

Inhibitory effect of green coffee bean extract on fat accumulation and body weight gain in mice

Hiroshi Shimoda, Emi Seki and Michio Aitani

ABSTRACT:

Background: An epidemiological study conducted in Italy indicated that coffee has the greatest antioxidant capacity among the commonly consumed beverages. Green coffee bean is rich in chlorogenic acid and its related compounds. The effect of green coffee bean extract (GCBE) on fat accumulation and body weight in mice was assessed with the objective of investigating the effect of GCBE on mild obesity.

Methods: Male ddy mice were fed a standard diet containing GCBE and its principal constituents, namely, caffeine and chlorogenic acid, for 14 days. Further, hepatic triglyceride (TG) level was also investigated after consecutive administration (13 days) of GCBE and its constituents. To examine the effect of GCBE and its constituents on fat absorption, serum TG changes were evaluated in olive oil-loaded mice. In addition, to investigate the effect on hepatic TG metabolism, carnitine palmitoyltransferase (CPT) activity in mice was evaluated after consecutive ingestion (6 days) of GCBE and its constituents (caffeine, chlorogenic acid, neochlorogenic acid and feruloylquinic acid mixture).

Results: It was found that 0.5% and 1% GCBE reduced visceral fat content and body weight. Caffeine and chlorogenic acid showed a tendency to reduce visceral fat and body weight. Oral administration of GCBE (100 and 200 mg/kg day) for 13 days showed a tendency to reduce hepatic TG in mice. In the same model, chlorogenic acid (60 mg/kg day) reduced hepatic TG level. In mice loaded with olive oil (5 mL/kg), GCBE (200 and 400 mg/kg) and caffeine (20 and 40 mg/kg) reduced TG level. GCBE (1%), neochlorogenic acid (0.028% and 0.055%) and feruloylquinic acid mixture (0.081%) significantly enhanced hepatic CPT activity in mice. However, neither caffeine nor chlorogenic acid alone was found to enhance CPT activity.

Conclusion: These results suggest that GCBE is possibly effective against weight gain and fat accumulation by inhibition of fat absorption and activation of fat metabolism in the liver. Caffeine was found to be a suppressor of fat absorption, while chlorogenic acid was found to be partially involved in the suppressive effect of GCBE that resulted in the reduction of hepatic TG level. Phenolic compounds such as neochlorogenic acid and feruloylquinic acid mixture, except chlorogenic acid, can enhance hepatic CPT activity.