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**Evaluasi Manfaat Minyak Sacha inchi (Plukenetia volubilis) terhadap Sintesis Trigliserida Tikus dengan Diet Tinggi Lemak dan Fruktosa Kajian: Gambaran Histopatologi dan Kadar Trigliserida Hepar,
Ekspresi Gen Lipogenik (Srebp-1c, Chrebp, Acc1, Fas, Dgat1 dan Dgat2), serta Kadar Protein DGAT1 dan
DGAT2 Hepar**
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ABSTRAK

Latar belakang: Asupan diet tinggi lemak dan fruktosa diketahui berperan dalam peningkatan akumulasi lipid intrahepatik yang berkontribusi dalam perkembangan penyakit perlemakan hati non-alkohol. Peningkatan asupan asam lemak tidak jenuh ganda (PUFA), seperti yang terkandung dalam minyak sacha inchi berpotensi memberikan efek protektif melalui regulasi ekspresi gen yang terlibat dalam jalur sintesis trigliserida.
Tujuan: mengevaluasi pengaruh pemberian minyak sacha inchi terhadap proses sintesis trigliserida pada tikus dengan diet tinggi lemak dan fruktosa.
Metode: Sebanyak 25 ekor tikus galur Wistar jantan (12 minggu; 240-320g) digunakan dalam penelitian ini. Tikus dibagi ke dalam 5 kelompok yaitu: normal, diet tinggi lemak dan fruktosa (LF), serta LF dengan suplementasi minyak sacha inchi dosis 0,13 (S1); 0,26 (S2); dan 0,39 (S3) g/hari. Pemberian minyak sacha inchi dilakukan selama 8 minggu melalui sonde. Di akhir penelitian, tikus didekapitasi dan hepar diambil. Hepar ditimbang dan dicuci menggunakan larutan saline dingin sebelum disimpan. Kadar trigliserida hepar dianalisis menggunakan metode enzimatik-kolorimetri, gambaran histopatologi hepar dianalisis menggunakan pewaranaan hematoksilin-eosin (H&E), ekspresi gen dianalisis menggunakan *quantitative-polymerase chain reaction* (q-PCR), serta kadar protein DGAT1 dan DGAT2 dianalisis menggunakan metode *enzyme-linked immunosorbent assay* (ELISA).
Hasil: Kelompok LF memiliki berat, kadar trigliserida, ekspresi mRNA *Chrebp*, *Acc1*, *Fas*, dan *Dgat1*, serta kadar protein DGAT1 dan DGAT2 hepar, yang lebih tinggi dibandingkan kelompok normal ($p < 0,05$). Sebaliknya, kelompok suplementasi minyak sacha inchi menunjukkan ekspresi mRNA *Chrebp*, *Acc1*, *Fas*, dan *Dgat1*, serta kadar protein DGAT1 dan DGAT2 yang lebih rendah dibandingkan kelompok LF ($p < 0,05$).
Kesimpulan: Suplementasi minyak sacha inchi berpotensi menghambat akumulasi trigliserida di hepar yang ditandai dengan ekspresi mRNA mRNA *Chrebp*, *Acc1*, *Fas*, dan *Dgat1*, serta kadar protein *DGAT1* dan *DGAT2* yang lebih rendah dibandingkan kelompok diet tinggi lemak dan fruktosa.

Kata kunci: perlemakan hati non-alkohol, asam lemak tidak jenuh ganda (PUFA), minyak sacha inchi, diet tinggi lemak, diet tinggi fruktosa

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ABSTRACT

Background: A high-fat and high-fructose diet contributes to intrahepatic lipid accumulation and increases the risk of non-alcoholic fatty liver disease. Increasing intake of polyunsaturated fatty acids (PUFAs), such as those found in sacha inchi oil, may exert protective effects by regulating gene expression involved in triglyceride synthesis.
Objective: To evaluate the effect of sacha inchi oil supplementation on triglyceride synthesis in rats fed a high-fat and fructose diet.
Methods: A total of 25 male Wistar rats (12 weeks old; 240–320 g) were randomly divided into five groups: normal, high-fat and high-fructose diet (LF), and LF supplemented with sacha inchi oil at doses of 0.13 (S1), 0.26 (S2), and 0.39 (S3) g/day. Sacha inchi oil was administered orally via gavage for 8 weeks. At the end of the study, the rats were sacrificed and liver tissues were collected. Hepatic triglyceride levels were measured using an enzymatic colorimetric method, histopathological analysis was performed using hematoxylin–eosin (H&E) staining, gene expression was analyzed using quantitative polymerase chain reaction (qPCR), and DGAT1 and DGAT2 protein levels were determined using enzyme-linked immunosorbent assay (ELISA).
Results: The LF group exhibited significantly higher liver weight, hepatic triglyceride levels, mRNA expression of *Chrebp*, *Acc1*, *Fas*, and *Dgat1*, as well as DGAT1 and DGAT2 protein levels compared to the normal group ($p < 0.05$). In contrast, the sacha inchi oil-supplemented groups showed lower mRNA expression of *Chrebp*, *Acc1*, *Fas*, and *Dgat1*, as well as lower DGAT1 and DGAT2 protein levels compared to the LF group ($p < 0.05$).
Conclusion: Sacha inchi oil supplementation may attenuate hepatic triglyceride accumulation, as indicated by lower expression of lipogenic genes (*Chrebp, Acc1, Fas, and Dgat1*), and reduced DGAT1 and DGAT2 protein levels compared to the high-fat and fructose diet group.

Key words: non-alcoholic fatty liver, polyunsaturated fatty acids, sacha inchi oil, high-fat diet, fructose