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Sex-specific effects of DHEA on bone mineral density and body composition: A pooled analysis of four clinical trials

Among older women, the naturally occurring hormone DHEA may preserve bone and muscle mass when compared with placebo, study suggests

AURORA, Colo. (Dec. 3, 2018) - Women 55 and older have an increased risk of bone and muscle loss but therapy with the hormone Dehydroepiandrosterone (DHEA) may help prevent bone loss and increase muscle mass in older women, according to a new study led by Catherine M. Jankowski, PhD, FACSM, an exercise physiologist and associate professor at the University of Colorado College of Nursing at the Anschutz Medical Campus.

The study was published online Nov. 27 in the journal *Clinical Endocrinology* and highlighted in *Endocrinology Today*.

Jankowski and colleagues analyzed data from four single-site, double-blinded, placebo-controlled, randomized clinical trials sponsored by the National Institute on Aging designed to assess the effects of oral DHEA therapy on bone mineral density (BMD) and body composition in women and men between the ages of 55 to 85 who were not using sex hormone therapy.

The dose of DHEA used in the studies increased circulating DHEA sulfate levels to that of young adults.

“Because age-related decreases in androgen and estrogen production contribute to the loss of bone and muscle mass in older adults, restoring DHEAS to youthful levels may be an effective strategy for maintaining bone and muscle,” said Jankowski.

In all four studies, dual-energy X-ray absorptiometry (DXA) was used to measure total body fat and lean (muscle) mass, and bone mineral density of the proximal femur, total hip, and lumbar spine at baseline and after 12 months of DHEA or placebo administration. Serum DHEA sulfate, estradiol, testosterone, sex hormone-binding globulin and insulin-like growth factor I concentrations were also measured at baseline and at 12 months. Researchers merged data from the four studies into a central database and compared the 12-month changes in BMD, body composition, circulating hormones, and growth factors in response to oral DHEA therapy versus placebo.

Of the 486 cases, 138 women and 98 men had low bone mass, and 29 women and 11 men had osteoporosis. The researchers found that DHEA therapy was associated with increased BMD of the lumbar spine, total hip and trochanter in women, but not in men. The increases in BMD in women were not as large as seen with other treatments such as bisphosphonates.

“Unlike some pharmaceutical trials targeting BMD, the DHEA trials we conducted did not target women with osteoporosis, which may have contributed to the modest increases in BMD,” said the researchers.

“It is possible that DHEA therapy could be a strategy to mitigate the decline in BMD in postmenopausal women who do not tolerate other treatments,” according to Jankowski. However, the authors also concluded that the safety of long-term DHEA therapy (more than one year) needs further research.

The investigators also found sex-specific results effects on fat-free mass (which includes muscle mass) in women and a decrease of 0.4 kg fat mass in men. None of the four trials controlled for exercise behaviors, which could have contributed to the increase in fat-mass of women taking DHEA.

“Combining DHEA therapy with resistance exercise that imparts mechanical strain to bone may promote greater increases in muscle mass and BMD compared to either intervention alone,” stated Jankowski. “The beneficial effects of DHEA replacement on body composition are to modestly increase fat-free mass in women and decrease fat mass in older men, a reversal of the usual age-related trends in muscle and fat.” Jankowski and colleagues are currently conducting a randomized placebo-controlled trial to determine the independent and combined effects of bone-loading exercise and DHEA on BMD and muscle mass in postmenopausal women with low bone mass or moderate osteoporosis (NCT# 03227458).

Co-authors of the pooled analysis include: Wendy Kohrt, Pamela Wolfe, and Sarah J. Schmiege of the University of Colorado Anschutz Medical Campus, Aurora, CO; K. Sreekumaran Nair, Sundeep Khosla, and Michael Jensen of the Mayo Clinic, Rochester, MN; Denise von Muhlen, Gail A. Laughlin, Donna Kritz-Silverstein, Jaclyn Bergstrom, and Richele Bettencourt of the University of California, San Diego, CA; Edward P. Weiss currently of St. Louis University, St. Louis, MO; and Dennis T. Villareal, currently of Baylor University and the Michael E. DeBakey Veterans Administration Medical Center in Houston, TX.

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