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Effects of clove (Syzygium aromaticum) in body weight, liver weight, and macroscopic liver appearance in Sprague Dawley rats fed with high fat diet.

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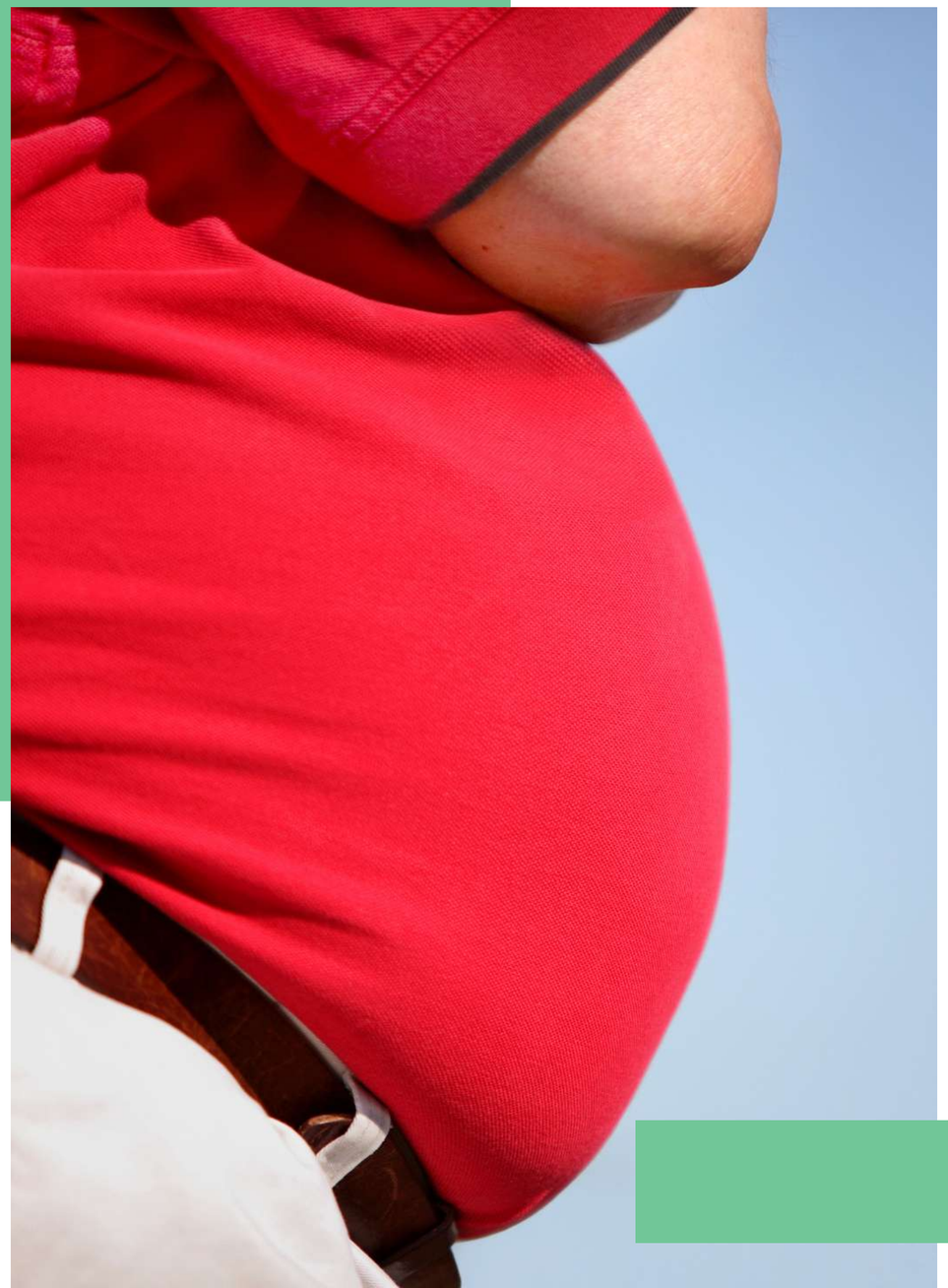
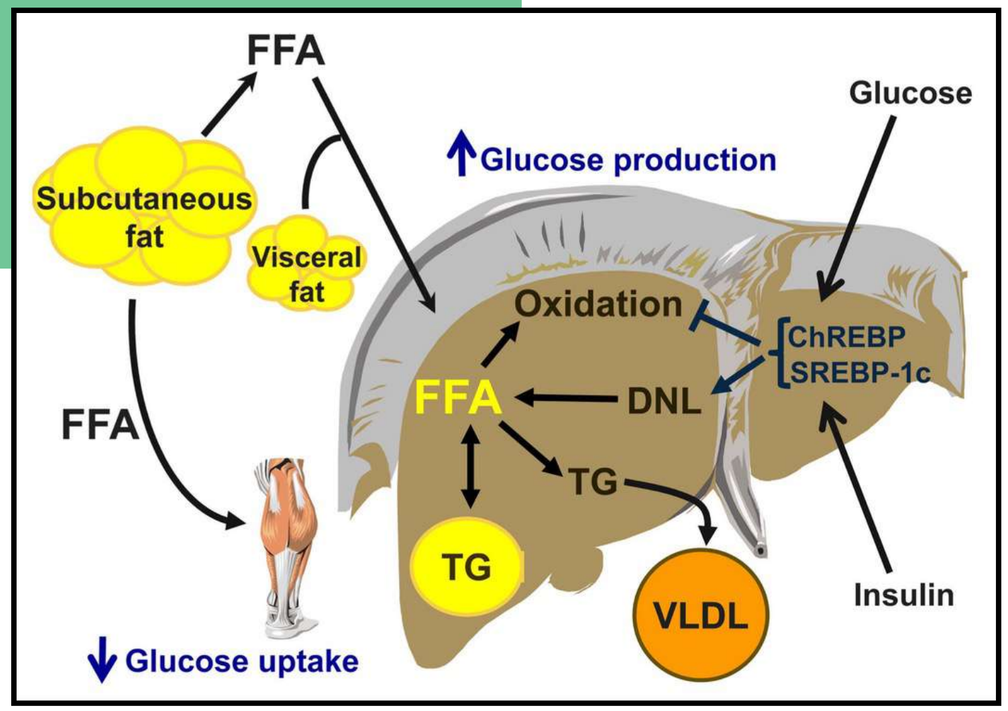


Introduction

Overweight and obesity have become serious global problems in recent years, with a recent report estimating that 1.5 billion adults worldwide are overweight, among whom over 200 million men and almost 300 million women are obese. Overweight and obesity were once considered problems associated with high-income nations, but their incidence is now increasing in low and middle-income countries, a trend that is attributed to chronic alcoholism, food overconsumption and sedentary lifestyle. Overweight and obese individuals face the risk of numerous chronic diseases, including heart disease, diabetes and some types of cancer, as well as psychological and social problems.



Introduction

Obesity is associated with a spectrum of liver abnormalities, known as nonalcoholic fatty liver disease (NAFLD), characterized by an increase in intrahepatic triglyceride content (i.e. steatosis) with or without inflammation and fibrosis (i.e. steatohepatitis). NAFLD has become an important public health problem because of its high prevalence, potential progression to severe liver disease, and association with serious cardiometabolic abnormalities, including type 2 diabetes mellitus (T2DM), the metabolic syndrome and coronary heart disease (CHD)

Introduction

- A recent research focus has been the development of anti-obesity agents derived from natural products. Such research has been bolstered by recent reports that traditional herbal extracts have been found effective in reducing body weight in vivo.
- Among these extracts, the dried aromatic flower buds of Syzygium aromaticum (L.) commonly known as cloves, have been reported to be useful in treating disorders in Asian countries.
- Phytochemical studies indicate that eugenol is the main chemical compound of cloves. Eugenol, a methoxyphenol component of clove, has been reported for a number of pharmacological effects, including the antioxidant, antiinflammatory, analgesic, anesthetic, antipyretic, antiplatelet, antianaphylactic, antidepressant, antibacterial, etc..

Introduction

- ,In some studies, eugenol effectively ameliorated hyperglycemia through inhibition of hepatic gluconeogenesis by modulating calcium calmodulin dependent kinase, kinase–AMP activated kinase–CREB binding protein signaling pathway.
- In the liver, eugenol has been investigated for its antioxidant, antiinflammatory and DNA protective properties.
- Therefore, the present study investigated the effect of S. aromaticum ethanol extract (SAE) on a rat model in which obesity and liver structure changes had been induced by administering a high–fat diet (HFD).

Materials & Methods

Chemical & Reagents

Dried cloves was purchased from IPB Biopharmacy Center (Bogor, Indonesia). Clove was extracted by using 96% ethanol through the maceration method in Indonesian Medicinal and Aromatic Crops Research Institute (IMACRI) (Bogor, Indonesia).

High Fat Diet induced-Rats & Analysis

Thirty 8-12 weeks-old male Sprague Dawley weighing 120-150 g were purchased from iRATco animal lab provider (Bogor, Indonesia). 5 rats each group were given intragastric administration of vehicle CMC 0,5% (normal control), high fat diet only (negative control), and simvastatin (positive control). The other three treatment groups were treated with dosages 150, 250, and 500 mg/kg/day of SA ethanolic extract. After 43 days of treatment, body weight and liver weight were counted, The liver macroscopic analysis was also done. All experiments were performed strictly in accordance with the recommendations of the guide for the care and use from iRATco Animal Laboratory (Bogor, Indonesia)

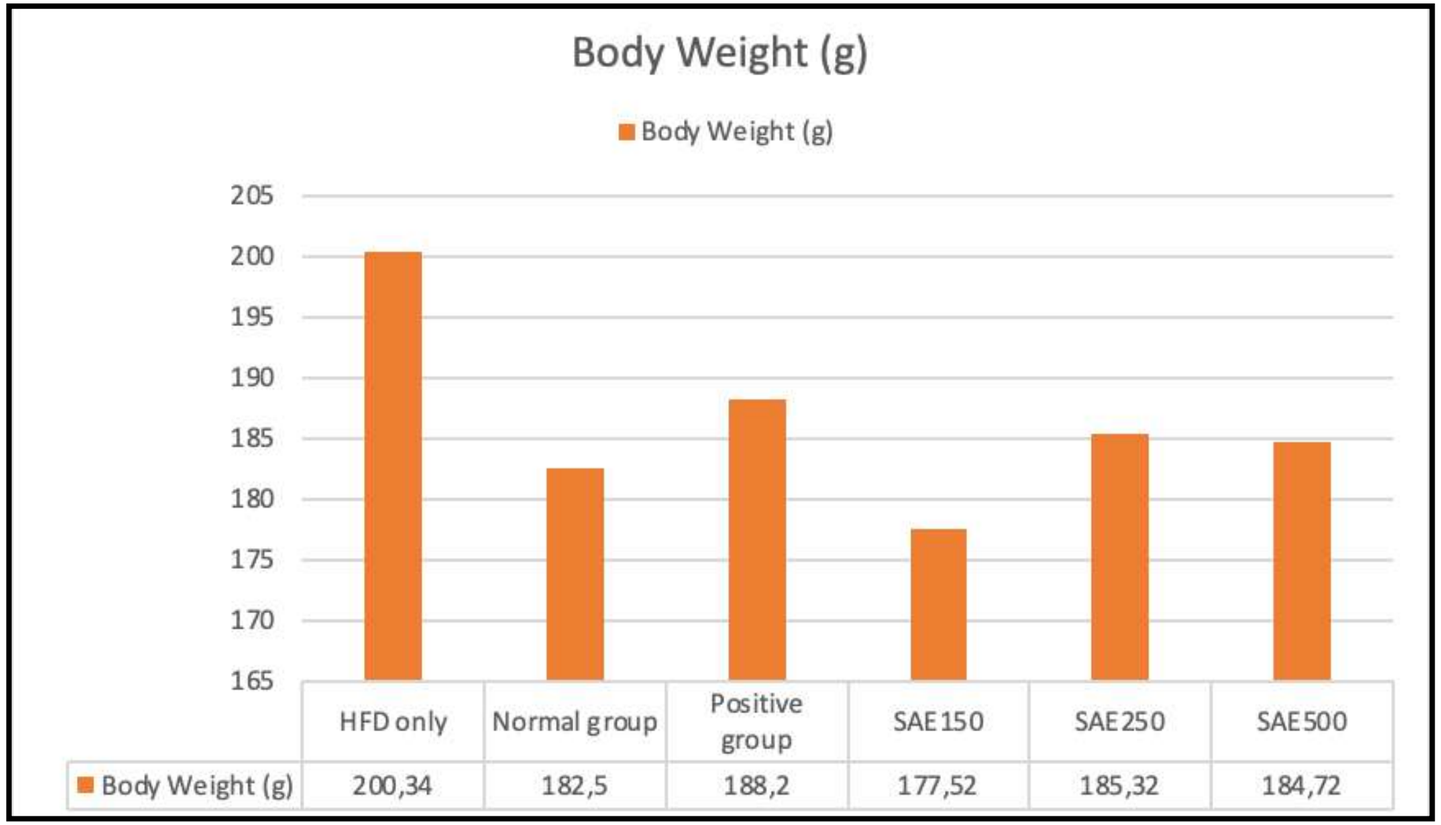
Statistical Analysis

Data are expressed as mean SD. Statistical significance was evaulated through one-way ANOVA and multiple comparison post-hoc bonferroni test ($P < 0,05$ & 0,01)

Results

Effects of SAE on body weight

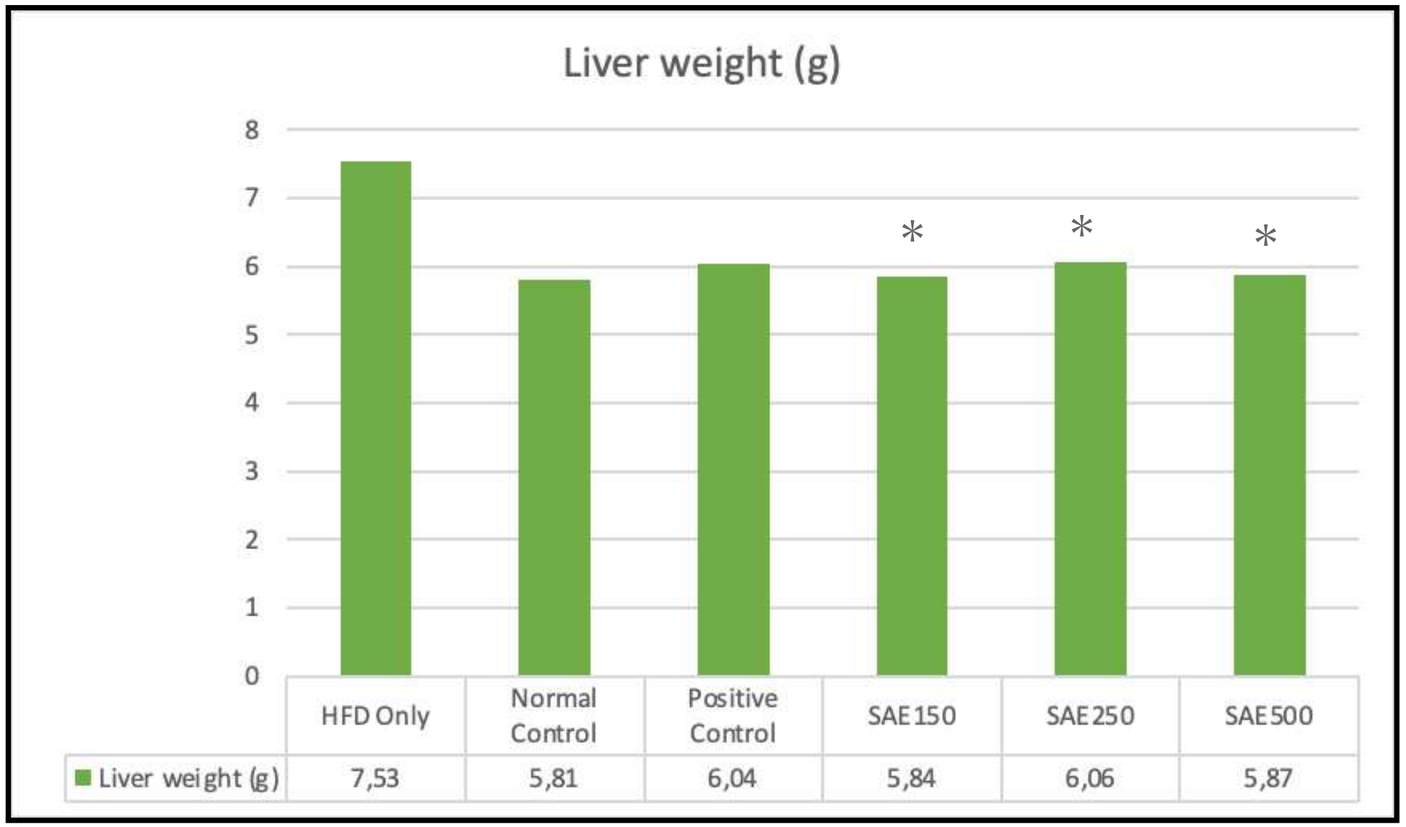
After 43 days of treatment on high fat diet, rats in high fat diet only group (negative control group) had higher body weight than rats in normal group. However, the body weight of rats in the treatment groups treated with SAE at dosages 150, 250, and 500 mg/kg/day was lower than rats in negative control group. Data are presented in mean SD.



Results

Effects of SAE on liver weight

After 43 days of treatment, the liver weight of rats in SAE treatment group (150, 250, & 500 mg/kg/day) were statistically lower than rats in high fat diet-only group. Data are presented mean SD.

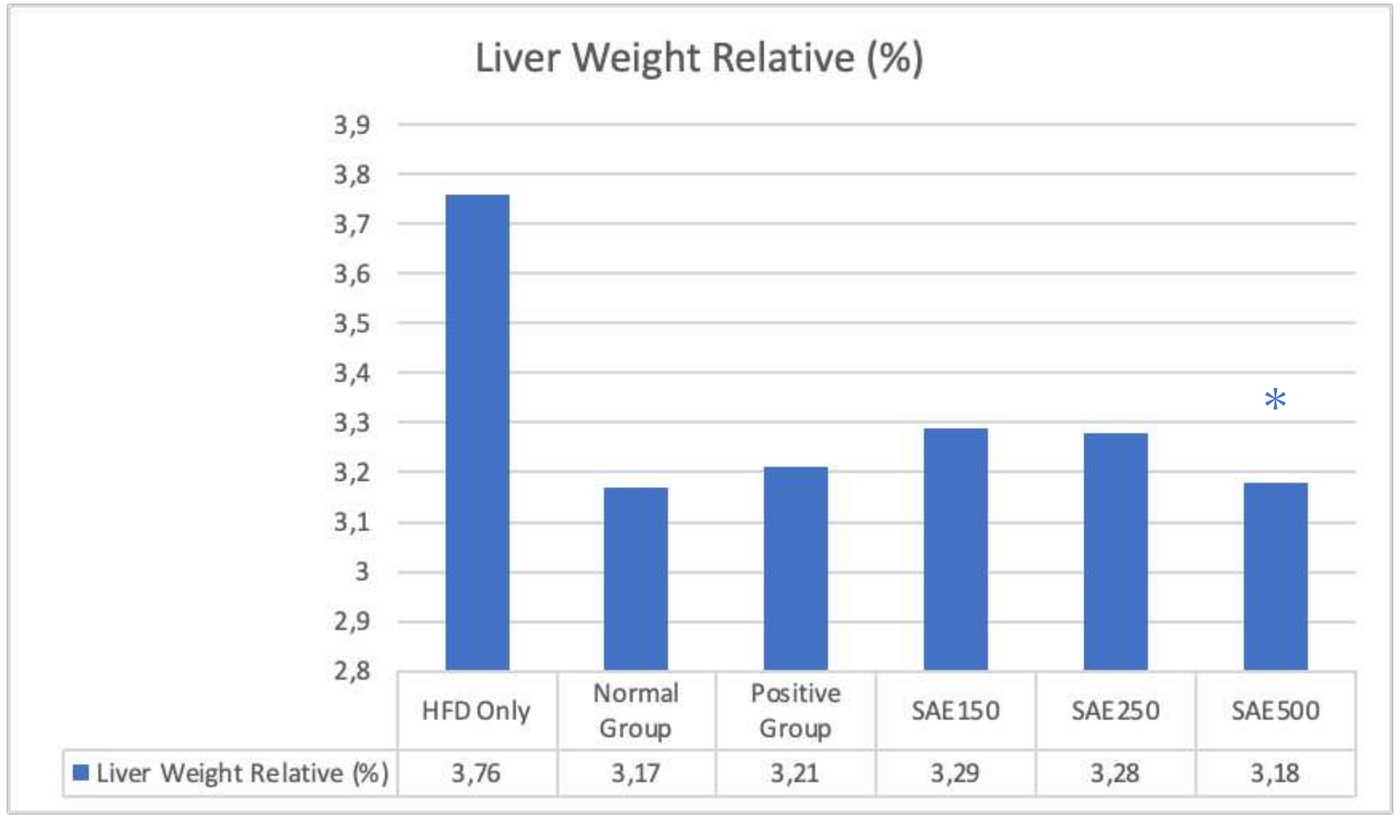


*P < 0,05 vs High-Fat-diet-only group , bonferroni multiple post hoc test.

Results

Effects of SAE on liver weight relative

After 43 days of treatment, the liver weight relative of rats in SAE treatment group was decreased than rats in high fat diet-only group. Especially, liver weight relative in SAE500 was statistically lower compared to HFD only group. Data are presented mean SD.

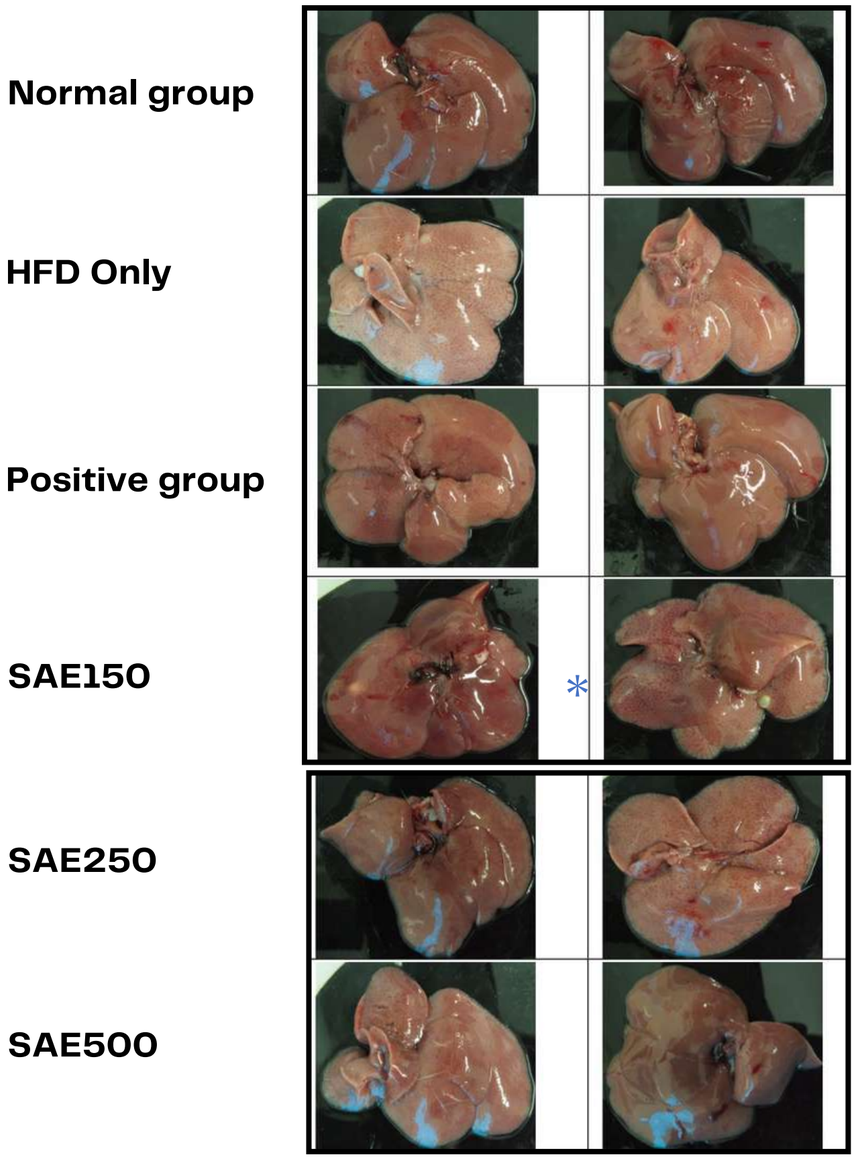


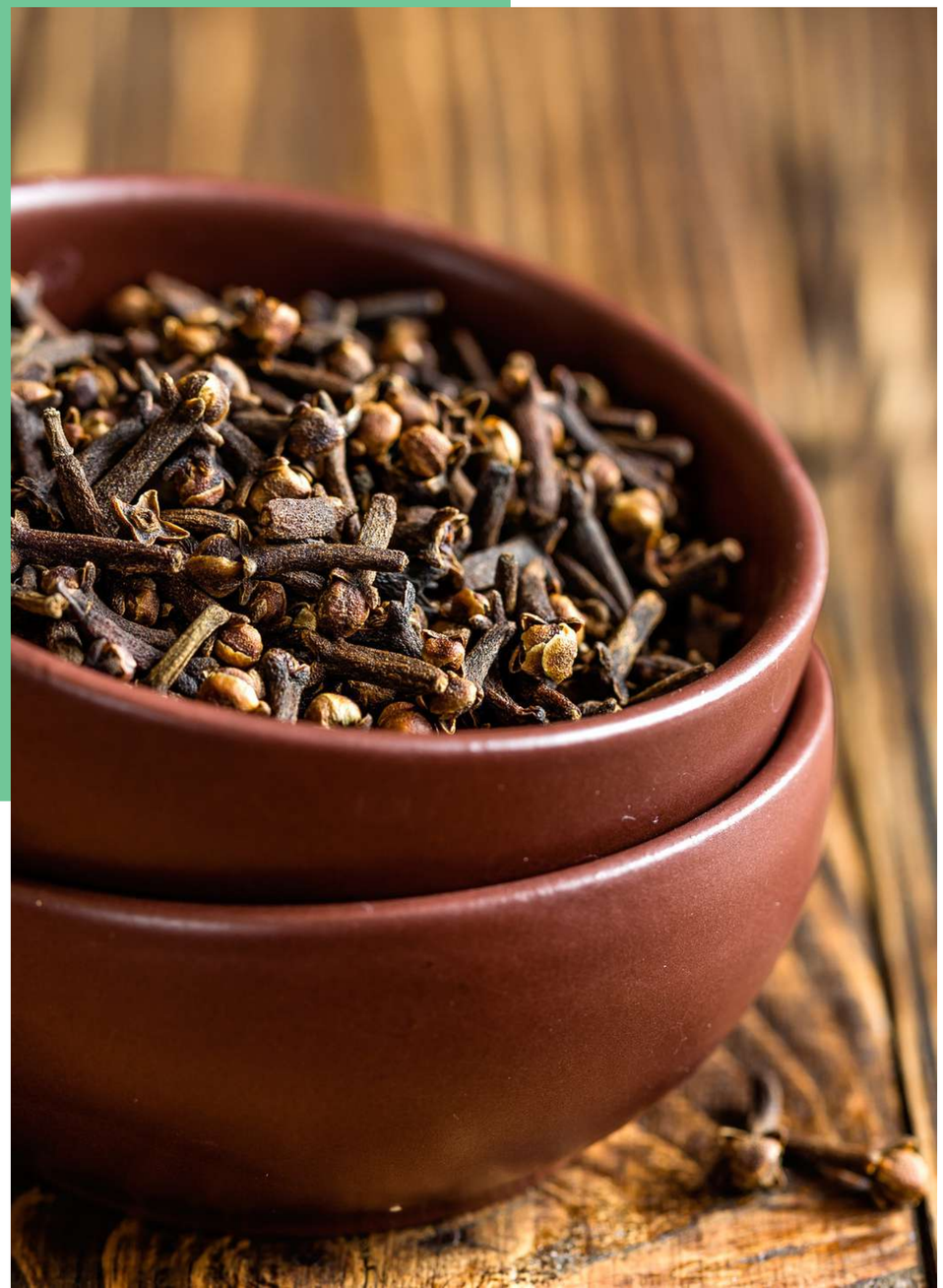
*P < 0,05 vs High-Fat-diet-only group , bonferroni multiple post hoc test.

Results

Effects of SAE on macroscopy liver appearance

The liver color of the high-fat-diet only control group appeared light yellow, and that of the normal group was dark red. the liver color of groups treated with dosages 150, 250, and 500 mg/kg/day were dark red similar to normal group.





Conclusion

We found that compared with the HFD only control group, SAE reduced body weight of rats. Rats treated with SAE also exhibited significant reduction of liver weight and relative liver weight that may possibly lead to hepatomegaly. Additionally, SAE prevented the macroscopic structure change of liver, a yellowish-fatty-look liver that may potentially a sign of NAFLD.

These results suggest that SAE/Cloves may affect the prevention of obesity and maintain liver structure by enhancing fat metabolism and antioxidative defenses. However, the exact molecular mechanisms and active components responsible for the inhibitory effects of SAE on obesity and in liver require futher investigation.

Thank you for your attention

Get in touch!

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