The Effect of Various High-Fat Diet on Liver Histology in The Development of NAFLD Models in Mice

Mahardian Rahmadi1, Ahmad Dzulfikri Nurhan2, Eka Dewi Pratiwi1, Devita Ardina Prameswari1, Sisca Melani Panggono1, Khoiriotin Nisak1, Junaidi Khotib1
1 Department of Clinical Pharmacy, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia
2 Post-graduate student, Master of Pharmacy, Faculty of Pharmacy, Universitas Airlangga, Surabaya, Indonesia

INTRODUCTION
Nonalcoholic fatty liver disease (NAFLD) is a condition caused by abnormalities in fat accumulation in the liver, without excessive alcohol intake [1]. The development of NAFLD is increasing rapidly in the world, along with changes in lifestyle. Excess lipid intake is one of the risk factors for NAFLD [2]. However, in vivo and human studies of the effects of fat intake on NAFLD development are limited [3].

Furthermore, the high-fat diet (HFD) is one approach that is often used to develop NAFLD models in experimental animals. Some of the ingredients that can be developed as HFD include beef tallow, animal ghee, vegetable ghee, and corn oil. Beef tallow and animal ghee are dominant in the content of saturated fatty acids (SFA) [4]. Meanwhile, vegetable ghee is dominant in the content of monounsaturated fatty acids (MUFA). Corn oil is rich in linoleic acid (ω-6 polyunsaturated fatty acids; ω-6 PUFA) [5,6].

The saturation and size of the carbon chains of fatty acids also affect their metabolism in the body. SFA and MUFA tend to be difficult to use as energy as soon as they are absorbed. Meanwhile, PUFAs tend to be immediately oxidized to be used as energy in the body or diverted to other functions, for example making cell membranes [7,8].

Thus, the variation of HFD and the success of creating HFD will significantly determine the NAFLD model. This study aim to assess effect of high fat diet variation on serum triglyceride levels and liver histology in the development of NAFLD models in mice.

OBJECTIVES
This study aim to assess effect of high fat diet variation on serum triglyceride levels and liver histology in the development of NAFLD models in mice.

METHOD
Balb/c male mice weighing about 20-30 g
fed for 28 days

Chow diet (Control group) vs. HFD* beef tallow 60%, HFD* beef tallow 45%, HFD* vegetable ghee, HFD* animal ghee + corn oil, HFD* vegetable ghee + corn oil

* HFD = High-fat diet in the form of pellets

measure

Bodyweight every day
Food intake every day
Triglyceride serum last day
Liver histology

RESULT
This study showed that high fat diets disturbed the triglycerides serum profile, beef tallow had the highest triglycerides serum, followed by vegetable ghee, animal ghee + corn oil, and vegetable ghee + corn oil. NAFLD model development can be achieved in all group mice were fed high-fat diet. Beef tallow 60% had the worst liver histology.

REFERENCES

CONCLUSION
This study showed that high fat diets disturbed the triglycerides serum profile, beef tallow had the highest triglycerides serum, followed by vegetable ghee, animal ghee + corn oil, and vegetable ghee + corn oil. NAFLD model development can be achieved in all group mice were fed high-fat diet. Beef tallow 60% had the worst liver histology.