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ORIGINAL RESEARCH COMMUNICATION

Soy isoflavones lower serum total and LDL cholesterol in humans: a meta-analysis of 11 randomized controlled trials [1,2,3]

Kyoko Taku, Keizo Umegaki, Yoko Sato, Yuko Taki, Kaori Endoh and Shaw Watanabe

[1] From the Information Center (KT, KU, YS, YT, and KE) and the Nutritional Education Program (SW), National Institute of Health and Nutrition, Tokyo, Japan

Background: Clinical trials have reported the cholesterol-lowering effects of soy protein intake, but the components responsible are not known.

Objective: This meta-analysis was primarily conducted to evaluate the precise effects of soy isoflavones on lipid profiles. The effects of soy protein that contains enriched and depleted isoflavones were also examined.

Design: PUBMED was searched for English-language reports of randomized controlled trials published from 1990 to 2006 that described the effects of soy protein intake in humans. Eleven studies were selected for the meta-analysis.

Results: Soy isoflavones significantly decreased serum total cholesterol by 0.10 mmol/L (3.9 mg/dL or 1.77%; $P = 0.02$) and LDL cholesterol by 0.13 mmol/L (5.0 mg/dL or 3.58%; $P < 0.0001$); no significant changes in HDL cholesterol and triacylglycerol were found. Isoflavone-depleted soy protein significantly decreased LDL cholesterol by 0.10 mmol/L (3.9 mg/dL or 2.77%; $P = 0.03$). Soy protein that contained enriched isoflavones significantly decreased LDL cholesterol by 0.18 mmol/L (7.0 mg/dL or 4.98%; $P < 0.0001$) and significantly increased HDL cholesterol by 0.04 mmol/L (1.6 mg/dL or 3.00%; $P = 0.05$). The reductions in LDL cholesterol were larger in the hypercholesterolemic subcategory than in the normocholesterolemic subcategory, but no significant linear correlations were observed between reductions and the starting values. No significant linear correlations were found between reductions in LDL cholesterol and soy protein ingestion or isoflavone intakes.

Conclusions: Soy isoflavones significantly reduced serum total and LDL cholesterol but did not change HDL cholesterol and triacylglycerol. Soy protein that contained enriched or depleted isoflavones also significantly improved lipid profiles. Reductions in LDL cholesterol were larger in hypercholesterolemic than in normocholesterolemic subjects.

Key Words: Soy isoflavones • soy protein • lipid • total cholesterol • LDL cholesterol • HDL cholesterol • triacylglycerol • meta-analysis

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