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Identification of the Active Compound and Anti-obesity Effect of Korean Naked Barley Extract on 3T3-L1 Adipocytes

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[Introduction]

Obesity has become a global health concern and is considered a major risk factor for diabetes mellitus, atherosclerosis, and certain cancers. Adipocytes in the body play an important role in energy balance by controlling storage and mobilization of triacylglycerol. In this study, the anti-adipogenic potential of barley extract was evaluated using 3T3-L1 adipocytes and an anti-adipogenic compound in the water extract was identified.

[Materials and Methods]

12 Korean barley cultivars were harvested on May, 2018 from the experimental field and milled in the laboratory at the National Institute of Crop Science, Rural Development Administration, Korea. The flour was defatted with hexane at room temperature. After filtration, the residual was extracted with prethanol and then extracted with water and dried with a freeze dryer. The effect of extract on intracellular lipid accumulation in 3T3-L1 cells was investigated. The chromatographic separation was performed and column chromatographic fraction with active was identified by LC/MS, NMR spectrometry.

[Results and Discussion]

Barley water extract significantly inhibited triglyceride accumulation in 3T3-L1 adipocytes without causing cytotoxicity. Lipid accumulation was different depending on cultivars and extract solvent. Saechalssal and Betaone showed high adipogenesis inhibitory activity. Water extract showed better inhibitory effect than prethanol extract. The major active compound in the extract was isolated and identified as ferulic acid (4-hydroxy-3-methoxycinnamic acid) by mass spectrometry and NMR analyses. The ferulic acid content in barley water extract and prethanol extract was approximately 107-235 µg/g and 34-88 µg/g, respectively. The findings of this study suggest that barley water extract has the potential as a functional material for use in the treatment of obesity.

[Acknowledgement]

This work was conducted with the support of the Cooperative Research Program for Agriculture Science & Technology Development (Project No. PJ0135242021) of the Rural Development Administration (RDA), Korea.

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