

## Exercise and Weight Loss Safe and Synergistic for Improving Physical Function in Obese Elderly Patients

Villareal D, Chode S, Parimi N, et al. Weight loss, exercise, or both and physical function in obese older patients. *N Engl J Med* 2011;364:1218–29.

### Study Overview

**Objective.** To determine the effect of weight loss and exercise on physical function among sedentary, obese patients 65 years of age or older.

**Design.** Randomized controlled trial in which subjects were assigned to a control group, a weight management program, an exercise program, or both the weight management and exercise programs for 1 year. The weight management program included weekly group sessions with dietitians and a prescribed balanced diet that provided a caloric deficit of 500 to 750 calories per day from their daily energy requirement. The exercise group included 3 group exercise sessions weekly, supervised by a physical therapist, with 90 total minutes of aerobic exercise, resistance training, and exercises to improve flexibility and balance. The control group received basic information about a healthy diet in monthly visits with research staff and was prohibited from participating in any organized weight loss or exercise program.

**Setting and participants.** 107 patients over age 65 years and obese (BMI  $\geq 30$  kg/m<sup>2</sup>) were enrolled in the study at the Washington University School of Medicine. Additional inclusion criteria were a sedentary lifestyle, mild-to-moderate frailty, stable body weight over the year prior to enrollment, and stable medications for the 6 months prior to enrollment. Potential subjects were excluded if they had severe car-

diopulmonary disease; musculoskeletal or neuromuscular impairments that would prevent participation in exercise training; visual, hearing, or cognitive impairment; a history of cancer; were current smokers; or used medication that affected bone health and metabolism.

**Main outcome measures.** Change from baseline in the score on the modified Physical Performance Test. This test involves several distinct physical tasks—walking 50 feet, putting on and removing a coat, picking up a penny, standing up from a chair, lifting a book, climbing a flight of stairs, performing a progressive Romberg test, climbing up and down 4 flights of stairs, and performing a 360-degree turn. The secondary outcomes were measures of frailty including VO<sub>2peak</sub> and scores on a functional status questionnaire, body composition, bone mineral density, specific physical function scores, and quality of life.

**Main results.** 93 subjects completed the study. The mean age of subjects was 69 to 70 years, and 57% to 65% of participants were women across the 4 groups. 11% to 15% were black. Mean weight was 99 to 104 kg with BMI of 36.9 to 37.3 kg/m<sup>2</sup>, and subjects took 3.3 to 4.7 medications daily. In the intent-to-treat analysis, physical function improved more from baseline in the combined diet and exercise group compared with the diet or exercise groups (increase in baseline score on the Physical Performance

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Test of 21% compared with 12% and 15%, respectively). These changes represented increases of 5.4, 3.4, and 4.0 points on the 36-point scale. All 3 intervention groups improved significantly more than the control group, which had a mean score increase of 1% from baseline ( $P < 0.001$  for all comparisons). On almost all secondary outcome measures, all 3 intervention groups showed significantly more improvements than the control group. The diet-exercise group also was superior to either the diet or exercise groups except in a few circumstances (no different than diet group in weight loss or change in fat mass; no different than exercise group in functional status and several of the strength, balance, and gait subscores). Weight loss was significantly greater in the diet and diet-exercise groups compared with control (9.7 kg lost at 1 year for the diet group and 8.6 kg lost for the diet-exercise group compared with loss of 0.1 kg for the control group); there was no difference in weight loss compared with control for the exercise group (loss of 0.5 kg).

**Conclusion.** Among obese elderly patients, diet and exercise are safe and effective at improving physical functioning.

### Commentary

The obesity epidemic in the United States has spared no age-group. By 2008, 37.1% of men and 33.6% of women  $\geq 60$  years of age were obese, rivaling or surpassing obesity rates among younger age-groups [1]. Obesity has become a significant source of disability among the elderly [2,3]. Despite the potential consequences of obesity, few trials are available to demonstrate the benefits of weight loss or exercise training among obese elderly patients [4,5]. In fact, some prior studies have reported possible harm with weight loss in this population due to an acceleration of muscle loss and loss of bone mineral density [6,7]. Furthermore, the potential benefits of weight loss could be blunted in this age-group because obesity at older ages may have less of an impact on chronic diseases such as cardiovascular disease or cancer than it does at younger age [7].

In this study, Villareal and colleagues report results from a well-conducted randomized clinical trial of diet and exercise training among sedentary, obese men and women  $\geq 65$  years of age who were found to be at least mildly frail on standardized measures. They found that both diet and supervised exercise training were beneficial in improving physical function, body fat, fitness, strength, balance, and gait. Combining a weight management program with exercise training was, in most cases, even more beneficial than either intervention alone. The diet program led to substantial weight loss by itself or when combined with exercise; exercise alone was not associated with weight loss.

The study used a strong methodology and was well-powered to find meaningful differences between groups in physical function scores at 1 year. Retention of subjects was strong, with 87% of subjects completing the trial, and compliance with the intervention was quite high, with greater than 80% attendance at all diet counseling and exercise sessions across all intervention groups. Adverse effects were minimal, though 1 subject fell during a physical functioning evaluation, resulting in a fractured ankle. Also, some concern arose because of a mild reduction in lean body mass and bone mineral density among patients in the diet group and to a lesser extent in the diet-exercise group, compared with the exercise and control groups.

These results are concordant with a prior randomized controlled trial by Messier et al conducted with 316 overweight and obese patients over age 60 with knee osteoarthritis, using a similar methodology to this study [8]. The trial lasted 18 months in total and had a similar intensity as this study for the first 4 months of the trial. However, the remaining 14 months included a less intense home-based component for both the diet and exercise interventions. They found that a combined diet and exercise group had greater improvements in physical function and pain compared with a control group. Most comparisons between the diet only and exercise only groups with the control showed no significant differences.

Villareal et al have provided compelling data that could guide clinicians and policy-makers about how best to approach obesity in the elderly. While the trial echoes some concerns previously raised, such as the loss of bone mineral density and lean body mass during weight loss, the benefits of treatment with both diet and exercise were clear. While improvements in cardiovascular and other outcomes commonly associated with weight loss in younger age-groups may prove elusive among the elderly, the magnitude of the effect in physical function and frailty are critically important, perhaps even more so than other benefits. Further research is needed to assess how long these improvements in physical functioning persist and whether the level of intensity used in this study for both the diet and exercise interventions is required for maintaining these improvements. Weekly sessions with dietitians and physical therapists are expensive, and cost-effectiveness data would be a helpful adjunct to this trial. Perhaps this data can convince policy-makers and insurers that coverage of intense weight loss and exercise programs are worth it to improve health and lower health care costs among the obese elderly.

### Applications for Clinical Practice

Weight loss and exercise training improve physical functioning among previously sedentary, obese elderly patients. While some concern remains about declining lean body

mass and bone mineral density with weight loss in this population, the benefits of both weight loss and exercise are convincing in this trial. Clinicians should more aggressively recommend weight loss and exercise among the elderly, and insurers and policy-makers should consider coverage of programs to support these interventions.

—Review by Jason P. Block, MD, MPH

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