

## **BAB 5**

### **KESIMPULAN DAN SARAN**

#### **5.1 Kesimpulan**

1. Berdasarkan hasil pada jurnal penelitian Kandungan Kimia pada tanaman Karet kebo (*Ficus elastica*) meliputi fenolik dan flavonoid serta senyawa murni quercitrin, myricitrin, morin, emodin, dan rutin.
2. Berdasarkan hasil pada jurnal penelitian Aktivitas Farmakologi pada tanaman Karet kebo (*Ficus elastica*) berfungsi sebagai antioksidan, antikoagulan, antibakteri, anti-preeklampsia, dan antimikroba.
3. Berdasarkan hasil pada jurnal penelitian menunjukkan adanya korelasi antara Kandungan Kimia dan Aktivitas Farmakologi pada tanaman Karet kebo (*Ficus elastica*) yakni adanya kandungan fenolik dan flavonoid dimana memiliki senyawa murni quercitrin, myricitrin, morin, emodin, dan rutin yang paling banyak dianalisis sebagai antioksidan dan antibakteri.

#### **5.2 Saran**

Penelitian selanjutnya perlu dilakukan studi literatur tanaman Karet kebo (*Ficus elastica*) dengan menggunakan rentang tahun terbit lebih panjang untuk mengetahui penelitian terbaru mengenai kandungan kimia dan aktivitas farmakologi dari tanaman Karet kebo (*Ficus elastica*).

## DAFTAR PUSTAKA

- Almahy, H.A., Rahmani, M., Sukari, M.A., & Ali, A.M., 2003, Investigation of Chemical Constituent of the Leaves *Ficus elastica* Roxb. and Their Antimicrobial Activity, *Pertanika Journal Sciences and Technology I*, **11(1)**: 57-63.
- Ambreen, S., Tariq, M., Masoud, M. S., Ali, I., Qasim, M., Mushtaq, A. Ahmed, M. and Asghar R., 2019, Anticoagulant Potential and Total Phenolic Content of Six Species of The Genus *Ficus* from Azad Kashmir, Pakistan, *Tropical Journal of Pharmaceutical Research* June 2019, **18(6)**: 1245-1251.
- Arif, H.S., 2013, 'Potensi Biolarvasida Ekstrak Etanol Kulit Batang Karet India (*Ficus elastica* Nois Ex Blume) dan Uji Toksisitasnya dengan Metode Brine Shrimps Lethality Test', *Skripsi*, Sarjana Farmasi, Universitas Muhammadiyah Surakarta, Surakarta.
- Ashok P.K. and Upadhaya K., 2012, Tannins are Astringent, *Journal of Pharmacognosy and Phytochemistry*, No: 8192, Uttarakhand, India.
- Backer, A and Van Den Brink, B., 1965, *Flora of Java (Spermatophytes Only)*, Vol. 1, N.V.P. The Netherlands, Noordhoff-Groningen.
- Baraja, M., 2008, Uji Toksisitas Ekstrak Daun *Ficus elastica* Nois ex Blume terhadap *Artemia salina* Leach dan Profil Kromatografi Lapis Tipis, *Skripsi*, Fakultas Farmasi Universitas Muhammadiyah Surakarta, Surakarta.
- Bhawana, R., Kaur, J., Vig, A.P., Arora, S., Kau, R., 2018, Evaluation of Antibacterial Potential of *Ficus* species.
- Chairul, 2003, Identifikasi Secara Cepat Bahan Bioaktif Pada Tumbuhan di Lapangan, *Berita Biologi* **6(4)**: 621-630.
- Dalimartha, S., 2008, *Atlas Tumbuhan Obat Indonesia jilid 5*, Pustaka Bunda, Jakarta.
- Dalimartha, S., 2009, *Atlas Tumbuhan Obat Indonesia jilid 6*, Pustaka Bunda, Jakarta.

- De Padua *et al.* 1999. Senyawa Kimia. Diakses pada 23 September 2019, <http://www.tempo.co.id/medica/arsip/122002/art-3.htm>.
- Departemen Kesehatan Republik Indonesia, 1989, *Materia Medika Indonesia*. Jilid V, Direktorat Jenderal Pengawasan Obat dan Makanan, Jakarta.
- Dewoto, H. 2007, Pengembangan Obat Tradisional Indonesia Menjadi Fitofarmaka, Departemen Farmakologi, Fakultas Kedokteran Universitas Indonesia. *Majalah Kedokteran Indonesia*, **57(7)**: 205-211.
- Dwiyani, R. 2013, *Mengenal Tanaman Pelindung di Sekitar Kita*, Udayana University Press, Denpasar.
- El-Hawary, S.S., Wassel, G.M., El-Menshawy, B.S., Ibrahim, N.A., Mahmoud, K., & Ayoub, M.M., 2012, Antitumor and Antioxidant Activity of *Ficus elastica* Roxb. and *Ficus bengalensis* Linn. Family Moraceae, *World Applied Sciences Journal*, **19(11)**: 1532-1539.
- Elhawary, S.S., Younis, I.Y., El-Bishbishy, M.H., Khattab, AR., 2018, LC–MS/MS-based chemometric analysis of phytochemical diversity in 13 *Ficus* spp. (Moraceae): Correlation to their in vitro antimicrobial and in silico quorum sensing inhibitory activities.
- El-Sayed A.A., 2017, Preeclampsia: A review of the pathogenesis and possible management strategies based on its pathophysiological derangements, *Taiwan J Obstet Gynecol*, **56**:593.
- Firman, H., 2005, Peranan Kegiatan piloting IMSTEP dalam peningkatan profesionalisme, *Exchange Experiences IMSTEP Working Group Conference*, Universitas Negeri Malang, Malang.
- Fong, H.S. 1978. *Phytochemical Screening*. Department of Pharmacognosy and Pharmacology, College of Pharmacy, University of Illinois at the Medical Center, Chicago.
- Friedman J.M., 2006, ACE inhibitors and congenital anomalies. *N Engl J Med*, **354**:500-2498.

- Ginting, C. N., Lister, I. N. E., Girsang, E., Riastawati, D., Kusuma, H. S. W. Dan Widowati, W., 2020, Antioxidant Activities of *Ficus elastica* Leaves Ethanol Extract and Its Compounds, *Mol Cell Biomed Sci*, **4(1)**: 27-33.
- Ginting, C. N., Lister, I. N. E., Girsang, E., Putri, Y. E., Mutia, M. S., Purba, R., Widowati, W., Wibowo, S. H. B. dan Rizal, R., 2020, *In silico* Anti-Preeclampsia Potential of Phytochemical Found in *Ficus elastica*, *Pharmacognoc Research*, **11(3)**: 279-282.
- Handayani, S., Kurniawati, I. dan Rasyid, F. A., 2020, Uji Aktivitas Antioksidan Ekstrak Daun Karet Kebo (*Ficus elastica*) dengan Metode Peredaman Radikal Bebas DPPH (1,1-Diphenyl-2-Picrylhydrazil), *Jurnal Farmasi Galenika (Galenika Journal of Pharmacy)* (e-Journal), **6(1)**: 141 – 150.
- Harborne, J.B., 1987, *Metode Fitokimia: Penuntun Cara Modern Menganalisis Tumbuhan*, Institut Teknologi Bandung, Bandung.
- Hari, B.N.V., Kumar, P.S. & Devi, D.R., 2011, Comparative in-vitro anthelmintic activity of the latex of *Ficus religiosa*, *Ficus elastica* and *Ficus bengalensis*, *Jurnal of Phytology*, **3(3)**: 26-30.
- Hasborne, 1973, Banso A, Adeyemo SO. Evaluation of Antibacterial Properties of Tannins Isolated from *Dichrostachys cinerea*, *African Journal of Biotechnology*, **6(15)**: 1785-1787.
- Hassan, H.A., Abdelwahab, S.F., Desoukey S.Y., Mohammed, K.M., Mohammed, 2019, Comparative Study of Antimicrobial Activity of Seven *Ficus* Species Cultivated in Egypt, *Indian Journal of Public Health Research and Development*, **10(11)**.
- Hilal, A.H. dan Alabri, S.S., 2013, Using NVIVO for Data Analysis in Qualitative Research, *International Interdisciplinary Journal of Education*, Vol 2.
- Hoan, T.T., Rahardja, K., 2002, Obat-obat Penting: Khasiat, Penggunaan dan Efek-efek Sampingnya, PT. Elek Media Komputindo, Jakarta.
- Jenkins, G.L., 1957, *The Chemistry of Organic Medical Products*, 4<sup>th</sup> ed. *Chapman and Hall, LTD*, New york, pp 320.

- Kambizi, L., Afolayan, A.J., 2008, Extracts from *Aloe ferox* and *Withania somnifera* inhibit *Candida albicans* and *Neisseria gonorrhoea*, *African J Biotech* **7**: 12-15.
- Kuete, V., Kamga, J., Sandjo, L. P., Ngameni, B., Poumale, H. M. P., Ambassa, P., and Ngadjui, B. T., 2011, Antimicrobial activities of the methanol extract, fractions and compounds from *Ficus polita* Vahl. (Moraceae). *BMC Complementary Altern. Med.* **11**: 1-6.
- Lenny S., 2006. Senyawa Flavonoida, Fenil Propanoida dan Alkaloida. *Karya Ilmiah*. Fakultas MIPA. Universitas Sumatera Utara, Medan.
- Lestari M.H.S. 1989, 'Isolasi dan Identifikasi Senyawa Golongan Flavonoid dari Daun *Bauhinia purpurea* Linn', *Skripsi*, Sarjana Farmasi, Universitas Airlangga, Surabaya.
- Lisdawati, V., 2002, Buah Mahkota Dewa-Toksisitas, Efek Antioksidan, dan Efek Anti Kanker Berdasarkan Uji Penapisan Farmakologi. Diakses pada 22 Juni 2020, <http://www.mahkotadewa.com/>.
- Liu L., Duan JA., Tang Y., Guo J., Yang N., Ma H. and Shi X., 2012, Taoren–Honghua herb pair and its main components promoting blood circulation through influencing on hemorheology, plasma coagulation and platelet aggregation, *Journal of Ethnopharmacology*, **139(2)**: 381-387.
- Makris, D.P., Kallithraka, S., Kefalas, P., 2006, 'Flavonols in grapes, grape products and wines: Burden, profile and influential parameters', *J. Food Compos. Anal.* **19**: 396–404.
- Marliana, S.D., Suryanti,V., dan Suyono, 2005. Skrining fitokimia dan analisis kromatografi lapis tipis komponen kimia buah labu siam (*Sechium edule* Jacq. Swartz.) dalam ekstrak etanol, *Biofarmasi*, **3(1)**: 26-31.
- Mbosso, E.J.T., Nguedia, J.C.A., Meyer, F., Lenta, B.N., Ngouela, S., Lallemand, B., Mathieu, V., Antwerpen, P.V., Njunda, A.L., Adiogo, D., Tsamo, E., Looze, Y., Kiss, R. and Wintjens, R., 2012, Ceramide, cerebroside and triterpenoid saponin from the bark of aerial roots of *Ficus elastica* (Moraceae), *Phytochemistry*, **83**: 95-103.

- Middleton, E., Kandaswami, C. Dan Theoharides, T.C., 2000, The effects of plant flavonoids on mammalian cells: implications for inflammation, *Heart Disease and Cancer*, **52**: 673-751.
- Moleong, L.J., 1996, Metodologi Penelitian Kualitatif Terjemahan oleh Tjun Surjaman, PT Remaja Rosdakarya, Bandung.
- Nitiema LW., Savadogo, A., Simpore, J., Dianou, D. And Traore, AS., 2012, In Vitro Antimicrobial Activity of Some Phenolic Compound (Coumarin and Quercetin) Against Gastroenteritis Bacterial Strains, *International Journal of Microbiology Research*, **3(3)**: 183-187.
- Nuria M.C., dan Faizatun, A., 2009. Uji Aktivitas Antibakteri Ekstrak Etanol Daun Jarak Pagar (*Jatropha curcas* L) Terhadap Bakteri *Staphylococcus aureus* ATCC 25923, *Escherichia coli* ATCC 25922, Dan *Salmonella typhi* ATCC 1408, *Mediagro*, **5(2)**: 26–37.
- Nurviana, V., Tuslinah, L. dan Susanti. 2019, Antioxidant Activity of Methanolic Extract of *Ficus elastica* L. Leaves, *Advances in Health Sciences Research*, **26**: 53-56.
- Panche, A.N., Diwan, A.D., Chandra, S.R., 2016, ‘Flavonoids: an overview’, *J. Nutr. Sci*, **5**: e47.
- Pothitirat, W., Chomnawang, M.T., Gertsanapan, W., 2009, Free Radical and Anti-Acne Activities of Mangosteen Fruit Rind Extracts Prepared by Different Extraction Methods, *Pharmaceutical Biology*, **48(2)**: 182-186.
- Rakhmawati, I.A. dan Alifia, N.N., 2018, Kajian kemampuan self-efficacy matematis siswa dalam pemecahan masalah matematika, *Jurnal Pembelajaran Matematika* **5(1)**.
- Ratnaningtyas, W., 2008., Formulasi Tablet Kunyah Ekstrak Rimpang Temu Putih (*Curcuma zedoaria* [Berg] Roscoe ) dengan Kombinasi Bahan Pengisi Sorbitol-Laktosa. Akses 22 Juni 2017, <http://etd.eprint.ums.ac.id/977/1/K100040087>.
- Robinson, T. 1995, *Kandungan Organik Tumbuhan Tinggi*, ITB, Bandung.

- Rohman, A., Riyanto S., Yuniarti N., Saputra W.R., Utami R. dan Mulatsih W., 2010, Antioxidant Activity, Total Phenolic and Total Flavaonoid of Extracts and Fractions of Red Fruit (*Padanus conoideus* Lam), *International Food Research Journal*, **17**: 97-106.
- Saeed, A., Iqbal, Z., Gulzar, Z., Hai, Z., Akram, M., Liaqat, L., dan Khalil, H. I., 2017, GC-FID and Physicochemical Studies of Oil From The Leaves of *Ficus elastica* Linn., *World Journal of Pharmaceutical Research*, **6(1)**: 47-53.
- Saeed, A., Iqbal, Z., Khalil, H.I., Hai, Z., Akram, M., Liaqat, L., Tara, Z., Mansha, M. and Gulzar, Z., 2017 Fatty Acid Profile of Aerial Roots of *Ficus elastica*, *World Journal Research*, **6(8)**: 54-60.
- Saifudin, A., Rahayu, dan Teruna, 2011, *Standardisasi Bahan Obat Alam*, Edisi Pertama, Graha Ilmu, Yogyakarta.
- Sanchez-Aranguren L.C., Prada C.E., Riano-Medina C.E. and Lopez M., 2014, Endothelial dysfunction and preeclampsia: Role of oxidative stress, *Front Physiol* **5**:372.
- Sari, L. 2006, Pemanfaatan Obat Tradisional dengan Pertimbangan Manfaat dan Keamanannya, *Majalah Ilmu Kefarmasian*, **3(1)**: 1-7.
- Schechter, I., Barzilai, I. L., and Bulatov, V., 1997, Online Remote Prediction of Gasoline Properties by Combined Optical Method, *Ana.Chim.Acta*, **339**: 193-199.
- Setiawan, A.R., 2017, 'Kajian Inhibisi Ekstrak Etanol Daun Bandotan (*Ageratum conyzoides* L.) dan Daun Karet Kebo (*Ficus elastica*) terhadap Aktivitas Protease Ekstrak Getah Pepaya', *Skripsi*, Sarjana Farmasi, Universitas Al-Ghifari, Bandung.
- Setyowati E.A.W., Ariani, S.R.D., Ashadi, M.B. dan Rahmawati, C.P., 2014, Skrining Fitokimia dan Identifikasi Komponen Utama Ekstrak Metanol Kulit Durian (*Durio zibethinus* Murr.) Varietas Petruk, Seminar Nasional Kimia dan Pendidikan Kimia, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Sebelas Maret, Surakarta.

- Sirisha N., Sreenivasulu M., Sangeeta K. and Chetty C. M., 2010, Antioxidant properties of *Ficus* species-a review, *International journal of pharmtech research* **2(4)**: 2174-2182.
- Soetan K.O. dkk., 2006. Evaluation of the Antimicrobial Activity of Saponins Extract of *Sorghum Bicolor* L. Moench, *African Journal of Biotechnology*, **5(23)**: 2405-2407, Ibadan, Niger ISSN 1684-5315.
- Tkachenko, H., Buyun, L., Terech-Majewska, E., Honcharenko, V., Prokopiv, A., Osadowski, Z., 2019, Preliminary *in vitro* screening of the antibacterial activity of leaf extracts from various *Ficus* species (Moraceae) against *Yersinia ruckeri*, *Fisheries and Aquatic Life*, **27**: 15 – 26.
- Teinkela, JEM., Noundou, XS., Fannang, S., Meyer, F., Vardamides, JC., Mpondo, EM., Krause, RWM., Azebaze, AGB., Nguedia, JCA., 2017, In vitro antimicrobial activity of the methanol extract and compounds from the wood of *Ficus elastica* Roxb. ex Hornem. aerial roots, *Saudi Journal of Biological Sciences*, **25**: 117–122.
- Tsuchiya, H., 2010, 'Structure dependent membrane interaction of flavonoids associated wiith their bioactivity' *Food Chemistry*, **120**: 1089-1096.
- Wairata, J., Matsjeh, S., dan Haryadi, W., 2013, Isolasi dan Identifikasi Senyawa Terpena Hasil Pirolisis Getah Karet Alam (*Hevea brasiliensis*), *Departement of Chemistry*, Fakultas Matematika dan Sains Universitas Gadjah Mada, Yogyakarta.
- Waji, R.A. dan Sugrani, A., 2009, 'Flavonoid (Quercetin)', *Sarjana Kimia*, Universitas Hasanuddin.
- Warisno, 2003, *Budidaya Karet kerbau*, Kanisius, Yogyakarta.
- Widowati, W., 2007, 'Potensi fraksi aktif antioksidan kacang koro (*Mucuna pruriens*) dalam pencegahan aterosklerosis', *Laporan Hasil Penelitian Hibah Bersaing Tahun Anggaran 2007/2008*, Universitas Katolik Soegijapranata, Semarang.
- Winarsi, H., 2007, *Antioksidan Alami dan Radikal Bebas*, Kanisius, Yogyakarta.



- Xie P., Cui L., Shan Y. and Kang W.Y., 2017, Antithrombotic effect and mechanism of radix paeoniae rubra, *Biomed Res Int*.
- YPKKI [Yayasan Pemberdayaan Konsumen Kesehatan Indonesia], 2012. Diakses 23 September 2019, <http://www.tempo.co.id>.
- Young B.C., Levine R.J. and Karumanchi S.A., 2010, Pathogenesis of Preeclampsia, *Annu Rev Pathol*, **5**:92-173.
- Youngken, H. W., 1951, 'Pharmaceutical Botany Ed. 7 Part III', *The Blakistone Co.*, Phildelphia-Toronto, pp 490.
- Zuhri, S. Dan Nurhaini, R. 2019. Uji efektivitas antibakteri ekstrak etanol daun karet kerbau (*Ficus elastica* Roxb. Ex Hornem.) terhadap bakteri *Staphylococcus aureus*, *Jurnal Ilmu Kesehatan*, **14**: 58-70.