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Effect of Deer Antler Extract on Osteogenic Gene Expression and Longitudinal Bone Growth of Adolescent Male Rats

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Abstract : Deer antler, traditionally used as a tonic and valuable drug in oriental medicine, has been considered to possess bone-strengthening activity. The upper section, mid section, and base of the antler has been known to exhibit different biological properties. Present study was performed to examine the effects of different parts of deer antler extract (DH) on osteogenic gene expressions in MG-63 cells and longitudinal bone growth in adolescent male rats. The expressions of osteogenic genes, collagen, alkaline phosphatase, osteocalcin, and osteopontin, were measured by quantitative real-time PCR. Longitudinal bone growth was measured in 3-week-old male Sprague-Dawley rats using fluorescence microscopy. To examine the effects on the growth plate metabolism, the total height of growth plate and bone morphogenetic protein-2 (BMP-2) were measured. Collagen and osteocalcin mRNA expressions were increased by all three parts of the DH treatment while osteopontin gene expression was not affected by any of the DH treatment. Alkaline phosphatase gene expression was increased by upper and mid part of DH while base part of DH fails to affect alkaline phosphatase gene expression. The upper and mid parts of the DH treatment enhanced longitudinal bone growth and total height of growth plate. The induction of BMP-2 protein expression in growth plate assessed by immunostaining was also promoted by upper and mid parts of the DH treatment. These results suggest that DH, especially upper and mid parts, stimulate osteogenic gene expressions and have the effect on bone growth in adolescent rats and might be used for the growth delayed adolescent and inherent growth failure patient.

Keywords : bone morphogenetic protein-2, deer antler, longitudinal bone growth, osteogenic genes
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