

BAB V

PENUTUP

5.1 Kesimpulan

Berdasarkan hasil penelitian yang telah dilakukan maka dapat disimpulkan bahwa ekstrak metanol biji kopi pinogu (*Coffee canephora var. Robusta*) mengandung senyawa asam klorogenat. Hal ini dapat diketahui dari hasil analisis menggunakan metode *Liquid chromatography–mass spectrometry* (LC-MS) yang menunjukkan waktu retensi 1 menit 34 detik dan pola fragmentasi berdasarkan berat molekul dari senyawa asam klorogenat yaitu 381 m/z.

5.2 Saran

Perlu dilakukan penelitian lebih lanjut mengenai kadar senyawa asam klorogenat yang terdapat dalam biji kopi pinogu (*Coffee canephora var. Robusta*) menggunakan metode *Liquid chromatography–mass spectrometry* (LC-MS).

DAFTAR PUSTAKA

- AAK. 1988. *Budidaya Tanaman Kopi*. Penerbit Kanisius. Yogyakarta.
- Castelnouvo, Giesepppe, Lacoviello dan Gaetona. 2012. Consumption of Cococa, Tea and Coffee and Risk Cardiovascular Disease. *Europen Journal of Internal Medicine*. 15-25.
- Clifford, M.N. 1999. Review: Chlorogenic Acids and Other Cinnamates Nature, Occurrence and Dietaru Burden. *Journl of the Science of Food and Agriculture*. 79: 362-372.
- Clifford, M. N. dan Knight, S. 2004. The cinnamoyl-amino acid conjugates of green robusta coffee beans. *Food Chemistry*. *Food and Function*. 457–463
- Clifford, M. N., Wu, W., Kirkpatrick, J., Jaiswal, R., dan Kuhnert, N. 2010. Profiling and characterisation by liquid chromatography/multi-stage mass spectrometry of the chlorogenic acids. *Gardeniae Fructus.Rapid Communications in Mass Spectrometry*. 3109–3120.
- Deinstrop, E.H. 2007. *Applied Thin-Layer Chromatography : Best Practice and Avoidance of Mistakes Second, Revised and Enlarged Edition*. Weinheim : WILEY-VCH Verlag GmbH & Co. KGaA.
- Departemen Kesehatan Republik Indonesia. 1985. *Cara Pembuatan Simplisia*. Direktorat Jendral POM-Depkes RI. Jakarta.
- Departemen Kesehatan Republik Indonesia. 1995. *Materia Medika Jilid VI*. Direktorat Jendral POM-Depkes RI. Jakarta.
- Departemen Kesehatan Republik Indonesia. 2000. *Acuan Sediaan Herbal*. Direktorat Jendral POM-Depkes RI. Jakarta.
- Departemen Kesehatan Republik Indonesia. 2009. *Farmakope Herbal Indonesia*. Departemen Kesehatan Republik Indonesia: Jakarta.
- Deconinck, E., P.Y Sacre., P. Courselle dan J.O. De Beer. 2013. Chromatography in the Detection and Characterization of Illegal Pharmaceutical Preparations. Oxford University Press. USA.
- Farah, A. 2012. *Coffe Constituents in Coffe: Emerging Health Effects and Disease Revention*. Blackwell Publishing Ltd. United Kingdom.
- Farah, A., T.D. Paulis, L.C. Trugo dan P.R. Martin. 2005. Effect of Roasting on the Formation of Chlorogenic Acid Lactones in Coffee, *Journal of Chromatographic Science*. 40: 1-12.

- Gocan, S. 2002. Stationary Phases for Thin-layer chromatography. *Journal of Chromatography Science*. 40:1-12.
- Gritter, Roy J. dkk. 1991. *Pengantar Kromatografi*. Edisi II. Penerbit ITB. Bandung.
- Gunawan, D. dan S.Mulyani. 2004. *Ilmu Obat Alam (Farmakognosi Jilid 1)*. Penebar Swadaya. Jakarta.
- Harborne, J.B. 1987. *Fitokimia*. Penerbit ITB. Bandung.
- Harborne, J.B., H. Baxter dan G.P. Moss. 1999. *Phytochemical Dictionary: A Handbook of Bioactive Compounds from Plants*. Taylor and Francis Ltd. London.
- Henrich, M., J. Barnes, S. Gibbons, Williamso, M. Elizabeth. 2004. *Fundamental of Pharmacognosy and Phytotherapy*. Elsevier. Hungary.
- Hostettmenn, K. dkk. 2006. *Cara Kromatografi Preparatif*. ITB. Bandung.
- Jaiswal, R., dan Kuhnert, N. 2010. Hierarchical scheme for liquid chromatography/multi-stage spectrometric identification of 3,4,5-triacyl chlorogenic acids in green Robusta coffee beans. *Rapid Communications in Mass Spectrometry*. 2283–2294.
- Jaiswal, R., dan Kuhnert, N. 2011. How to identify and discriminate between the methyl quinates of chlorogenic acids by liquid chromatography–tandem mass spectrometry. *Journal of Mass Spectrometry*. 269–281.
- Jaiswal, R., dan Kuhnert, N. 2011. *Identification and characterization offive new classesof chlorogenic acids*. In burdock k Arctium lappaL. Roots by liquid chromatography.
- Jaiswal, R., Kiprotich, J., dan Kuhnert, N. 2011. Determination of the hydroxycinnamate Profile of 12 members of the Asteraceae family. *Phytochemistry*. 781–790.
- Kang, J.S. 2012. Principles and Applications of LC-MS/MS for the Quantitative Bioanalysis of Analytes in Various Biological Samples. *Department of Pharmacology & Clinical Pharmacology Laboratory, Biomedical Research Institute, Hanyang University. South Korea*.
- Lee. J.H., Park, J.H., Kim, Y.S dan Han, Y. 2008. Chlorogenic Acid, a Plyphenolic Compound, Treats Mice with Septic Arthritis Caused by *Candida albicans*. *International Immunopharmacology*. 8: 1681-1685.

- Lelyana, S. 2008. Pengaruh Kopi Terhadap Kadar Asam Urat Darah. *Tesis*. Universitas Diponegoro. Semarang.
- Leonardis, D.A., L. Pizzella dan V. Macciola. 2008. Evaluation of Chlorogenic Acid and Its Metabolites as Potential Antioxidants for Fish Oil. *European Journal of Lipid Science and Technology*. 110 (10): 941-948.
- Lipsy, P. 2010. *Thin Layer Chromatography Characterization of the Active Ingredients in Excedrin and Anacin*. Department of Chemistry and Chemical Biology, Stevens Institute of Technology. USA.
- Mahesa, M.F. 2012. Esterifikasi Senyawa Polifenol dari Ekstrak Kulit Biji Kopi dengan Asam p-Hidroksibenzoat dengan Menggunakan Katalis $\text{SiO}_2-\text{H}_2\text{SO}_4$. *Tesis*. Universitas Indonesia. Jakarta.
- Manastas, A. 2014. *Teknologi Penanganan Pasca Panen Kopi Robusta*. Kanisius. Yogyakarta.
- Meng, S., J. Cao, Q. Feng, J. Peng dan Y. Hu. 2013. Roles of Chlorogenic Acid on Regulating Glucose and Lipids Metabolism: A Review. *Evidence-Based Complementary and Alternative Medicine*. 2013: 1-11.
- Muljana, W. 2010. *Bercocok Tanam Kopi*. CV. Aneka Ilmu: Jakarta.
- Munson, J. W. 1991. *Analisis Farmasi Metode Modern*. Airlangga University Press, Surabaya.
- Najayati, S dan Danarti. 2012. *Kopi, Budidaya dan Penanganan Lepas Panen*. PT Penebar Swadaya. Jakarta.
- Natella, F., M. Nardini, I. Ghiselli, C. Dattilo and C. Scaccini. 2002. Coffee Drinking Influence plasma antioxidant capacity in humans. *Journal of Agricultural and Food Chemistry* 50:6211-6216.
- Olthof, M.R., P.C.H. Hollman dan M.B. Katan. 2001. Chlorogenic Acid and Caffeic Acid Are Absorbed in Humans. *Journal of Nutrition*. 131: 66-71.
- Rohman, A. 2009. *Kromatografi Untuk Analisis obat*. Pustaka Pelajar. Jakarta.
- Septianus. 2011. Perbandingan Aktivitas Berbagai Antioksidan Terhadap Penampilan Broiler. *Jurnal Penelitian Pertanian Terapan*. 68-74.
- Sukohar, A., Setiawan, F. Wirakusumah, H.S. Sastramihardja. 2011. Isolasi dan Karakterisasi Senyawa Sitotoksik Kafein dan Asam Klorogenat dari Biji Kopi Robusta Lampung. *Jurnal Medika Planta Vol. 1 No. 4*. 12-25.

- Stalmach, A. Mullen, W. Nagai, C. Crozier, dan Brasil. J. Plant Physiol. 2006. On-line HPLC analysis of the antioxidant activity of phenolic compounds. *in brewed paper-filtered coffee.* 253-262.
- Syamsulbahri, 1996. *Bercocok Tanam Tanaman Perkebunan Tahunan.* Gadjah Mada Press, Yogyakarta.
- Szekely. 1983. *Convection in Arc Weld Pool.* Welding Research Supplement.
- Thom. E. 2007. The Effect of Chlorogenic Acid Enriched Coffee on Glucose Absorption in Healthy Volunteers and Its Effect on Body Mass When Used Long-term in Overweight and Obese People. *The Journal of International Medical Research.* 35: 900-908.
- Tice, R. 1998. *Chlorogenic Acid [327-97-9] and Caffeic Acid [331-39-5] : Review of Toxicological Literature.* ILS. North Carolina.
- Voight, R. 1995. *Buku Pelajaran Teknologi Farmasi.* Universitas Gadjah Mada. Yogyakarta.
- Wulandari, L. 2011. *Kromatografi Lapis Tipis.* PT. Taman Kampus Presindo: Jember.
- Zhao, Y., J. Wang, O. Ballevre, H. Lou dan W. Zhang. 2011. Antihypertensive Effects and Mechanisms of Chlorogenic Acid. *Hypertension Research.* 2011: 1-5.