

Evidence Based Critical Appraisal Topic
Plant Sterols and Cholesterol Management

Becky Schneider RN, FNP-S

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Clinical Scenario

A 33 year old male presents to the clinic for treatment of high cholesterol. He had a physical exam at his place of employment two months ago with lab work. His lab reports show an elevated LDL at 220 mg/dl and an HDL at 44 mg/dl. All other vital signs and labs are within normal limits. Since his initial exam two months ago he has started an exercise program and has modified his diet to include less saturated fat. He has lost 20lbs and now weighs 196lbs His past medical history is negative. Family history is positive for coronary artery disease and hypertension. The patient and his wife, who is a nurse, would like to try alternative therapies before he is placed on a statin. Results indicate uncontrolled hypercholesterolemia.

Clinical Question

Among adult patients with hypercholesterolemia who are seeking alternative therapies, are plant sterols effective as traditional medication, such as statins in lowering or treating elevated cholesterol levels thereby reducing cardiovascular risk?

Articles

Genser, B., Silbernagel, G., De Backer, G., Bruckert, E., Carmena, R., Chapman, M., & ... März, W. (2012). Plant sterols and cardiovascular disease: a systematic review and meta-analysis. *European Heart Journal*, 33(4), 444-451. doi:10.1093/eurheartj/ehr441

Silbernagel, G., Fauler, G., Renner, W., Landl, E., Hoffmann, M., Winkelmann, B., & ... März, W. (2009). The relationships of cholesterol metabolism and plasma plant sterols with the severity of coronary artery disease. *Journal Of Lipid Research*, 50(2), 334-341.

Summary and Appraisal of Key Evidence

Study 1 Gesner et al., (2012) conducted a systematic review and meta-analysis aimed to investigate whether there is an association between serum concentrations of two common plant sterols (sitosterol and campesterol) and cardiovascular disease. The article had a Level 2, Grade A level of evidence. The authors searched MEDLINE via PUBMED (from 1950 to April 2010), EMBASE (from 1996 to April 2010), and the COCHRANE library (from 1988 to April 2010) and identified 17 studies using different designs (four case-control, five nested case-control, three cohort, five cross-sectional) involving 11,182 participants. This large sample is strength in this review. The systemic review and meta-analysis had a few limitations, it was based only on few observational studies and is therefore prone to bias due to uncontrolled confounding and meta-analysis based on SMD between CVD cases and controls (MA 2) is likely to be biased since most studies only provided crude-unadjusted statistics of the sterol distributions. The systematic review and meta-analysis did not reveal any evidence that plant sterols may lower cholesterol thereby lowering the risk of CVD. Also, the studies that were utilized for the systematic literature review reported inconsistent findings. The studies reviewed did not

consider if factors that could influence the absorption of sterols in the gut, which include genetic factors, age, gender, diet, metabolic background, and medications.

Study 2 Silbernagel et al., (2009) investigated the relationships of cholesterol metabolism and plasma plant sterols by measuring cholestanol, lathosterol, campesterol, sitosterol, and the severity of CAD in 2,440 participants of the Ludwigshafen Risk and Cardiovascular health (LURIC) study. LURIC is a cohort study designed to investigate cardiovascular risk factors that took place over ten years. Coronary status was determined by angiography, and the severity of CAD was assessed by the Friesinger Score (FS) providing Level 2, Grade A level of evidence. Fasting blood samples were collected before angiography and were kept frozen at -80°C between the day of blood draw and the day of analysis. All of the participants in the study were Caucasian, of German ancestry, and lived Germany. Except for acute coronary syndromes, individuals had to be in a stable clinical condition. Patients with and without statin treatment were included in the study. The FS was broken down to four (A–D) categories of severity of CAD. Comparisons among the four groups of the FS were analyzed. The study concluded that there is an association of high cholesterol absorption and low cholesterol synthesis with an increased severity of coronary atherosclerosis in participants of the LURIC study. The study provides a large and reliable body of data on the relationships of cholesterol homeostasis and plasma plant sterols with CAD. Some limitations included that information on the dietary habits of the participants was not available and they could not exclude the possibility that sample storage for up to 10 years may have affected plasma sterol concentrations.

Clinical Bottom Line

These studies had two different conclusions. Study 1 concluded that there was not enough evidence that plant sterols may lower cholesterol; however study 2 concluded that sterols may help lower cholesterol, particularly LDL. I believe there needs to be further research on the topic. It was difficult to find articles published within the last 5 years relating to this topic of interest. According to Gesner et al., (2012) cardiovascular disease is the leading cause of death worldwide and hypercholesterolemia is a major contributing factor. Patients are always going to want safe and effective alternatives to medications. It is important for care providers to know the safety and accuracy of alternative therapies for patients.

Implications for Practice

I would recommend a trial period of three months for patients who do not want to take traditional medications, such as statins. For sterols it is not recommended that patients take more than 4g/day. Sterol administration along with diet modification and an exercise regimen may lower LDL in patients with hypercholesterolemia.