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Methanol extract of strawberry cultivar 'Aprika' increases glucose uptake in 3T3-F442A adipocytes

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Insulin resistance is a state where a normal amount of insulin can't provoke an appropriate metabolic response. Insulin promotes membrane trafficking of the glucose transporter GLUT4 from the storage vesicles to the plasma membrane in white adipose tissue. Adipocytes use glucose for lipogenesis and store the energy as lipid droplets. If adipocytes are unable to uptake glucose, a chronic state of hyperglycemia is developed, with severe health consequences. Polyphenols are natural anti-inflammatory and antioxidant agents. Food rich in polyphenols has been suggested to exert an ameliorative effect on restoring insulin sensitivity, with the main identified target being AMPK[1,2], one of the key sensors of intracellular energy. Here, we tested the effect of methanol extracts from three newly introduced strawberry (*Fragaria x ananassa*, Duch.) cultivars – 'Aprika', 'Sandra' and 'Quicky' on glucose metabolism in 3T3-F442A adipocytes. It was determined that 'Aprika' has the highest total phenolic content, relative to the other two cultivars. After 72-h exposure, none of the strawberry cultivars affected adipocyte cell growth significantly. Protein expression analysis of the differentiated adipocytes suggested 'Aprika', but not the other two cultivars, significantly increased the AMPK expression, as well as GLUT4, thus increasing glucose uptake. Strawberry extracts did not significantly affect the differentiation of adipocytes (SIRT1 and PPARγ), nor the fatty acid synthesis (ACC). Conclusively, the 'Aprika' methanol extract with high phenolic content exerts an ameliorative effect on glucose uptake, presumably through activation of the AMPK-dependent mechanism of GLUT4 trafficking. The systemic effects of the 'Aprika' cultivar should be further investigated. Implications of the research are decreased hyperglycemia in obese and diabetic patients, by the introduction of the 'Aprika' strawberry cultivar into everyday diet.

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References

1. Zhao L, Zou T, Gomez NA, Wang B, Zhu MJ, Du M. Raspberry alleviates obesity-induced inflammation and insulin resistance in skeletal muscle through activation of AMP-activated protein kinase (AMPK) α1. Nutr Diabetes 2018;8:39.
2. Xu W, Luo Y, Yin J, Huang M, Luo F. Targeting AMPK signaling by polyphenols: A novel strategy for tackling aging. Food Funct 2023;14:56-73.