

Hypotriacylglycerolemic and antiobesity properties of fermented tea obtained by mixing green tea leaves and loquat leaves

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Summary

We manufactured a new mixed and fermented tea obtained by tea-rolling processing of third-crop green tea leaves and loquat leaves. The fermented tea extract inhibited pancreatic lipase activity *in vitro*, and effectively suppressed postprandial hypertriacylglycerolemia in rats. Liver triacylglycerol concentration and white adipose tissue weight were reduced in rats fed a diet containing 1% freeze-dried fermented tea extract for 4 weeks. The activity of fatty acid synthase in liver was also markedly decreased. The serum triacylglycerol- and body fat-lowering effects of the fermented tea extract were strong relative to the level of dietary supplementation. In human study, serum triacylglycerol levels were lowered by drinking 600 mL of fermented tea per day for 3 months. It is suggested that the new fermented tea exhibited hypotriacylglycerolemic and antiobesity properties through suppression of both hepatic fatty acid synthesis and postprandial hypertriacylglycerolemia by inhibition of pancreatic lipase.

Introduction

We investigated the effects of a new fermented tea obtained by tea-rolling processing of third-crop green tea leaves and loquat leaves on triacylglycerol metabolism in rats and humans, and the mechanisms of hypotriacylglycerolemic and antiobesity action by fermented tea.

Materials and methods

Third-crop green tea leaves withered by primary tea-rolling dryer and fresh loquat leaves were mixed at a ratio of 9:1, kneaded with a tea roller for 20 min, and dried by tea drier, to yield the mixed and fermented tea leaves (Miyata, *et al.* (2009)). We used freeze dried powder of the fermented tea extract as a test sample. Pancreatic lipase activity was measured *in vitro* by the method of Han, *et al.* (1999). In fat tolerance test, sample solutions with 10% soybean oil emulsion were administered orally to male Sprague-Dawley rats, and serum triacylglycerol levels were measured from 0 to 6 h after administration. The rats of the same species were fed a diet containing sample powder for 4 weeks, body fat weight and serum and hepatic triacylglycerol levels were measured. Human subjects drank 600 mL of fermented tea per day for 3 months, and serum triacylglycerol levels were measured every month.

Results and discussion

When IC₅₀ values for pancreatic lipase were determined using triolein as substrate, the inhibitory activity of fermented tea (IC₅₀ = 1,081±88 µg/mL) was significantly stronger than those of green tea (IC₅₀ = 2,245±175 µg/mL) and loquat tea (IC₅₀ = 4,501±52 µg/mL).

The increment of triacylglycerol concentration in the rats orally given fat emulsion with fermented tea, but not green tea or loquat tea, was effectively suppressed at 1 and 2 h, and differences were significant from the case of no sample administration (Figure 1).

When rats fed a diet containing 1% freeze dried green tea-, loquat tea-, or fermented tea-extract for 4 weeks, white adipose tissue weights and hepatic triacylglycerol levels were significantly reduced in the feeding of fermented tea, but not the other teas. The body fat- and serum triacylglycerol-lowering effect

of fermented tea was observed in a dose dependent manner (Figure 2). The activity of fatty acid synthase in liver was also markedly decreased.

In human study, body fat percentage, degree of obesity, and serum triacylglycerol levels (Figure 3) were lowered in subjects drank fermented tea versus placebo (green tea) every day for 3 months.

It is suggested that the new fermented tea exhibited hypotriacylglycerolemic and antiobesity properties through suppression of both hepatic fatty acid synthesis and postprandial hypertriacylglycerolemia by inhibition of pancreatic lipase.

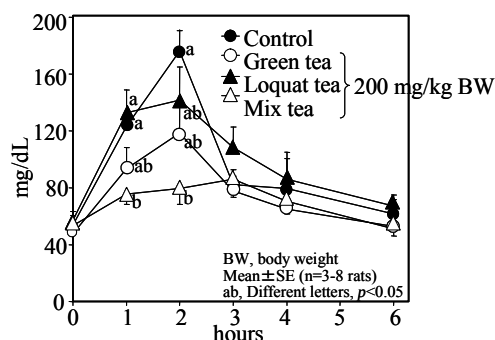


Figure 1. Serum triacylglycerol levels after administration of samples with emulsion in rats.

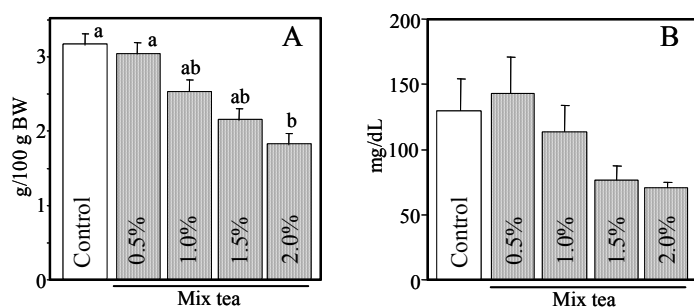


Figure 2. Perirenal and epididymal white adipose tissue weights (A) and serum triacylglycerol levels (B) in rats. BW, body weight; Mean $\pm$ SE (n=7-8 rats); ab, Different letters, $p < 0.05$

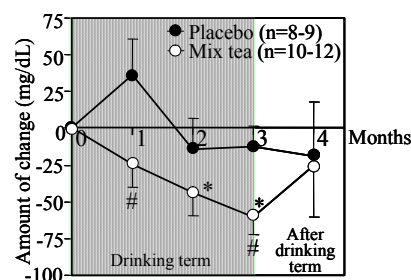


Figure 3. Serum triacylglycerol levels in human subjects (Initial value ≥ 140 mg/dL) * $p < 0.05$ for 0 month # $p < 0.05$ for placebo group

Acknowledgements

This work was supported by a Grant from the Industry-University-Government Cooperation Project Research of Nagasaki Prefecture, Japan

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