Effects of whole soy milk on metabolic disorders and digestive efficiency in high-fat diet-induced obese mice

Yoon-Mi Lee[1)], Hyun-Min Park[1)],Sooji Song[1)], Yu Young Lee[2)], Kyung-Jin Yeum[1)]*

[1)]Division of Food Science, College of Biomedical and Health Sciences, Konkuk University, Chungju, Republic of Korea,

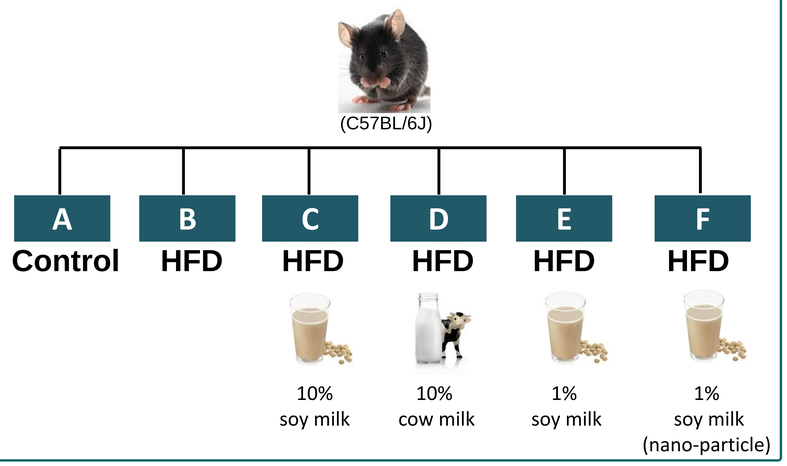
[2)] Department of Central Area, National Institute of Crop Science, Rural Development Administration, Suwon, Republic of Korea

Abstract

Obesity has been increasing with severe complications such as hyperglycemia, hypertension, and dyslipidemia. The aim of this study was to evaluate the effects of whole soy milk and nano particle-whole soy milk on metabolic disorders and digestive efficiency in high-fat diet (HFD)-fed mice. Mice (C57BL/6J, n=70) were randomly assigned to six groups, A: normal diet based on AIN-93G, B: HFD (45% kcal % fat), C: HFD containing 10% whole soy milk powder, D: HFD containing 10% whole cow milk powder, E: HFD containing 1% whole soy milk powder, F: HFD containing 1% nano particle-whole soy milk for 8 weeks. Intake of whole soy milk (Group C) did not change body weight and fat mass compared with those of HFD-diet mice, however, significantly lowered blood pressure than that of HFD-fed mice. On the other hand, we found that mice-fed nano particle-whole soymilk (Group F) had higher body weight and fat mass than those of HFD-fed groups. These results suggest that intake of whole soy milk could be helpful for the regulation of obesity and its related metabolic disorders.

Supported by Rural Development Administration (PJ011885), Republic of Korea

Scheme of animal study



Method

Animal study

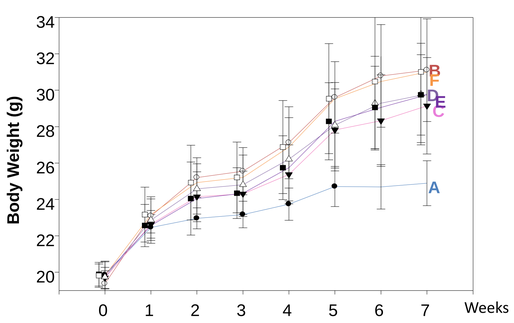
All procedures were approved by Institutional Animal Care and Use Committee of Konkuk University. Five week old male mice (C57BL/6J, n=70) were provided by SLC, Japan, and they were kept for 1 week to acclimate at experimental housing condition. Then, the mice were randomly assigned to A: normal diet based on AIN-93G, B: HFD (45% kcal % fat), C: HFD containing 10% whole soymilk powder, D: HFD containing10% whole cow milk powder, E: HFD containing 1% whole soymilk powder, F: HFD containing 1% nano particle-whole soymilk for 8 weeks. Initial blood glucose levels from tail vein were determined by glucometer (SD biosensor, INC), and body weight were measured three times per week throughout feeding period. In the final week of feeding period, blood pressure was assessed using non-invasive tail-cuff method (Muromachi, MK-1030) and body fat was measured using dual-energy X-ray absorptiometry (PIXImus series). On the day of sacrifice, liver, white adipose tissue and kidney were immediately extracted and frozen in liquid nitrogen. Blood was collected and centrifuged at 3000 rpm for 15 minutes at 4℃, the serum were transferred to new tube, and stored at -80℃.

Analysis of blood serum

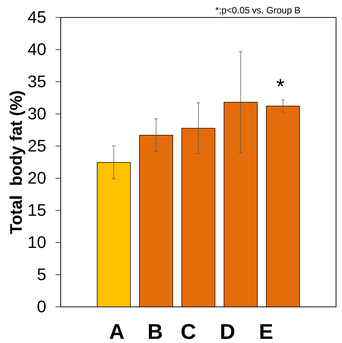
Triglyceride, cholesterol of serum was determined by colorimetric assay kit according to manufacturer's instruction (Cayman chemical).

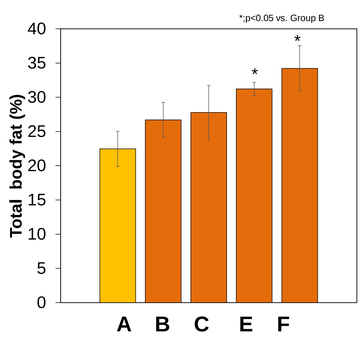
Results

1. Changes of body weights during feeding period

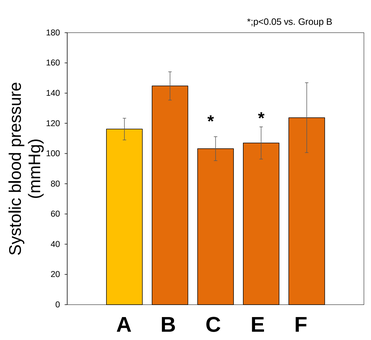


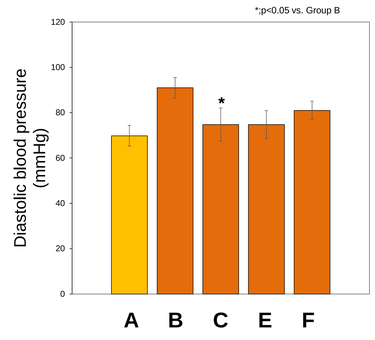
2. Effect of whole soy milk on total body fat



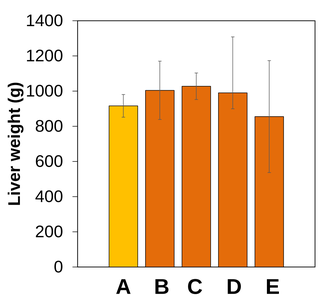


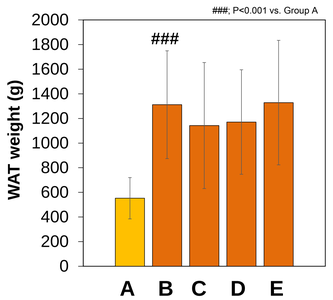
3. Effect of whole soy milk on blood pressure

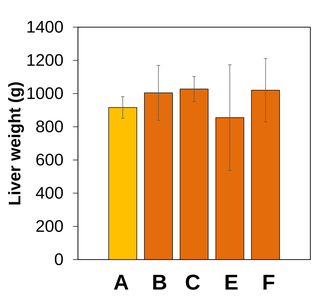


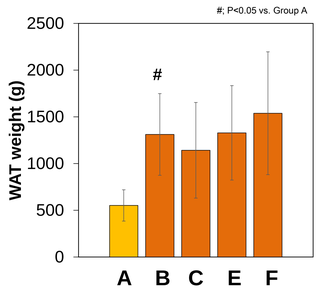


4. Effect of whole soy milk on organ weight









Conclusion

- **These results suggest that intake of whole soy milk could be helpful for the regulation of obesity and its related metabolic disorders**
- **Supported by Rural Development Administration (PJ011885), Republic of Korea**