

Opuntia ficus-indica var. Saboten Stimulates Adipogenesis, Lipolysis, and Glucose Uptake in 3T3-L1 Adipocytes

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Abstract : The prickly pear cactus (*Opuntia ficus-indica*) has a global distribution and has been used for medicinal benefits such as arteriosclerosis, diabetes, gastritis, and hyperglycemia. The prickly pear variety *Opuntia ficus-indica* var. Saboten (OFS) is widely cultivated in Cheju Island, the southwestern region of Korea, and used as a functional food. The present study investigated the effects of OFS on adipogenesis, lipolysis, glucose uptake, and glucose transporter (GLUT4) expression using preadipocyte 3T3-L1 cells. Adipogenesis was determined by preadipocyte differentiation and triglyceride accumulation assessed by Oil Red O staining. Lipolysis was determined as the rate of glycerol release. Insulin-stimulated glucose uptake and GLUT4 expression were measured using fluorescent glucose analogue, 2-NBDG, and ELISA, respectively. Quantitative real-time RT-PCR was performed to investigate the effects of OFS on the mRNA expression of peroxisome proliferator-activated receptor γ (PPAR γ), a regulator of adipocyte differentiation. Ethanol extracts of OFS dose-dependently enhanced adipocyte differentiation and cellular triglyceride levels indicating the enhancement of the differentiation of preadipocytes into adipocytes. Insulin-stimulated glucose uptake and GLUT4 expression were also dose-dependently increased by OFS treatment. Furthermore, OFS treatment also increased the mRNA levels of PPAR γ . These effects of OFS on adipocytes suggest that OFS is potentially beneficial for type 2 diabetes by due to its enhanced glucose uptake and balanced adipogenesis and lipolysis properties.

Keywords : 3T3-L1 preadipocyte cell, adipogenesis, GLUT4, lipolysis, *Opuntia ficus-indica* var. Saboten, PPAR γ , prickly pear cactus

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