TRACK 3: CHEMISTRY

Suppression of lipid accumulation by water-extracts of red mold rice through down-regulation of PPARɣ and C/EBPα transcription factors

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Recently, water-soluble secondary metabolites from *Monascus* fermented red mold rice (RMR) have gained attention as a potential alternative treatment for obesity and overweight. Peroxisome proliferator-activated receptor γ (PPARγ) and CCAAT/enhancer-binding proteins (C/EBPs) are crucial regulators involved in the proliferation and differentiation of adipocytes. The current study aimed to investigate the impact of water-soluble adipogenesis-inhibiting compounds from RMR water-extracts on the adipogenic transcription factors PPARγ and C/EBPα. Lovastatin and citrinin free RMR water-extracts produced by the *Monascus pilosus* NBRC4507 strain grown at 30 °C for 10, 14, 17 and 21 days were introduced at concentrations of 0.50, 0.75, 1.00 mg/mL to evaluate their inhibitory effects on lipid accumulation in 3T3-L1 adipocytes using Oil red O staining. In addition, the effect of RMR water-extract on TG accumulation, GPDH activity and glycerol release was observed. The effect of RMR water-extract on the expression of PPARγ and C/EBPα was examined using RT-PCR. When compared to the percentage adipogenesis inhibition of 35.31 ± 1.57% by the positive control lovastatin (2.02 mg/mL), the water-extracts from 14 days cultured RMR showed significant adipogenesis inhibitory activities (28.30 ± 3.44% for 0.50 mg/mL, 37.5 ± 4.44% for 0.75 mg/mL, and 46.1 ± 3.52% for 1.00 mg/mL). The RMR water-extracts significantly inhibit TG accumulation and GPDH activity of 3T3-L1 adipocytes while promoting the glycerol release from 3T3L-1 cells in a concentration-dependent manner indicating the promotion of lipolysis and reducing the lipogenesis. Compared to the positive control lovastatin, the expression of PPARγ was found to be significantly suppressed by the RMR water-extracts by 0.48 ± 0.045, and 0.40 ± 0.117 at a final concentration of 0.75 and 1.0 mg/mL, respectively and the expression of C/EBPα was also suppressed at a final concentration of 0.75 (0.66 ± 0.109), and 1.00 mg/mL (0.57 ± 0.136). In conclusion, the inhibitory effect of 14-day cultured RMR water extracts from *Monascus pilosus* NBRC4507 on adipocyte differentiation is primarily due to the downregulation of the transcription factors PPARγ and C/EBPα, resulting in both reduced lipogenesis and enhanced lipolysis.

Keywords: *Lipogenesis, Lipolysis, Monascus pilosus, RMR water-extract, 3T3-L1 cell*