

## **BAB V**

### **KESIMPULAN DAN SARAN**

#### **5.1      Kesimpulan**

1. Pemberian sediaan kurkumin-MSN dapat melindungi sel hepar dengan menurunkan kadar ALT
2. Pemberian sediaan kurkumin-MSN dapat melindungi fungsi sel hepar dengan menurunkan kadar AST.
3. Pemberian sediaan kurkumin-MSN dapat melindungi fungsi sel hepar dengan peningkatan kadar ALP.

#### **5.2      Saran**

Perlu dilakukan penelitian lebih lanjut mengenai toksisitas dari MSN (*Mesoporous Silica Nanoparticle*) dan dengan jumlah populasi yang lebih banyak.

## DAFTAR PUSTAKA

- Aboderin, F.I. and Oyetayo, V.O. 2006, Haematological Studies of Rats Fed Different Doses of Probiotic Lactobacillus Plantarum Isolated From Fermenting Corn Slurry, *Pakistan J of Nutrition*, **5**: 102-105.
- Adiyati, P.N. 2011, ‘Ragam Jenis Ektoparasit Pada Hewan Coba Tikus Putih (*Rattus norvegicus*) galur *Sprague dawley*’, Skripsi, Fakultas Kedokteran Hewan Institut Pertanian, Bogor.
- Aggarwal, B.B. 2010, Targeting Inflammation-Induced Obesity and Metabolic Disease by Curcumin and Other Nutraceuticals, *Annu Rev Nutr*, **21(30)**: 173-199.
- Agoes, A. 2010, *Tanaman Obat Indonesia*, Buku 2, Salemba Medika, Jakarta, 25-26.
- Akbar, B. 2010, *Tumbuhan dengan Kandungan Senyawa Aktif yang Berpotensi Sebagai Bahan Antifertilitas*, Adabia Press, Jakarta.
- Bagschi, A. 2012, Extraction of Curcumin, *IOSR J of Environ Science*, Vol(1): 2319-2404.
- Bateman, N., Jefferson, R., Thomas, S., Thompson, J., and Vale, A. 2014, Oxford Desk Reference: *Toxicology*, CPI group Ltd, Oxford, p.221.
- Belcaro, G., Cesarone, M.R., Dugall, M., Pellegrini, L., Ledda, A., Grossi, M.G., Togni, S., and Appendino, G. 2010, Efficacy and Safety of Meriva a Curcumin-phosphatidylcholine Complex During Extended Administration in Osteoarthritis Patient, *Altern Med Rev*, **15(4)**: 337-44.
- Burcham, P.C. 2014, *An Introduction to Toxicology*, Springer, London, pp.170-171.
- Cahyono, J.B., Suharjo, B. 2009, *Hepatitis A*, Edisi 1, Kanisius, Yogyakarta.
- Direktorat Jendral Pengawasan Obat dan Makanan, 1995, *Farmakope Indonesia*, Edisi IV, Jakarta: Departemen Kesehatan Indonesia.
- Direktorat Jendral Pengawasan Obat dan Makanan, 2010, *Sentra Informasi Keracunan Nasional*, Jakarta: Pusat Informasi Obat dan Makanan.
- Droge, W. 2002, Free Radicals in The Physiological Control of Cell Function, *Physiological Reviews*, **82(1)**: 47-95.

- Friedman, L.S., and Keffe, E.B. 2012, *Handbook of Liver Disease*, 6<sup>th</sup> Edition, Elsevier Inc, New York, pp.170.
- Fudholi, A. 2013, *Disolusi dan Pelepasan Obat In Vitro*, Pustaka Pelajar, Yogyakarta.
- Ganong, W.F., and McPhee, S.J. 2011, *Patofisiologi Penyakit Pengantar Menuju Kedokteran Klinis*, Edisi 5, Jakarta: EGC, 453-455.
- Gorunovic, M.S., Lukic, P.B. 2011, Curcumae Rhizoma, Faculty of Pharmacy, University of Belgrade, eds *Pharmacognosy*, pp.516-518.
- Gowda, S., Desai, P.B., Hull, V.V., Math, A.K, Vemekar, S.N., and Kulkami, S.S. 2009, A Review on Laboratory Liver Function Tests, *Pan Afr Med*, **3(17)**: 1-11.
- Hadi, S. 2000, *Hepatologi Bandung*, Mandar Maju, Bandung.
- Hartati, S.Y. 2013, Khasiat Kunyit Sebagai Obat Tradisional dan Manfaat Lainnya, *Warta Penelitian dan Pengembangan Tanaman Industri*, Vol(19):2.
- Hartono, S., Hadisoewignyo, L., Yang, Y., Anand, K.M., Antaresti., Luciana, T., Robby, W., and Chengzhong, Y. 2015, Amine Functionalized Cubic Mesoporous Silica Nanoparticles as Oral Delivery System for Curcumin Bioavailability Enhancement, *Nanotechnology*, pp.7.
- Hau, Jan., and Steven, J.S. 2011, *Handbook of Laboratory Animal Science*, CRC Press, 3<sup>rd</sup> edition, New York.
- Huang, M.T., W. Ma., Lou, Y.R., Lu, Y.P., Chang, R., Newmark, H., and Conney, A.H. 2013, Inhibitory Effects of Curcumin on Tumorigenesis in Mice, *Journal of Cellular Biochemistry Supplement*, **27**:26-34.
- Kasdallah-Grisa, A., Momagui, B., Aouani, E., Hammami, M., May, M.E., and Gharbi, N. 2007, Resveratrol a Red Wine Polyphenols Attenuates Ethanol-induced Oxidative Stress in Rats Liver, *Life Sciences*, **80**: 1033-1039.
- Kannel, K.A., Drake, M.T., and Hurley, D.L. 2010, Vitamin Defeciciency in Adult When to Test and How to Treat, *Mayo Clin Proc*, **85(8)**: 752-758.
- Kim, M.B., Kim, C., Song, Y., and Hwang, J.K. 2014, Antihyperglycemic and Anti-Inflammatory Effect of Standardized *Curcuma Xanthorrhiza* Roxb. Extract and Its Active Compound *Xanthorrhizol* in High-Fat

Diet-Induced Obese Mice, *Hindawi Publishing Corporation Evidence-Based Complementary and Alternative Medicine*, pp.10.

Kim, Y.R., Lee, S.Y., Lee, E.J., and Park, S.H. 2014, Toxicity of Colloidal Silica Nanoparticles Administered Orally for 90 Days in Rats, *International Journal of Nanomedicine*, **9(2)**: 67-68.

Kim, Yongjae. 2013, Hepatoprotective Effect of Fermented Curcuma longa L. on Carbon Tetrachloride-Induced Oxidative Stress in Rats, *Elsevier Food Chemistry*, **151**: 148-153.

Li, L.PhD., Liu, T.PhD., Fu, C.MD., Tan, L.PhD., Meng, X.PhD., Liu, H.PhD. 2015, Biodistribution, Excretion and Toxicity of Mesoporous Silica Nanoparticles After Oral Administration Depend on Their Shape, *Nanomedicine Journal*, Vol(11): 5.

Manahan, S.E. 2002, *Toxicological Chemistry and Biochemistry 3<sup>rd</sup> edition*, Lewis Publisher, New York, pp. 329-330.

Marinda, F.D. 2014, Hepatoprotective Effect of Curcumin in Chronic Hepatitis, *J Majority*, Vol(3):7.

Marslin, G., Prakash, J., Qi, S., and Franklin, G. 2018, Oral Delivery of Curcumin Polymeric Nanoparticles Ameliorates CCl<sub>4</sub> induced Subacute Hepatotoxicity in Wistar Rats, *Polymers*, **10(5)**.

Martin, A., Sinko, P., and Singh, Y. 2011, *Physical Pharmacy and Pharmaceutical Sciences 6<sup>th</sup> edition*, Philadelphia: Lippincott Williams & Walkins.

Menkes, R.I. 2016, *Formularium Obat Herbal Asli Indonesia*, Jakarta: Peraturan Menteri Kesehatan Republik Indonesia, No 6.

Murray, R.K., Granner, D.K., and Rodwel, V.W. 2009, *Biokimia Harper edisi 27*, Penerjemah Wulandari, N., Terjemahan dari: *Herper's Illustrated Biochemistry 27<sup>th</sup> edition*, Jakarta: EGC.

Pandey, R., Ahmad, Z., Sharma, S., and Khuller, G. 2010, Nanoencapsulation of Azole Antifungals Potential Applications to Improve Oral Drug Delivery, *Int J Pharm*, **301(1)**: 268-276.

Popat, A., S, Jambhrunkar., S, Karmakar., M, Yu., and C, Yu. 2014, Mesoporous Silica Nanoparticles Loading Doxorubicin Reverse Multidrug Resistance Performance and Mechanism, *Nanoscale*, **(3)**: 4314-4322.

- Ronaldi, E. 2004, *Tinjauan Klinis Hasil Pemeriksaan Laboratorium*, Jakarta: ECG.
- Rosidi, A., Setiawan, B., Riyadi, H., and Briawan, D. 2013, Effect of Temulawak (*Curcuma xanthorrhiza* roxb) Extract on Reduction of MDA (Malondialdehyde) Level, *Pakistan Journal of Nutrition*, **12(9)**: 842-850.
- Ruffin, M.T., Normolle, D.P., Heath, D.D., Bailey, J.M., Murray, S.I., Boggs, M.E., Crowell, J.A., Rock, C.L., and Brenner, D.E. 2003, Dose Escalation of Curcumin in Healthy Adulth, *Cancer Epidemiol Biomarkers*, Vol(12).
- Sahoo, S.K., and Labhsetwar, V. 2006, An Important Determinant in Nanoparticle-Mediated Drug/Gene Delivery in Nanoparticle Technology for Drug Delivery, *Nanoparticle Interface*, **(6)**: 139-154.
- Schmidt, P.C., and Herzog, R. 2002, Calcium Phosphate in Pharmaceutical Tableting, *Physico-Pharmaceutical Properties Pharm Wld*, **15**: 105-110.
- Sharma, R.A., McLelland, H.R., and Hill, K.A. 2001, Pharmacodynamic and Pharmacokinetic Study of Oral Curcuma Extract in Patient With Colorectal Cancer, *Clin Cancer*, Vol(7): 1894-1900.
- Singh, K. 2009, Evaluation of Mimosa Pudica Seed Mucilage as Sustained-release Excipient, *AAPS PharmSciTech*, **10(4)**: 1121-1127.
- Sirois, M. 2005, *Laboratory Animal Medicine: Principles and Procedures*, Mosby Inc, New York, pp.368.
- Syukri, 2002, *Biofarmasetika*, Yogyakarta: UII Press, 71-73.
- Timbrell, J.A. 2000, *Principles of Biochemical Toxicology*, 3<sup>rd</sup> edition, Taylor and Francis Group, pp: 269-271.
- Utami, A., Meryalita, R., Prihatin, N.A., Ambarsari, L., dan Kurniatin, P.A. 2012, Variasi Metode DNA Daun Temulawak (*Curcuma xanthorrhizae* roxb), *Prosiding Seminar Nasional Kimia*, Unesa.
- Watson, L.J. 2014, HepatocellularCarcinoma, Diakses tanggal 28 Februari 2018, <https://geekymedics.com/hepatocellular-carcinoma>.
- Wibowo, 2015, Suara Merbabu, *Buletin Balai Taman Nasional Gunung Merbabu*, Boyolali.

Zhang, Dong-wei., Fu, Min., Gao, Si-Hua., and Liu, Jun-Li, 2013,  
Curcumin and Diabetes: A Systematic Review, *Hindawi Publishing  
Corporation*, (13): 16.