

## INTISARI

**Latar Belakang:** Diet tinggi lemak dan fruktosa dapat menyebabkan gangguan pensinyalan insulin. Pemberian diet tinggi lemak dan fruktosa dapat meningkatkan  $\beta$ -oksidasi yang diawali dengan meningkatnya gen CPT-1B dan kadar *citrate synthase*. Akan tetapi  $\beta$ -oksidasi memiliki kapasitas optimal sehingga apabila terjadi *overload* menyebabkan pembentukan senyawa intermediet yang dapat mengganggu pensinyalan insulin. Di dalam biji kacang gude mengandung serat. Serat pangan diketahui dapat membantu meningkatkan sensitivitas insulin.

**Tujuan:** Penelitian ini bertujuan untuk menganalisa pengaruh substitusi tepung kacang gude (*Cajanus cajan* L.) terhadap ekspresi gen *carnitine palmitoyltransferase-1B* (CPT-1B) dan kadar *citrate synthase* pada tikus dengan diet tinggi lemak dan fruktosa.

**Metode:** Subjek pada penelitian ini adalah 25 ekor tikus galur *Sprague Dawley* berusia 1 bulan dengan berat  $\pm 100$  g, dibagi menjadi 5 kelompok yaitu kelompok normal (N), kelompok kontrol diet tinggi lemak dan fruktosa (HF), kelompok intervensi kacang gude dosis 1 sebesar 33 g/kg pakan (HFD1), kelompok intervensi kacang gude dosis 2 sebesar 66 g/kg pakan (HFD2), kelompok intervensi kacang gude dosis 3 sebesar 99 g/kg pakan (HFD3). Induksi diet tinggi lemak dan fruktosa dilakukan selama 10 minggu sedangkan intervensi substitusi tepung kacang gude dilakukan selama 6 minggu. Ekspresi CPT-1B diukur menggunakan RT-PCR sedangkan kadar *citrate synthase* diukur menggunakan ELISA. Sampel yang digunakan untuk mengukur ekspresi gen CPT-1B dan kadar *citrate synthase* adalah otot skelet (*quadriceps femoris*).

**Hasil:** Peningkatan secara signifikan ( $p < 0,05$ ) ekspresi gen CPT-1B dan kadar *citrate synthase* terjadi pada kelompok tikus yang diberikan diet tinggi lemak dan fruktosa. Setelah dilakukan intervensi, ekspresi gen CPT-1B dan kadar *citrate synthase* mengalami penurunan. Kelompok HFD-1 mengalami penurunan paling besar dan mendekati kelompok normal. Konsumsi substitusi kacang gude berkorelasi erat dan berbanding lurus dengan ekspresi gen CPT-1B dan kadar *citrate synthase*.

**Kesimpulan:** Substitusi tepung kacang gude mampu menurunkan ekspresi gen CPT-1B dan kadar *citrate synthase* pada tikus model diet tinggi lemak dan fruktosa.

**Kata kunci:** lemak, fruktosa, *carnitine palmitoyltransferase-1B*, *citrate synthase*, gude, serat

## ABSTRACT

**Background:** High fat and fructose diet can lead impaired insulin signaling. Impaired insulin signaling was initiated by  $\beta$ -oxidation overload. Beta-oxidation overload was characterized by increase of CPT-1B expression and *citrate synthase* protein level. One of nutrition that can improve insulin sensitivity was dietary fiber. Dietary fiber contains in many legumes include gude bean seed (*Cajanus cajan* L.).

**Objectives:** This study aim to analyzed the effect of gude bean flour substitution (*Cajanus cajan* L.) on the CPT-1B gene expression and *citrate synthase* protein level in rats with high-fat and fructose diet.

**Methods:** The subjects of this study were 25 *Sprague Dawley* rats aged 1 month with body weight  $\pm 100$  g, divided into 5 groups, namely the normal group (N), the control group with high fat and fructose diet (HF), the intervention group of gude bean dose 1 was 33 g/kg rat food (HFD1), intervention group of gude bean dose 2 was 66 g/kg rats food (HFD2), intervention group of gude bean dose 3 was 99 g/kg rats food (HFD3). The induction of high-fat and fructose diet was carried out for 10 weeks, while the gude flour substitution intervention was 6 weeks. *Carnitine palmitoyltransferase-1B* expression was measured using RT-PCR while *citrate synthase* protein levels were measured using ELISA. The samples of CPT-1B expression and *citrate synthase* level were skeletal muscle (*quadriceps femoris*).

**Result:** *Carnitine palmitoyltransferase-1B* expression and *citrate synthase* protein level in HF group was significantly increased ( $p < 0.05$ ). After intervention, CPT-1B gene expression and *citrate synthase* protein levels were decreased. The HFD1 group had the greatest decrease and the value approached the normal group. The total consumption of gude bean substitution was correlated with CPT-1B gene expression and *citrate synthase* protein levels.

**Conclusion:** Gude flour substitution was able to reduce CPT-1B gene expression and *citrate synthase* protein levels in rat with high-fat and fructose diet.

**Keywords:** fat, fructose, *carnitine palmitoyltransferase-1B*, *citrate synthase*, gude, fiber