

Olive leaf extract: olive polyphenols and cardiovascular risk reduction

DAVID COLQUHOUN MB BS, FRACP, FCSANZ

Antioxidant anti-inflammatory polyphenols in olive leaf extract appear to improve risk factors for cardiovascular disease. Animal study results are beginning to be confirmed in human studies.

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The products of the olive tree, *Olea europaea*, have been used in folk medicine in countries such as Spain, Italy, France and Greece since ancient times, and there are over 200 references to the olive tree and its products in the Bible.¹ A Mediterranean diet, or more specifically the diet of Southern Italy, Greece and Spain, has been associated with a very low risk of cardiovascular disease. Features of the Mediterranean diet compared with a northern European diet include having olive oil as the principal source of fat and having a much higher intake of legumes and vegetables (which is probably facilitated by marinating and cooking these vegetables in olive oil).

Numerous studies in the 1980s demonstrated that a diet rich in olive oil is associated with lowering of total cholesterol, triglycerides and blood pressure.²⁻⁴ In the past decade, a Mediterranean diet has been shown to be associated with an improvement in endothelial function and a decrease in the oxidant status of the blood.

Studies have indicated that in addition to the unsaturated fat (about 75% of the fat in olive oil is the monounsaturated fatty acid oleic acid), the polar fraction of olive oil contains antioxidant anti-inflammatory polyphenols that probably play a role in the oil's beneficial cardiovascular properties.⁵ The antioxidant polyphenols are synthesised in the olive leaves as well as in the

fruit, and high concentrations of these polyphenols can be sourced from both the leaves and the waste product (fruit pulp) of the olive oil extraction process. The concentrations of these polyphenols have been shown to be 10 to 30 times greater in olive leaf extract than in extra virgin olive oil.⁶ Olive leaves, however, contain only low concentrations of oleic acid.

The various polar (hydrophilic) phenolic compounds in extra virgin olive oil belong to the classes phenolic acids, phenol ethyl alcohol, hydroxyisochromans, flavonoids, lignans and secoiridoids.⁷ These phenolic compounds are responsible for the flavour and aroma of olive oil. In olive leaf extract, the major secoiridoid is oleuropein. In contrast, olive oil has a low concentration of oleuropein, its most abundant phenolic molecule being hydroxytyrosol (which is the principal degradation product of oleuropein).

EVIDENCE BASE

Most of the studies that have assessed therapeutic potential – cardiovascular and other – of phenolics from olive leaves have been in animals. Animal studies predict to a large extent what happens in humans but human studies are needed to test the hypotheses.

Animal studies of cardioprotective effects

- A study from Tunisia showed that both a phenolic-rich extract of olive mill wastewater and hydroxytyrosol purified from it decreased plasma total cholesterol and LDL cholesterol levels, increased HDL cholesterol levels and

Associate Professor Colquhoun is Associate Professor of Medicine at the University of Queensland, and Medical Director of Core Research Group Pty Ltd, Brisbane, Qld.

SERIES EDITOR: Professor Marc Cohen, MB BS(Hons), PhD(Elec Eng), PhD(TCM), BMedSc(Hons), FAMAC, FICAE, Foundation Professor of Complementary Medicine, RMIT University, Melbourne, Vic, and President of the Australasian Integrative Medicine Association.

decreased oxidised LDL cholesterol levels in rats fed a cholesterol-rich diet.⁸

- A Brisbane study recently demonstrated that olive leaf extract (containing oleuropein and hydroxytyrosol reversed chronic inflammation in a rat model of diet-induced obesity.⁹
- Further, a Serbian study demonstrated that a dried olive leaf extract in a mouse model inhibited autoimmune diabetes by downregulating proinflammatory and cytotoxic mediators.¹⁰
- A rabbit model of experimental atherosclerosis from China showed that olive leaf extract significantly inhibited the development of atherosclerosis.¹¹ The researchers related this most to suppression of the inflammatory response, a critical part of the genesis of atherosclerosis. This study confirmed the antiatherosclerotic effect of an olive leaf extract in an insulin-resistant rat model of hypertension shown in an earlier study from South Africa.¹² The extract used in this earlier study was from an African wild olive tree, which, in marked contrast to European olive leaf extract, has only trace amounts of oleuropein.

Human studies of cardioprotective effects

- A study from the Royal Melbourne Institute of Technology University showed that olive leaf extract inhibited platelet function in humans.¹³ There was a dose-dependent reduction of platelet activity.
- A twins study from Switzerland demonstrated antihypertensive and cholesterol-lowering effects of olive leaf extract in humans.¹⁴ Twins of each of 40 monozygotic pairs were assigned to 500 or 1000 mg of an olive leaf extract for eight weeks or advice on a healthy lifestyle. There were significant dose-dependent within-pair differences in blood pressure (decrease from 137/80 mmHg to 126/76 mmHg in the high-dose group) and also in LDL cholesterol levels.

Studies of other effects of olive leaf extract

- A Serbian study showed an antimelanoma action of dry olive leaf extract in a mouse model.¹⁵
- Many studies have demonstrated antimicrobial activity of the common *O. europaea* olive leaf extract. A Western Australian study showed olive leaf extract to be significantly effective against *Campylobacter jejuni*, *Helicobacter pylori* and *Staphylococcus aureus* (including methicillin-resistant *S. aureus*), with low minimum inhibitory concentrations.¹⁶
- A study from Iran assessed the antidiabetic effects of olive leaf extract in comparison with the sulfonylurea glibenclamide in a diabetic rat model and found the extract to be more effective than glibenclamide.¹⁷
- A Japanese study demonstrated that olive leaf extract prevented the spontaneous occurrence of nonalcoholic steatohepatitis in a rat model.¹⁸

CONCLUSION

Olive leaf extract as a whole and certain specific polyphenols appear to improve risk factors for cardiovascular disease. Animal study results showing these beneficial effects of olive leaf are beginning to be confirmed in human studies. **MT**

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