Ginseng Berry Suppresses Metabolic Syndrome Induced by High-Fructose Diet in Rats

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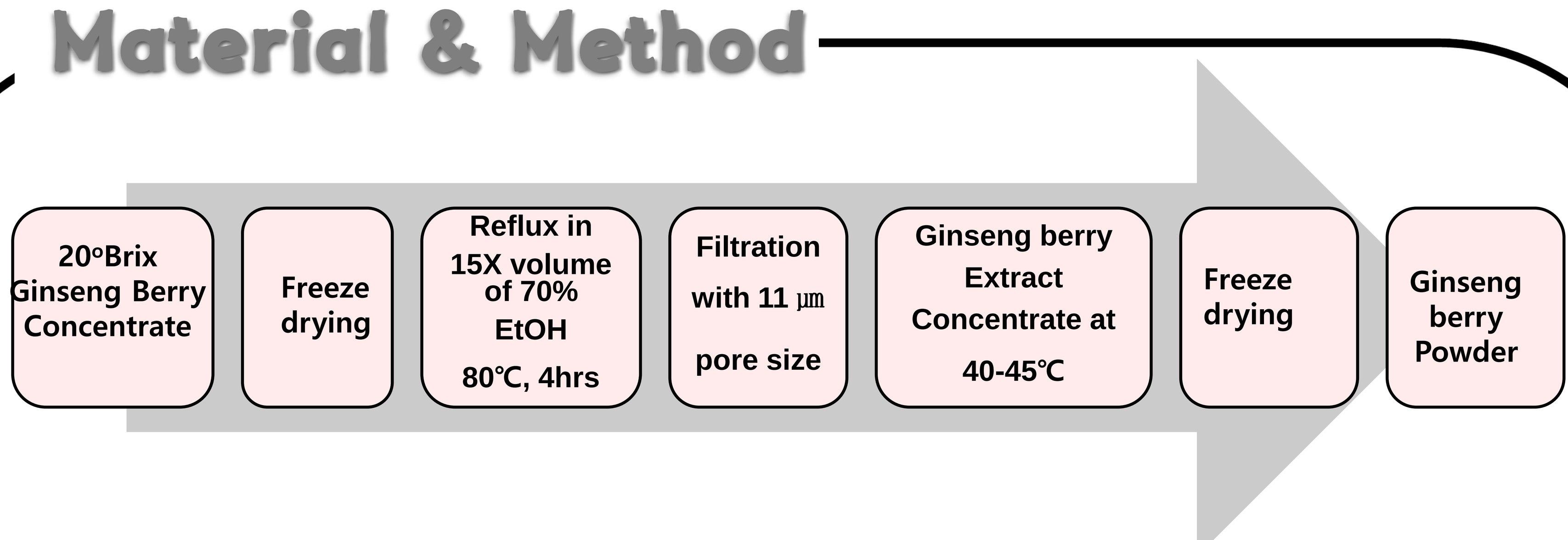
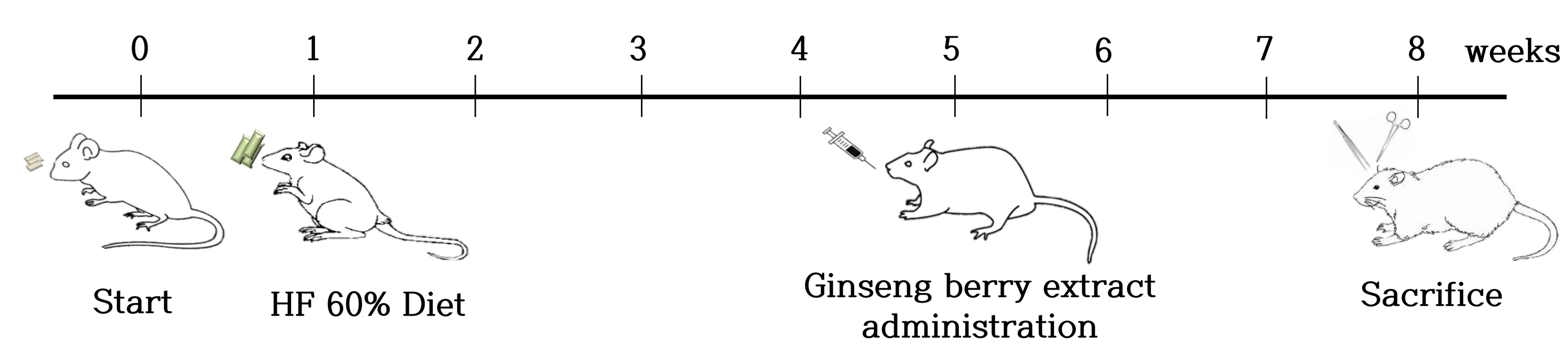
Abstract

This study was conducted to investigate the inhibitory effect of 70% ethanol extract of ginseng berry on the metabolic syndrome induced by high-fructose diet according to the degree of maturity of ginseng berry in the male Sprague-Dawley rats. Five weeks old SD rats were divided into four groups. AIN-76A diets were fed in the control (CONT) group and 60% high-fructose diet in the metabolic syndrome induced group (HF). The extract fed groups divided into two; one was administered 200 mg/kg/day of mature red ginseng berry extract (RB) and the other the immature green ginseng berry extract (GB). The experiment was carried out for 8 weeks. The ginseng berry extract was orally administered from the 5th week of high-fructose diet. The high-fructose diet increased body weight, blood pressure, epididymal fat weight, liver weight, kidney weight, levels of insulin, total cholesterol, triglyceride, LDL-cholesterol, C-reactive protein (CRP), and aorta thickness of the animal model, but ginseng berry extract administration reduced these changes. These results suggest that the ginseng beery has an excellent preventive effect on the metabolic syndrome by improving obesity, dyslipidemia, blood sugar and blood pressure in the animal model induced by high-fructose diet. Therefore, ginseng berry is expected to be a good ingredient for novel health food to prevent the metabolic syndrome.

Material & Method





- Sprague-Dawley rat 5W
- HF : High Fructose 60% diet
- RB : Red Berry extract
- GB : Green Berry extract

- CONT : normal diet (n=8)
- HF : AIN-76A high-fructose diet (n=8)
- RB : HF + 200mg/kg of RB extract (n=9)
- GB : HF + 200mg/kg of GB extract (n=9)

- Animal
  - food intake : 3 times a week
  - body weight : twice a week
- Blood pressure : once a week

- OGTT : 4th and 8th week
- Blood analysis : TG, T-C, HDL-C, LDL-C, CRP
- Epididymal fat weight
- Aorta thickness

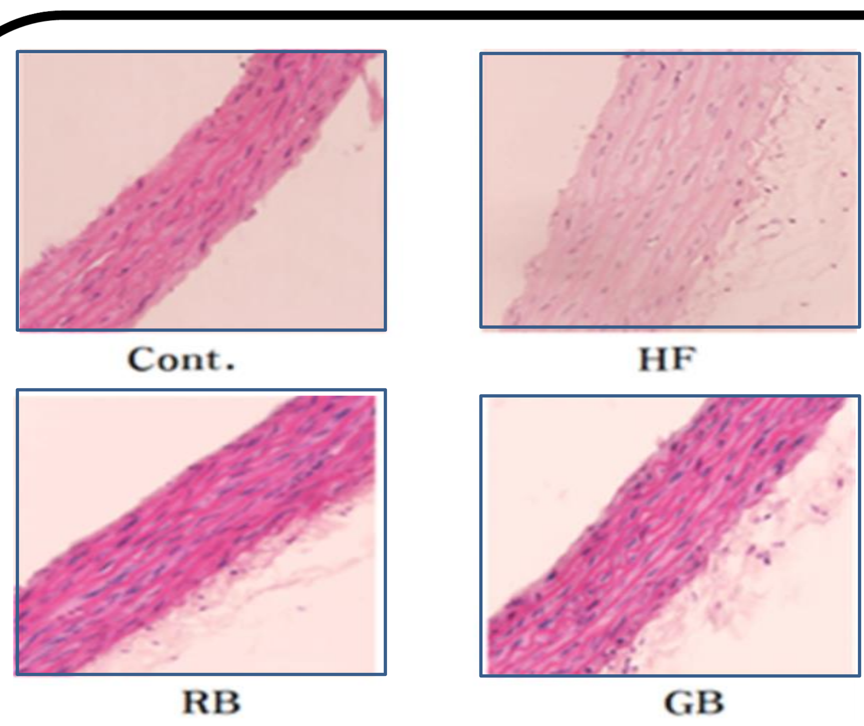


Figure 9. Effects of RB/GB on aorta morphology.

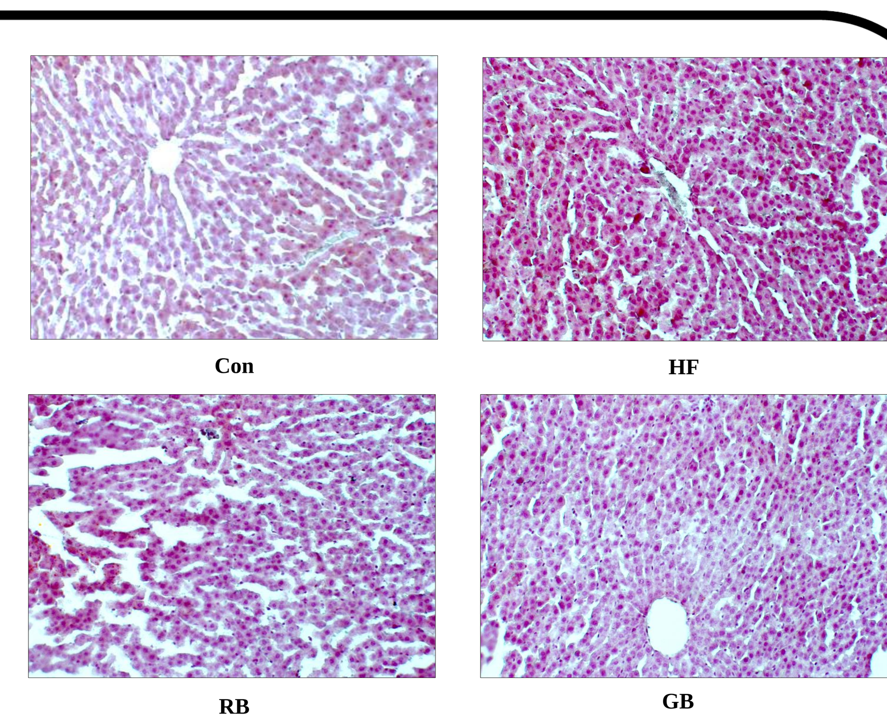


Figure 10. Effects of RB/GB on Liver morphology.

Result

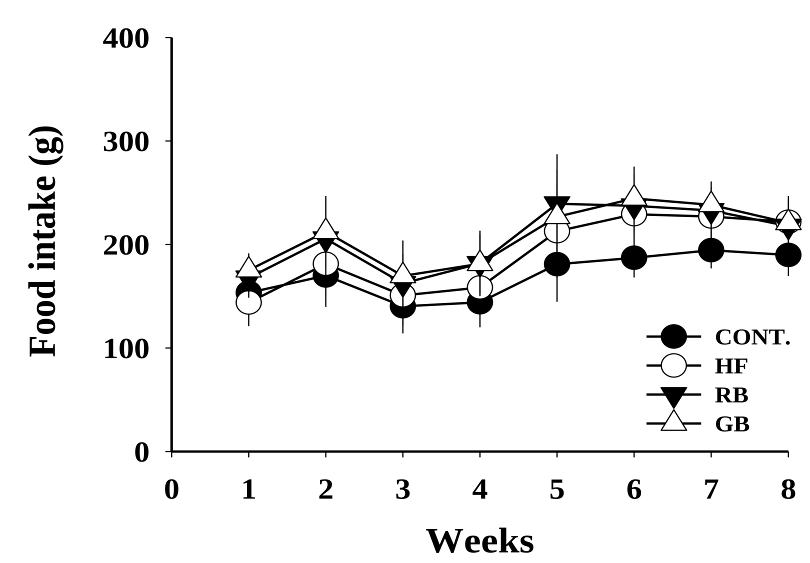


Figure 1. Effects of RB/GB on food intake. Values were expressed as mean ± S.E. (n=8).

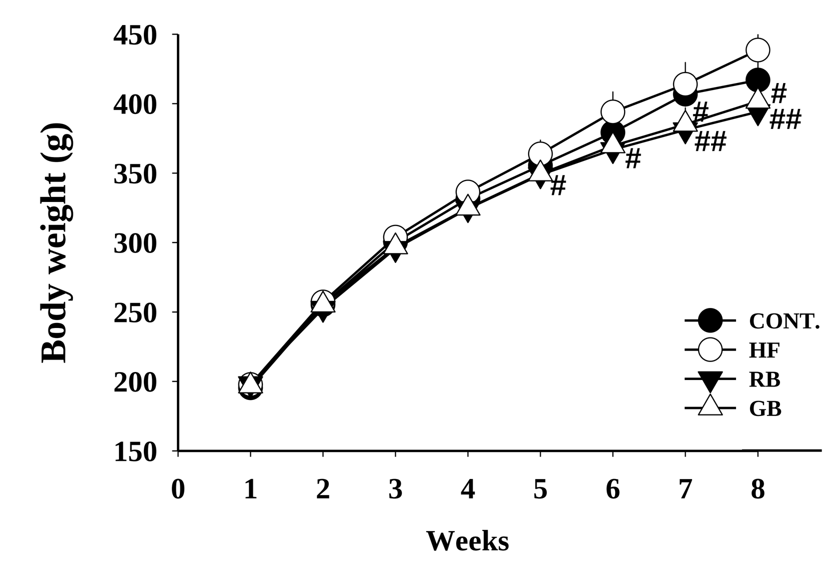


Figure 2. Effects of RB/GB on body weight. Values were expressed as mean ± S.E. (n=8). $^{\#}p<0.05$ vs. HF.

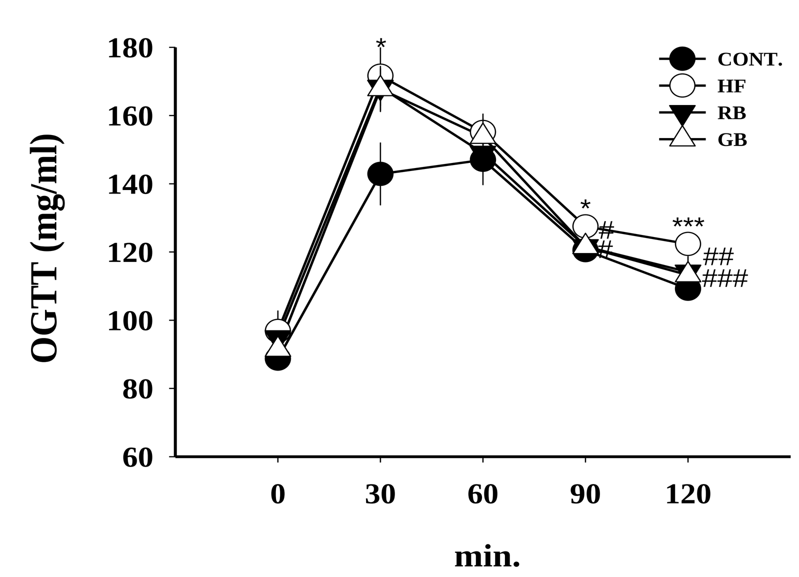


Figure 3. Effects of RB/GB on blood glucose level after oral intake. Values were expressed as mean ± S.E. (n=8).

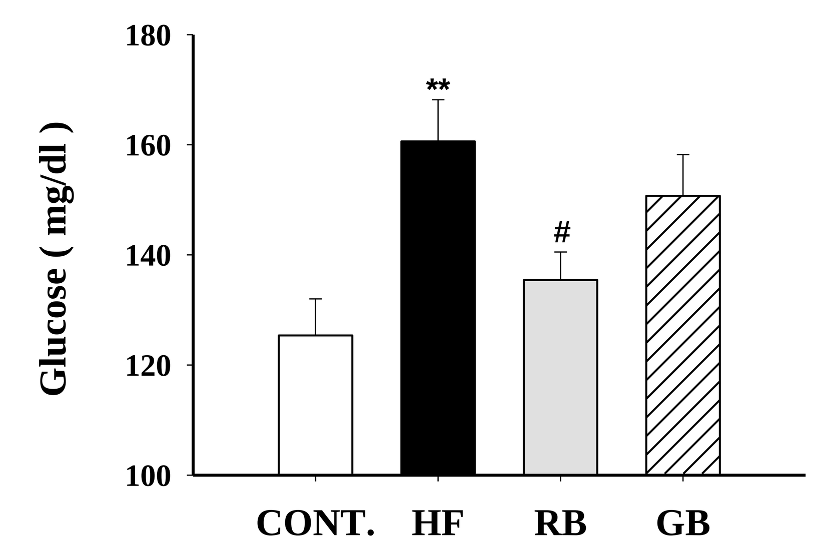


Figure 4. Effects of RB/GB on blood glucose level. Values were expressed as mean ± S.E. (n=8).

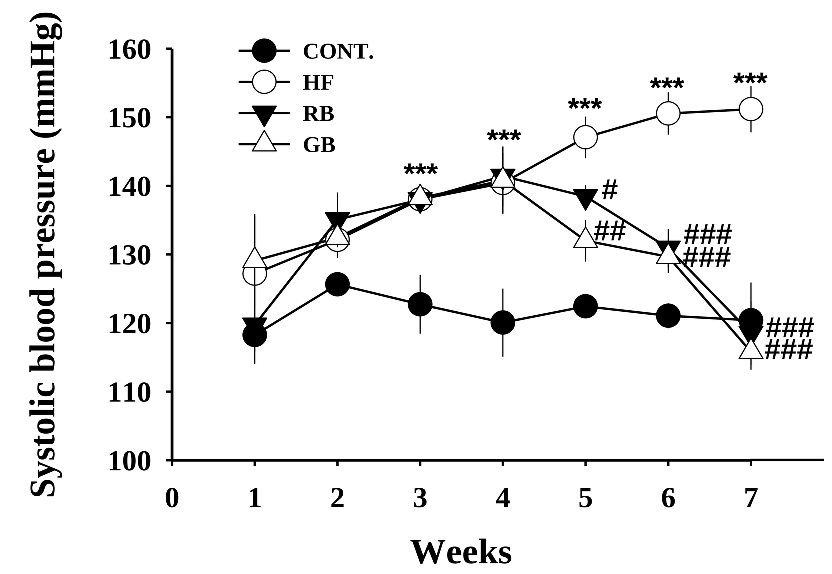


Figure 5. Effects of RB/GB on blood pressure. Values were expressed as mean ± S.E. (n=8). $^{**}p<0.01$ vs. Cont.; $^{\#\#\#}p<0.001$ vs. HF.

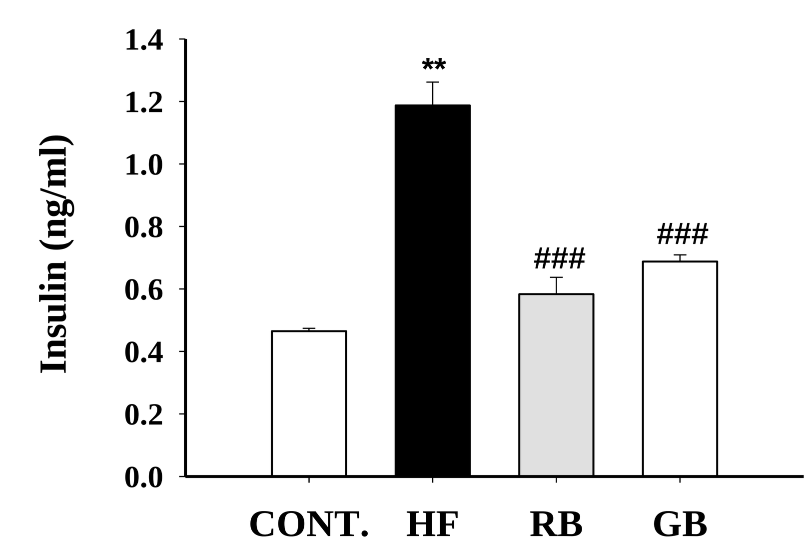


Figure 6. Effects of RB/GB on insulin. Values were expressed as mean ± S.E. (n=8). $^{**}p<0.01$ vs. Cont.; $^{\#\#\#}p<0.001$ vs. HF.

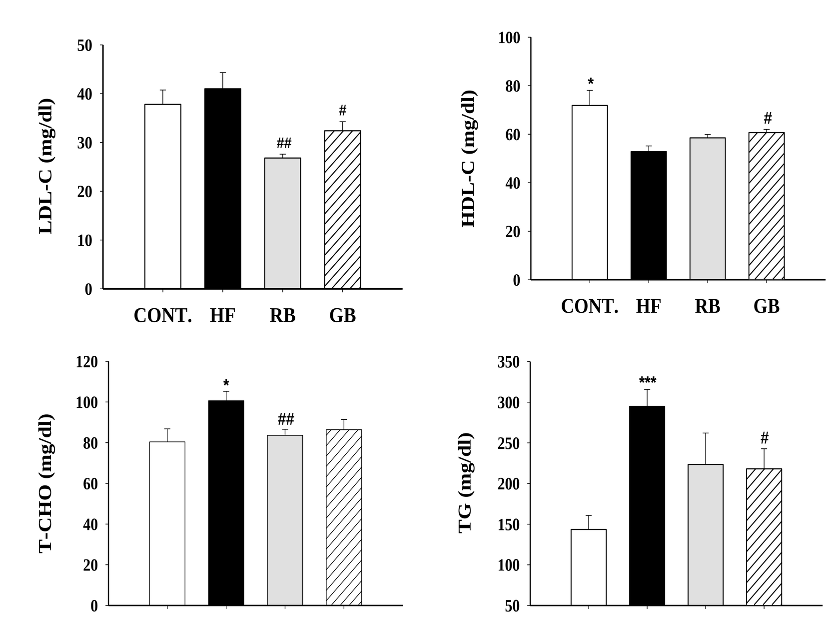


Figure 7. Effects of RB/GB on TG (A), T-Chol (B), HDL-C (C), LDL-C (D). Values were expressed as mean ± S.E. (n=8). $^{***}p<0.001$, $^{*}p<0.05$ vs. Cont; $^{\#}p<0.05$, $^{\#\#}p<0.01$ vs. HF.

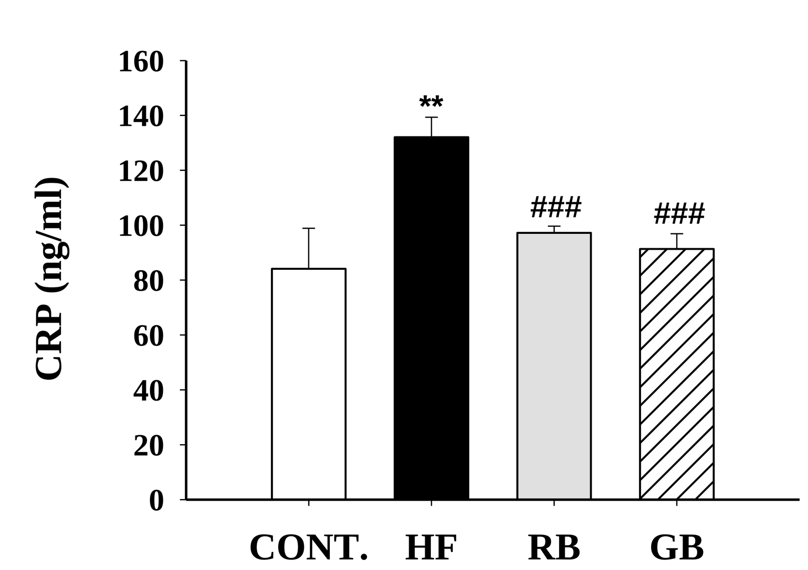


Figure 8. Effects of RB/GB on CRP. Values were expressed as mean ± S.E. (n=8). $^{**}p<0.01$ vs. Cont.; $^{\#\#\#}p<0.001$ vs. HF.

Conclusion

AIN-76A high-fructose diet successfully induced the metabolic syndrome by increasing body weight, blood pressure, epididymal fat weight, liver weight, kidney weight, levels of insulin, total cholesterol, triglyceride, L이 -cholesterol, C-reactive protein (CRP), and aorta thickness in the Sprague-Dawley male rats. The ginseng berry extract orally administered for 4 weeks reduced total-C, LDL-C and TG and increased HDL-C; improved blood glucose, blood pressure and CRP level. These results suggest that the ginseng beery has an excellent preventive effect on the metabolic syndrome and is a good ingredient for novel health food to prevent the metabolic syndrome.

* This research was partially supported by Korean Society of Food Culture.

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