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Eggs do not raise blood cholesterol: results of a randomised controlled trial

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Eggs are a unique food that are high in cholesterol, but low in saturated fat. Egg consumption recommendations have fluctuated over time due to the belief that increased intake of dietary cholesterol raises plasma low density lipoprotein cholesterol (LDL-C) and therefore cardiovascular disease risk[(1)]. Research suggests it is saturated fat, rather than dietary cholesterol, that is implicated in this association, yet controversy over egg consumption remains[(1,2)]. This study aimed to evaluate the independent effects of dietary cholesterol (from eggs) and saturated fat intakes on LDL-C. Sixty-one adults with LDL-C less than 3.5 mmol/L (39 ± 2 years, BMI 25.8 ± 0.8 kg/m^2) were enrolled in a randomised controlled counter-balanced, three-arm cross-over study[(3)]. Participants consumed three isocaloric diets for five weeks each in randomised order: a high-cholesterol (600 mg)/low-saturated fat (6%) diet including two eggs per day (EGG) diet, a low-cholesterol (300 mg)/high-saturated fat (12%) without eggs (EGG-FREE) diet, and a control diet (CON) high in both cholesterol (600 mg) and saturated fat (12%) including one egg per week. Each diet phase included eight detailed daily meal plans with recipes, which were used on rotation for the five-week period. Throughout each dietary phase participants attended three diet review consults (via video conference or phone) and received individualised dietary advice from a dietitian. Dietary intake (5-day diaries analysed using Foodworks, Xyris Software, Australia), and lipid and lipoprotein levels were measured at study entry, and at the end of each diet phase. Treatment effects were analysed using linear mixed effects models. Results are reported as mean ± standard error. Forty-eight participants completed all three diets, with dietary analyses demonstrating target cholesterol and saturated fat intakes were generally met for each diet. Notably, saturated fat intake was 2% higher than target for all diets (CON and EGG 14%; EGG-FREE 8%). Compared to CON, plasma LDL-C concentration was significantly lower following the EGG diet (2.83 ± 0.08 mmol/L vs 2.68 ± 0.08 mmol/L, $p = 0.02$), but not the EGG-FREE diet (2.75 ± 0.08 mmol/L, $p = 0.52$). Across all three diets there was a significant within-individual relationship between dietary saturated fat intake and LDL-C concentration ($\beta = 0.35$, $p = 0.002$), but there was no significant relationship with dietary cholesterol intake ($\beta = -0.006$, $p = 0.42$). Our findings indicate that dietary saturated fat, not cholesterol, is responsible for elevating plasma LDL-C concentrations. Consuming two eggs per day within a low-saturated fat diet does not adversely affect plasma LDL-C.

References

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