

Inclusion of Almonds in a Cholesterol-Lowering Diet Improves Plasma HDL Subspecies and Cholesterol Efflux to Serum in Normal-Weight Individuals with Elevated LDL Cholesterol.

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Abstract:

Background: Almonds may increase circulating HDL cholesterol when substituted for a high-carbohydrate snack in an isocaloric diet, yet little is known about the effects on HDL biology and function. **Objective:** The objective was to determine whether incorporating 43 g almonds/d in a cholesterol-lowering diet would improve HDL subspecies and function, which were secondary study outcomes. **Methods:** In a randomized, 2-period, crossover, controlled-feeding study, a diet with 43 g almonds/d (percentage of total energy: 51% carbohydrate, 16% protein, and 32% total and 8% saturated fat) was compared with a similar diet with an isocaloric muffin substitution (58% carbohydrate, 15% protein, and 26% total and 8% saturated fat) in men and women with elevated LDL cholesterol. Plasma HDL subspecies and cholesterol efflux from J774 macrophages to human serum were measured at baseline and after each diet period. Diet effects were examined in all participants (n = 48) and in normal-weight (body mass index: <25; n = 14) and overweight or obese (≥ 25 ; n = 34) participants by using linear mixed models. **Results:** The almond diet, compared with the control diet, increased α -1 HDL [mean \pm SEM: 26.7 ± 1.5 compared with 24.3 ± 1.3 mg apolipoprotein A-I (apoA-I) /dL; P = 0.001]. In normal-weight participants, the almond diet, relative to the control diet, increased α -1 HDL (33.7 ± 3.2 compared with 28.4 ± 2.6 mg apoA-I/dL), the α -1 to pre- β -1 ratio [geometric mean (95% CI): 4.3 (3.3, 5.7) compared with 3.1 (2.4, 4.0)], and non-ATP-binding cassette transporter A1 cholesterol efflux ($8.3\% \pm 0.4\%$ compared with $7.8\% \pm 0.3\%$) and decreased pre- β -2 (3.8 ± 0.4 compared with 4.6 ± 0.4 mg apoA-I/dL) and α -3 (23.5 ± 0.9 compared with 26.9 ± 1.1 mg apoA-I/dL) HDL (P < 0.05). No diet effects were observed in the overweight or obese group. **Conclusions:** Substituting almonds for a carbohydrate-rich snack within a lower-saturated-fat diet may be a simple strategy to maintain a favorable circulating HDL subpopulation distribution and improve cholesterol efflux in normal-weight individuals with elevated LDL cholesterol.