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Effects of obesity and soy protein diet on serum vitamin D metabolites

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Abstract

The obesity epidemic in the US has continued for over two decades as the proportion of overweight and obese adults in the population continues to rise. Obesity has been linked with the risk of development of various diseases such as diabetics, cardiovascular disease (CVD) and certain types of cancers. Vitamin D deficiency has been on the rise and has been related to several chronic disease developments such as insulin resistance, certain types of cancers and CVD. There is a suggestion that obese people have lower serum 25-hydroxyvitamin D concentration. The objective of this pilot study was to investigate the effects of obesity and diet containing soy protein isolate (SPI) on serum 25-hydroxyvitamin D3 (25(OH)D) (major storage form of Vitamin D) and 1,25-dihydroxyvitamin D3 ($1,25(OH)_2D$) (active form). A total of 32 five-week-old female Zucker rats (16 obese fa/fa and 16 lean) were acclimated for one week and at the age of 42 days, rats were randomly assigned to the following groups: 1) lean, casein diet; 2) obese, casein diet; 3) lean, soy protein diet; and 4) obese, soy protein diet. Rats were housed 2 per cage with *ad libitum* access to water and semi-purified diet. The semi-purified diet was similar to the AIN-93G diet formulation and was prepared with equivalent amounts of dietary protein, either casein (CAS, control) or a partially hydrolyzed soy protein isolate containing naturally occurring isoflavones (SPI). Rats were weighed twice weekly. At end of the experiment (8 weeks), all rats were sacrificed and serum was collected and stored at -20ºC. Serum concentrations of 25(OH)D and $1,25(OH)_2D$ were measured using an HPLC method with analytical equipment from Thermo Scientific (Waltham, MA). We used Student's *t* test for comparisons of serum, dietary and body weight. Data were analyzed using Excel software and presented as Mean $\pm$ SD.Obese rats in both CAS and SPI diet groups gained significantly more weight ($P<0.001$) than lean rats. In both CAS and SPI diets, obesity decreased serum concentrations of 25(OH)D compare to lean groups (41.20 $\pm$8.60 vs. 33.08 $\pm$ 3.31pmol/mL, $P<0.05$,for lean and obese CAS, respectively and 35.55 + 4.19 vs. 30.97 $\pm$ 4.40pmol/mL, $P<0.05$, for lean and obese SPI, respectively. Obesity and soy diet had no significant effects on serum concentration of $1,25(OH)_2D$.Our results suggest that obesity alone decreased Vitamin D status (25(OH)D)regardless of diet,but no effects were observed on serum $1,25(OH)_2D$ concentrations. Supported by CUMG to RH.

Biography

Reza Hakkak, Ph.D., is nutritionist and Professor and Chairman of the Department of Dietetics and Nutrition in the College of Health Professions, Professor of Pediatrics in the College of Medicine, and Professor of Department of Health Policy and Management in the College of Public Health at the University of Arkansas for Medical Sciences. Dr. Hakkak's research includes Nutritional toxicology, Influence of diet and nutrition on cancer prevention or promotion, Obesity and Breast Cancer prevention or promotion, Animal modeling for Cancer Research. For past several years, his research interests have focused on links between obesity and breast cancer prevention or promotion. Dr. Hakkak has published more than 40 research articles and more than 150 abstracts and presentations.