



Anti-osteoporosis activity of red yeast rice extract on ovariectomy-induced bone loss in rats

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ABSTRACT. Osteoporosis is the most common bone disease, affecting millions of people worldwide and leading to significant morbidity and high costs. Monacolin K, an extract of red yeast rice (RZR, *Hongqu*), plays important roles in the management of dyslipidemia, coronary heart disease, and diabetes. Our study aimed to investigate the protective effect of monacolin K on ovariectomy-induced bone loss in rats. Fifty female Sprague-Dawley rats were randomly divided into a sham-operated and five ovariectomized (OVX) groups: OVX with vehicle, OVX with fluvastatin, and OVX with RZR extract of three graded doses. Bone mineral density (BMD), biochemical markers, and cell viability were analyzed by dual

energy X-ray absorptiometry, enzyme-linked immunosorbent assay, and 3(4,5-dimethylthiazol-2-yl)-2,5-diphenyl tetrazolium bromide (MTT) assays. Gene expression was evaluated by real-time polymerase chain reaction amplification and western blot. Our results showed that administration of RYR extract markedly increased the bone mineral density in OVX rats. Moreover, RYR extract decreased the levels of bone turnover markers, including osteocalcin and tartrate resistant acid phosphatase activity. The MMT assay revealed that RYR extract treatment significantly improved the osteoblast viabilities in a dose-dependent manner ($P < 0.05$). At the molecular level, we further demonstrated that RYR extract enhanced the expression of Bmp2 and Bmp4 both at the mRNA and protein levels. Collectively, these data suggested RYR extract could protect against osteoporosis in ovariectomized rats, most likely through activation of BMP2/4 expression.

Key words: Osteoporosis; Red yeast rice; BMP-2; BMP-4