

## **BAB 5**

### **KESIMPULAN**

#### **5.1. Kesimpulan**

1. Pemberian suplementasi serat pangan inulin-MCT tidak meningkatkan rasio sel T-limfosit CD3CD4CD25:CD3 pada mencit *swiss webster* obesitas yang diberi pakan tinggi lemak-sukrosa
2. Pemberian suplementasi serat pangan inulin-MCT tidak meningkatkan rasio sel T-limfosit CD3CD8CD25:CD3 pada mencit *swiss webster* obesitas yang diberi pakan tinggi lemak-sukrosa

#### **5.2. Saran**

1. Perlu dilakukan penelitian lebih lanjut mengenai efek pemberian inulin-MCT terhadap komposisi mikroorganisme flora normal
2. Perlu dilakukan penelitian lebih lanjut mengenai efek suplementasi inulin-MCT terhadap sel T regulator CD3<sup>pos</sup>CD4<sup>pos</sup>CD25<sup>pos</sup>Foxp3 dan CD3<sup>pos</sup>CD8<sup>pos</sup>CD25<sup>pos</sup>Foxp3<sup>pos</sup> pada mencit yang mengalami obesitas
3. Perlu dilakukan penelitian mengenai parameter kadar SCFA pada lumen usus dan pembuluh darah terhadap mencit yang mengalami obesitas

## DAFTAR PUSTAKA

- Akram, W., Garud, N., Joshi, R. 2019, Role of Inulin as Prebiotics on Inflammatory Bowel Disease. *Drug Discoveries and Therapeutics*, **13**: 1–8.
- Aydinol, P., Ozcan, T. 2017, Production of Reduced-fat Labneh Cheese with Inulin and  $\beta$ -glucan Fibre-based Fat Replacer. *International Journal of Dairy Technology*, **71(2)**: 362–371.
- Babayan, V. K. 1987, Medium-Chain Triglycerides and Structured Lipids. *Lipids*, **22**: 417–420.
- Blaut, M. 2002, Relationship of prebiotics and food to intestinal microflora. *European Journal of Nutrition*, **41**: 11–16 .
- Bonilla, F. A., Oettgen, H., C. 2010, Adaptive immunity. *Journal of Allergy and Clinical Immunology*, **125(2)**: S33–40.
- Bonner, W. A., Hulett, H. R., Sweet, R. G., Herzenberg, L. A. 1972, Fluorescence activated cell sorting, *Review of Scientific Instrument*, **43(3)**: 404–409.
- Brennan, A. M., and Mantzoros, C. S. 2006, Drug Insight: the role of leptin in human physiology and pathophysiology—emerging clinical applications. *Nature Clinical Practice Endocrinology & Metabolism*. **2(6)**: 318–327 .
- Brown, B., Roehl, K., Betz, M. 2015, Enteral Nutrition Formula Selection: Current Evidence and Implications for Practice Review of Enteral Nutrition Formulations. *Nutrition in Clinical Practice*, **30(1)**: 72–85.
- Chen, K., Chen, H., Faas, M. M., de Haan, B. J., Li, J., Xiao, P., Zhang, H., Diana, J., de Vos, P., Sun, J. 2017, Specific inulin-type fructan fibers protect against autoimmune diabetes by modulating gut immunity, barrier function and microbiota homeostasis. *Molecular Nutrition & Food Research*, **61(8)**:1–35.
- De Frel., D. L., Atsma, D. E., Pijl, H., Seidell, J. C., Leenen, P. J. M., Dik, W. A., Rossum, E. F. C. 2020, The impact of obesity and lifestyle on the immune system and susceptibility to infections such as COVID-19, *Frontiers in Nutrition*, **(7)**: 1–12.

- Dhingra, D., Michael, M., Rajput, H., Patil, R. T. 2012, Dietary fibre in foods: a review, *Journal of Food Science and Technology*, **49(3)**: 255–266.
- Dickinson, B. 2002, Introduction to Flow Cytometry: A Learning Guide, Becton, Dickinson and Company, Franklin Lakes.
- Dwivedi, M., Kumar, P., Laddha, N., C., Kemp, E., H. 2016. Induction of Regulatory T Cells: A Role for Probiotics and Prebiotics to Suppress Autoimmunity, *Autoimmunity reviews*, **15(4)**: 379–392.
- Femia, A. P., Luceri, C., Dolaro, P., Giannini, A., Biggeri, A., Salvadori, M., Clune, Y., Collins, K. J., Paglierani, M., Caderni, G. 2002, Antitumorigenic Activity of The Prebiotic Inulin Enriched with Oligofructose in Combination with The Probiotics *Lactobacillus rhamnosus* and *Bifidobacterium lactis* on Azoxymethane-induced Colon Carcinogenesis in Rats, *Carcinogenesis*, **23**: 1953–1960.
- Franck, A. 2002, Technological Functionality of Inulin and Oligofructose, *British Journal of Nutrition*, **87**: S287–S291.
- Gibson, G. R., Beatty, E. R. Wang, X., Cummings, J. H. 1995, Selective stimulation of bifidobacteria in the human colon by oligofructose and inulin, *Gastroenterology*, **108(4)**: 975–982.
- Guarino, M. P. L., Altomare, A., Emerenziani, S., Di Rosa, C., Ribolsi, M., Balestrieri, P., Iovino, P., Rocch, G., Cicala, M. 2020. Mechanisms of Action of Prebiotics and Their Effects on Gastrointestinal Disorders in Adults. *Nutrients*, **12**: 1037.
- Guilherme, A., Virbasius, J. V., Puri, V. Czech, M., P. 2008, Adipocyte Dysfunctions Linking Obesity to Insulin Resistance and Type 2 Diabetes, *Nature Reviews Molecular Cell Biology*, **9(5)**: 367–377.
- Guillon, F., Champ, M. 2000, Structural and Physical Properties of Dietary fibres, and Consequences of Processing on Human Physiology, *Food Research International*, **33**: 233–245.
- Harrington, L. E., Hatton, R. D., Mangan, P. R., Turner, H., Murphy, T. L., Murphy, K. M., and Weaver, C. T. 2005, Interleukin 17-producing CD4<sup>POS</sup> effector T cells develop via a lineage distinct from the T helper type 1 and 2 lineages, *Nature Immunology*, **6(11)**: 1123–1132.

- Holmes, K. L., Otten, G., Yokoyama, W. M. 2001, Flow Cytometry Analysis Using the Becton Dickinson FACS Calibur, *Current Protocols in Immunology*, **5(4)**: 1–22.
- Jadhav, H.B., Annapure, U.S. 2022, Triglycerides of medium-chain fatty acids: a concise review. *Journal of Food Science and Technology*, **60(8)**: 2143–2152.
- Kwon, H.K., Lee, C.G., So, J.S., Chae, C.S., Hwang, J.S., Sahoo, A., Nam, J.H., Rhee, J.H., Hwang, K.C., Im, S.H. 2010, Generation of regulatory dendritic cells and CD4<sup>pos</sup>Foxp3<sup>pos</sup> T cells by probiotics administration suppresses immune disorders, *Proceedings of the National Academy of Sciences*, **107(5)**: 2159–2164.
- Létourneau, S., Krieg, C., Pantaleo, G. and Boyman, O. 2009, IL-2- and CD25-dependent immunoregulatory mechanisms in the homeostasis of T-cell subsets, *Journal of Allergy and Clinical Immunology* **123(4)**: 758–762.
- Liao, X., Makris M., Luo, X. M. 2016, Fluorescence-activated Cell Sorting for Purification of Plasmacytoid Dendritic Cells from the Mouse Bone Marrow, *Journal of Visualized Experiments*, **117**: 1–7.
- He, K., Shi, J. C., Mao, X. M. 2014, Safety and efficacy of acarbose in the treatment of diabetes in Chinese patients, *Therapeutics and clinical risk management*, **10**: 505–511.
- Lim, S. S., Vos, T., Flaxman, A. D., Danaei, G., Shibuya, K., Adair-Rohani, H., ... Andrews, K. G. 2012, A comparative risk assessment of burden of disease and injury attributable to 67 risk factors and risk factor clusters in 21 regions, 1990-2010: a systematic analysis for the Global Burden of Disease Study 2010, *The Lancet*, **380(9859)**: 2264–2260.
- Liu, R.H. 2003, Health Benefits of Fruit and Vegetables are from Additive and Synergistic Combinations of Phytochemicals, *American Journal of Clinical Nutrition*, **78**: 517S-520S.
- Marshall, J. S., Warrington, R., Watson, W., Kim, H. L. 2018, An Introduction to Immunology and Immunopathology, *Allergy, Asthma and Clinical Immunology*, **14(49)**: 6–14.
- Marten, B., Pfeuffer M., Schrezenmeir, J. 2006, Medium-chain triglycerides, *International Dairy Journal*, **16**:1374–1382.

- McHugh, R. S., Whitters, M. J., Piccirillo, C. A., Young, D. A., Shevach, E. M., Collins, M., & Byrne, M. C. 2002, CD4<sup>pos</sup>CD25<sup>pos</sup> Immunoregulatory T Cells, *Immunity*, **16(2)**: 311–323.
- McKinnon, K., M. 2019, Flow cytometry : An Overview, *Current Protocols in Immunology*, **120(5)**: 1–16.
- Murphy, K., M., Travers, P., Walport, M. 2007, Janeway`s immunobiology, 7th ed, Garland Science, New York.
- Odle, J. 1998, Medium-Chain Triglycerides: a unique energy source for neonatal pigs. *Pig News Info*. **20**:25N–32N.
- Pasqualetti, V., Altomare, A., Guarino, M. P. L., Locato, V., Cocca, S., Cimini, S., Palma, R., Alloni, R., DeGara, L., Cicala, M. 2014, Antioxidant activity of inulin and its role in the prevention of human colonic muscle cell impairment induced by lipopolysaccharide mucosal exposure. *PLoS One*.
- Reddy, B. S. 1999, Possible mechanisms by which pro- and prebiotics influence colon carcinogenesis and tumor growth. *Journal of Nutrition American Institute of Nutrition*, **129**: 1478S-1482S.
- Riset Kesehatan Dasar (Riskesdas). 2013, Badan Penelitian dan Pengembangan Kesehatan Kementerian RI tahun 2013, Diakses: 10 Mei 2022, <http://www.depkes.go.id/resources/download/general/Hasil%20Riskesdas%20>
- Rooks, M. G., and Garrett, W. S. 2016, Gut microbiota, metabolites and host immunity, *Nature Reviews Immunology*, **16(6)**: 341–352.
- Roopashree, P. G., Shetty, S. S., Suchetha, K. N. 2021, Effect of medium chain fatty acid in human health and diseases. *Journal of Functional Foods*.
- Salomon, B., Lenschow, D. J., Rhee, L., Ashourian, N., Singh, B., Sharpe, A., & Bluestone, J. A. 2000), B7/CD28 Costimulation Is Essential for the Homeostasis of the CD4+CD25+ Immunoregulatory T Cells that Control Autoimmune Diabetes. *Immunity*, **12(4)**: 431–440.
- Saravia, J., Chapman, N. M., and Chi, H. 2019, Helper T cell differentiation, *Cellular and Molecular Immunology*, **16(7)**: 634–643.

- Saulnier, D. M., Spinler, J. K., Gibson, G. R., Versalovic, J. 2009, Mechanisms of Probiosis and Prebiosis: Considerations for Enhanced Functional Foods. *Current Opinion in Biotechnology*, **20**: 135–141.
- Simon, G. E., Korff, M. V., Saundres, K., Miglioretti, D. L., Crane, P. K., Belle, G. V., Kessler, R. C. 2006, Association Between Obesity and Psychiatric Disorders in the US Adult Population, *Arch Gen Psychiatry*, **63**: 824–830.
- Sizer, F., Whitney, E. 2008, *Nutrition: Concepts and Controversies*, 11th ed. Thomson Wadsworth, Belmont, California.
- St-Onge, M. P., Jones, P. J. 2002, Physiological effects of medium-chain triglycerides: potential agents in the prevention of obesity, *Journal of Nutrition*, **132**: 329–32.
- Swinburn, B. A., Sacks, G., Hall, K. D., McPherson, K., Finegood, D. T., Moodie, M. L., Gortmaker, S. L. 2011, The global obesity pandemic: shaped by global drivers and local environments, *The Lancet*, **378(9793)**: 804–814.
- Tucker, L.A., Thomas, K.S. 2009, Increasing total fiber intake reduces risk of weight and fat gains in women, *Journal of Nutrition*, **139**: 576–581.
- Upadhayay, J., Perakakis, N., Ghaly, W., Mantzoros, C. 2018, Obesity as a Disease, *Medical Clinics of North America*, **102(1)**: 13–33.
- WHO, 2020, *Obesity and Overweight*, Diakses pada 24 Agustus 2022, <https://www.who.int/news-room/fact-sheets/detail/obesity-andoverweight>.
- Wong, J. M., Jenkins, D. J. 2007, Carbohydrate Digestibility and Metabolic Effects. *Journal of Nutrition*. **137**: 2539S - 2546S.
- Yang, L., Xie, X., Tu, Z., Fu, J., Xu, D., Zhou, Y. 2021, The signal pathways and treatment of cytokine storm in COVID-19. *Signal Transduction and Targeted Therapy*. **6(1)**: 255.