Role of Olive Oil in Reducing Oxidative Stress

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Environmental, physical and mental stressors cause the production of reactive oxygen species, also known as free radicals. The production of free radicals leads to the human body being subject to the pressures of oxidative stress.

Free radicals are highly reactive unstable cells consisting of molecules that are unpaired with electrons. The cells don't like to exist in this unpaired state and therefore search the body to find stable, yet perhaps vulnerable areas to steal electrons from. Free radicals don't discriminate. They need to stabilize and will steal the electrons from wherever they find them available.

Although free radicals do play an important role in the body and it's immune defense and cell

function, too many free radicals lead to widespread damage. The oxidative stress produced by free radicals has been linked to the development of diseases such as cardiovascular disease, cancer, and neurodegenerative diseases, among others.

Essentially, oxidative stress is as an imbalance between the oxidant and antioxidant systems of the body. Antioxidants stabilize free radicals by providing a supply of electrons to stabilize cells. Therefore, if we can aid the body by providing more antioxidants, it makes sense that oxidative stress is reduced and therefore, damage to organs and tissues is reduced also.

Foods are one of the best bioavailable sources of antioxidants for the human body, with extra virgin olive oil (EVOO) being one of the most studied antioxidant food sources. According to a study published in Food Chemistry, 2014, phenolic acids, phenolic alcohols, secoiridoids, lignans, and flavones are the four categories identified in EVOO as the most important. Though it is likely due to the synergistic activity of all olive oil (OO) compounds, according to research, phenols known as tyrosol and hydroxytyrosol and their fractions 3,4-dihydroxyphenylethanol-elenolic acid (3,4-DHPEA-EA) and 3,4-dihydroxyphenylethanol-elenolic acid dialdehyde (3,4-DHPEA-EDA), are the compounds being identified as providing some of the greatest antioxidant activities.

In the study published in Food Chemistry, researchers looked at a variety of EVOOs to evaluate their anti-radical, lipid peroxide inhibition, H202 and nitrous oxide (NO) scavenging abilities — all antioxidant scaling tests. No variation for olive oils showed for H202 scavenging, all oils showing between 69.9–76.8 percent scavenging ability. All the analyzed fractions exhibited strong anti-radical inhibition but there was variation in the sample ranging from 14.8-26.6 ug/ml. Inhibition of linoleic acid degradation ranged from 39-45 percent, and NO scavenging activity ranged from 29.8-40.7 percent.

Another more recent study, published in the Journal of Food Composition and Analysis, 2015, looked at a range of 32 EVOOs from the Italian retail market to measure their antioxidant capacity. A test called ABTS assay is commonly used to test the antioxidant levels in foods. The average ABTS antioxidant activity in the range of EVOOs was 32.4 u.mol Trolox equivalents. Only two of the samples were significantly higher, at approximately 66 u.mol.

Overall the total antioxidant activity in this sample of EVOOs was attributed to the polyphenol hydroxytyrosol along with the alpha-tocopherol content. Another interesting observation was that the bitterness of the samples was an attribute of the higher quality oils. Therefore, choosing an olive oil with bitter pungent notes will deliver more antioxidant value and indicates an indirect measure of olive oil quality.

Although many studies show that EVOO provides a range of different health benefits, in many cases the mechanisms are still not fully understood. Still, much of the research surrounding EVOO in relation to disease prevention or risk reversal, frequently attributes a reduction in oxidative stress as one of the main mechanisms.

A study, published in Food & Function, 2015, found that the polyphenolic compounds in EVOO, 3,4-DHPEA-EA and 3,4-DHPEA-EDA significantly protect red blood cells from oxidative stress. In regard to cardiovascular disease, EVOO has been shown to change the status of oxidative stress, inflammation, lipid peroxidation, and lipid profile in coronary artery disease. Researchers have even suggested that EVOO may be beneficial for preventing oxidative stress related diseases such as retinopathy of prematurity, bronchopulmonary dysplasia, periventricular

leukomalacia and necrotizing enterocolitis, in very low birth weight infants.

The central nervous system (CNS) is particularly susceptible to oxidative stress. As a study in Food Science and Technology explains, “This is mainly due to its high amounts of polyunsaturated fatty acids (PUFA) content which constitute easily oxidizable substrates and an inherently high flux of reactive oxygen species (ROS). Another reason of oxidative stress is the low level of endogenous antioxidant enzymes in CNS relative to other tissues, and its high oxygen consumption.”

EVOO has also been shown to exert a positive influence on CNS oxidative stress, in particular brain lipid peroxide levels and helping to restore brain fatty acid composition – especially levels of docosahexaenoic acid (DHA). It’s also been shown to increase antioxidant enzyme activities to help mitigate the oxidative damage that leads to neurodegenerative disorders such as Alzheimer and Parkinson disease.

The role that EVOO plays in reducing oxidative stress is extremely important. Clearly the research shows that EVOO does, in fact, provide a cost effective, readily available antioxidant food source that can be prescribed for consumption in the everyday diet to reduce the effects of oxidative stress and therefore reduces the risk and progression of many different diseases.

Source: Olive Oil Times