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The Effectiveness of the Mediterranean Diet and Plant-Based Diets in Improving the Lipid Profile of Patients with Dyslipidemia: A Narrative Review

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Abstract. Dyslipidemia contributes to atherosclerotic cardiovascular risk, particularly through elevated low-density lipoprotein cholesterol (LDL-C). Mediterranean and plant-based dietary patterns may improve circulating lipids. This narrative review examines their effects on total cholesterol, LDL-C, HDL-C, and triglycerides, together with biological mechanisms and limitations of the evidence. Targeted literature identification focused on traceable PubMed-indexed studies and publisher records, encompassing randomized trials, meta-analyses, and relevant reviews. Randomized-trial meta-analyses indicate that vegetarian and vegan diets reduce total cholesterol and LDL-C compared with omnivorous diets, while triglyceride changes are less consistent. Direct comparisons suggest greater LDL-C reductions with low-calorie vegetarian diets and greater triglyceride improvements with Mediterranean diets in certain settings. Mediterranean dietary interventions may also improve HDL function and LDL-related properties. Variation in participant characteristics, actual dietary composition, weight change, medication use, and intervention duration limits broad generalization. Both patterns can support dyslipidemia management, but currently available direct evidence does not establish universal superiority of either approach among patients with diagnosed dyslipidemia. Additional trials in hypercholesterolemia and recent meta-analyses strengthen the assessment of LDL changes, while also highlighting heterogeneous HDL and triglyceride responses and null findings in selected comparisons.

Keywords: *Dyslipidemia; Mediterranean Diet; Plant-Based Diet; LDL Cholesterol; HDL Cholesterol.*

A. INTRODUCTION

Dyslipidemia refers to abnormal plasma lipid concentrations and may include elevated total cholesterol, LDL cholesterol, or triglycerides, as well as reduced HDL cholesterol. In the prevention of atherosclerotic cardiovascular disease, particular attention is directed toward atherogenic lipoproteins and cumulative exposure to LDL. Dietary modification is an important component of management, but interventions should be evaluated according to measurable benefits and individual patient characteristics (Trautwein & McKay, 2020; Koch et al., 2023).

The Mediterranean diet emphasizes vegetables, fruits, legumes, whole grains, olive oil, and fish, while limiting red meat and processed foods. Plant-based diet is an umbrella term for eating patterns that prioritize plant foods, ranging from flexible approaches to vegetarian and vegan diets. These terms are not interchangeable: the Mediterranean diet is not necessarily vegetarian, and a plant-based diet is not necessarily low in saturated fat or rich in fiber (Trautwein & McKay, 2020; Martínez-González et al., 2015; Ros et al., 2014).

Improvements in lipid profiles may differ between dietary patterns because of differences in the replacement of saturated with unsaturated fats, the amount of viscous fiber, plant sterols, plant protein, and changes in body weight. Meta-analyses indicate benefits of vegetarian or vegan diets for total cholesterol and LDL cholesterol, although triglyceride effects are not consistently observed. Comparative studies are therefore needed to distinguish the effects of each dietary pattern (Koch et al., 2023; Yokoyama et al., 2017; Wang et al., 2015; Sofi et al., 2018; Barnard et al., 2022).

This review synthesizes evidence on the effectiveness of these two dietary patterns for LDL cholesterol, HDL cholesterol, total cholesterol, and triglycerides; describes potential biological mechanisms; and identifies limitations in the evidence specifically relevant to patients with dyslipidemia. The emphasis is on analytical synthesis rather than disconnected summaries of individual studies.

Several recent studies strengthen the rationale for a more specific assessment. A clinical trial in patients with hypercholesterolemia evaluated a Mediterranean diet adapted to Korean foods (Lee et al., 2021), while a controlled feeding study in heterozygous familial hypercholesterolemia examined a whole-food, plant-based diet under isocaloric conditions (Lessard-Lord et al., 2026). These studies assess LDL changes that are directly relevant to clinical practice, but their diagnoses, comparator diets, and durations differ; their findings should therefore not be combined without considering context.

B. METHOD

This narrative review was developed through targeted searches of PubMed, publisher websites, and accessible scientific article indexes up to October 2026. Search terms included Mediterranean diet, vegetarian diet, vegan diet, plant-based diet, Portfolio diet, dyslipidemia, hyperlipidemia, total cholesterol, LDL cholesterol, HDL cholesterol, triglycerides, and related combinations. Literature was selected according to title relevance, availability of lipid outcomes, and contribution to comparison of the two dietary patterns or explanation of biological mechanisms. Clinical trials and meta-analyses were treated as the main evidence, while articles on food components, cardiovascular events, and non-lipid biomarkers were used for context. Additional searches expanded the evidence on direct lipid changes, including studies published through October 2026. The reference list contains 40 unique publications; this review was not a systematic screening exercise and did not include a formal risk-of-bias assessment.

The reviewed literature included studies of patients with hyperlipidemia, people at cardiovascular risk, populations with overweight, and healthy participants. Differences in population were considered when assessing generalizability to patients with dyslipidemia. Findings were synthesized descriptively according to dietary category, lipid outcome, study design, and interpretive limitations. No quantitative pooling or formal risk-of-bias assessment was conducted. The numbers of identified articles, duplicates screened, and excluded studies are not reported because the search was not systematic and no complete screening log was maintained. The references represent material used for synthesis and context; they do not imply that every cited publication directly establishes effectiveness in patients with diagnosed dyslipidemia.

C. RESULT AND DISCUSSION

The literature revealed three main groups of findings: changes in lipid concentrations with plant-based diets, effects of the Mediterranean diet on lipids and lipoprotein characteristics, and studies directly comparing the two patterns. A meta-analysis by Koch et al. (2023) synthesized 30 randomized controlled trials and found reductions of approximately 0.34 mmol/L in total cholesterol and 0.30 mmol/L in LDL cholesterol with vegetarian or vegan diets, while the change in triglycerides was not statistically significant. A meta-analysis of the Portfolio diet in people with hyperlipidemia also reported a meaningful LDL reduction when cholesterol-lowering foods were combined (Koch et al., 2023; Chiavaroli et al., 2018).

Direct comparative research includes CARDIVEG, which compared a low-calorie vegetarian diet with a low-calorie Mediterranean diet; a study by Barnard et al., which compared a low-fat vegan diet with a Mediterranean diet; and OMNIVEG, which investigated

a change from a traditional Mediterranean diet to a vegan Mediterranean diet in healthy men. Differences in population, energy intake, and intervention type should be considered when interpreting comparative findings (Sofi et al., 2018; Barnard et al., 2022; López-Moreno et al., 2024).

Table 1. Summary of Key Studies on Dietary Interventions and Lipid Profiles

Study/Year	Design and population	Relevant findings
Koch et al. (2023)	Meta-analysis of 30 RCTs; vegetarian/vegan vs. omnivorous diets	Total cholesterol decreased by 0.34 mmol/L and LDL by 0.30 mmol/L; triglyceride change was not significant.
Wang et al. (2015)	Meta-analysis of 11 vegetarian-diet RCTs	Total cholesterol, LDL, HDL, and non-HDL cholesterol decreased; each parameter should be interpreted according to the direction of change.
Sofi et al. (2018)	CARDIVEG randomized crossover trial	The vegetarian diet was relatively more favorable for LDL, while the Mediterranean diet was more favorable for triglycerides; participants were overweight.
Barnard et al. (2022)	Randomized crossover trial of a low-fat vegan diet vs. Mediterranean diet	The low-fat vegan diet produced a greater LDL reduction in this study; the population was not limited to patients with dyslipidemia.
López-Moreno et al. (2024)	OMNIVEG crossover study	Evaluated lipid changes after transition toward a vegan Mediterranean diet; the sample comprised healthy men and was limited in size.
Jenkins et al. (2011)	RCT involving 351 participants with hyperlipidemia; Portfolio diet	A combination of plant sterols, soy, viscous fiber, and nuts reduced LDL.
Chiavaroli et al. (2018)	Meta-analysis of Portfolio dietary-pattern trials in hyperlipidemia	LDL decreased by approximately 17% compared with control diets.
Hernáez et al. (2017)	PREDIMED RCT substudy	Improvement in some HDL and LDL characteristics; these findings are not equivalent to changes in routine lipid concentrations.
Fitó et al. (2007)	PREDIMED RCT substudy	Reduction in LDL oxidation biomarkers during the Mediterranean-diet intervention.
Landry et al. (2023)	RCT involving 22 pairs of identical twins	A healthy vegan diet reduced LDL more than an omnivorous diet over eight weeks.

Note: This table highlights core studies used in the synthesis; other articles support the discussion of mechanisms, clinical context, and critical interpretation. Related PREDIMED and CARDIVEG publications may share the same underlying participants and are therefore not counted as independent evidence.

Additional selected studies included a Korean-style Mediterranean diet trial in patients with hypercholesterolemia, a controlled crossover feeding trial of a whole-food, plant-based diet in familial hypercholesterolemia, a clinical trial of plant foods in hypercholesterolemia,

and systematic reviews evaluating consistency in lipid changes. Mechanistic literature and studies reporting neutral results were also included to avoid relying exclusively on positive findings (Gardner et al., 2005; Lee et al., 2021; Papadaki et al., 2020; Keshani et al., 2024; Pourrajab et al., 2025; Lessard-Lord et al., 2026).

Interpretation of the literature should begin with the clinical outcome being assessed. LDL cholesterol is a key target in reducing atherosclerotic risk, whereas total cholesterol reflects several lipoprotein fractions. HDL cholesterol should not be viewed simply as a value that must always increase, because changes in HDL concentration do not necessarily indicate changes in its capacity to mediate reverse cholesterol transport. Triglycerides may respond to energy intake, carbohydrate quality, adiposity, and metabolic status. Thus, any claim about the "most effective diet" should specify the lipid outcome and patient group concerned (Trautwein & McKay, 2020; Hernáez et al., 2017).

For plant-based diets, the most consistent pattern is a reduction in LDL and total cholesterol, as shown in the randomized-trial syntheses by Koch et al. (2023) and Wang et al. (2015). Yokoyama et al. (2017) combined observational and clinical evidence, providing a broader context; however, findings from different study designs should not be treated as equivalent to results from a single randomized trial. Reductions in HDL reported in some vegetarian-diet studies also demonstrate that lipid-profile changes do not always move in the same direction. These findings support evaluating overall cardiovascular risk rather than relying on a single laboratory value (Koch et al., 2023; Yokoyama et al., 2017; Wang et al., 2015).

Evidence particularly relevant to hypercholesterolemia comes from the Portfolio diet, which combines plant protein, plant sterols, viscous fiber, and nuts. Jenkins et al. (2003) showed that combining these food components could reduce LDL in a short study of participants with hyperlipidemia; a subsequent six-month trial strengthened evidence for the feasibility of this approach as a self-selected diet. The meta-analysis by Chiavaroli et al. (2018) pooled controlled trials and reported an LDL reduction of approximately 17%. However, the Portfolio diet is a specific therapeutic dietary pattern and should not be equated with all forms of plant-based eating (Jenkins et al., 2011; Jenkins et al., 2003; Chiavaroli et al., 2018; Jones et al., 2005).

The biological rationale is supported by evidence on individual food components. Meta-analyses of controlled trials associate soy protein with reductions in LDL and total cholesterol, as well as oat beta-glucan fiber. Plant sterols and stanols may reduce intestinal cholesterol absorption, while foods rich in unsaturated fats, such as nuts, may improve several lipid parameters. However, effects observed for individual components cannot simply be added together to predict the effect of a complete dietary pattern without trials of that pattern itself (Blanco Mejia et al., 2019; Whitehead et al., 2014; Del Gobbo et al., 2015; Nishi et al., 2025; Guasch-Ferré et al., 2023; Shaghaghi et al., 2013; Scholle et al., 2009).

The Mediterranean diet places greater emphasis on the quality of fat sources, nuts, olive oil, fish, whole grains, and plant foods rich in bioactive compounds. In controlled studies, benefits have been observed not only in plasma cholesterol but also in LDL oxidation and HDL characteristics. Fitó et al. (2007) reported changes in LDL oxidation biomarkers after three months, while Hernáez et al. (2017) assessed HDL function and LDL atherogenic properties in a PREDIMED substudy. These outcomes are mechanistically important, but they should not be misinterpreted as evidence that LDL concentrations always decline by a specific amount (Hernáez et al., 2017; Fitó et al., 2007).

The PREDIMED study has contributed substantially to knowledge about the Mediterranean diet and cardiovascular risk. For citation integrity, the original 2013 main publication is not treated as a definitive source in this review because it was retracted and

republished with corrections in 2018. The 2018 publication is used as evidence on primary prevention of cardiovascular events, not as a substitute for lipid-specific results. Other articles from the PREDIMED cohort report different outcomes, but some share the same underlying participants and therefore do not represent independent replications (Estruch et al., 2018; Estruch et al., 2006; Babio et al., 2014; Guasch-Ferré et al., 2017; Martínez-González et al., 2015; Ros et al., 2014).

Direct comparisons are most relevant to the central question of this review. CARDIVEG found that both a low-calorie vegetarian diet and a low-calorie Mediterranean diet could improve several metabolic indicators, with a tendency toward greater LDL benefits from the vegetarian diet and greater triglyceride benefits from the Mediterranean diet. Barnard et al. (2022) reported a more pronounced LDL improvement during the low-fat vegan phase than during the Mediterranean phase in adults with overweight. OMNIVEG adds evidence on lipid changes when a traditional Mediterranean diet is changed to a vegan Mediterranean diet, but its small sample and healthy male participants limit applicability to patients with clinical dyslipidemia (Sofi et al., 2018; Barnard et al., 2022; López-Moreno et al., 2024).

These comparisons require careful interpretation because “low-calorie vegetarian,” “low-fat vegan,” and “vegan Mediterranean” diets are not the same intervention. Differences in energy intake and body weight may confound attempts to isolate the effect of dietary composition. Additional CARDIVEG analyses of energy-balance hormones and kidney function do not replace LDL or triglyceride outcomes; rather, they show that the parent study also investigated other mechanisms and clinical aspects. Citing multiple CARDIVEG reports without distinguishing their outcomes may create a false impression of independent evidence (Sofi et al., 2018; Barnard et al., 2022; Dinu et al., 2020; Dinu et al., 2021).

The clinical implication is that dietary choice should be tailored to the predominant lipid abnormality and patient preferences. When LDL reduction is the main goal, reducing saturated fat and increasing whole plant foods, soluble fiber, nuts, and plant protein may be useful. When triglycerides are elevated, energy balance, carbohydrate quality, body weight, and other metabolic factors also require attention. Neither the Mediterranean diet nor a plant-based diet automatically replaces lipid-lowering medication when pharmacotherapy is indicated. Education, nutritional adequacy, adherence, and repeat lipid testing remain important (Trautwein & McKay, 2020; Jenkins et al., 2011; Chiavaroli et al., 2018; Dybvik et al., 2023).

Evidence related to cardiovascular complications broadens the context but should be distinguished from direct measurements of lipid profiles. Cohort meta-analyses of vegetarian or vegan diets assess cardiovascular outcomes rather than experimentally induced changes in lipids. Research on oxidative stress and inflammation describes possible pathways linking dietary quality with metabolic health. However, these associations do not mean that every biomarker change guarantees fewer myocardial infarctions or strokes (Dybvik et al., 2023; Ilari et al., 2025).

The main limitations include heterogeneity in the definition of plant-based diets, the limited number of studies focused on patients with diagnosed dyslipidemia, often short intervention periods, and variation in lipid-lowering medication use. Meta-analyses may also include the same clinical trials as the primary studies cited. This narrative review did not conduct a formal risk-of-bias assessment or a systematic search that could guarantee comprehensive coverage. The conclusions therefore reflect patterns in the literature reviewed rather than a newly calculated pooled effect.

Future research should directly compare a standardized Mediterranean diet with a high-quality plant-based diet in patients diagnosed with dyslipidemia, control for medication use and energy intake, measure adherence, and provide sufficiently long follow-up. Primary

outcomes should include LDL cholesterol, non-HDL cholesterol, triglycerides, and, where possible, apolipoprotein B. Maintenance of benefits after the intensive intervention ends should also be assessed.

In patients with hypercholesterolemia, Lee et al. (2021) tested a calorie-restricted Korean-style Mediterranean diet in a crossover trial involving 92 participants. The diet was associated with reductions in total and LDL cholesterol, but also with a reduction in HDL cholesterol, indicating that several lipid fractions should be considered together when evaluating success. Gardner et al. (2005) conducted a clinical trial in 120 people with elevated baseline LDL; increasing nutrient-rich plant foods within a low-fat pattern reduced LDL more than the comparison low-fat diet, while changes in HDL and triglycerides were not significantly different. Both studies support dietary intervention, but the dietary compositions differed from those used in CARDIVEG.

Evidence particularly relevant to genetic dyslipidemia comes from Lessard-Lord et al. (2026), who compared a whole-food, plant-based diet with a standard American diet in a controlled crossover feeding trial involving 50 adults with heterozygous familial hypercholesterolemia who were not taking cholesterol-lowering medication. Each intervention lasted four weeks under isocaloric feeding conditions. This design helps assess dietary effects without relying on weight change as the sole explanation, although the underlying condition limits generalizability to all forms of dyslipidemia. Brown et al. (2022) examined serum cholesterol and nutrient-intake changes during a short-term healthy plant-based diet; this study is more useful for implementation context than as definitive evidence in patients with dyslipidemia.

Inconsistent findings enrich rather than weaken critical interpretation. Papadaki et al. (2020) reviewed controlled trials of the Mediterranean diet and metabolic health. In a meta-analysis of 18 clinical trials, Keshani et al. (2024) found a small reduction in triglycerides with an olive-oil-enriched Mediterranean diet compared with control diets, without consistent benefits for other cardiometabolic markers. Pourrajab et al. (2025) found no significant difference in lipid indices when directly comparing a Mediterranean diet supplemented with olive oil with one supplemented with mixed nuts. This does not mean that neither approach is beneficial compared with the original diet; rather, these types of healthy-fat supplementation have not demonstrated clear superiority over one another for lipid outcomes.

Padhi et al. (2015) also reported that whole soy flour delivered through muffins at two doses of soy protein did not reduce LDL in a controlled trial of adults with hypercholesterolemia. This null finding should be distinguished from research on overall plant-based dietary patterns: benefits observed with the Portfolio diet cannot be attributed to a single food. Food matrix, combinations of components, and the choice of comparator are important when interpreting the mechanisms of cholesterol reduction.

D. CONCLUSION

The Mediterranean and plant-based dietary patterns may both improve lipid profiles through changes in fat quality, fiber intake, and plant-food components. Clinical trials and meta-analyses generally support reductions in LDL and total cholesterol with vegetarian or vegan diets, whereas effects on triglycerides are not consistently significant. The Mediterranean diet has shown benefits for several lipid parameters and lipoprotein characteristics and may provide greater triglyceride improvement in certain comparative settings. However, differences in study design, intervention composition, and participant populations prevent the conclusion that either diet is superior for all patients with dyslipidemia. Dietary choices should be individualized and integrated into comprehensive cardiovascular risk management.

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