

BAB VI

KESIMPULAN DAN SARAN

6.1 Kesimpulan

Berdasarkan hasil penelitian yang telah dilakukan, maka dapat diambil kesimpulan sebagai berikut

1. Senyawa metabolit sekunder hasil isolasi dari umbi *Dioscorea hispida* diduga termasuk golongan senyawa non fenolik.
2. Uji aktivitas antioksidan terhadap radikal DPPH dari subfraksi 2 dan 3 ekstrak metanol umbi *Dioscorea hispida* memiliki nilai IC₅₀ masing-masing sebesar 228,396 ppm dan 433,266 ppm. Hal ini menunjukkan bahwa subfraksi ekstrak tersebut berpotensi sebagai antioksidan.
3. Uji aktivitas antikanker terhadap sel kanker A549 dari ekstrak methanol, subfraksi 1, subfraksi 2 dan subfraksi 3 *Dioscorea hispida* masing-masing memberikan nilai IC₅₀ yang lebih kecil yaitu 38,92; 22,21; 44,45; dan 20,69 ppm dibandingkan dengan aktivitas antikanker terhadap sel HeLa dan sel T47D (>100 ppm).

6.2 Saran

Mengingat keterbatasan sampel dalam proses pemisahan hingga karakterisasi penentuan struktur dan uji bioaktivitas serta tingginya kemungkinan untuk menemukan senyawa baru dan memiliki potensi antioksidan dan antikanker yang tinggi, maka disarankan untuk menggunakan teknik pemisahan yang lain seperti soxhlet atau yang lainnya .

DAFTAR PUSTAKA

- Abbasi, A. M., Shah, M. H., Liu, R. H., & Guo, X. 2004. Ethnomedicinal values, phenolic contents and antioxidant properties of wild culinary vegetables. *Journal of Ethnopharmacology*, 1-13.
- Adesanya, S. A., Ogundana, S. K., & Roberts, M. F. 1989. Dihydrostilbene phytoalexins of *Dioscorea bulbifera* and *D. dumentorum*. *Phytochemistry*, 28(3), 773-774.
- Albert, B. 1994. *Molecular Biology of the Cell*. 3th ed. New York and London: Garland Publisher. Inc.
- Bhandari, M. R., & Kawabata, J. 2005. Bitterness and toxicity in wild yam (*Dioscorea* spp.) tubers of Nepal. *Plant Food for Human Nutrition*, 60, 129-135.
- Burdall, S.E., Hanby, A.M., Lansdown, M.R.J., Speirs, V. 2003. Breast cancer cell lines : friend or foe?, *Breast Cancer Res.*, 5, 89–95.
- Centers for Disease Control and Prevention., 2014, *Keperawatan Medikal Bedah: Manajemen Klinis untuk Hasil yang Diharapkan* (8th edisi), Singapore: Elsevier.
- Chaudhary S. 2015. Evaluation of antioxidant and anticancer activity of extract and fractions of *Nardostachys jatamansi* DC in breast carcinoma. *BMC Complementary and Alternative Medicine* 15:50. DOI : 10.1186/s12906-015-0563-1.
- Chiu, C. S., Deng, J. s., Chang, H. y., Chen, Y. C., Lee, M. M, Hou, W. C., et al. 2013. Antioxidant and anti-inflammatory properties of Taiwanese yam (*Dioscorea japonica* Thunb. Var. *pseudojaponica* (Hayata) Yamam.) and its reference compounds. *Food Chemistry*, 141, 1087-1096.
- Classification for Kingdom Plantae Down to Species *Dioscorea hispida* Dennst. Dipetik pada tanggal 25 November 2016 dari *United States Department of Agriculture (USDA) Natural Resources Conservation Service*. <http://www.plant.usda.gov>
- Cooper, G. M. 2000. *The Cell: A Molecular Approach* (2nd ed.). Sunderland (MA). Sinauer Associates.
- Dai, J dan Mumper, RJ. 2010. Plant Phenolics: Extraction, Analysis and Their Antioxidant and Anticancer Properties. *J mol* 15,7313. Doi :10.3390/molecules 15107313.
- Dong, S. H., Cai, G., Napolitano, J. G., Nikolic, D., Lankin, D. C., McAlpine, J. B., et al. 2013. Lipped steroid saponins from *Dioscorea villosa* (wild yam). *Fitoterapia*, 91, 113-124.

- Doyle, A dan Griffiths, JB. 2000. *Cell and Tissue Culture for Medical Research*. New York : John Wiley and Sons Ltd.
- Farida, K. 2010. *Kanker Payudara dan Masektomi pada Pengidapnya*, Jurnal Pembelajaran, 3, 34-38.
- Fagboun, D. E., Ogundana, S. K, Adesyana, S. A., & Roberts, M. F. 1987. Dihydrostilbene phytoalexins from *Dioscorea rotundata*. *Phytochemistry*, 26(12), 3187-3189.
- Freshney, R. I. 1986. *Animal Cell Culture: A Practical Approach*, 1st edition. IRL Press. Washington DC.
- Green, R. 2004. Antioxidant Activity of Peanut Plant Tissues. Raleigh: North Caroline State University.
- Gurav, S, Deshkar, N., Gulkari, V., Duragkar, N., & Patil, A. 2007. Free radical scavenging activity of *Polygala chinensis* Linn. *Pharmacologyonline*, 2, 245-253.
- Halliwell, JB. and JM. Gutteridge. 1999. *Free Radicals in Biology and Medicine*. Third Edition. Oxford University Press Inc., New York. p. 23–31, 105–115.
- Hapsari, R. T. 2014. Prospek uwi sebagai pangan fungsional dan bahan diversifikasi pangan. *Bulletin Palawija*, 27(2), 26-38.
- Haraguchi, M., Dos Santos, A. Z., Marx Young, M. C., & Chu, E. P. 1994. Steroidal prosapogenins from *Dioscorea olfersiana*. *Phytochemistry*, 36(4), 1005-1008.
- Harwood, L. M., Moody, C. J., & Percy, J. M. 1999. *Experimental Organic Chemistry*. Berlin: Iowa State University Press.
- Hoyer, G. A., Sucrow, W., & Winkler, D. 1975. Diosgenin saponins from *Dioscorea floribunda*. *Phytochemistry*, 14(2), 539-542.
- Ignatavicius, D. D., Workman, M. L. & Winkelmann. C., 2016, *Medical Surgical Nursing: Patient-Centered Collaborative Care* (8th Ed.), St. Louis, Missouri; Elsivier.
- Itharat, A., Thongdeeying, P., & Runagnoo, S. 2014. Isolation and characterization of a new cytotoxic dihydrophenanthrene from *Dioscorea membranacea* rhizomes and its activity against five human cancer cell lines. *Journal of Ethnopharmacology*, 156, 130-134.
- Jing, S. S., Wang, Y., Yan, Y. M., Li, X, Li, X, J., Zhao, C. C., et al. 2016. Diocollettines A, an unusual tricyclic diarylheptanoid derivative from the rhizomes of *Dioscorea colletti*. *Tetrahedron Letters*, 1-10.

- Jun, M.H.Y., J., Fong, X., Wan, C.S., Yang, C.T., Ho. 2003. Comparison of Antioxidant Activities of Isoflavones Form Kudzu Root (*Pueraria labata* O). *J Food Sci Institute Technol.* 68:2117-2122.
- Kaku, K., 2010, Pathophysiology of Type 2 Diabetes and Its Treatment Policy *Japan Medical Association*, 53(1). 41-46.
- Khardoni, R., 2016a, Type 2 Diabetes Mellitus. *Practice Essentials*.
- Kim, J. S. 2005. Radical scavenging capacity and antioxidant activity of the E vitamer fraction in rice bran. *Journal of Food Science*, 70(3), 208-213.
- Koleva, I. I., Beek, T. A., Linssen, J. P., Groot, A. d., & Evstatieva, L. N. 2002. Screening of Plant extract for antioxidant activity: a comparative study on three testing methods. *Phytochemical Analysis*, 13, 8-17.
- Koswara, S. 2015. Teknologi Pengolahan Umbi-Umbian. Dalam *Bagian : Pengolahan Umbi Gadung* (hal. 1-9). Bogor: Bogor Agriculture University.
- Kristanti, A. N., Aminah, N. S., Tanjung, M., & Kurniadi, B. 2008. Buku Ajar Fitokimia. Surabaya: Airlangga University Press.
- Kumoro, A. C., & Hartati, I. 2015. Microwave assisted extraction of dioscorin from Gadung (*Dioscorea hispida* Dennst) Tuber Flour. *Procedia Chemistry*, 14, 47-55.
- Labibah, Q., 2017, Isolasi dan Identifikasi Senyawa Fenolik Fraksi Etil Asetat dari Kulit Umbi Gadung (*Dioscorea hispida* Dennst) Serta Uji Aktivitas Antioksidan Terhadap DPPH, *Tesis*, Fakultas Sains dan Teknologi Universitas Airlangga, Surabaya.
- Lewis, S. L., Dirksen, S. R., Heitkemper, M. M. & Bucher, L., 2014, *Medical Surgical: Assessment and management of clinical problems*, St. Louis, Missouri: Elsevier/Mosby.
- Lingga L. 2012. *The Healing Power of Antioxidant*. Jakarta: PT. Elex Media Komputindo.
- Liu, H., Chou, G. X., Guo, Y. L., Ji, L. L., Wang, J. M., & Wang, Z. T. 2010. Norclerodane diterpenoids from rhizomes of *Dioscorea bulbifera*. *Phytochemistry*, 71, 1174-1180.
- Liu, X. T., Wang, Z. Z., Xiao, W., Zhao, H. W., Hu, J., & Yu, B. 2008. Cholestane and spirostanol glycosides from the rhizomes of *Dioscorea septemloba*. *Phytochemistry*, 69, 1411-1418.
- Lü , J. M., Lin, P., & Chen, C. 2010. Chemical and molecular of anti-oxidants : Experimental approaches and model systems. *Journal of Cellular and Molecular Medicine*, 14(4), 840-860.

- Luo, D., 2013. Structural investigation of polysaccharide (DMB) purified from *Dioscorea nipponica* Makino, *Carbo Pol*, 12, 144-8617.
- Matias, M., Campos, G., Santos, A. O., Falcao, A., Silvestre, S., Alves, G. 2017. Synthesis, in vitro evaluation and QSAR modelling of potential antitumoral 3,4-dihydropyrimidin-2-(1H)-ton, *Arab. J. of Chem.*, 1-17.
- Meiyanto, M., Kudo, G., Lee, Y., Yang, T.J., Gelboin, H.V., Gonzalez, F.J., 1999, Targeted Disruption of the Microsomal Epoxide Hydrolase Gene, *The Journal of Biological Chemistry*, 274, 23963-23968.
- Min, M. A., Jiang, Z. Z., Ruan, J. L., & Zhang, L. Y. 2011. Toxicity of a diterpene lactone isolated from *Dioscorea bulbifera* on hepatocytes. *Chinese Journal of Natural Medicines*, 9(4), 280-285.
- Molyneux, P. 2004. The use of the stable free radical diphenylpicrylhydrazyl (DPPH) for estimating antioxidant activity. *Songklanakarin J. Sci. Technol.*, 26(2), 211-219.
- Mosmann, T., 1983, Rapid Colorimetric Assay for Cellular Growth and Survival : Application to Proliferation and Cytotoxicity Assays, *Journal of Immunological Method*, 65, 59-65.
- Murugan, M., & Mohan, V. R. 2012. In vitro antioxidant studies of *Dioscorea esculenta* (Lour) Burkill. *Asian Pasific Journal of Tropical Biomedicine*, S1620-S1624.
- Muti'ah, R. 2014. *Pengembangan Fitofarmaka Antikanker*, Malang : UIN Maliki Press, 22-24.
- National Cancer Institute. 2001. *Measuring Cancer Death*. <http://www.cancer.gov/csr>. Diakses Oktober 2019
- Noorhajati, H. 2014. Aktivitas antioksidan ekstrak kulit batang trengguli (*Cassia fistula*) dengan uji DPPH. *Prosiding Seminar Nasional Sains dan Pendidikan Sains IX*, 5(1), 467-471.
- Ozo, O., Caygill, J., & Coursey, D. 1984. Phenolics of five yam (*Dioscorea*) species. *Phytochemistry*, 23(2), 329-331.
- Pambayun, R. 2007. Kiat Sukses Teknologi Pengolahan Umbi Gadung. Yogyakarta: Ardana Media.
- Purnomo, Daryono, B. S., Rugayah, Issirep. 2012. Studi Etnobotani *Dioscorea* spp. (*Dioscoreaceae*) dan Kearifan Budaya Lokal Masyarakat di Sekitar Hutan Wonosadi Gunung Kidul Yogyakarta. *Jurnal Natur Indonesia*, 14(3), 191-198.
- Rahman, A.U., Choudhary, M.I., Thomsen, W.J. 2001. *Bioassay Techniques for Drug Development*. Amsterdam, The Netherlands : Harwood Academic Publishers. 30-31.

- Rakotobe, L., Mambu, L., Deville, A., Dubost, L., Jeannoda, V., Rakoto, D., et al. 2010. Clerodane and 19-norclerodane diterpenoids from the tubers of *Dioscorea antaly*. *Phytochemistry*, 71, 1007-1013.
- Rakotobe, L., Mambu, L., Deville, A., Dubost, L., Jeannoda, V., Rakoto, D., et al. 2010. Clerodane and 19-norclerodane diterpenoids from the tubers of *Dioscorea antaly*. *Phytochemistry*, 71, 1007-1013.
- Ramadhan, R, Phuwapraisirisan, P. 2015. New arylalkanones from *Horsfieldia macrobotrys*, effective antidiabetic agent concomitantly inhibiting α -glucosidase and free radicals, *Bioorganic & Medicinal Chemistry Letter*, (25) 4529-4533.
- Risky TA, Suyatno. 2014. Aktivitas Antioksidan dan Antikanker Ekstrak Metanol Tumbuhan Paku *Adiantum philippensis* L. *J UNESA Chem* 3 No. 1.
- Riss, T.L., Moravec, R.A., Niles, A.L., Benink, H.A., Worzella, T.J., Minor, L. 2013. *Cell Viability Assay*, in Sittampalam GS, Coussens NP, Brimacombe K, et al. (Editor), *Assay Guidance Manual*, Eli Lilly & Company and the National Center for Advancing Translational Science, Bethesda.
- Sasikumar, J. M., Maheshu, V., Jayadev, R. 2009. In vitro antioxidant activity of methanolic extract of *Berberis tinctoria* Lesh. root and root bark. *Journal of Herbal Medicine Toxicology*, 32(3), 53-58.
- Sharma, O. P., & Bhat, T. K. 2009. DPPH antioxidant assay revisited. *Food Chemistry*, 113, 1202-1205.
- Sim, K.S., Sri, A.M., Norhanom, W. 2010. Phenolic content and antioxidant activity of crude and fractionated extracts of *Pereskia bleo* (Kunth) DC. (Cactaceae). *Afri J Pharm and Pharmacol*. 4. 193-201.
- Sloane, D. 2009. Cancer epidemiology in the united states : racial, social, and economic factors, *Methods Mol. Bio.*, 471, 65-83.
- Son, H.L., Anh, N.P. 2013. Phytochemical composition, in vitro antioxidant and anticancer activities of quercetin from methanol extract of *Asparagus cochinchinensis*. *Academic Journal*. 7 (46): 3360-3366.
- Sumunar, S. R., & Estiasih, T. 2015. Umbi gadung (*Dioscorea hispida* Dennst) sebagai bahan pangan yang mengandung senyawa bioaktif. *Jurnal Pangan dan Agroindustri*, 3(1), 108-112.
- Sunder, R., Rangaswami, S., & Reddy, G. 1978. A new dihydrophenanthrene from *Dioscorea decipiens*. *Phytochemistry*, 17, 1067.
- Teponno, R. B., Tapondjou, A. L., Gatsing, D., Djoukeng, J. D., Mansour, E. A., Tabacchi, R., et al. 2006. Bafoudiosbulbins A, and B, two anti-salmonellal clerodane diterpenoids from *Dioscorea bulbifera* L. var sativa. *Phytochemistry*, 67, 1957-1963.

- Tewtrakul, S., Itharat, A. 2007. Anti-allergic substances from the rhizomes of *Dioscorea membranacea*. *Bioorg and Med Chem*, 14. 8707-8711.
- Theerasin, S., & Baker, A. 2009. Analysis and identification of phenolic compounds in *Dioscorea hispida* Dennst. *Asian Journal of Food And Agro-Industry*, 2(4), 547-560.
- Wattanapitayakul SK, Chularojmontri I, Herunsalee A, Charuchongkolwongse S, Niumsakul S, Bauer JA. 2005. Screening of antioxidants from medicinal plants for cardioprotective effect against doxorubicin toxicity. *Basic and Clinical Pharmacology and Toxicology*. 96:80.
- Winarsi H. 2007. *Antioksidan Alami Dan Radikal Bebas*. Yogyakarta: Kanisius.
- Woo, K. W., Kwon, O. W., Kim, S. Y., Choi, S. Z., Son, M. W., Kim, K. H., et al. 2014. Phenolic derivatives from the rhizomes of *Dioscorea nipponica* and their anti-neuroinflammatory and neuroprotective activities. *Journal of Ethnopharmacology*, 155, 1164-1170.
- Woo, K. W., Moon, E., Kwon, O. W., Lee, S. O., Kim, S. Y., Choi, S. Z., et al. 2013. Anti-neuroinflammatory diarylheptanoids from rhizomes of *Dioscorea nipponica*. *Bioorganic & Medicinal Chemistry Letters*, 23, 3806-3809.
- Yang, M. H., Yoon, K. D., Chin, Y. W., Park, J. H., & Kim, J. 2009. Phenolic compounds with radical scavenging and cyclooxygenase-2 (COX-2) inhibitory activities from *Dioscorea opposita*. *Bioorganic & Medicinal Chemistry*, 17, 2689-2694.
- Zhang, Y., Yu, H. Y., Chao, L. P., Qu, L., Ruan, J. Y., Liu, Y. X., et al. 2016. Anti-inflammatory steroids from the rhizomes of *Dioscorea septemloba*. China: Tianjin.