



Quercus infectoria semi-purified fractions promoted BMP-2, Runx2 and osteopontin expression in human fetal osteoblastic cell line

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Abstract

Quercus infectoria (QI) is traditional medicines in Asia which contain many active phytochemical compounds that have the potential to stimulate bone formation. However, the precise mechanism of the therapeutic effect of QI on osteoblast has not been elucidated. The present study was carried out to extract the active compound of QI through a series of purification in order to obtain semi-purified fractions of QI followed by examining its phytochemical profile through liquid chromatography mass spectrometry (LC-MS) as well as to delineate the molecular mechanism of QI semi-purified fraction-enhanced bone formation by investigating the protein expression of bone morphogenic protein-2 (BMP-2), Runx2 and osteopontin (OPN) in the hFOB 1.19 human fetal osteoblastic cell line. The semi-purified fractions of QI were produced in series of column chromatography and thin layer chromatography (TLC) technique. The obtained fractions were then tested in a series of bio-guided assay through MTT assay. Three most potent fractions with lowest EC₅₀ value (Fraction A-10.85 µg/ml, Fraction B-12.00 µg/ml and Fraction C-11.60 µg/ml) were selected to be treated with hFOB1.19 cell followed by quantification of BMP-2, Runx2 and OPN protein expression at day 1, 3 and 7. Compound profiling through LC-MS analysis showed that the chosen fractions consist of main active component known as gallic acid that has been showed previously to promote bone formation. Results show that QI semi-purified fractions increased the activity of BMP-2, Runx2 and OPN at day 1 and day 3. Meanwhile as the expression of BMP-2 and Runx2 continue to increase at day 7, the expression of OPN shows a down regulation at day 7. Furthermore, the study showed that combination of Fraction A, B and C with osteoporotic drug (pamidronate) further increase the expression of BMP-2 and Runx2 contrary to OPN expression. These finding demonstrated that semi-purified fraction of QI enhanced bone formation through expression of investigated bone-related marker.

Keywords

Quercus infectoria, Bone Morphogenic Protein-2 (BMP-2), Runx2, Osteopontin, hFOB1.19 cell
Funding

Reference