

Absorption and bioavailability of nano-size reduced calcium citrate fortified milk powder in ovariectomized and ovariectomized-osteoporosis rats

ABSTRACT

The aim of this study was to evaluate the effects of fortification and nano-size reduction on calcium absorption and bioavailability of milk powder formula in sham, ovariectomized, and ovariectomized-osteoporosis rats as a menopause and menopause-osteoporosis model. Skim milk powder and skim milk powder fortified with calcium citrate and the suitable doses of inulin, eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA), and vitamins D₃, K₁, and B₆ were formulated based on the North American and Western European recommended dietary allowances. Optimization on cycle and pressure of high-pressure homogenizer was done to produce nano-fortified milk powder. In vivo study demonstrated that fortification and calcium citrate nano-fortified milk powder increased absorption and bioavailability of calcium, as well as bone stiffness and bone strength in sham, ovariectomized, and ovariectomized-osteoporosis rats. This study successfully developed an effective fortified milk powder for food application.

Keywords: Calcium absorption; Calcium bioavailability; Fortified milk; In vivo study; Menopause; Nanoparticle; Osteoporosis