Abstract

Obesity is a major public health concern associated with metabolic disorders such as type 2 diabetes mellitus, dyslipidemia, and cardiovascular diseases. Adipose tissue plays an important role in energy homeostasis, and its dysfunction contributes to obesity-related complications. E4BP4 (NFIL3) is a circadian-associated transcription factor that has been implicated in adipocyte differentiation, metabolism, and thermogenic regulation. However, its role during adipocyte differentiation remains incompletely understood. This study aimed to investigate the effects of E4BP4 overexpression on the differentiation of stromal vascular fraction (SVF)-derived adipocytes using a doxycycline-inducible lentiviral expression system.

Western blot analysis confirmed successful induction of E4BP4 and HA-tag expression in HEK293T cells following doxycycline treatment. Morphological observations demonstrated successful adipocyte differentiation in all experimental groups, with E4BP4-overexpressing cells exhibiting smaller and more dispersed lipid droplets compared with controls. However, rt-qPCR analysis showed no significant differences in E4BP4 mRNA expression among experimental groups ($p > 0.05$), and western blot analysis in SVF-derived adipocytes did not provide conclusive evidence of successful E4BP4 overexpression. In conclusion, although the inducible lentiviral system successfully induced E4BP4 expression in HEK293T cells and morphological differences were observed during adipocyte differentiation, the present study did not provide sufficient evidence that E4BP4 overexpression significantly altered E4BP4 transcript expression or adipocyte phenotype under the conditions examined. Further studies are required to evaluate downstream thermogenic markers and clarify the role of E4BP4 in adipocyte biology.

Keywords: E4BP4 (NFIL3), Adipocyte differentiation, Transcriptional regulation, Thermogenesis, Phenotypic differentiation