



Seed Oils

Vegetable oils represent a diverse category of oils obtained from various plant sources, including seeds (such as flaxseed and canola), nuts (including peanuts), fruit pulp (such as olives and palm) and cereal bran (such as rice bran). For decades, there has been a significant interest in evaluating the relationship between dietary fat intake and risk of chronic disease. More recently the focus has shifted to type of fat rather than total fat intake. Guidelines or recommendations on this topic focus on limiting intake of saturated fat and replacing saturated fat intake with unsaturated fatty acids.

In recent years, the nutritional value of seed oils—often referred to as vegetable oils—has come under increased scrutiny. There is considerable uncertainty surrounding their impact on health, particularly regarding their fatty acid composition, such as the essential omega-6 polyunsaturated fat linoleic acid (LA). Additionally, the industrial processing methods used to produce these oils have raised further health-related concerns. This brief report summarizes current evidence on the effects of seed oils on health outcomes.

Nutrient Profile of Seed Oils and Related Concerns

Seed oils are a rich source of omega-6 fatty acids, especially linoleic acid, and contain a minimal amount of saturated fat. Like any source of fat, seed oils contain different types of fatty acids and their composition vary widely. For example, olive oil is about 55-83% monounsaturated fatty acids (MUFA), 3.5-21% polyunsaturated fatty acids (PUFA) and 7.5-20% saturated fatty acids (SFA). Canola oil is about 63% MUFA, 30% PUFA and 7% SFA.

Polyunsaturated fats encompass both omega-3 and omega-6 fatty acids. There is a belief that this high omega-6 content may contribute to chronic inflammation. This concern stems from the fact that linoleic acid, the predominant omega-6 in seed oils, can be metabolized into arachidonic acid, a precursor to pro-inflammatory compounds in the body. However, research indicates that a small percentage of linoleic acid is converted to arachidonic acid. Furthermore, there is evidence to show that higher intake of omega-6 is associated with better cardiovascular health.

Emerging evidence also suggests that bioactive compounds in seed oils such as tocopherols, biophenols, phytosterols, stigmastadienes, terpenes and squalene may have potentially beneficial health implications.

Another concern is regarding the ratio of omega-6 to omega-3 fatty acids. For a long time, this ratio used to be 1:1. The recent western diet has increased this ratio to 10:1 or greater. However, there is no clear evidence to indicate what the best ratio is. There is significant evidence to indicate that omega-3s have stronger anti-inflammatory effects but there is no clear evidence to indicate that omega-6 has pro-inflammatory effects. Achieving adequate dietary intake of omega-3 fatty acids often involves consuming foods that concurrently contain omega-6 fatty acids.

Another concern stems from the harmful changes that potentially occur during the processing and cooking of these oils. Many seed oils undergo high-temperature industrial processing that can introduce harmful oxidation products or trans fats. However, toxic products like hexane are almost entirely removed from the final product during the refining process. Seed oils can also be processed by mechanically extracting oil from seeds through cold processing or expeller pressing, without the use of chemical solvents. However, these oils tend to have lower smoke points for cooking, shorter shelf lives and are more expensive.

Existing national and global dietary guidelines recommend limiting total fat intake and saturated fat intake. Some also recommend replacing saturated fat intake with polyunsaturated fat intake, which consist of high omega-6 fatty acids.

Evidence on the Effect of Seed Oils on Health Outcomes

In recent years there has been an increase in research that documents positive associations of seed oil intake and health outcomes. Most of the evidence on this topic is based on studies examining seed oil consumption, overall PUFA intake or linoleic acid intake.

A large 2025 cohort indicated that the highest intake of total plant-based oils compared to the lowest intake was associated with 16% lower total mortality, whereas the highest butter intake compared to lowest intake was associated with 15% higher risk of total mortality. This study further indicates that there is a significant association between higher intakes of canola, soybean and olive oils and lower total mortality. Higher plant-based oil intake was associated with an 11% lower risk of cancer mortality and 6% lower risk of cardiovascular mortality. The cohort also demonstrated that substituting total butter intake with an equivalent amount of total plant-based oils was associated with 17% reduction in total mortality and 17% reduction in cancer mortality.

Two umbrella reviews focused on current evidence of vegetable oils suggest that intake of vegetable oils rich in MUFAs and PUFAs have desirable health effects. One review synthesized findings from 48 systematic reviews and found oils such as canola oil, rice bran oil and virgin olive oil are beneficial in reducing total cholesterol and low-density lipoproteins (LDL). Beneficial effects on glycemic control and weight reduction were also observed. Certainty of evidence ranged from moderate to very low across different outcomes. The second review focused on nutrient and bioactive components of edible oils and fats beyond just their fatty acid content. They reported that the beneficial effects of these may be attributed to compounds such as biophenols and flavonoids. Emerging evidence also suggests potential health benefits from tocopherols and squalene, which are present in certain edible vegetable oils like palm, soybean, canola and sunflower oil.

Multiple systematic reviews¹²⁻¹⁸ suggest that higher intake of PUFAs generally, and linoleic acid specifically, have multiple positive health effects. This, along with the replacement of SFA with either LA or other PUFAs, has the potential to improve CVD related outcomes and reduce risk of developing Type 2 diabetes. A 2025 systematic review¹⁹ based on 11 RCTs indicated that seed oils, such as canola, flaxseed and sesame, can positively improve lipid profile and glycemic control while potentially modulating oxidative stress markers. Additionally, a few systematic reviews of RCTs and individual RCT trials focused on specific vegetable oils consistently shows that higher intake of these vegetable oils is associated with improvements in lipid profiles.²⁰⁻²⁹ Similarly, a network meta-analysis of RCTs indicates replacement of SFA with oils rich in PUFA and MUFA improve lipid profiles.¹⁴

There is some evidence to address concerns that higher PUFA intake can promote inflammation and oxidative stress. Two systematic reviews of RCTs³⁰⁻³¹ demonstrated that higher intake of LA did not increase or had no effect on inflammatory markers. Oxidation of PUFAs has been demonstrated in both in vitro and ex vivo studies, however, RCTs show no effect of omega-6 or PUFA on oxidative stress markers.^{25,32,33}

Conclusion

Current scientific literature supports incorporating seed oils into a well-rounded diet, particularly as an alternative to saturated fat. Although some debates persist around their potential inflammatory or oxidative effects, the majority of peer-reviewed studies do not support these concerns when seed oils are consumed in typical dietary amounts. Health authorities continue to recommend seed oils over animal fats due to their potential to lower cardiovascular risk. Like all dietary fats, seed oils are best used in moderation and as part of a diet that emphasizes whole foods—such as fruits, vegetables, whole grains and lean proteins—while limiting highly processed products.

Note from the Academy of Nutrition and Dietetics:

The information in this document is from the Academy's scientific summary of seed oils, which reflects findings from evidence-based research and is a high-level overview of seed oils; this summary is not a comprehensive deep-dive on the topic. This information is up to date as of June 2025.

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