Acanthopanax henryi (Oliv.) Harms has been used in the treatment of arthritis, rheumatism, and abdominal pain. This study evaluated whether natural compounds isolated from the leaves of *A. henryi* (Oliv.) Harms could inhibit adipocyte differentiation by regulating transcriptional factors such as peroxisome proliferator-activated receptor γ (PPARγ) and CCAAT/enhancer-binding protein α (C/EBPα). AMP-activated protein kinase (AMPK) activity was also evaluated. Among the several compounds isolated from the leaves of *A. henryi* (Oliv.) Harms, Glycoside St-C1 and Glycoside St-E2 significantly decreased lipid accumulation and the expressions of PPARγ and C/EBPα. Glycoside St-C1 and Glycoside St-E2 were found to activate AMPK when they regulated PPARγ and C/EBPα. Results confirmed that Glycoside St-C1 and Glycoside St-E2 isolated from the leaves of *A. henryi* (Oliv.) Harms can inhibit adipogenesis through the AMPK-PPARγ-C/EBPα mechanism. Thus, this study suggests that Glycoside St-C1 and Glycoside St-E2 have a therapeutic effect due to activation of the AMPKα.

Glycoside St-C1 and Glycoside St-E2 decreased lipid accumulation and the expressions of PPARγ and C/EBPα. Glycoside St-C1 and Glycoside St-E2 were found to activate AMPK.