Divers.*, 25(2), 723-740.
- Kumar, A., Singh, A.K., Singh, H., Vijayan, V., Kumar, D., Naik, J., Thareja, S., Yadav, J.P., Pathak, P., Grishina, M., Verma, A., Khalilullah, H., Jaremko, M., Emwas, A.H., and Kumar, P., 2023, Nitrogen Containing Heterocycles as Anticancer Agents: A Medicinal Chemistry Perspective, *Pharmaceuticals*, 16, 299.
- Lakhia, R., Verma, N.R., Raghav, N., and Pundeer, R., 2023, Chalcone and Pyrazoline Derivatives of Dehydroacetic Acid as Digestive Enzyme Effectors and *In Silico* Studies, *J. Mol. Struct.*, 1291, 135884.
- Lin, Z.M., Wang, Z.Y., Zhou, X.W., Zhang, M., Gao, D.F., Zhang, L., Wang, P., Chen, Y., Lin, Y.X., Zhao, B.X., Miao, J.Y., and Kong, F., 2020, Discovery of New Fluorescent Thiazole–Pyrazoline Derivatives as Autophagy Inducers by Inhibiting Mtor Activity in A549 Human Lung Cancer Cells, *Cell Death Discov.*, 11, 551.

- Lodhi, G., and Nayak, A., 2022, Synthesis, Characterization and Pharmacological Evaluation of Chalcones and Its Derivatives for Analgesic Activity, *Int. J. Health Sci.*, 6, 13665-13678.
- Maldonado, J., Oliva, A., Guzman, L., Molinari, A., and Acevedo, W., 2024, Synthesis, Anticancer Activity, and Docking Studies of Novel Hydroquinone-Chalcone-Pyrazoline Hybrid Derivatives, *Int. J. Mol. Sci.* 25, 7281.
- Mahadevaswamy, L.D., and Kariyappa, A.K., 2017, An Environmentally Benign Lemon Juice Mediated Synthesis of Novel Furan Conjugated Pyrazole Derivatives and Their Biological Evaluation, *Pharm. Chem. J.*, 8(51), 670-677.
- Matiadis, D., 2023, Strategies and Methods for the Synthesis of 2-Pyrazolines: Recent Developments (2012–2022), *Adv. Synth. Catal.*, 365, 1934-1969.
- McCauley, J., Zivanovic, A., and Skropeta, D., 2013, Bioassays for Anticancer Activities, *Methods Mol. Biol.*, 1055, 191-205.
- Mehmood, R., Sadiq, A., Alsantali, R.I., Mughal, E.U., Alsharif, M.A., Naeem, N., Raoqi, M.M., Chaudhry, G.S., Ahmed, S.A., 2022, Synthesis and Evaluation of 1,3,5-Triaryl-2-Pyrazoline Derivatives as Potent Dual Inhibitors of Urease and α -Glucosidase Together with Their Cytotoxic, Molecular Modeling and Drug-Likeness Studies, *ACS Omega*, 7, 3775-3795.
- Monga, V., Goyal, K., Steindel, M., Malhotra, M., Rajani, D.P., and Rajani, S.D., 2014, Synthesis and Evaluation of New Chalcones, Derived Pyrazoline and Cyclohexenone Derivatives as Potent Antimicrobial, Antitubercular and Antileishmanial Agents, *Med. Chem. Res.*, 23(4), 2019-2032.
- Mothana, R.A., Arbab, A.H., Gamal, A.A., Parvez, M.K., and Dosari, M.S., 2022, Isolation and Characterization of Two Chalcone Derivatives with Anti-Hepatitis B Virus Activity from the Endemic Socotraen *Dracaena cinnabari* (Dragon's Blood Tree), *Molecules*, 27, 952.
- Nawaz, T., Tajammal, A., Qurashi, W., Nisa, N., Binjawhar, D.N., and Iqbal, M., 2024, Synthesis, Antibacterial, Antibiofilm, and Docking Studies of Chalcones Against Multidrug Resistance Pathogens, *Heliyon*, 30618.
- Nayak, S.P.R.R., Dhivya, L.S., Reshma, R., Almutairi, B.O., Arokiyaraj, S., Kathiravan, M.K., and Arockiaraj, J., 2023, Furan Based Synthetic Chalcone Derivative Functions Against Gut Inflammation and Oxidative Stress Demonstrated In *In-Vivo* Zebrafish Model, *Eur. J. Pharmacol.*, 957, 175994.

- Nehra, B., Rulhania, S., Jaiswal, S., Kumar, B., Singh, G., and Monga, V., 2020, Recent Advancements in the Development of Bioactive Pyrazoline Derivatives, *Eur. J. Med. Chem.*, 205, 112666.
- Nepali, K., Kadian, K., Ojha, R., Dhiman, R., Garg, A., Singh, G., Buddhiraja, A., Bedi, P.M.S., and Dhar, K.L., 2012, Effect of Ring A and Ring B Substitution on The Cytotoxic Potentia of Pyrazole Tethered Chalcones, *Med. Chem. Res.*, 21, 2990-2997.
- Okolo, E.N., Ugwu, D.I., Ezema, B.E., Ndefo, J.C., Eze, F.U., Ezema, C.G., Ezugwu, J.A., and Ujam, O.T., 2021, New Chalcone Derivatives as Potential Antimicrobial and Antioxiandt Agent, *Sci. Rep.*, 11, 2871.
- Ouyang, Y., Li, J., Chen, X., Fu, X., Sun, S., and Wu, Q., 2021, Chalcone Derivatives: Role in Anticancer Therapy, *Biomol.*, 11(6), 894.
- Pise, A.S., Jadhav, S.D., Burungale, A.S., Devkate, S.S., and Gawade, R.B., 2018, Ultrasound Assisted Synthesis of 1,5-Diaryl and 1,3,5-Triaryl-2-pyrazolines by Using KOH/EtOH System with Cu(I) Catalyst, *Asian J. Chem.*, 4(30), 894-896.
- Pranaya, R.C., 2022, Synthesis of Chalcone Derivatives Based on 2-Acetylfruran and Methoxybenzaldehydes and Its Activity Assays as Antimalarial Agent, *Undergraduate Thesis*, 1-67.
- Qin, H., Zhang, Z.W., Lekkala, R., Alsulami, H., and Rakesh, K., 2020, Chalcone Hybrids as Privileged Scaffolds in Antimalarial Drug Discovery: A Key Review, *Euro. J. Med. Chem.*, 193, 112215.
- Rammohan, A., Reddy, J.S., Sravya, G., Rao, C.N., and Zyryanov, G.V., 2020, Chalcone Synthesis, Properties and Medicinal Applications: a Review, *Environ. Chem. Lett.*, 18, 433-458.
- Rashid, H., Xu, Y., Ahmad, N., Muhammad, Y., and Wang, L., 2019, Promising Anti-Inflammatory Effects of Chalcones via Inhibition of Cyclooxygenase, Prostaglandin E2, Inducible NO Synthase and Nuclear Factor K_b Activities, *Bioorg. Chem.*, 87, 335-365.
- Reddy, L., Odhav, B., and Bhoola, K.D., 2003, Natural Products for Cancer Prevention: A Global Perspective, *Pharmacol. Ther.*, 99(1), 1-13.
- Robinson, S.J., Petzer, J.P., Blanche, G.T., Petzer, A., Walt, M.M., Bergh, J.J., and Lourens, A.C.U., 2015, 2-Aminopyrimidines as Dual Adenosine A1/A2A Antagonists, *Eur. J. Med. Chem.* 2(104), 177-188.

- Sakthinathan, S.P., Vanangamudi, G., and Thirunarayanan, G., 2012. Synthesis, Spectral Studies and Antimicrobial Activities of Some 2-Naphthyl Pyrazoline Derivatives, *Spectrochim. Acta A Mol. Biomol. Spectrosc.*, 95, 693–700.
- Salum, K.A., Alidmat, M.M., Khairuldean, M., Kamal, N.N.S.N.M., and Muhammad, M., 2020, Design, Synthesis, Characterization, and Cytotoxicity Activity Evaluation of Mono-Chalcones and New Pyrazolines Derivatives, *J. Appl. Pharm. Sci.*, 10(08), 20-36.
- Shaabaa, M.R., Mayhoub, A.S., and Farag, A.M., 2012, Recent Advances In The Therapeutic Applications of Pyrazolines, *Expert. Opin. Ther. Pat.*, 22(3), 253-291.
- Shaffer, C.V., Cai, S., Peng, J., Robles, A.J., Hartley, R.M., Powell, D.R., Du, L., Cichewicz, R.H., and Mooberry, S.L., 2016, Texas Native Plants Yield Compounds with Cytotoxic Activities against Prostate Cancer Cells, *J. Nat. Prod.*, 79, 531-540.
- Sharma, K., Kumar, A., Prakash, R., Tripathi, A., Singh, R., Bajpai, R., Sahasrabuddhe, A.A., Singh, D., and Narender, T., 2022., Pyrazoline Analogues: Design, Synthesis, and Evaluation of Anti-Osteoporosis Activity, *Bioorganic Med. Chem. Lett.*, 60, 1-7.
- Sharma, M., Sharma, S., Buddhiraja, A., Saxena, A.K., Nepali, K., and Bedi, P.M. S., 2014, Synthesis and Cytotoxicity Studies of 3,5-diaryl N-acetylpyrazoline-isatin Hybrids, *Med. Chem. Res.*, 23, 4337-4344.
- Sharma, P., Kumar, S., Ali, F., Anthal, S., Gupta, V.K., Khan, I.A., Singh, S., Sangwan, P.L., Suri, K.A., Gupta, B.D., Gupta, D.K., Dutt, P.Vishwakarma, R.A., and Satti, N.K., 2013, Synthesis and Biologic Activities of Some Novel Heterocyclic Chalcone Derivatives, *Med. Chem. Res.*, 22, 3969-3983.
- Shashiprabha, Holla, B.S., and Nefisath, P., 2019, Synthesis and Characterization of Chalcones and Pyrazolines derived from Substituted Aryl ether, *Map. J. Sci.*, 2(18), 13-19.
- Shrestha, J., Kim, S.W., Kim, S.B., Oh, Y.S., Ki, S.H., Lee, T., Park, T., Baek, D.J., and Park, E.Y., 2022, Determining the Anticancer Activity of Sphingosine Kinase Inhibitors Containing Heteroatoms in Their Tail Structure, *Pharmaceutics*, 14(1), 15-22.
- Suma, A.A.T., Wahyuningsih, T.D., and Mustofa, 2019. Synthesis, Cytotoxicity Evaluation and Molecular Docking Study of N-Phenylpyrazoline Derivatives, *Indones. J. Chem.*, 19(4), 1081–1090.

- Tanamatayarat, P., Limtrakul, P.N., Chunsakaow, S., and, Duangrat, C., 2003, Screening of Some Rubiaceae Plants for Cytotoxic Activity Against Cervix Carcinoma (KB-3-1) Cell Line, *Thai J. Pharm. Sci.*, 3(4), 167-172.
- Thach, T.D., Nguyen, M.T., Nguyen, A.T., Andg, C.H., Luong, T.B., Andg, V.S., Banh, K.S., Lue, V.S., and Nguyen, T.D., 2021, Synthesis and Antimicrobial, Antiproliferative and Anti-Inflammatory Activities of Novel 1,3,5-Substituted Pyrazoline Sulphonamides, *Arab. J. Chem.*, 14, 1-12.
- Thorn, C.F., Oshiro, C., Marsh, S., Boussard, T.H., McLeod, H., Klein, T.E., and Altman, R.B., 2011, Doxorubicin Pathways: Pharmacodynamics and Adverse Effects, *Pharmacogenet.*, 21(7), 440-446.
- Tseng, C.H., Tzeng, C.C., Chiu, C.C., Hsu, C.Y., Chou, C.K., and Chen, Y.L., Discovery of 2-[2-(5-Nitrofuranyl)vinyl]quinoline Derivatives as A Novel Type of Antimetastatic Agents, *Bioorganic Med. Chem.*, 23, 141-148.
- Viveka, S., Shama, P., Nagaraja, G.K., Ballav, S., and Kerkar, S., 2015, Design and Synthesis of Some New Pyrazolyl-Pyrazolines as Potential Anti-Inflammatory, Analgesic and Antibacterial Agents, *Eur. J. Med. Chem.*, 101, 442-451.
- Wahyuningsih, T.D., Setiawati, Suma, A.A.T., Stansyah, Y.M., and Astuti, E., 2022, Synthesis, Biological Evaluation and Molecular Docking of Methoxy N-Phenylpyrazoline Derivatives as Anticancer Agents, *Pak. J. Pharm. Sci.*, 35(4), 965-972.
- Wu, J., Wu, S., Shi, L., Zhang, S., Ren, J., Yao, S., Yun, D., Huang, L., Wang, J., and Li, W., 2017, Design, Synthesis, and Evaluation of Asymmetric EF24 Analogues as Potential Anti-Cancer Agents for Lung Cancer, *Eur. J. Med. Chem.*, 125, 1321-1331.
- Yadav, C.S., Azad, I., Khan, A.R., Nasibullah, M., Ahmad, N., Hansda, D., Ali, S.N., Shrivastav, K., Akil, M., and Lohani, M.B., 2024, Recent Advances in The Synthesis of Pyrazoline Derivatives from Chalcones as Potent Pharmacological Agents: a Comprehensive Review, *Results Chem.*, 7, 101326.
- Yusuf, M., and Jain, P., 2014, Synthetic and Biological Studies of Pyrazolines and Related Heterocyclic Compounds, *Arab. J. Chem.*, 7, 553-596.
- Zhou, B., Jiang, P., Lu, J., and Xing, C., 2016, Characterization of The Fluorescence Properties of 4-Dialkylaminochalcones and Investigation of The Cytotoxic Mechanism of Chalcones, *Arch. Pharm.*, 349, 539-552.