Journal of Chiropractic Medicine (2013) 12, 3–14

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JOURNAL of CHIROPRACTIC MEDICINE

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Original studies

Changes in anthropometric measurements, body composition, blood pressure, lipid profile, and testosterone in patients participating in a low-energy dietary intervention

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Received 7 May 2012; received in revised form 30 October 2012; accepted 15 November 2012

Key indexing terms:
Weight loss;
Caloric restriction;
Energy metabolism

Abstract

Objective: The purpose of this study was to describe changes in anthropometric measurements, body composition, blood pressure, lipid profile, and testosterone following a low–energy-density dietary intervention plus regimented supplementation program.

Methods: The study design was a pre-post intervention design without a control group. Normal participants were recruited from the faculty, staff, students, and community members from a chiropractic college to participate in a 21-day weight loss program. All participants (n = 49; 36 women, 13 men; 31 ± 10.3 years of age) received freshly prepared mostly vegan meals (breakfast, lunch, and dinner) that included 1200 to 1400 daily calories (5020.8 to 5857.6 J) for the women and 1600 to 1800 (6694.4 to 7531.2 J) daily calories for the men. Nutritional supplements containing enzymes that were intended to facilitate digestion, reduce cholesterol levels, increase metabolic rate, and mediate inflammatory processes were consumed 30 minutes before each meal. The regimented supplementation program included once-daily supplementation with a green drink that contained alfalfa, wheatgrass, apple cider vinegar, and fulvic acid throughout the study period. A cleanse supplementation containing magnesium, chia, flaxseed, lemon, camu camu, cat's claw, bentonite clay, tumeric, pau d'arco, chanca piedra, stevia, zeolite clay, slippery elm, garlic, ginger, peppermint, aloe, citrus bioflavonoids, and fulvic acid was added before each meal during week 2. During week 3, the cleanse supplementation was replaced with probiotic and prebiotic supplementation.

Results: Multiple paired *t* tests detected clinically meaningful reductions in weight (−8.7 ± 5.54 lb) (−3.9 ± 2.5 kg), total cholesterol (−30.0 ± 29.77 mg/dL), and low-density lipoprotein cholesterol (−21.0 ± 25.20 mg/dL) ($P < .05$). There was a pre-post intervention increase in testosterone for men (111.0 ± 121.13 ng/dL, $P < .05$).

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1556-3707/$ – see front matter
http://dx.doi.org/10.1016/j.jcm.2012.11.003

Conclusions: Weight loss and improvements in total cholesterol and low-density lipoprotein cholesterol levels occurred after a low–energy-density dietary intervention plus regimented supplementation program.

Introduction

The prevalence of obesity has increased from 11.9% to 33.4% in men and from 16.6% to 36.5% in women when comparing the National Health and Nutrition Examination Survey I study (1971-1975) to the National Health and Nutrition Examination Survey 2005-2006 data.[1] As summarized by Rolls,[2,3] the accumulating evidence suggests that the promotion of diets that reduce the energy density of foods consumed and address the effects of portion size on the intake of nutritious low-energy dense foods may be an effective future strategy to both prevent and treat obesity. Epidemiological evidence substantiates that consumption of low–energy-density carbohydrates, for example, fruits, vegetables, and whole grain products, positively impacts weight and health even though clinical trials evidence may be lagging.[4] Low–energy-density diets may allow individuals to more effectively lose weight, maintain a healthy weight, and prevent chronic diseases associated with being overweight and obese to include cardiovascular disease, type II diabetes, and certain types of cancers.[4-8] In addition, portion size provides independent and additive effects of energy density on weight management; and portion size impacts energy intake for a single meal with the potential for persistent effects on energy intake over multiple days.[cf3]

Research on vegetarian diets, especially vegan diet, and the Mediterranean-style diets provides us with good examples of the impact of consuming nutritious low-energy dense foods on weight and health.[9-14] Given that adherence to the diet plan is the critical factor for weight loss, weight maintenance, and health benefits, health care professionals need to address individualized eating habits of patients, the effectiveness of popular weight loss diets, and the cost of purchasing of foods when making dietary recommendations.[15,16] However, designing energy (calorie)-restricted diet plans based upon the consumption of low–calorie-density foods may be able to overcome the adherence barriers of patient behaviors and dietary costs. Patient education is emerging as an effective strategy associated with individuals consuming reduced-calorie diets.[17-20] Preliminary data on the dietary costs of nutritious low-calorie dense foods are beginning to indicate their affordability.[21-23] Other research is emphasizing the importance of addressing the effects of food costs on implementing nutritional interventions for the consumption of healthy foods and the resultant impact on reducing obesity and disease-related risk factors.[24-26]

In addition to dietary modifications, emerging evidence suggests a relationship between the microbial ecology of the gut and obesity.[27-29] Recommendations for dietary interventions with probiotic and prebiotic nutritional components suggest that alleviating dysbiosis, an imbalance of intestinal bacteria and/or elevated levels of fungi, may restore the optimal microbial ecology of the gut.[29-33] Probiotics and prebiotics may have significant health benefits on lipid metabolism, mineral absorption, and immune function via their beneficial influences on microbial ecology of the gut.[29,31-35] Although there are limited clinical data on the role of microflora management interventions on weight loss and improved health status,[36-38] probiotic and prebiotic nutritional supplementation and colon cleansing products are being promoted as critical elements for initiating and maintaining weight loss. Probiotic and prebiotic nutritional supplements may evolve into a daily regimen to maintain optimal microbial ecology of the gut for weight management and health.[31,32] To date, colon-cleansing products lack sufficient evidence; but anecdotal recommendations suggest using colon-cleansing products as a detoxification intervention once or twice a year.

In systematic reviews and meta-analyses, dietary modifications involving either low-carbohydrate foods or low-fat diets induce weight loss and reduce metabolic risk factors.[9-14,39] These data suggest that low–calorie-density diets and caloric restriction may be the critical elements in weight management programs regardless of dietary macronutrients.[2,3,15] Designing and describing calorie-restricted meal plans of low–calorie-density foods may help health care professions address the constraints of time, knowledge, and costs of promoting and/or delivering nutritional interventions as well as providing their patients with meal plans that fit