

Epimedium and Its Bioactive Compound Icarin Promote Hypertrophy of C2C12 CellsYi-An, Lin (M.S)^{1*}, Mei-Chieh, Hsu (Ph.D)², Szu-Tah, Chen (Ph.D)³¹National Taiwan Sport University (Graduate Institution of Athletics and Coaching Science), Taoyuan City, Taiwan²Kaohsiung Medical University (Department of Sports Medicine), Kaohsiung City, Taiwan³Chang Gung Memorial Hospital (Division of Endocrinology and Metabolism), Taoyuan City, Taiwan

*Corresponding author: Yi-An, Lin, E-mail: vn508773@gmail.com

Abstract

Introduction: **Epimedium** and its major component flavonoids had been intensively investigated for therapeutic potential on neurogenesis and osteogenesis, but the effect on myogenesis was still lacking. The purpose of this study was to investigate effects of **Epimedium** and icaritin induced muscular hypertrophy and the association with PI3K/Akt/mTOR pathway activation.

Methods: The mouse myoblast cell line C2C12 was applied in this study. After a 4-day differentiation, cells were exposed to **Epimedium** extracts (EE) and icaritin treatments in short (1-2 hours) and long (24-48 hours) term periods. The effect on muscular hypertrophy was assessed by calculating the myotube diameter after imaging from light microscope and immunofluorescence staining of myosin heavy chain (MyHC). The activation of PI3K/Akt/mTOR pathway (the phosphorylation of Akt, mTOR, p70S6K, and ERK1/2) and the protein levels of MyHC isoforms, androgen receptor (AR) and myostatin were detected by the immunoblot assay.

Results: EE and icaritin treatments significantly increased myotube diameter and the area of MyHC-positive myotubes. Short-term exposure of EE and icaritin significantly phosphorylated Akt, mTOR, p70S6K, and ERK1/2 as IGF-1 did. A 24-h treatment with EE and icaritin increased the expression of MyHC isoforms and AR, but attenuated myostatin expression.

Conclusions: Our study suggested that **Epimedium** and icaritin stimulated C2C12 hypertrophy by the activation of PI3K/Akt/mTOR pathway to enhance MyHC and AR expression, in concomitant with myostatin inhibition.

Keywords: Insulin-like growth factor 1, Myostatin, Natural products, PI3K/Akt/mTOR pathway