

# Are plant-based diets efficacious in lowering total serum cholesterol and low-density lipoprotein levels?

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*Cardiovascular disease is a leading cause of morbidity and mortality in the U.S. and around the globe. A large body of literature accumulated over the past several decades has shown the benefit of lowering serum total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) levels to reduce cardiovascular risk. National guidelines suggest therapeutic lifestyle changes, beginning with diet, as a first step toward lowering TC and LDL-C. It has been suggested a plant-based, low fat diet can substantially reduce TC and LDL-C and thereby reduce risk of cardiovascular disease. The purpose of this review is to examine the state of the science regarding the efficacy of plant-based diets in reducing serum TC and LDL-C levels. While results of the research review indicate some benefit, strong evidence supporting the efficacy of plant-based diet in reducing atherogenic lipids is lacking. (J Vasc Nurs 2014;32:46-50)*

High levels of serum total cholesterol (TC) and low-density lipoprotein cholesterol (LDL-C) levels are associated with increased risk of cardiovascular diseases.<sup>1</sup> Diets that include high fat content from animal products have been associated with elevated TC and LDL-C and it has been suggested that plant-based diets are associated with significantly lower serum lipid levels.<sup>2-5</sup> Dietary modifications are a first-line therapy for lipid management and are therefore indicated for individuals with elevated TC and LDL-C to reduce cardiovascular risk. Two review reports summarizing the effects of plant-based diets on TC and LDL-C demonstrate significant benefit of such diets on lowering unfavorable lipids.<sup>6,7</sup> The purpose of this review is to explore the current state of the science regarding the efficacy of plant-based, low-fat diets in reducing serum TC and LDL-C levels.

## BACKGROUND AND SIGNIFICANCE

Cardiovascular diseases, defined as stroke and heart disease, are responsible for 34% of all deaths in the United States or 1 in 2.9 deaths. Coronary heart disease (CHD) mortality incidence is specifically responsible for 1 in 6 deaths in the United States.<sup>8</sup>

The overall prevalence of CHD for adults >18 years is 6%-7%.<sup>9</sup> Annual direct and indirect costs for treating cardiovascular diseases are estimated at \$273 billion and \$444 billion, respectively, and account for approximately 17% of total national health care expenditures.<sup>10</sup> The Framingham Heart Study, a seminal work first published in the early 1960s, identified the now well-known risk factors for CHD, including elevated TC and LDL-C.<sup>11</sup> A large body of literature accumulated over the past five decades has shown the important benefit of lowering serum cholesterol and LDL-C levels to reduce cardiovascular risk. An estimated 27.5% of adults >20 years of age have total serum cholesterol levels >240 mg/dL,<sup>12</sup> illustrating the need for effective therapies for reducing risk.

Guidelines from the National Heart Lung and Blood Institute, The Detection, Evaluation, and Treatment of High Blood Cholesterol in Adults (Adult Treatment Panel IV, 2012) suggest therapeutic lifestyle changes as a first step after risk stratification, beginning with diet. The Therapeutic Lifestyle Changes Diet includes saturated fat <7% of calories, cholesterol <200 mg/d, consider increased viscous (soluble) fiber (10-25 g/d), and plant stanols/sterols (2 g/d) as therapeutic options.<sup>13</sup> Other experts advocate for stricter reductions in fat intake and increased plant sources of nutrients, as well as reduction or elimination of atherogenic compounds contained in a traditional, animal-based, American diet. It has been suggested that a plant-based, low-fat diet can substantially reduce TC and LDL-C and thereby reduce risk for cardiovascular diseases.

## Review question

Despite significant evidence that plant-based diets are efficacious on the reduction of risk related to CHD and atherogenic lipids, there are few reports that summarize the intervention studies examining the quality of the research of prospective interventions. Thus, the review question that guides this search is: Are plant-based, low-fat diets efficacious in reducing total serum cholesterol and LDL-C levels?

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TABLE 1

## STUDIES INCLUDED FOR REVIEW

<i>Author</i>	<i>Purpose</i>	<i>Design &amp; Sample Population</i>	<i>Measures/Instruments</i>	<i>Tests/Interventions</i>	<i>Results/statistical analysis</i>	<i>Level of Evidence*</i>
Barnard et al <sup>2</sup> (2006)	Does low-fat vegan diet improve glycemic control and CV risk factors	RCT; n=99 DM II; Both M/F; 2 groups vegan & ADA diets; mean age 57/55; Mean BMI vegan 34 kg/m <sup>2</sup> ; 80% on statin both groups	Serum TC, HDL, Trig, VLDL	22 week vegan diet 10% fat ADA <7% saturated fat, 60-70% carbs and monosaturated Fats; cholestrol <200 mg/day. Diet recalls. Labs draws 0, 11, 22 weeks.	Vegan: LDL -21.2%, TC -17.6% HDL -11.08% ADA: LDL -9.7% TC -9.3% HDL -5.7% P < 0.001 between groups t-tests regression	B
DeBiase et al <sup>3</sup> (2007)	Compare levels of TC, LDL, HDL and Trig between vegetarian and omnivores	Cross-sectional; N=76 Brazilian both M/F; 54 veg, 3 groups 18 vegans; 22 omnivore Mean BMI vegan 21.79 Omnivore 25.4; mean age vegan 30 omnivore 38	Questionnaire One lab draw	Serum TC, HDL, LDL, Trig	Vegan LDL regression coefficients -54.14 TC -44.92 adjusted for age P<.001	C

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