

## 5th Annual Congress on Yoga and Meditation

### Weighted Vest Use during Dietary Weight Loss on Bone Health in Older Adults with Obesity

Kristen M Beavers,  
Wake Forest University,  
USA



#### Abstract (600 Words):

To examine the effects of daily weighted vest use during a dietary weight loss intervention, on (a) hip and spine bone mineral density (aBMD), and (b) biomarkers of bone turnover, in older adults with obesity. 37 older ( $70.1 \pm 3.0$  years) adults with obesity ( $BMI=35.3 \pm 2.9$ ) underwent a 22 week dietary weight loss intervention (1100-1300 kcal/day) with (Diet+Vest;  $n=20$ ) or without (Diet;  $n=17$ ) weighted vest use (goal: 10+ h/ day; weight added incrementally based on amount of weight lost). Total body weight; DXA-acquired aBMD of the total hip, femoral neck and lumbar spine; and biomarkers of bone turnover (OC, BALP, P1NP, CTX) were measured at baseline and follow up. General linear models, adjusted for baseline values of the outcome and gender, were used to examine intervention effects. Average weight loss was significant in both groups ( $-11.2 \pm 4.4$  kg and  $-11.0 \pm 6.3$  kg, Diet+Vest and Diet groups, respectively), with no difference between groups ( $p=0.91$ ). Average weighted vest use was  $6.7 \pm 2.2$  h/ day. No significant changes in aBMD or biomarkers were observed, although trends were noted for total hip aBMD and BALP. Loss in total hip aBMD was greater in the Diet group compared with Diet+Vest ( $\Delta$ :  $-18.7$  [29.3, -8.1] mg/cm<sup>2</sup> versus  $-6.1$  [-15.7, 3.5] mg/cm<sup>2</sup>;  $p=0.08$ ). BALP increased in the Diet+Vest group by 3.8% ( $\Delta$ :  $0.59$  [-0.33, 1.50]  $\mu$ g/L) and decreased by -4.6% in the Diet group ( $\Delta$ :  $-0.70$  [-1.70, 0.31]  $\mu$ g/L,  $p=0.07$ ). Weighted vest use during weight loss may attenuate loss of hip aBMD and increase bone formation in older adults with obesity. Further study is warranted.

#### Biography (200 words):

With our current health care system facing an overwhelming number of older adults living with disability, Kristen Beavers aims to keep people living independently as long as possible. She is broadly interested in understanding how nutrition and exercise relate to prevention and causes of disease and disability in older adults, and is actively working to optimize weight loss strategies for this population. By training, she is a registered dietitian and certified personal trainer, and has been continuously funded by the National Institutes on Aging since 2010 to understand the effects of intentional weight loss on changes in several indicators of health, including body composition, cardiometabolic fitness, and functional decline. Her current research focuses on the effects of exercise type (resistance training or aerobic training) during weight loss on bone health, as well as whether a high-protein diet can preserve muscle mass and mobility in older adults with obesity. In sum, if there's a lifestyle-based strategy that can help older adults lose fat, while keeping muscle and bone, Beavers wants to find it

#### Importance of research (200 words):

Recommendation for intentional weight loss in advanced aged individuals (i.e., 65+ years) remains controversial due to weight loss-associated loss of bone mass and potential exacerbation of age-related osteoporotic fracture risk. One potential strategy to preserve bone health during a diet-induced weight loss program is to add weight-bearing exercise. The osteogenic effect of exercise in weight-stable older adults is well recognized and is attributed to the increased mechanical stress placed on bone tissue [10]. However, data from randomized controlled trials (RCTs) specifically designed to assess the effect of exercise on bone mass during weight loss are limited, with mixed findings reported. Moreover, exercise participation among older adults is strikingly low, with less than 10% of adults over the age of 65 meeting national physical activity guidelines. In fact, compliance may be a primary factor explaining discrepant trial findings, and speaks to the larger issue of identification of easily translatable weight loss countermeasures to minimize bone loss. Preventing reductions in mechanical load via use of a weighted vest may offer an alternative to exercise training to attenuate weight loss-associated bone loss in older adults with obesity. Skeletal tissue is highly responsive to mechanical perturbation and most data show that the magnitude of decline in bone density is proportional to the amount of total weight lost, suggesting that reduced mechanical stress is one mechanism underlying the loss of bone in response

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to weight reduction. Prior clinical studies of weighted vest use are limited, but do provide support for this concept. For instance, walking while wearing a vest weighted with up to 8% of body mass increases loading of the skeletal system, and thus causes increased bone formation and decreased bone resorption in weight stable adults, when compared to sedentary controls. Similarly, wearing a weighted vest while strength training and stair climbing for one hour per day, three days per week increased femoral neck bone mineral density in older adults, when compared to controls. The effects of weighted vest use during caloric restriction, however, as a means to attenuate weight loss-associated bone loss has not yet been studied.

### Info of Institute and laboratory (200 words):



Wake Forest University is a private research university in Winston-Salem, North Carolina. Founded in 1834, the university received its name from its original location in Wake Forest, north of Raleigh, North Carolina. The Reynolda Campus, the university's main campus, has been located north of downtown Winston-Salem since the university moved there in 1956. The Atrium Health Wake Forest Baptist medical campus has two locations, the older one located near the Ardmore neighborhood in central Winston-Salem, and the newer campus at Wake Forest Innovation Quarter downtown. The university also occupies lab space at Biotech Plaza at Innovation Quarter, and at the Center for Nanotechnology and Molecular Materials. The university's Graduate School of Management maintains a presence on the main campus in Winston-Salem and in Charlotte, North Carolina.

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