

2007 - The metabolic effects of almond consumption in adults with pre-diabetes

Title:

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Summary:

Pre-diabetes is defined as the presence of impaired fasting glucose or impaired glucose tolerance. There is good experimental evidence showing that type 2 diabetes mellitus (T2DM) can be prevented or delayed with diet and lifestyle modification. Moreover, high levels of the inflammatory biomarkers C-reactive protein and interleukin-6 identify patients at increased risk for developing cardiovascular disease and progressing from pre-diabetes to overt T2DM. Almond-enriched meal patterns have potent natural anti-inflammatory properties that might decrease C-reactive protein levels, improve cardiovascular risk and delay the onset of T2DM in adults with pre-diabetes.

This study was conducted at the University of Medicine and Dentistry of New Jersey (UMDNJ) to study the effects of an almond-enriched diet on glycemic control, specific inflammatory biomarkers, and cardiovascular risk factors in adults with pre-diabetes. Participants with pre-diabetes were recruited from diabetes clinics and health fairs. They were assigned to a control diet (nut-free) or an almond-enriched diet (intervention) yielding 35% fat, 50% CHO and 15% protein. Subjects attended monthly clinics where raw or dry roasted whole varieties of almonds were given to those on the intervention diet. All participants kept food and activity records and reported dietary recalls to the study registered dietitian.

Anthropometric and blood pressure measurements were recorded at each monthly clinic and every 8 weeks serum samples were collected. Total cholesterol, LDL-C, HDL-C, TG and glucose was determined. Venous blood was drawn to measure CRP, IL-6, alpha tocopherol and insulin. Glycosylated hemoglobin was determined insulin resistance was assessed.

The almond-enriched intervention group exhibited greater reductions in insulin (21.78 mU/ml vs. +1.47 mU/ml, $p < 0.002$), homeostasis model analysis for insulin resistance (20.48 vs. +0.30, $p < 0.007$), and homeostasis model analysis for beta-cell function (213.2 vs. +22.3, $p < 0.001$) compared with the nut-free control group. Clinically significant declines in LDL-C were found in the almond-enriched intervention group (212.4 mg/dl vs. 20.4 mg/dl) as compared with the nut-free control group. No changes were observed in BMI (20.4 vs. 20.7 kg/m², $p = 0.191$), systolic blood pressure (24.4 mm Hg vs. 23.5 mm Hg, $p = 0.773$), or for the other measured cardiovascular risk factors.

In conclusion, an ADA diet consisting of 20% of calories as almonds over a 16-week period is effective in improving markers of insulin sensitivity and yields clinically significant improvements in LDL-C in adults with prediabetes.

Publications

Wien, M, Bleich D, Raghuvanshi M, Gould-Forgerite S, Gomes J, Monahan-Couch L, Oda K. Almond consumption and cardiovascular risk factors in adults with pre-diabetes. *J Am Coll Nutr* 2010; 29:189-197. [full text](#)

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Presentations:

Wien M, Sabaté J, Monahan-Couch L, Oda K. The effect of almonds on plasma lipids in person with prediabetes. Experimental Biology 2008, San Diego CA, April 2008. [*FASEB J* 2008 22:677.21]. [abstract](#)

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