

고지방식이로 유도한 대사증후군쥐에서 수수의 항당뇨 효과에 대한 연구

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Anti-diabetic effect of sorghum extracts in high-fat diet induced metabolic syndrome mice

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Objectives: This study was investigated the hypothesis that sorghum extract may exert anti-diabetic effects through a mechanism that improves insulin sensitivity via PPAR- γ activation in adipose tissue.

Materials and methods: Seven C57BL/6 mice were fed AIN-93M diet with 10% fat (LF) from total energy intake and twenty-one mice were fed a high-fat AIN diet with 60% fat from total energy intake to induce metabolic syndrome for 14 weeks. High fat diet fed mice were randomly divided into three groups (n=7 each) with oral administration of 1 mL distilled water (HF), 0.5 % sorghum extract (0.5% SE), or 1 % sorghum extract (1% SE), respectively from week 8 to week 14 for 6 weeks. Mice with the AIN-93 M diet with 10% fat were also fed 1 mL distilled water orally.

Results and discussion: Levels of total- and LDL-cholesterol, and glucose, and AUC of glucose was significantly lower in mice with 0.5% SE and 1% SE than in mice with HF. Serum insulin level was significantly lower in mice with 1% SE than in mice with HF and 0.5% SE. There were no significant differences in levels of serum TG, HDL-cholesterol, glutamic oxaloacetic transaminase, and glutamic pyruvic transaminase among groups. The expression of PPAR- γ was significantly higher in mice with 1% SE than in mice with HF and 0.5% SE, but and was similar to that in mice with LF. The expression of TNF- α was significantly lower in mice with 1% SE than in mice with HF and LF, and was significantly lower in mice with 0.5% SE than in mice with LF. The expression of adiponectin was significantly higher in mice with 0.5% SE and 1% SE than in mice with HF, but not with LF. These results suggested that sorghum extract significantly increase insulin sensitivity, and improve hyperglycemia possibly through regulating PPAR- γ mediated glucose metabolism in this mice model of metabolic syndrome.

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(This work was supported by a grant from the KRDA, Agricultural R&D 15th Agenda)

Table 1. Lipid profiles, liver function, levels of glucose and insulin in serum*

	LF	HF	0.5% SE	1% SE
TG (mg/dL)	79.27±10.17	76.87±9.10	71.03±11.10	85.17±11.87
TC (mg/dL)	157.93±6.15 [†]	166.41±7.91 ^b	140.34±9.99 ^{bc}	130.08±8.41 ^c
HDL-C (mg/dL)	80.33±3.80	87.71±3.33	80.67±7.93	77.41±3.22
LDL-C (mg/dL)	62.65±2.27 ^a	69.19±3.55 ^a	45.19±6.09 ^b	33.88±3.45 ^b
GOT (IU/L)	34.62±2.90	44.71±3.78	40.15±6.27	39.92±5.56
GPT (IU/L)	12.53±1.18	24.62±5.74	17.26±3.74	16.26±2.36
Glucose (mg/dL)	95.30±3.39 ^a	180.44±18.53 ^b	128.63±13.86 ^a	128.22±7.66 ^a
Insulin (mg/mL)	0.39±0.08 ^a	0.79±0.09 ^b	0.68±0.18 ^b	0.39±0.08 ^a
AUC of glucose (mg·min/dL)	14245.50±432.10 ^a	23028.33±2485.64 ^b	17653.13±2229.71 ^a	17246.67±1453.21 ^a

^aValues are expressed as means ± SEM; n=7 in each group. LF: low fat diet; HF: high fat diet; 0.5% SE: high fat diet with 0.5% sorghum extract, 1% SE: high fat diet with 1% sorghum extract; TG, triglyceride; TC, total cholesterol; HDL-C, high-density lipoprotein cholesterol; LDL-C, low-density lipoprotein cholesterol; GOT, glutamic oxaloacetic transaminase; GPT, glutamic pyruvic transaminase; AUC, area under the curve.

[†] Values in row with different letters are significantly different, $p < 0.05$ (ANOVA with Duncan's multiple-range test).

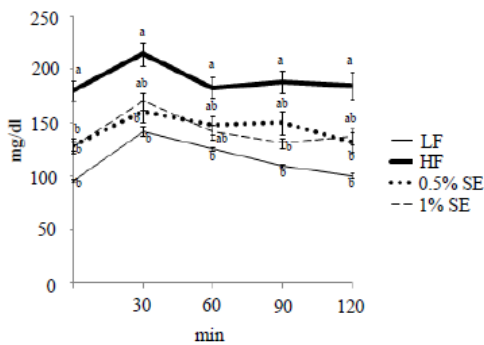


Figure 1. Effect of Sorghum extract on oral glucose tolerance test (OGTT). Values are expressed as the mean±SE; n=7 in each group. LF: low fat diet; HF: high fat diet; 0.5% SE: high fat diet with 0.5% sorghum extract, 1% SE: high fat diet with 1% sorghum extract. Values with different letters are significantly different, $p < 0.05$ (ANOVA with Duncan's multiple-range test).

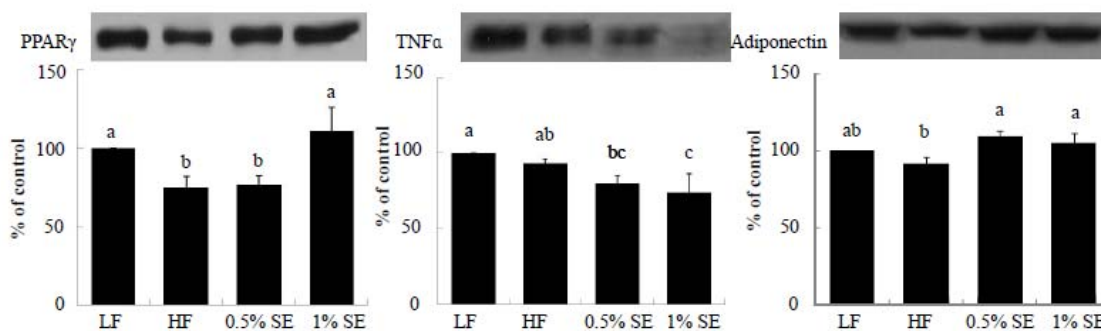


Figure 2. Effect of sorghum extracts on protein expression of PPAR- γ , TNF- α and adiponectin in adipose tissue. Values are expressed as means ± SEM; n=7 in each group. LF: low fat diet; HF: high fat diet; 0.5% SE: high fat diet with 0.5% sorghum extract, 1% SE: high fat diet with 1% sorghum extract. Values with different letters are significantly different, $p < 0.05$ (ANOVA with Duncan's multiple-range test).