Olive Oil: Nutraceutical and Pharmaceutical Food

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Abstract
Olive and olive oil is a major part of the Mediterranean diet and breakfast. This tree is a member of Oleaceae family. The genus *Olea* is containing 2 subgenera *Tetrapilus* and *Olea*. The Mediterranean diet that includes up to 40% of calories as fat, led to a decrease in chronic diseases because of the high oleic acid intake. Olive oil is the oily juice, which is obtained from the olive fruit. It has a characteristic sensory profile and nutrition value. There is a good balance of fatty acids, between saturated, monounsaturated, and polyunsaturated acids in olive oil. This oil is unique among edible and vegetable oils and it can be consumed in the crude form, therefore, its tocopherols and phenolic content is conserved. Olive oil has very valuable minor components, such as phenolic compounds, sterols, vitamin and antioxidants. The chemical composition of olive oil varies, depending on the genetic, geographic and agronomic conditions, harvest time and technological factors.

VOO's main fatty acids are C14:0 (myristic acid), C16:0 (palmitic acid), C16:1 (palmitoleic acid), C17:0 (heptadecanoic acid), C17:1 (cis-10-Heptadecenoic acid), C18:0 (stearic), C18:1n9c (oleic), C18:1n9t (elaidic acid), C18:2n6c (linoleic acid), C18:3n3 (alpha-linolenic acid), C20:0 (arachidic acid), C20:1n9 (cis-11-eicosenoic acid), C22:0 (behenic acid) and C24:0 (lignoceric acid). Monounsaturated fatty acids of VOO are mainly oleic acid and palmitoleic acid, polyunsaturated fatty acids are linoleic acid and linolenic acid, and saturated fatty acids are palmitic acid, stearic acid, arachidonic acid, myristic acid. Minor compounds such as tocopherols (α, β and γ), phenolic compounds including apigenin, caffeic acid, gallic acid, luteolin, m-coumaric acid, p-coumaric acid, p-coumaric acid, oleuropein, syringic acid, trans-ferulic acid, vanillic acid, vanillin, tyrosol, 3-hydroxy tyrosol, 3,4 -dihydroxy benzoic acid, 4-hydroxy benzoic acid, 4-hydroxy phenyl acetic acid, ligstroside, lignans have important role in functional properties of VOO.

Phenolic Compounds in Olives and Olive Oils
Polyphenols (phenolic compounds) are secondary plant metabolites, in greater or lesser amounts in almost all fruit and vegetables. Phenolic compounds more commonly used name “polyphenols” are compounds having phenol functional group. Most of phenolic compounds give the plants their characteristic color of yellow-red-blue tones, as well as flavor components such as bitterness and astrigency. Olive is one of the fruits that contain phenolic compounds with high density. Phenolic compounds have distributed in specific proportions, almost in all parts of olive such as leaves, husk, and core; mostly in pulp.

Concentration of the phenolic compounds of VOO depends on climate, soil where olives grow, variety, fruit maturity, harvest method, extraction method, relaxation temperature and time. It affects shelf life and sensory properties of VOO. Polyphenols with different chemical structures, are extracted from extra VOO. Wide ranges (50-1000 ppm) have been reported for the levels of total polar phenols in olive oils. Common range is between 100 and 300 ppm. Studies on different olive varieties have shown that, some phenolic compounds can be specific for a single variety and also amount of some phenolic compounds have differed among cultivars. In addition, Oleuropein is the major polyphenol glycoside in olive oil, and its amount depends on the cultivar. The common polyphenols of VOO are aglycons form of secoiridoids. Major secoiridoids in VOO are the dialdehydic form of enolic acid linked to 3,4-dihydroxyphenyl ethanol (3,4-DHPEA) or p-hydroxyphenyl) ethanol (p-HPEA) (3,4-DHPEA-EDA or p-HPEA-EDA) and an isomer of the...
Olive Oil


Olive oil was shown to induce oxidative stability increase with higher polyphenol content. Hydroxytyrosol as one of the important polyphenols can donate a hydrogen to free radicals. This action resolves its harmful effect. On the other hand, hydroxytyrosol has metal ions chelating ability, that are themselves pro-oxidant agents. Considering the ability of the polyphenols to protect against LDL cholesterol oxidation, some studies indicate that, both hydroxytyrosol and oleuropein inhibit CuSO4-induced oxidation of LDL which depends on its concentration. Luteolin and lutein aglycon have also protecting effects against LDL oxidation.

Effect of Olive Oil on Hypertension

Scientific research showed that, olive oil polyphenols are mediators of inflammation. Miles et al reported that, the different polyphenols of olive oil such as vanillic, p-coumaric, syringic, homovanillic and caffeic acids, oleuropein glycoside, and tyrosol had ability to inhibit the proinflammatory effects of lipopolysaccharide using diluted human blood cultures. They reported that, the polyphenols have varying degrees of inhibiting the cytokines at different levels.

In the present study, oleuropein and caffeic acid decreased the concentration of interleukin-1β.

Effect of Olive Oil on Inflammation

The Effect of Oleuropein on Ischemic Myocardium

Recently, studies have focused on the development of new methods to limit infarct size and other manifestations of postischemic injury. The gold standard in the treatment of acute myocardial infarction is reperfusion therapy. Restoration of blood flow to ischemic tissue results in a paradoxical phenomenon known as ischemic-reperfusion injury. The potentially harmful aspect of myocardial reperfusion injury, termed lethal reperfusion injury, is defined as myocardial damage due to the restoration of coronary blood flow after potentially fatal ischemic insult. Myocardial injury thus results in cell death in itself. Animal studies have shown that, fatal reperfusion injury is responsible for 50% of the final infarct size and focused on the prevention of many new strategies.

Conclusions

Olive oil is a functional food and it has nutraceuticals effects. According to the research results, olive oil has important role on improving of human health. This is attributed to its major and minor compounds. Although, the protective effect of olive oil against cardiovascular diseases is well documented,
there are few reports on the possible positive effects of olive oil on the gastrointestinal tract. The therapeutic health features of bioactive compounds in olive oil are attributed to the high concentration of monounsaturated fatty acids and polyphenols. Due to its high content of oleic acid, olive oil is known as healthy and safe fat when compared to other edible oils. It can also reduce cardiovascular disease risk due to its useful effect on blood lipid compounds. It can be said that olive oil is not only food, it is also a natural drug without any side effect on human health.

Conflict of Interest Disclosures
The author declares he has no conflicts of interest.

Reference


