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Effect of Various Bean Consumption on Bone Metabolism in Ovariectomized Rats

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난소절제 흰쥐에서 다양한 콩의 섭취가 골대사에 미치는 영향

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Objectives Soybean has been shown to have a beneficial effect on bone metabolism in ovariectomized rats, but the other legumes frequently consumed in Asia have not been studied. This study was investigated the effects of various beans consumption on bone metabolism in ovariectomized rats.

Materials and Methods Forty-two female Sprague-Dawley rats were either sham-operated (Sham, n=7) or surgically ovariectomized and then fed a regular AIN-93M diet (OVX, n=7) or AIN-93M containing soybean (OS, n=7), mung bean (OM, n=7), cowpea (OC, n=7) or adzuki beans (OA, n=7) for 10 weeks. BMD and BMC measurements were executed at the end of the dietary experiment. After the rats were anesthetized, the BMDs and BMCs of the right femur, tibia, and lumbar spine were measured using dual-energy X-ray absorptiometry (DEXA). BMC (expressed in grams) was divided by the area of the site being scanned to obtain BMD (expressed in g/cm^2), per the DEXA system. The right tibia was imaged with a 3D microcomputed tomography (μCT) system. The segmented 3D images were used to calculate the total bone volume of the tibia (BV) and the tibial trabecular bone volume (BV/TV).

Results The final body weight and subcutaneous fat weight were significantly higher, and uterus weight was lower in OVX group than Sham group. In all bean groups were significantly increased the serum calcium and phosphorous ratio and decreased urinary calcium excretion as compared with OVX group. Serum concentration of 17β-estradiol was significantly lower in OVX than Sham group, and was lowest in OS

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group. Plasma osteocalcin concentration was significantly increased in OVX with all beans, but urinary deoxypridinoline excretion was lowest in OC group. There were no significant differences on bone mineral density (BMD) and bone mineral contents (BMC) of the right femur, tibia, and lumbar spine. Micro-CT analysis of the right tibia indicated that OVX group decreased trabecular bone volume of the tibia when compared to the Sham group, but no significant difference was found within OVX with all bean groups. In conclusion, although there were no significant differences in bone BMD, BMC, or microarchitecture, consumption of cowpea significantly increased bone formation and decreased bone resorption, suggesting that cowpea may have a protective effect on bone loss in ovariectomized rats.

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