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File: ■ Olive (*Olea europaea*) Oil
■ Fatty Liver Disease

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RE: Olive Oil May Help Patients with Non-Alcoholic Fatty Liver Disease

Assy N, Nassar F, Nasser G, Grosovski M. Olive oil consumption and non-alcoholic fatty liver disease. *World J Gastroenterol*. 2009;15(15):1809-1815.

Non-alcoholic fatty liver disease (NAFLD) and non-alcoholic steatohepatitis (NASH), which occur in 10% to 24% of the general population, can lead to fibrosis, cirrhosis, and hepatocellular carcinoma. Animal and human studies suggest that dietary factors can affect fatty infiltration and lipid peroxidation in various types of liver disease including NAFLD. A Mediterranean diet, with a high supply of energy coming from monounsaturated fatty acids (MUFAs) mainly from olive (*Olea europaea*) oil, may help prevent metabolic syndrome, hypertension, and cardiovascular disease. In this review, the authors describe dietary habits and their relationship to insulin resistance and postprandial glucose and triglyceride (TG) levels in NASH, the mechanism by which olive oil ameliorates fatty liver, experimental and clinical studies of olive oil and NAFLD, and future perspectives.

Each 100 g of olive oil contains the following fatty acids: MUFA, 73.7 g (n-9 oleic acid 18:1); saturated fatty acids (SFAs), 13.5 g (palmitic acid 16:0); and polyunsaturated fatty acids (PUFAs), 7.9 g (n-6 linoleic acid 18:2, and n-3 alpha-linoleic acid 18:3).[1]

Explaining the pathophysiology of NAFLD, dietary fat, and hepatic lipids, the authors note that excessive inappropriate dietary fat intake, combined with peripheral insulin resistance, continued TG hydrolysis via lipoprotein lipase, and other genetic alterations in key lipid metabolic pathways, results in increased blood free fatty acid concentration. This leads to excessive muscle fat accumulation and increased liver concentration of TG and cholesterol esters. Peripheral insulin resistance affects carbohydrate and fat metabolism, diverting glucose to the liver and stimulating lipogenesis, causing further TG accumulation in the liver.

The authors further explain that excess fat metabolites induce insulin resistance in fatty liver, and that the relationship among dietary habits, insulin resistance, postprandial lipemia, and fatty liver involves nuclear factor-kappaB (NF-κB) activation.

In human studies cited by the authors, dietary MUFA (oleic acid) decreased oxidized low-density lipoprotein (LDL), LDL cholesterol, and TG concentration levels without the concomitant decrease in high-density lipoprotein (HDL). In other studies, replacing carbohydrates and saturated fat with MUFAs led to reduced glucose and blood pressure levels and to increased HDL in patients with diabetes.

A meta-analysis of studies in individuals with diabetes showed that a high-fat diet with 22% to 33% of the energy from MUFAs resulted in lower plasma total cholesterol, very-LDL, and TG levels compared to a low-fat, high-carbohydrate diet. Therefore, say the authors, an increased intake of MUFAs, particularly as a replacement for SFAs and as a higher proportion in the diet, instead of carbohydrates, may be beneficial for NAFLD patients. Other clinical studies have documented the beneficial effect of MUFAs in lowering blood pressure. In one study, shifting from a diet rich in SFAs to one rich in MUFAs improved insulin sensitivity in healthy people.

In a previous study conducted by the authors, olive oil decreased the accumulation of TGs in the liver of rats. An animal study from Spain showed that treatment with a balanced diet rich in olive oil contributed to the recovery of the liver from hepatic steatosis.

According to the authors, the exact mechanism through which MUFAs and olive oil could modify hepatic TG content is not clear. Additional effects of olive oil relate to its polyphenols, which have antioxidant and anti-inflammatory effects. A diet rich in olive oil improves endothelial function compared with a high-carbohydrate diet or a high-linoleic acid diet, say the authors. The principle mechanisms of action of olive oil appear to be a decrease in NF-κB activation, a decrease in LDL oxidation, and an improvement in insulin resistance. Further studies are needed, say the authors, to ascertain whether the consumption of olive oil may be helpful in NAFLD patients.

—*Shari Henson*

References

[1]Ramirez-Tortosa MC, Grandaos S, Quiles JL. *Olive Oil and Health*. In: Quiles JL, Ramirez-Tortosa C, Yaqoob P, eds. Wallingford: CABI International; 2006:45-62.

The American Botanical Council has chosen not to reprint the original article; however, it is available at http://www.wjgnet.com/1007-9327/15/1809.asp.